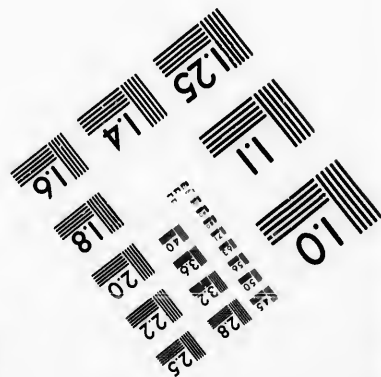
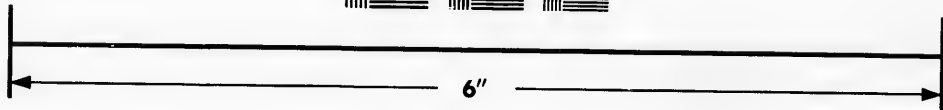
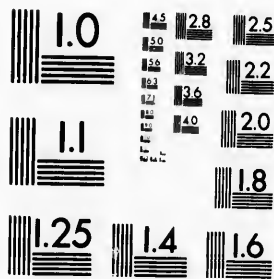


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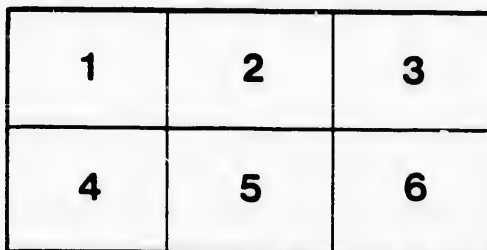
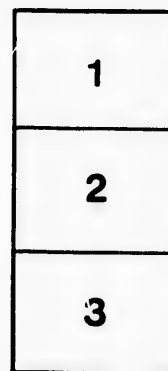
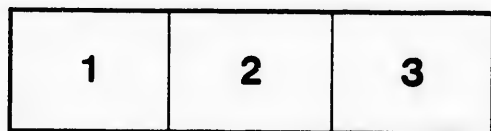
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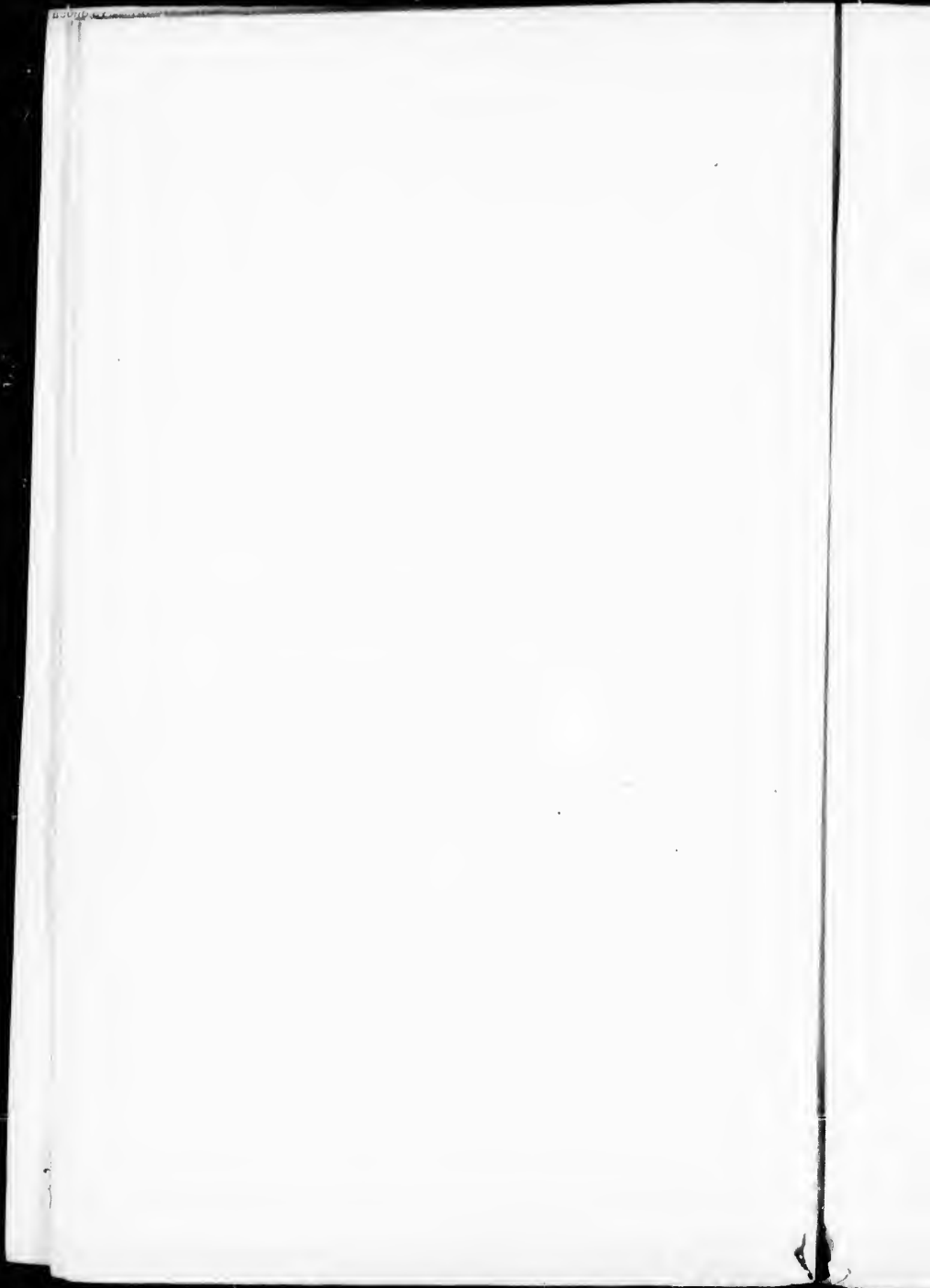
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REMARKS ON SPECIALISM.

BY

WILLIAM OSLER, M. D.,

PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE.

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REMARKS ON SPECIALISM.¹

BY WM. ORLER, M.D.,

Professor of Medicine in the Johns Hopkins University, Baltimore.

GENTLEMEN: First, let me express my gratitude for your kindness in conferring upon me the honor of your Presidency — an honor enhanced by the standing and character of the men who have previously occupied this chair. To have selected as your presiding officer one whose work has lain in the wide field of general medicine, is an indication that you duly appreciate the relation of the special subject in which we are now interested, and to which this Society is devoted. The diseases incident to infancy and childhood are so varied, covering every department of internal medicine, as well as of surgery, that the broad distinctions emphasized by the names physician and surgeon suffice to characterize us, and happily we have not as yet been stamped with a distinctive appellation, under which so many of our colleagues in other lines labor. In the extraordinary development of modern medicine limitation in work is inevitable, and although as practitioners and teachers we are all necessarily interested, to some degree, in the diseases of children, there are among us those who find in them their chief occupation, and our Society is but an organized expression of a very natural desire to unite for the purposes of study.

On an occasion of this kind it seems best to me not to discuss any particular subject, but to deal with some problem of general interest, with bearings, how-

¹ President's Address at the opening of the Fourth Annual Meeting of the Pediatric Society, Boston, May 2, 1892.

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ever, upon our organization. In comparison with the older countries of Europe specialism may truly be said to be the most distinctive feature in the medical profession of America. And it may not be inappropriate to consider here a few of its advantages and disadvantages.

"That which has been is that which shall be." Medicine may be said to have begun with specialists. The Ebers Papyrus is largely taken up with the consideration of local diseases, and centuries later we find in Greece certain individuals treating special ailments; and Aristophanes satirizes a "rectum specialist" in a way not unlike our comic journals would "poke fun" at an oculist or an aurist. The tail of our emblematic snake has returned into its mouth; at no age has specialism been so rife. To follow its gradual development during the present century would take more time than is at my disposal, and would not be a profitable task. The rapid increase of knowledge has made concentration in work a necessity; specialism is here, and here to stay.

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away?

The advantages to the profession which followed this differentiation have nowhere been more striking than in this country, and the earnest workers in ophthalmology, gynecology, dermatology, and other branches have contributed largely to inculcate the idea of *thoroughness*, the necessity for which is apt to be lost sight of in the hurry and bustle incident to the growth of a nation. Better work is done all along the line: a shallow diffuseness has given place to the clearness and definiteness which comes from accurate study in a limited field. The day has gone by for Admirable Crichtons, and although we have a few notable illustrations in our ranks of men who have become distinguished authorities in eye and skin diseases, and upon syphilis without sacrificing their inter-

ization. In comparison with Europe specialism may truly be a distinctive feature in the medical profession. And it may not be inappreciable a few of its advantages and disadvantages in general surgery, such are necessarily rare, and, unfortunately, from the very circumstances of the case likely to become more uncommon. Then how comforting to the general practitioner is the wise counsel of the specialist. We take him a case that has puzzled and annoyed us, the diagnosis of which is uncertain, and we consult in vain the unwritten records of our experience and the printed records of our books. He labels it in a few minutes as a coleopterist would a beetle, and we feel grateful for the accuracy of his information and happy in the possession of the label. And if sometimes (standing like Aaron between life and death) he illumines too brightly the darkness of our ignorance, are we not as often beholden to him for gentle dealing?

It is almost unnecessary to remark that the public, in which we live and move, has not been slow to recognize the advantage of a division of labor in the field of medicine. The desire for expert knowledge is, however, now so general that there is a grave danger lest the family doctor should become, in some places, a relic of the past. It must indeed be a comfort to thousands to feel that in the serious emergencies of life, expert skill is now so freely available. Perhaps, as specialists, no class in our profession has been more roundly abused for meddling some work than the gynecologists, and yet what shall not be forgiven to the men, who, as a direct outcome of the very operative details which have received the bitterest criticism, have learned to recognize tubal gestation, and are to day saving lives which otherwise would inevitably have been lost? I have known Formad to show in one year at the Philadelphia Pathological Society, ten or twelve examples of ruptured tubal pregnancy obtained in medico-legal work (sudden deaths) in that city. The benefits which the public reap from specialism may be gathered from

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the fact that in a not much longer period of time I have seen seven specimens of tubal gestation, not removed by the pathologist, but by the gynecologist, with the saving of five lives. The conservatism, which branded ovariologists as butchers and belly-rippers, is not yet dead among us, and I say it frankly, to our shame, that it has not always been professional encouragement which has supported the daring advances on special lines. Humanity owes a great debt of gratitude to the devoted men who have striven during the past half-century for exactness in knowledge and for its practical application in all departments, a debt too great to pay, too great, one sometimes feels, even to acknowledge.

Specialism is not, however, without many disadvantages. A radical error at the outset is the failure to recognize that the results of specialized observation are at best only partial truths, which require to be correlated with facts obtained by wider study. The various organs, the diseases of which are subdivided for treatment, are not isolated, but complex parts of a complex whole, and every day's experience brings home the truth of the saying, "when one member suffers all the members suffer with it." Plato must have discussed this very question with his bright friends in the profession, — Eryximachus, perhaps, — or he never could have put the following words in the mouth of Socrates: "I dare say that you may have heard eminent physicians say to a patient who comes to them with bad eyes, that they cannot cure the eyes by themselves, but that if his eyes are to be cured, his head must be treated; and then again they say that to think of curing the head alone and not the rest of the body also, is the height of folly. And arguing in this way they apply their methods to the whole body, and try to treat and heal the whole and the part together. Did

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you ever observe that this is what they say?"² A sen-
 tence which embodies the law and the gospel for spe-
 cialists.

A serious danger is the attempt to manufacture
 rapidly a highly complex structure from ill-seasoned
 material. The speedy success which often comes from
 the cultivation of a speciality is a strong incentive to
 young men to adopt early a particular line of work.
 How frequently are we consulted by sucklings in our
 ranks as to the most likely branch in which to succeed,
 or a student, with the brazen assurance which only ig-
 norance can give, announces that he intends to be a
 gynecologist or an oculist. No more dangerous mem-
 bers of our profession exist than those born into it, so
 to speak, as specialists. Without any broad foundation
 in physiology or pathology, and ignorant of the great
 processes of disease no amount of technical skill can
 hide from the keen eyes of colleagues defects which
 too often require the arts of the charlatan to screen
 from the public.

In the cultivation of a speciality as an *art* there is a
 tendency to develop a narrow and pedantic spirit; and
 the man who, year in and year out, examines eyes,
 palpates ovaries, or tunnels urethra, without regard
 to the wider influences upon which his art rests, is apt,
 insensibly perhaps, but none the less surely, to acquire
 the attitude of mind of the old Scotch shoemaker, who,
 in response to the Dominie's suggestions about the
 weightier matters of life, asked, "D'ye ken leather?"
 There is not a single department, the study of which
 does not carry with it the correction of this most
 lamentable tendency. Problems in physiology and
 pathology touch at every point the commonest affec-
 tions, and exercised in these, if only in the early years
 of professional life, the man is chastened, so to speak,

² Charmides: Jowett's translation.

and can never, even in the daily round of the most exacting practice, degenerate into a money-making machine. And let the younger of my hearers lay this to heart: scan the lives of say twenty of the men most prominent in special lines of medicine and surgery to-day in this country, and you will find, with scarcely an exception, the early years devoted to anatomical, physiological, or pathological studies. They rose high because the foundations were deep. The most distinguished oculists have been men trained in physiology and pathology; and some, like Sir Wm. Bowman, have had reputations so pre-eminent in several departments that the identity of the physiologist has been lost in the ophthalmologist.

In the larger cities the work of the specialist encroaches more and more upon that of the general practitioner, and this condition, though in many ways to be regretted, is not likely to be changed. I have known the head of a household pay, in the course of a year, for the professional services of six physicians — a gynecologist, an oculist, a laryngologist, a dermatologist and a surgeon. What remained after this partition of the general practitioner came in sixth and looked after the health of the children. It is interesting to note that to this one pertains the functions to a large extent of the old family doctor, and further advice is usually sought through him or at his suggestion. In the evolution of the specialist, the children's doctor is the last to appear, not because of any extreme differentiation, but rather he is a vestigial remnant of what was formerly in cities the general practitioner. May I not say that there are members of our Society whose interest in their work is largely due to this new feature in domestic life? In the division of the household among our brethren, the children alone remain, and fortunately their ailments are too diversified to allow much specialization.

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After all, though specialism is rife, and has so carved the "body of physic" that Hippocrates would scarcely recognize it, and though its sounds go out loudly and echo through the journals and society reports, nevertheless, I would boldly make claim for a wider diffusion of its benefits. (Of dwellers in cities arrogance is a peculiar trait, and we discuss problems in a "surely-we-are-the-people" style, forgetting that outside lie the greater millions equally precious to Æsculapius, and under the care of men who cannot specialize, who must be able to set fractures, perform version, treat iritis as well as fever, earache as well as the itch. What of the benefits of specialism to this larger class from whose ranks the cities are replenished and whose health is so essential to the nation? The out-door department of our hospitals and the consulting-rooms of city physicians tell of the necessity of special knowledge to these people, particularly in emergencies and in the graver and more unusual forms of disease; but those who thus avail themselves form but a fraction of the numbers who require technical skill for the purposes of diagnosis or treatment. Very little additional knowledge enables the general practitioner to grapple with a large proportion of the cases which in cities come under the care of the specialist. The question resolves itself into one of education. It is impossible in three sessions to bring men beyond the superficial routine, but in a more prolonged course — as I know from experience — the student can be taught practically, in the wards and dispensaries enough of the technique of the specialist to give, at least, a foundation upon which to work. He should leave the schools knowing the practical application of the microscope, the ophthalmoscope and the laryngoscope, and in these and other lines he should have proceeded to the stage in which he recognizes the limitations of his knowledge. Such a

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man, in general practice, should know a "choked-disk"; the examination for tube-casts should be a familiar, every-day task; and he should be able to tell whether a vocal chord was paralyzed. A serious obstacle to this happy consummation — which can be reached in a well-ordered system of education — is the absence, in the early years of practice, of material upon which to freshen the memory and to "keep the hand in"; but the man who, as a student, has reached a certain point always retains some measure of the old facility. The post-graduate schools have done much to enable men to revive, and to acquire, technical skill, and have been of great service in generalizing special knowledge. In the practice of a good, all-round man, the number of cases demanding the help of a specialist is, after all, not great. The ordinary run of nervous disorders should be recognized, adenoid vegetations he would treat with the skill of a laryngologist; he would know enough not to tinker with a case of glaucoma; and though he might not diagnose a pus-tube from tubal gestation, he would (in this as in other details) have learned to know his limits and be ready to seek further advice.

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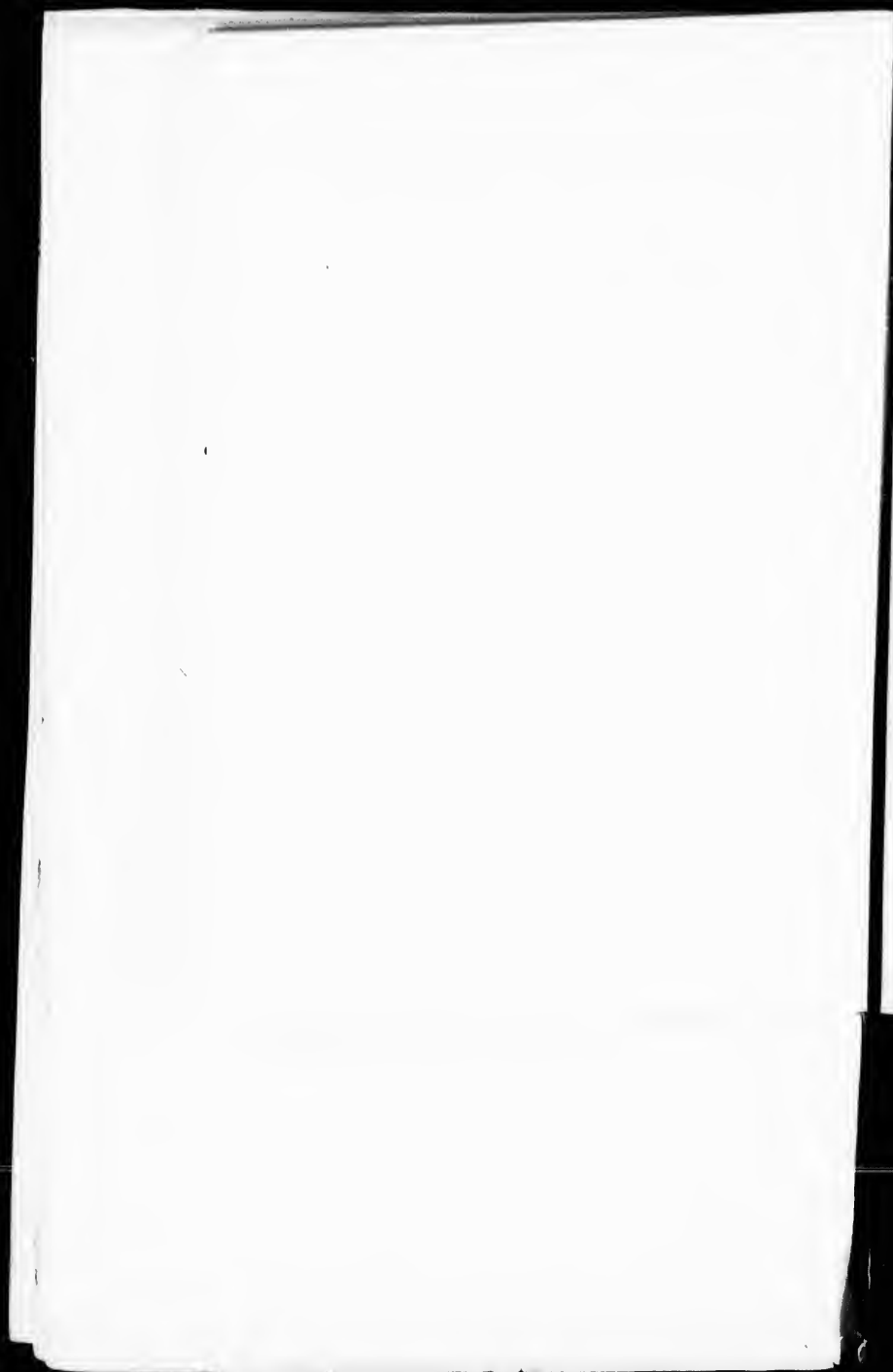
With the revival and extension of education the benefits of specialism will become more widespread, and to this end the efforts of colleges and hospitals should be directed.

Amey?

The organization of societies for the study of particular diseases has been of late a very notable feature in the professional life of this country. Since the foundation of the Ophthalmological Society, more than a dozen associations have been formed, and their union in a triennial congress has proved a remarkable success. These societies stimulate work, promote good-fellowship, and aid materially in maintaining the standard of professional scholarship. They are nearly all exclusive

bodies, limited in membership, and demanding for admission evidence of special fitness. This point is sometimes urged against them; but the members exercise no arbitrary privilege in asking of candidates familiarity with the subject, and evidence of ability to contribute to the general store of knowledge. In some of the specialties these societies have been particularly useful in disciplining men who have traduced, not the code, but the unwritten traditions of our craft, acting as if they were vendors of wares to be hawked in the market-place.

Our own Society may be regarded as the outcome of a notable revival, during the past few years, of interest in the study of the diseases of children. The existence of a special journal devoted to pediatrics, and the successful issue of a large cyclopedia of the diseases of children testify to the appreciation on the part of the profession of the necessity for the more accurate study of this branch. This body offers to men who are working and teaching in pediatrics an opportunity of knowing each other, of discussing subjects of common interest, and through the medium of their publications making general the more special details of value in practice. The programme before you indicates clearly that we are all workers in general medicine; and may the character of the papers and the discussions be the best justification of the existence of an organization devoted to the study of a particular section in that field.



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[Reprinted from THE CLIMATOLOGIST, April, 1892.]

THE HEALING OF TUBERCULOSIS.¹

By WILLIAM OSLER, M.D., F.R.C.P., Lond.,
 PROFESSOR OF MEDICINE JOHNS HOPKINS UNIVERSITY, BALTIMORE.

THAT pulmonary tuberculosis is a curable affection is demonstrated clinically by the recovery of patients in whose sputa elastic tissue and bacilli have been found, and anatomically by the existence of lesions in all stages of repair. The healing follows ordinary pathological laws; the granulation-products and associated pneumonia become converted into a durable scar-tissue, and the caseous areas become impregnated with lime salts. To these conditions alone the term *healing* should be applied. Much more commonly the fibrous substitution does not involve the entire tuberculous mass, or the cheesy nodules are simply encapsulated, and the tubercle may then be termed involuted or quiescent, but is not destroyed. When cavities of any size have formed, perfect healing in the true sense of the term does not, I believe, occur. I have never seen a specimen which would indicate that a vomica had cicatrized. Owing to the shrinkage of the connective tissue, a cavity may be greatly limited; or, indeed, an entire series of cavities may be so reduced by the gradual sclerosis that an upper lobe, in which this most frequently happens, may be only one-third its normal size and consist of a mass of indurated tissue containing cavities which communicate with dilated bronchi. These are the *cicatrices fistuleuses* of Laennec.

Although of late much study has been given to the subject, our knowledge is not more complete than that of Laennec's, whose article on "The Curability of Phthisis"² is an admirable presentation of the question even from our present standpoint. He recognized the frequency with which, in post-mortem examina-

¹ Read before the Medico-Chirurgical Faculty of Maryland, session of 1891.

² Laennec, *Traité de l'Auscultation*, tome II., page 97, 4th edition, Paris, 1837.

tions, evidence of old tubercular lesions occurred, and his wide clinical experience had taught him that recovery took place in many cases. He recognized the *cicatrices complètes* and the *cicatrices fistuleuses*, and suggested that as tubercles growing in the glands, "which we call *serofulae*," often healed, why should it not do the same in the lungs?

Recent studies have shown that in a considerable proportion of the bodies of persons dying of all diseases, quiescent or healed tubercular lesions are found in the lungs; a proportion so high, indeed, in the case of some observers, as almost to justify the old German axiom, "*Jedermann hat am Ende ein bißchen Tuberculose.*"

My attention was called to the point in 1870 by Palmer Howard, of Montreal, who was in the habit of pointing out the great frequency of puckering at the apices of the lungs in elderly persons. Subsequently, when I became pathologist to the Montreal General Hospital, we frequently discussed the significance of these changes, whether indicative or not of healed phthisis. We see at the apices the following conditions, all of which have been held by some to signify healed tubercular processes:—

1. Thickening of the pleura, usually the posterior surface of the apex, with perhaps subjacent induration of the lung tissue for a distance of a few millimetres. This I do not think indicates more than a local chronic pleurisy, and, as my colleague, Dr. Welch, suggests, is possibly analogous to, and has no greater significance than, a milky patch on the pericardium.

2. A puckered cicatrix at the apex depressing the pleura, which here may or may not be thickened. On section, there is a fibrous scar much pigmented, the bronchioles in the neighborhood are dilated, but there are neither tubercles nor cheesy masses. Such structures are extremely common, and may in some, but I doubt if in all, cases indicate a healed tubercular lesion.

3. Puckered cicatrices with a cheesy or cretaceous central nodule and with scattered tubercles—"colonies," Laennec called them—in the vicinity. Identical with these in their true nature, though differing in the general appearance, are the solitary or cheesy calcareous nodules found throughout the lungs. The

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healing

tubercular nature of the structures in this division cannot be doubted.

4. The *cicatrices fistulosas* of Laennec, consisting of one or more quiescent cavities surrounded by fibroid tissue and communicating with bronchi.

I have carefully reviewed the records of 1000 post-mortems, dictated in all instances by myself, with reference to this question. In 216 cases death was caused by pulmonary tuberculosis. Excluding the simple fibroid puckering, the local thickening of the pleura, and the solitary caseous or calcareous mass, there were among the remaining 784 cases, 59, or 5.05 per cent., in which persons dying of other diseases presented undoubted tuberculous lesions in the lungs. This proportion will appear small in comparison with the figures which I shall give presently, but it must be remembered that I have excluded the simple fibroid puckering and the solitary cheesy nodule, unless in the latter case it was distinctly mentioned that there were colonies of tubercles in its vicinity. Of the 59 cases, the chief causes of death were: cancer of various organs, 12; cirrhosis of the liver, 7; accidents and operations, 8; acute fevers, 9; uremia, 5; diseases of the heart and arteries, 5; other affections, 13. The ages of the cases were as follows: under ten years, 4; from ten to twenty, 2; from twenty to thirty, 8; from thirty to forty, 10; from forty to fifty, 14; from fifty to sixty, 14; from sixty to seventy, 5; above seventy, 2.

The observations upon this subject have been of late numerous, and the discrepancies in the figures are due largely to an absence of a uniform criterion as to what should be regarded as obsolete or quiescent tubercles. If the fibroid patches are to be included, as in some of the following statistics, the percentage is high. Heitler analyzed the Vienna post-mortem records and found that in 16,562 cases, in which the death was not directly caused by phthisis, there were 780 instances of obsolete tubercle, a percentage of 4.7. He excluded, as I have done, the simple fibroid induration at the apex. With each decennial period, up to the sixtieth year, the number of cases increased.

In 27 per cent., in 400 bodies, Bollinger found evidence of healing of tubercular lesions in the lungs. Staudacher, in 787

cases, found apex cirrhosis in 202. Massini found evidences of healing in 39 per cent. in 228 bodies examined. Harris, of Manchester, has examined 200 bodies, keeping this object specially in view. Excluding the deaths from phthisis and persons under twenty, there were left 139 cases for analysis, in 54 of which there were relics of former active tuberculosis, 38.84 per cent. The greater number of these were in the third, fourth, and fifth decades. The large proportion here given is accounted for by the inclusion of the fibroid cicatrices as well as the caseous masses.

I heard the statement made in Paris that, of the bodies examined in the morgue, the majority of which are of suicides or persons accidentally killed, nearly seventy-five per cent. present evidences of old tuberculous lesions.

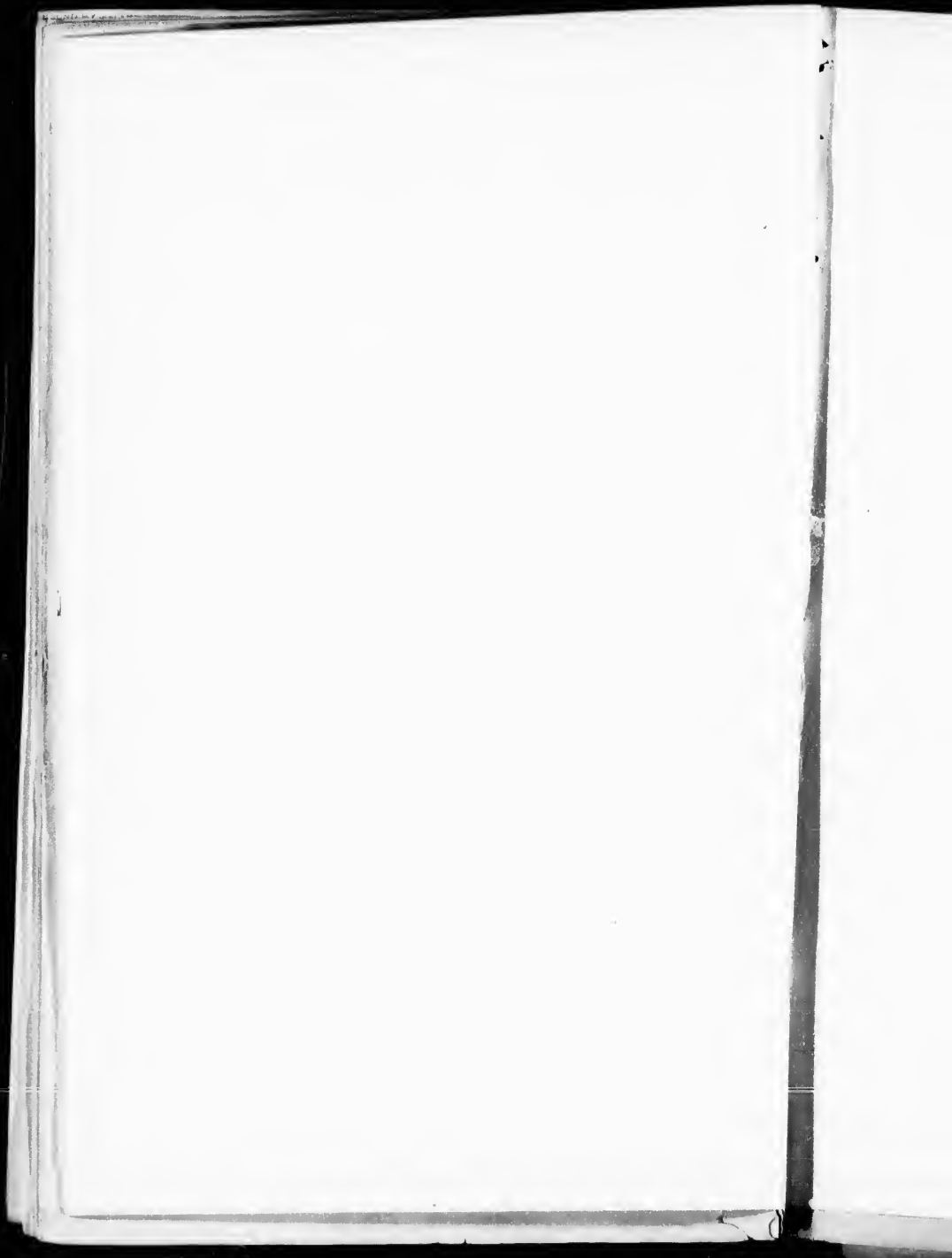
These facts demonstrate, first, the wide-spread prevalence of tuberculosis; and secondly, the fact, as shown by my figures, that at least one-fourth of all infected persons recover spontaneously. In the great majority of these cases the disease is very limited and has made no progress, and in many instances could not have given physical signs. But even in more advanced disease, where the local indications are marked and bacilli and elastic tissue present in the sputum, arrest is by no means infrequent, and although post-mortem evidence shows that we are wrong in speaking of the process as *cured*, yet the condition is consistent with comparatively good health.

We may say, then, that in one-fourth of all persons infected the disease is never manifest, but remains local, and the lesions gradually heal. In another fourth of those attacked, local signs develop, but the physiological resistance is sufficient to arrest the process, or in modern language the battle is against the invaders, the day is with the tissues, and a permanent truce is agreed upon, or sometimes a permanent withdrawal of the enemy. The remaining fifty per cent. of those infected fight, for months and years, losing battles until the final defeat comes.

The nature of the *tissue soil* is the important factor in tuberculosis; the seed is so widely scattered, that upon each one of us, sooner or later, some grains must fall. I am in the habit of illustrating this point to my students by the parable of the sower

who went out to sow his seed. In the large majority of persons the bacilli, which are inhaled or ingested, find the conditions unfavorable to their growth—"Some fell by the way-side;" in a second group the bacilli find lodgment and grow, but they do not thrive, as the soil conditions are not suitable, there is, in the language of the parable, "no depth of earth"—"Some fell upon stony ground;" and in a third group the tissue soil is favorable, the bacilli grow luxuriantly, producing the various local manifestations of tuberculosis—"Other fell on good ground."

Once infection has occurred, the chief indication is to place the person in surroundings favorable to the maintenance of the maximum degree of nutrition. The influence of environment has never been better illustrated than by Trudeau's experiment. Inoculated rabbits, confined in a damp dark place, rapidly succumbed, whilst others allowed to roam at large either recovered or had slight lesions. It is the same in human tuberculosis; a patient confined to the house, living in close, overheated rooms, or in a stuffy, ill-ventilated dwelling of the poor, or treated in a hospital ward, is in a position analogous to the rabbit confined in the cellar, whereas a patient living in fresh air and sunshine for the greater part of the day has a chance comparable to that of the rabbit running wild. The very essence of the climatic treatment of tuberculosis is *improved nutrition* by change of environment. Fresh air and sunshine are the essentials with which, in comparison, altitude is of secondary importance.





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ON THE ASSOCIATION OF CON-
GENITAL WRY-NECK, WITH
MARKED FACIAL ASYM-
METRY.

BY WILLIAM OSLER, M. D.,
JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

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ON THE ASSOCIATION OF CONGENITAL WRY-
NECK, WITH MARKED FACIAL ASYM-
METRY.*

BY WILLIAM OSLER, M.D.,

Johns Hopkins Hospital, Baltimore, Md.

WILKS † speaks as follows of this condition: "In refer-
ence to wry-neck there is a fact worthy of observation
and further investigation; that in young persons subject
to this affection the head and face on the contracted side
do not develop as on the other, and in consequence there
is a want of symmetry in the countenance when narrowly
examined from the front. One eye is slightly lower than
the other, and the whole of that side of the face and head
is smaller than on the other. In a lad lately in the hos-
pital with heart disease, a wry-neck existed from infancy,
and this remarkable want of symmetry was very evident.
In a young lady patient, also, who is otherwise well
grown, this disproportion of the two sides of the head
and face is clearly shown. It may be asked whether this
is due to some failure of nervous power having its founda-
tion in the same cause which produced the wry-neck, or
whether the contracted muscle itself exerts an influence
on growth, and, if so, whether the division of the sterno-
mastoid would allow development again to proceed." The
references to it in the literature are scanty, and it has
even escaped the notice of that most observant of obser-
vers, Gowers.

Bradford ‡ mentions a child of six months, which was
born with a lack of symmetry of the cranium, affecting
the frontal bone on the right side. The face and head in
every other respect were symmetrical. The head was
habitually carried in the position of wry-neck with the
chin turned to the right, exactly in the position to sug-
gest the explanation by the mother that the left side was
heavier than the right, and the head was held crooked.

Krummacher § reports two cases; in one, a child aged
ten with right-sided torticollis, the face showed marked

* Read before the American Pediatric Society, Washington, D. C., Sep-
tember 24, 1891.

† "Diseases of the Nervous System," 1st edition, 1878, p. 454.

‡ *Boston Medical and Surgical Journal*, vol. cvi., 1882.

§ "Berlin Thesis," 1889. *Zur Aetiologie d. Schadel-Asymmetrie beim
Angeb. Schei/halse.*

asymmetry. In the second the child, aged twelve, at about the age of two years fell and had paralysis of the extremities on the right side. The sternal portion of the right sterno-mastoid was contracted. The facial asymmetry was striking; very little difference in the extremities; no special asymmetry in the two sides of the skull.

Stanley Boyd reports a case of a girl, aged nine years, in whom the torticollis was noticed shortly after birth. The right half of the face was distinctly smaller than the left. Careful measurements and the accompanying photograph showed the great difference which existed between the two sides, not only of the face but of the skull.

By far the most important communication on the subject is by C. H. Golding-Bird,* who reports six cases of congenital wry-neck with facial hemi-atrophy.

The following case has come under my observation:

Margaret G., aged fifteen, a well-grown, healthy-looking girl, with good family history. She was well as a child. Nothing wrong was noticed until her tenth year. On the 18th of December, 1886, she fell and cut her chin, and the mother states that for two weeks she held her head turned to the right, and for a year or more after this she had wry-neck. The following year Dr. Tiffany operated, and there was temporary benefit. Subsequently by gymnastic exercises she improved very much. The mother is positive that the child had not wry-neck when young. The asymmetry of the face has been noted for several years, and is thought by the mother to be progressive. A photograph taken at four and a half, full face, shows complete equality of the sides; no lowering of the eye or eyebrows. A second picture at eight and a half shows both sides fairly equal and the eyes on the same level.

Neck; circumference, 30.5 cm. The left side is distinctly fuller than the right; scarcely perceptible scar above the sternal attachment of the sterno-mastoid. The outline of the sterno-mastoid on the right side is plainer than on the left when the head is straight and the depression between the two portions is better marked. The muscle on the left side is distinctly larger and fuller, and is of greater breadth; particularly well seen when the head is rotated to the right. The clavicular part is

|| *Illustrated Medical News*, London, 1889.

* *Guy's Hospital Reports*, vol. xlvii, 1890.

full and strong, and there is no trace of the division between the sternal and clavicular portions. When the head is rotated to the left the sternal portion stands out prominently and well. No difference apparent in the trapezius of either side.

Movements of the head seem free, but she rotates to the left rather more than to the right. The face shows marked asymmetry. The measurements are as follows: On the left side, from below the lobe of the ear to the angle of the mouth, is exactly 10 cm.; corresponding measurement on the other side is exactly 9.2 cm. From the outer canthus to the tip of the antitragus: right, 8.4; left, 8.8. A horizontal line through the middle of the left pupil passes at the margin of the upper lid of the other eye. A line passing at the margin of the lower lid of the left eye passes through the middle of the pupil of the right. The right eyebrow is on a distinctly lower level than the left. The nose is straight.

The whole cheek, including the malar bone and zygoma of the right side, is distinctly smaller than the left; no difference in the ears. Pupils are equal, react alike. Laughs on both sides of her face equally. Both frontals move well. A little flattening perhaps in the right temple.

The measurement of the head, 36.5 cm. Nothing of note in the hands and arms. The teeth are well formed, equal. No molars in the lower jaw on the right side. The palate is well formed; the sides of the tongue equal.

The question arises whether this was really a case of congenital wry-neck. The mother is quite positive in her statement that the child held her head perfectly straight until after the accident at her twelfth year. Golding-Bird mentions that in all but one of his cases he was informed that the deformity had only been recently noticed, but an appeal to the photograph album in several instances showed that the deformity had existed long before the parents had noticed it. In our patient the photograph taken at four and a half and the photograph at eight and a half years show no asymmetry, certainly not in the earlier one. In the picture at eight and a half some have said the sides looked equal, others that the left side looked the smaller.

Facial asymmetry quite evident to the observer may be overlooked by the parents and friends, who have been familiar with the appearance of the child from infancy. Under these circumstances it is only necessary to show

them the reflection of the face in the looking-glass, which brings out the asymmetry between the sides in a striking manner.

All of the cases on record have been on the right side. Slight grades of facial asymmetry are exceedingly common, probably quite as common as asymmetry of the skull, but it is only when extreme and progressive that the term hemi-atrophy can be applied to it. The condition evidently is quite different from Romberg's facial hemi-atrophy. In none of the cases reported has the unilateral wasting been progressive, nor has it proceeded to the same grade as seen in this affection. The skin is not observably changed, and there does not appear to be the same loss of subcutaneous tissue, nor is there wasting of the sebaceous follicles, nor any change in the nutrition of the hairs. The differences in the bones and of the muscles may, however, be very striking in the form at present under consideration.

In the cases with torticollis the condition is rather, as Wilks suggests, as if the face on the affected side had not developed proportionately, so that it is arrest of growth rather than an actual atrophy.

A perfectly satisfactory explanation of this asymmetry and of its relation to torticollis has not yet been offered. Eulenberg (quoted by Golding-Bird) has suggested that the position of the neck interfered with the vessels and nerves passing to the head and so arrests the nutrition, but this does not seem very likely. Golding-Bird advances the view that the facial hemi-atrophy is not a consequence of the torticollis, but an integral part of the affection, both having a common central origin, which he believes is a primary polio-encephalitis. He states that "bearing in mind the exact similarity between congenital torticollis and a case of infantile paralysis with talipes equinus, the conclusion is, to my mind, all but inevitable that "caput obstipum," with its contracted sterno-mastoid, wasting of the facial muscles and soft parts, and even of the bones, forms an exact copy of alipes equinus with contracted calf-muscles, ill-nourished soft parts, and in many instances shortened bones, and must have a similar origin." It certainly appears more reasonable to think that the hemi-atrophy and the shortened muscles are both the expression of some central lesion, but it is difficult to understand, from our present knowledge of cortical localization, exactly where the mischief could be.

The facial condition is apparently not progressive. As already mentioned, it is a question whether it is a condition of atrophy of the face or whether it is not really an arrest or imperfection in the development. If the former it would, as in Romberg's type of hemi-atrophy, produce in time more serious alterations than have been present in any of the cases yet recorded. The history and the photographs in my patient suggest that the wry-neck and asymmetry may have developed after the injury. The facial condition is such as might be produced by arrest of development, but how brought about and in what way related to the torticollis is not very clear.









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CXXI

INTERSTITIAL PROCESSES IN THE CENTRAL
NERVOUS SYSTEM.

By WILLIAM OSLER, M.D.

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INTERSTITIAL PROCESSES IN THE CENTRAL NERVOUS SYSTEM.

BY WILLIAM OSLER, M.D.

Professor of Medicine in the Johns Hopkins University, Baltimore.

By arrangement with the Referee I have agreed to confine my remarks to a presentation of certain points for discussion in connection with interstitial processes in the central nervous system. The subject is beset with difficulties. If we cannot hope in the present state of our knowledge to dispell the darkness which surrounds it, we may at least get an inkling of the direction in which to look for light; if we cannot expect a solution of the problem which more than any other stretches to tension the pia mater of the neurologist, we can perhaps get a definite outline for our ignorance, which in any question is a great gain.

The connective tissue of the central nervous system is of two kinds, one special and peculiar, the neuroglia, derived from the ectoderm, with distinct morphological and chemical characters; the other, derived from the mesoderm, is identical with the ordinary collagenous fibrous tissue of the body. Both play important parts in indurative processes in the brain and cord.

A convenient division of the scleroses is into (1) the degenerative, (2), the inflammatory, and (3), the developmental.

The *degenerative* scleroses comprise the largest and most important subdivision in which provisionally the following groups may be made:

(a) The common atrophic, secondary degeneration. Nerve fibres cut off from their idioplastic centres, i. e., their ganglia, die and their place is gradually occupied by neuroglia.

(b) Toxic forms, among which may be placed the scleroses from lead and ergot and most important of all the posterior sclerosis due, in each a large proportion of cases, to the virus of syphilis. Other unknown toxic bodies, as in pernicious anæmia, may induce degeneration of the nerve fibres of certain tracts. The systemic paths differ in their susceptibility and the posterior columns appear most prone to undergo sclerosis.

(c) The sclerosis associated with changes in the smaller arteries and capillaries. As a senile process, a sclerotic atrophy of the convolutions

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is one of the most common of cerebral lesions. Some of the forms of insular sclerosis are also found with marked arterial lesions. The relation of the induration to the vascular change is the question which, in the brain as in the other organs, has excited most controversy. Is the primary alteration a premature degeneration of the cells and fibres, to which the sclerosis is secondary, or is the essential factor an alteration in nutrition caused by a lesion of the capillaries and smaller arteries? This I would propose as the first question for discussion on this part of the subject.

The *inflammatory* scleroses embrace a less important and less extensive group which I would separate sharply from the degenerations, sometimes confounded with them. I would divide them into 1st, the secondary form which develops in consequence of reactive inflammation about tumors, hemorrhages, foreign bodies, abscess and trauma. Histologically this is pure mesodermal sclerosis with a fibrous matrix similar to that which develops under like conditions in other parts of the body. 2d, the sclerosis which follows a primary encephalitis or meningio-encephalitis, or a myelitis. An acute process which may be termed inflammatory occurs in the central nervous system in consequence of the action of the poison of the specific fevers and possibly too of syphilis; also independently as poliomyelitis and as a poli-encephalitis. The terminal event is induration more or less extensive. How far that most interesting variety the sclerosis found in infantile hemiplegia is the outcome of an acute encephalitis is yet doubtful. The mode of onset in the child with fever, convulsions and marked constitutional disturbance speaks for an inflammatory process. The change is cortical, of variable extent, not following any vascular distribution, the meninges are adherent, and histologically the sclerosis is such as would follow an acute inflammation with destruction of tissue elements. This constitutes an extremely common variety of cerebral sclerosis and may involve a few convolutions or those of an entire lobe. The disease is not infrequent and is one of the most serious of all cerebral affections of children. Much discussion has taken place as to its true nature and with this I would link the second question for discussion now and for research hereafter,—the lobar scleroses of children, what is the nature of the primary lesion? inflammatory or vascular?

The *developmental* scleroses form a group to which of late special attention has been paid and an attempt has been made by French writers to place them in a position of importance which they have not heretofore occupied. The best known variety of this is the diffuse cortical sclerosis of children which is met with either as a congenital condition, when it may appear rather as an arrest of development, or

occurring later in life, gradually produces atrophy of one hemisphere. In such cases there may be no involvement of the meninges, no evidence of chronic inflammation and the process seems explicable only on the supposition of a developmental error, a vice of construction leading to progressive increase in the neuroglia.

A second form is the well known growth about the central canal which constitutes the anatomical basis in syringo-myelia, the essential factor in which is an enormous proliferation of the neuroglia of the central gray matter. The term *gliosis* has been applied to this variety which is now very generally regarded as a *lésion d'évolution*.

Thirdly, an interesting attempt has been made by Déjerine and Letulle to separate Friedrieh's ataxia from the ordinary form and to place it among the developmental sclerosis. This disease is distinguished from Romberg's tabes by its early onset, its occurrence in members of the same family, and according to the authors just named by definite histological peculiarities.

And lastly a most interesting study has been made by Chaslin on the brains of epileptics on which he claims to have found a sclerotic change of a distinctive kind quite apart from the ordinary form and suggestive of an association with a primitive fault of construction. The assertion is made that in these varieties the histological element is purely neuroglial, not admixed with ordinary connective tissue as in the other forms. It is in fact an *ectodermic* not a *mesodermic* sclerosis.

These statements have not passed without sharp criticism, particularly by Weigert, who denies the special characters of the anatomical changes in these affections. The subject is still an open one, fresh, and of peculiar interest, and I would propose as the third question for discussion now—and to some forethought and work hereafter: How far can we recognize in the sclerosis of the brain and cord a separation into an ectodermic, purely neuroglial form, a mesodermic (connective tissue) form, and mixed varieties?*

* Illustrations were shown of the various forms of cerebral sclerosis.

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THE COLD-BATH TREATMENT OF TYPHOID FEVER.¹

By WILLIAM OSLER, M. D.,

Professor of Medicine in Johns Hopkins University.

GENTLEMEN: While no one can bring a railing accusation against us as a profession for neglecting the things that pertain to the cure of disease by drugs, we must bear meekly the rebuke of those who claim that non-medicinal agents, such as systematic exercise, fresh air, and the use of water scarcely receive the attention which their virtues demand. Particularly is this the case with water as a means of controlling the severer symptoms of fever. For centuries it was one of the great hygienic measures, and the use of baths in disease is recommended by writers in every age since Hippocrates. You will find, indeed, in the writings of the Father of Medicine an admirable account of the indications and uses of the bath, to some of which I shall refer again.

During the first half of this century hydrotherapy was largely in the hands of the hydropaths, by which term may be distinguished the large class of hermaphrodite practitioners who look upon water as a cure-all; but under the guidance of von Ziemssen, Liebermeister, Winternitz, Brand, and others, the use of compresses, douches, and the various forms of baths has been introduced largely into rational practice. More than thirty years ago Brand, of Stettin, urged the systematic treatment of typhoid fever by cold baths. The method has been successfully carried out on a

¹A Clinical Lecture delivered to the Graduate Class of the Johns Hopkins Hospital, Baltimore, November 9, 1892.
Reprint from the *Medical News*, Philadelphia, December 3, 1892.

large scale in Germany and in France, but in England and in this country only spasmodic and not very successful efforts have been made to encourage its use, even in hospital practice. The remarkable figures published by Brand in 1887 made me determine to adopt it at the earliest possible date; but when the wards of the Johns Hopkins Hospital were first opened the arrangements were not adapted, and our staff of nurses not large enough, to carry out the method thoroughly, so that for the first year we followed the ordinary symptomatic and expectant plan of treatment. I am not myself personally responsible for its introduction. During my absence in Europe, in 1890, my former first assistant, Dr. Laffeur, now of Montreal, after a visit to the wards of Dr. J. C. Wilson at the German Hospital in Philadelphia, began the practice, and the hospital is under a lasting debt to him for the accuracy and care with which at the outset, and for more than a year subsequently, he supervised the details of the treatment.

Most of you have seen the application of the method in the wards, but I shall emphasize certain points in the procedure by having one of the patients bathed before you, so that you may see the minutiae.

The ward orders, subject of course to modifications, are as follows: The temperature of typhoid-fever patients is to be taken every two hours; when above 102.5° , a bath at 70° is to be given every third hour. The patient before you has reached the sixteenth day of the disease. He has been in hospital nine days, and has had thirty-six baths. The tub is wheeled to the side of the bed—a practice much preferable to that followed in some of the foreign hospitals of carrying the patient to the bath, or indeed allowing him, if he is able, to walk to it.

The technique of the procedure is as follows: The tub, as you see, is of light *papier-maché* material, and even when filled with water, as at present, is readily portable on wheels. The temperature of the water is 68° . Here in the amphitheatre we shall reverse the usual procedure and have the patient wheeled to the side of the bath. The preparation is extremely simple. The heavier bed-clothes are removed and a light sheet is thrown over the patient from the neck down. Under this his night-shirt is removed, and, if necessary, a light napkin is applied over the genitals. The patient is given a small quantity of whiskey. Two orderlies will

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now lift him into the bath, still covered with the sheet. This patient happens to be a large, well-nourished man, and he fits very comfortably into the bath tub, having, as you notice, an air-cushion supporting the head and neck. You will see in the ante-room one or two other forms of bath tubs, one of which has a sloping platform for the support of the back. In more delicate, particularly in thin, emaciated patients, the greatest care must be taken to support the nates and make the posture in the bath as comfortable as possible. A cloth wrung out of ice-water is placed upon the patient's head, and with a small sponge the head and face are kept bathed with the same water. You see here an unusually docile patient, who takes the baths without much protest, but, as you have just heard him say, he would prefer them warm. Systematic friction is now applied to the skin either with the hand or by means of a cloth or India-rubber, which for convenience may be attached to a stick. The friction is rightly regarded as a very important element in the treatment, though, as you hear from this patient, he does not at all like it, and prefers to be left alone. Curiously enough, Hippocrates laid stress upon this very point when he said: "But the person who takes the bath should be orderly and reserved in his manner, should do nothing for himself, but others should pour the water upon him and rub him." The abdomen should not be rubbed. While the patient is in the bath, the bed is prepared for his reception with a rubber sheet, a blanket, and over these an old linen sheet. (After remaining in the bath for twenty minutes the patient was lifted out.)

I am glad that you have witnessed the little *contretemps* in lifting this patient out of his bath. You see that he is a strongly built, heavy man, and the orderlies were only just able to lift him from the bath to the bed, and you saw that in doing so there was some little difficulty, owing to the catching of one arm on the side of the bath. This, however, does not very often happen, but now and then patients complain of scratches in the process of lifting in and out of the bath; and though done, as you see, with the greatest possible care, these little accidents are liable to happen. The man is now well wrapped up in the sheet, which is tucked in between the arms and legs, and brought well around the neck. Over this the blanket is placed. In cases in which the temperature is very high the patient may remain in the sheet for from five

to ten minutes, but under other circumstances he may be carefully dried at once. You see that this man retains a good color in his face; the extremities are cold but not livid; and he is now beginning to shiver. Very often this shivering is distressing while in the bath, and one of the most unpleasant features of the system. If the patient is very cold and the shivering is extreme, hot bottles may be applied to the feet and at the sides. You see by this two-hourly temperature-chart the influence of the baths; and half an hour after this the temperature will be taken again, and the record made. If at the end of three hours the temperature is again above 102.5° , he will have another bath such as you have just seen. Now, before the patient is wheeled out, he will be given two ounces of hot milk with a little whiskey.

Practically what you have seen in this case is the routine of our treatment. The patients receive no medicine other than alcohol, and that we do not give as a matter of course, but as a rule only, before and after the bath. In other cases, when the heart becomes feeble, we give strychnine, and in some cases digitalis and ether. The effects of the baths are: first, to reduce the fever, principally by favoring heat-dissipation and by the direct action of the cold water upon the blood that circulates in the superficial vessels; secondly, as a general tonic to the nervous and circulatory systems. Perhaps the most striking effect is seen in the lessening of the nervous irritability, the favoring of sleep, and the clearing of the mind. In patients treated early by this method we rarely see the dry tongue, muttering delirium, the subsultus, and the other grave nervous phenomena which are of such serious import in typhoid fever. The baths, too, appear to improve the general nutrition, and the patients take their food better, digest better, and, as has been said, the vital processes all seem more active. Do not suppose, however, that you can, as Brand enthusiastically says, keep the patient in an almost afebrile condition. An inspection of any series of carefully-taken charts will convince you that this is an impossibility; the temperature rises again in a variable space of time, and in some instances the influence of the bath upon the rectal temperature is extremely slight.

An important question is, shall we bathe all cases indifferently, whether the temperature reaches 102.5° or not, and whether grave or mild? When the temperature does not reach the point indi-

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ated, if the patient's condition is good and there are no nervous symptoms, the baths are not ordered. This has been our practice during the past two years, and I do not know that we have in any case had cause to regret it. Of course, we do not here often see patients before the seventh day, but occasionally, as in the man in bed 3 in ward F, we do find cases in which the temperature is very low on admission, scarcely 100° or 101° , while subsequently the fever becomes very pronounced. Now, in the very case in question, the man has subsequently had a sharp attack of typhoid fever, but we did not bathe him when his temperature was low for the very good reason that we did not think he had the disease. On the other hand, in doubtful cases in which the fever is 103° , we have no hesitation in ordering baths, and have frequently bathed patients who subsequently proved to have pneumonia or malaria.

The contra-indications are as follows: Hemorrhage from the bowels; not because the cold baths tend to increase the hemorrhage, but because they interfere with the essential element in treatment, namely, rest. You have seen within the past week in the patients in beds 20 and 24 that the baths were omitted on account of hemorrhage. In the extreme debility of the last stage, in a protracted case, with a feeble pulse, it is advisable to omit the baths, though we do so with reluctance; but in many cases it has seemed wise, particularly in cases admitted in the third week, or admitted in relapse. Often in a day or two the condition improves sufficiently to justify their use. Neither pneumonia nor bronchitis is regarded as a special contra-indication, and pleurisy, only when the pain is severe. Of course, the baths must be omitted when there are signs of perforation.

We use the bath-treatment and advocate it because by it the mortality in typhoid fever has been reduced so remarkably in hospital work that its employment seems imperative for the saving of lives. You can for yourselves read and compare the statistics in the different hospitals which are given in two special works on this method now available for practitioners in this country—one, *The Hydratic Treatment in Typhoid Fever*, by Dr. Sihler, of Cleveland, formerly a Fellow of the Johns Hopkins University; the other on the *Use of Water in Modern Medicine*, by Dr. Simon Baruch, of New York. These little books should be widely read by the profession. They are timely contributions to a subject that has not

yet reached the daily lives of the doctors in this country. Practically, the mortality under the cold-bath treatment in hospitals has been reduced from 15 and 20 or 25 per cent., to an average of 6 or 7 per cent., taking all cases, or even very much lower if the cases are seen early. Indeed, Brand has figures that show an absence of mortality in some 1,200 cases in which the treatment began before the fifth day. But in hospital practice we can never expect to see our patients before the end of the first week. At the German Hospital in Philadelphia, where the method has been followed most accurately by Dr. J. C. Wilson and his colleagues, there were ninety-four consecutive cases treated without a death; but I understand from Dr. Wilson that this remarkable good fortune has not continued, though the mortality has been kept at a very low rate. Our own more limited experience is also strikingly in favor of the method, and a report is in course of publication dealing with the first hundred cases so treated. In the first year of the opening of the hospital there were thirty-two cases treated on the symptomatic and expectant plan, of which eight died, a mortality of 25 per cent., a rate unusually high even for a general hospital. The cases, however, were of unusual severity; one had acute hemorrhagic nephritis, with profuse hematuria; one case, admitted at the beginning of the third week, had extensive double pneumonia. Two cases died of perforation, while another case died of profuse hemorrhage from the bowels. On the other hand, in the first hundred cases treated by the cold baths, the mortality has been only 7 per cent., a reduction so striking and remarkable that it must be attributed to the good results of the bath. Even this rate of mortality, which is about the average for hospitals in which the rigid Brand system is carried out, would be considered by the proposer of the method far too high. In the report referred to I have given full details of the fatal cases, and it will be noticed that one of the seven, an old man of seventy, was admitted late in the disease with extensive lobar pneumonia, and as the disease was not recognized as typhoid he was not bathed. Two cases were admitted in relapse.

You will be pleased to learn that in the cases treated this year we are still gratified with the results of the method. We are at about the seventieth case in our second series of a hundred cases, and only six of these have died.

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Lastly, of special interest to you as practitioners, comes the question, how far is this method available in private practice? I have been rapped over the knuckles, so to speak, for saying that in private practice it was scarcely feasible, but I suppose it is more correct to say that in this, as in other matters, where there is a will there is a way, and if the practitioner insists and has the courage of his convictions, the method can in many cases be carried out at home. It is very interesting at this point to know Dr. Sihler's experience in private practice, and I would recommend the careful perusal, by practitioners, of Appendix A of his little manual. Really the chief obstacle to-day is that of which Hippocrates complains, when, in speaking of the bath, he says "Sometimes it must be less used than it would be otherwise, from the want of accommodation; for in few families are all the conveniences prepared, and persons who can manage the baths as they ought to." Portable tubs, however, are now available, and with a good nurse, intelligently assisted by one or two members of the patient's family, the practice can be successfully carried out. There is now, moreover, a much stronger feeling in the profession in favor of hydrotherapy, and the practitioner can at least get the moral support of his colleagues. Still there are difficulties, which can, however, be overcome with care, patience, and a little tact. My preceptor, Dr. R. P. Howard, in Montreal, used to tell a story which rather set the younger ones among us against the Brand method. Early in the "sixties," shortly after the publication of Brand's paper, Dr. Howard, in his lectures on typhoid fever, had given the full details, and had spoken of the remarkable results obtained by Brand. One of his pupils, a year or so later, practising in a small town in Western Canada, had faith enough in his teacher and in Brand, to use the cold bath in a very severe case of typhoid fever, which occurred in one of the prominent families of the town. The poor patient promptly died after the bath, and the young physician felt so chagrined, and the feeling against him was so strong, that he left the town. Such an accident, however, is a very remote contingency, and one that need scarcely be taken into account in discussing the advantages and disadvantages of the cold-bath treatment in typhoid fever.

Do not, however, underestimate the troubles that you will encounter in introducing this method into family practice. I have

here a letter from one of my old University Hospital house-physicians, an extremely careful and able practitioner, who has been using the cold bath very faithfully, and in speaking of one case he says: "The prayers, entreaties, supplications, and last but not least effective, the lusty yells of this girl at each bath were such as not to materially increase the repose of the neighborhood or strengthen to any great extent the *morale* of the family."

We have been congratulating ourselves during the past two or three months that our numerous cases have been doing so satisfactorily, but yesterday one of the inevitable accidents occurred which, in general hospitals must continue, in spite of Brand's statements, to occur occasionally and maintain some mortality, at any rate, in typhoid fever. The patient, admitted about the seventh day of his illness, was a strong, well-built, healthy man, aged thirty-seven. He was bathed from the time of his entry, and had had about forty baths. The day before yesterday the pulse was feeble and rapid after the bath, and it was thought advisable to order the baths to be discontinued. There was a little tenderness in the abdomen, but nothing very striking. Yesterday, as some of you saw, the signs of perforation were well marked, and of this he died. I show you here the small intestine, and you will see a somewhat unusual and remarkable picture. There is a small slough near the ileo-cecal valve, and there are two or three small ulcers in the first half above the valve. There are also one or two swollen solitary follicles, but there are also several patches which show simply the shaven-beard appearance, and the lymph-elements are not themselves specially swollen. At a distance of 30 cm. from the valve there is a small perforation, resulting from the extension of a small, deep slough through both muscular coats. Higher up there are one or two small ulcers, not larger than peas, and above this there are Peyer's patches uninvolved, with scarcely any infiltration. The spleen is very much enlarged and soft. Here was a patient, without extremely high temperature, bathed from about the seventh day, with every favorable indication, and as the autopsy showed, extremely slight ulceration in the ileum, and yet, owing no doubt to local conditions in the limited area involved, the necrosis had extended deeply, and passing through both muscular coats, the inevitable perforation occurred, with fatal peritonitis.

TEACHER AND STUDENT.

AN ADDRESS

DELIVERED ON THE OCCASION OF THE OPENING OF THE NEW
BUILDING OF THE COLLEGE OF MEDICINE AND SUR-
GERY OF THE UNIVERSITY OF MINNESOTA,
MINNEAPOLIS, OCTOBER 4TH, 1892.

BY

WILLIAM OSLER, M. D., F. R. C. P. LOND.,
*Professor of Medicine in the Johns Hopkins University and Physician-in-Chief
to the Johns Hopkins Hospital, Baltimore.*

BALTIMORE:
JOHN MURPHY & CO.,
1892.

A University consists, and has ever consisted, in demand and supply, in wants which it alone can satisfy and which it does satisfy, in the communication of knowledge, and the relation and bond which exists between the teacher and the taught. Its constituting, animating principle is this moral attraction of one class of persons to another; which is prior in its nature, nay commonly in its history, to any other tie whatever; so that, where this is wanting, a University is alive only in name, and has lost its true essence, whatever be the advantages, whether of position or of affluence, with which the civil power or private benefactors contrive to encircle it.—JOHN HENRY NEWMAN.

It would seem, Adelmantus, that the direction in which education starts a man will determine his future life.—PLATO, *Republic*, iv.

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ADDRESS.

Your Excellency, Mr. President, Ladies and Gentlemen:—

When I received from the Dean of the College of Medicine, Dr. Millard, an invitation to deliver the opening address on this occasion, there were several reasons for a ready acquiescence. There was nothing nearly so good on hand for the first week of October, which long habit had made for me the week of weeks in the calendar. Here was a chance to satisfy the "*besoin de respirer*" in an atmosphere brightened by young lives, to still a deep autumnal yearning not unnatural in a man the best years of whose life have been passed with undergraduate students, and who has had temporarily to content himself with the dry husks of graduate teaching. Then the invitation was a great compliment, greater, for the distance it had travelled; but lastly and chiefly I wanted to see you all, to relieve a brotherly instinct such as sent David to his brethren in the camp of Saul, an instinct which has often driven me far afield, and has enriched my life with good friends and pleasant memories.

Nor did I hesitate a moment in the selection of a subject. On such an occasion, and at this time, when the profession and public are awakening to the importance of medical education, my choice was necessarily restricted. Instead, however, of a formal presentation of the conditions and needs of medical study, I shall address myself chiefly to a consideration of some of our functions as teachers, in dealing with

which I can incidentally touch upon questions of general interest, and can, moreover, speaking on behalf of the Faculty, say a few words of welcome and encouragement to the classes which have assembled for the year.

I.

Truly it may be said to-day that in the methods of teaching medicine the old order changeth giving place to new, and to this revolution let me briefly refer, since it has an immediate bearing on the main point I wish to make in the first portion of my address. The medical schools of the country have been either independent, University, or State Institutions. The first class, by far the most numerous, have in title University affiliations, but are actually devoid of organic union with seats of learning. Necessary as these bodies have been in the past, it is a cause for sincere congratulation that the number is steadily diminishing. Admirable in certain respects—adorned too in many instances by the names of men who bore the burden and heat of the day of small things and have passed to their rest amid our honored dead—the truth must be acknowledged that the lamentable state of medical education in this country twenty years ago was the direct result of the inherent viciousness of a system they fostered. Something in the scheme gradually deadened in the professors all sense of responsibility until they professed to teach (mark the word) in less than two years—one of the most difficult arts in the world to acquire. Responsibility! fellow teachers in medicine, believe me that when in the next century some historian, standing perhaps in this place, traces the development of the profession in this country, he will dwell on notable achievements, on great discoveries, and on the unwearied devotion of its members, but he will pass judgment—yes, severe judgment—on the absence of the sense of responsibility which permitted a criminal laxity in medical education unknown before in our annals. But an awakening has come, and there is sounding

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the knell of the doom of the medical college, responsible neither to the public nor the profession.

The schools with close university connections have been the most progressive and thorough in this country. The revolution referred to began some twenty years ago by the appearance of the President of a well known University at a meeting of its medical faculty with a peremptory command to set their house in order. Universities which teach only the Liberal Arts remain to-day, as in the middle ages, *Scholæ minores*, lacking the technical faculties which make the *Scholæ majores*. The advantages of this most natural union are manifold and reciprocal. The professors in a University medical school have not that independence of which I have spoken, but are under an influence which tends constantly to keep them at a high level, and the spirit of emulation with the other faculties improves the standard of work, and is a strong stimulus to further development.

To anyone who has watched the growth of the new ideas in education it is evident that the most solid advances in methods of teaching, the improved equipment, clinical and laboratory, and the kindlier spirit of generous rivalry—which formerly consisted in that debased counting of heads as a test of merit—all these advantages have come from a tightening of the bonds between the medical school and the University.

And lastly there are the State schools, of which this college is one of the few examples. It has been a characteristic of American Institutions to foster private industries and to permit private corporations to meet any demands on the part of the public. This idea carried to extreme allowed the unrestricted manufacture—note the term—of doctors, quite regardless of the qualifications usually though necessary in civilized communities—of physicians who may never have been inside a hospital ward, and who had after graduation to learn medicine somewhat in the fashion of the Chinese doctors who recognized the course of the arteries of the body, by noting just where the blood spurted when the acupuncture needle

was inserted. So far as I know State authorities have never interfered with any legally instituted medical school, however poorly equipped for its work, however lax the qualifications for license. Not only has this policy of non-intervention been carried to excess, but in many states a few physicians of any town could get a charter for a school without giving guarantees that laboratory or clinical facilities would be available. This anomalous condition is rapidly changing, owing partly to a revival of loyalty to higher ideals within our ranks, and partly to a growing appreciation in the public of the value of physicians thoroughly educated in modern methods. A practical acknowledgment of this is found in the recognition in three States at least of medicine as one of the technical branches to be taught in the University supported by the people at large.

But it is a secondary matter, after all, whether a school is under state or University control, whether the endowments are great or small, the equipments palatial or humble, the fate of an institution rests not on these; the inherent, vital element, which transcends all material interests, which may give to a school glory and renown in their absence, and lacking which all the "pride, pomp and circumstance" are vain—this vitalizing element, I say, lies in the men who work in its halls, and in the ideals which they cherish and teach. There is a passage in one of John Henry Newman's Historical Sketches, which expresses this feeling in terse and beautiful language, "I say then that the personality of the teacher is able in some sort to dispense with an academical system, but that the system cannot in any way dispense with personal influence. With influence there is life, without it there is none; if influence is deprived of its true position it will not by those means be got rid of, it will only break out irregularly, dangerously. An academical system without the personal influence of teachers upon pupils is an Arctic winter; it will create an ice-bound, petrified, cast-iron University, and nothing else."

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Naturally from this standpoint the selection of teachers is the function of the highest importance in the Regents of a University. Owing to local conditions the choice of men for certain of the chairs is restricted to residents in the University town, as the salaries in most schools of this country have to be supplemented by outside work. But in all departments this principle should be acknowledged and acted upon by trustees and faculties, and supported by public opinion—that the very best men available should receive appointments. It is gratifying to note the broad liberality displayed by American colleges in welcoming from all parts teachers who may have shown any special fitness, emulating in this respect the liberality of the Athenians, in whose porticoes and lecture halls the stranger was greeted as a citizen and judged by his mental gifts alone. Not the least by any means of the object lessons taught by a great University is that literature and science know no country, and, as has been well said, acknowledge ‘no sovereignty but that of mind, and no nobility but that of genius.’ But it is difficult in this matter to guide public opinion and the Regents have often to combat, and meet with firmness, a provincialism which is as fatal to the highest development of a University as is the shibboleth of a sectarian institution. No taint of this vice is here apparent, nor does it appear in your sister State Universities, which have medical faculties. Michigan has displayed a notable freedom from this spirit in the appointments to chairs in the medical faculty, and, if I remember aright, the last three nominations were from London, Philadelphia, and Galveston.¹ So also in the newly organized medical faculty of the State University of Texas, a wide freedom of choice was shown and the best men were chosen, irrespective of race or country.

¹ And not only in this respect is Michigan an example. She has earned the gratitude of every lover of higher education by first making compulsory a four-year curriculum. Harvard has followed this session, and the University of Pennsylvania begins next year. We now have first, second and third class schools, corresponding to the four, three and two session colleges.

II.

The function of the teacher, to paraphrase the words of Matthew Arnold, is to teach and to propagate the best that is known and taught in the world. To teach the current knowledge of the subject he professes—sifting, analyzing, assorting, laying down principles. To propagate; *i. e.*, to multiply, facts on which to base principles—experimenting, searching, testing. The best that is known and taught in the world—nothing less can satisfy a teacher worthy of the name, and upon us of the medical faculty lies a bounden duty in this respect, since our Art, coördinate with human suffering, is cosmopolitan.

There are two aspects in which we may view the teacher, as a worker and instructor in science, and as practitioner and professor of the art; and these correspond to the natural division of the faculty into the medical school proper and the hospital.

In this eminently practical country the teacher of science has not yet received full recognition, owing in part to the great expense connected with his work, and in part to carelessness or ignorance in the public as to the real strength of a nation. To equip and maintain separate Laboratories in Anatomy, Physiology, Chemistry (physiological and pharmacological), Pathology and Hygiene, to employ skilled teachers, who shall spend all their time in study and instruction, requires a capital not to-day at the command of any medical school in the land. There are fortunate ones with two or three departments well organized, not one with all. In contrast, Bavaria, a kingdom of the German Empire, with an area less than this state, and a population of five and a half millions, supports in its three University towns flourishing medical schools with extensive laboratories, many of which are presided over by men of world-wide reputation, the steps of whose doors are worn in many cases by cis-Atlantic students seeking the wisdom of methods and the virtue of inspiration not easily accessible at home. But there were professors in Bavarian

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schools before Marquette and Joliet had launched their canoes on the great stream which the intrepid La Salle had discovered, before Du Luth met Father Hennepin below the falls of St. Anthony; and justice compels us to acknowledge that in the winning of an empire from the back-woods the people of this land had other things to think of, more urgent needs than laboratories of research. All has now changed. In this state, for example, the phenomenal growth of which has repeated the growth of the nation, the wilderness has been made to blossom as the rose, and the evidences of wealth and prosperity on every side almost constrains one to break out into the now old song, "Happy is that people that is in such a case."

But in the enormous development of material interests there is danger lest we miss altogether the secret of a nation's life, the true test of which is to be found in its intellectual and moral standards. There is no more potent antidote to the corroding influence of mammon than the presence in a community of a body of men devoted to science, living for investigation, and caring nothing for the lust of the eyes and the pride of life. We forget that the measure of the value of a nation to the world is neither the bushel nor the barrel, but *mind*; and that wheat and pork, though useful and necessary, are but dross in comparison with intellectual products which alone are imperishable. The kindly fruits of the earth are easily grown; the finer fruits of the mind are of slow growth, and require prolonged culture.

Each one of the scientific branches to which I have referred has been so specialized that even to teach it takes more time than can be given by a single Professor, and the laboratory classes demand skilled assistance. The aim of a school should be to have these departments in the charge of men who have; first, *enthusiasm*, that deep love of a subject, that desire to teach and extend it, without which all instruction becomes cold and lifeless; second, *a full personal knowledge of the branch taught*, not a second-hand information derived from books, but the living experience derived from experimental

and practical work in the best laboratories. This type of instructor is fortunately not rare in American schools. The well-grounded students who have pursued their studies in England and on the Continent have added depth and breadth to our professional scholarship, and their critical faculties have been sharpened to discern what is best in the world of medicine. It is particularly in these branches that we need teachers of wide learning, whose standards of work are the highest known, and whose methods are those of the masters in Israel. Third, men who have a *sense of obligation*, that feeling which impels a teacher to be also a contributor, and to add to the stores from which he so freely draws. And precisely here is the necessity to know the best that is taught in his branch, the world over. The investigator to be successful must start abreast of the knowledge of the day, and he differs from the teacher, who, living in the present, expounds only what is current, in that his thoughts must be in the future, and his ways and work in advance of the day in which he lives. Thus, unless a bacteriologist has studied methods thoroughly and is familiar with the extraordinarily complex flora associated with healthy and diseased conditions, and keeps in touch with every laboratory of research at home and abroad, he will, in attempting original work, find himself exploring ground already well known, and will probably burden an already over-laden literature with faulty and crude observations. To avoid mistakes he must know what is going on in the laboratories of England, France, and Germany, as well as in those of his own country, and he must receive and read six or ten journals devoted to the subject. The same need for wide and accurate study holds good in all branches.

Thoroughly equipped laboratories in charge of men thoroughly equipped as teachers and investigators is the most pressing want to-day in the medical schools of this country.

The teacher as a professor and practitioner of his art is more favored than his brother, of whom I have been speaking; he is more common, too, and less interesting; though in the

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eyes of "the fool multitude who choose by show" more important. And from the standpoint of medicine as an art for the prevention and cure of disease, the man who translates the hieroglyphics of science into the plain language of healing is certainly the more useful. He is more favored in as much as the laboratory in which he works, the hospital, is a necessity in every centre of population. The same obligation rests on him to know and to teach the best that is known and taught in the world—on the surgeon the obligation to know thoroughly the scientific principles on which his art is based, to be a master in the technique of his handiwork, ever studying, modifying, improving;—on the physician, the obligation to study the natural history of diseases and the means for their prevention, to know the true value of regimen, diet, and drugs in their treatment, ever testing, devising, thinking;—and upon both, to teach to their students habits of self-reliance and to be to them examples of gentleness, forbearance, and courtesy in dealing with their suffering brethren.

I would fain dwell upon many other points in the relation of the hospital to the medical school—on the necessity of ample, full and prolonged clinical instruction, and the importance of bringing the student and the patient into close contact; not the cloudy knowledge of the amphitheatre, but the accurate, critical knowledge of the wards; on the encouragement of the younger men as instructors and helpers in ward work and upon the duty of hospital physicians and surgeons to contribute to the advance of their art—but I pass on with an illusion to a very delicate matter in college faculties.

From one who, like themselves, has passed *la crise de quarante ans*, the seniors present will pardon a few plain remarks upon the disadvantages to a school of having too many men of mature, not to say, riper years. Insensibly in the fifth and sixth decades there begins to creep over most of us a change, noted physically among other ways in the silvering of the hair and that lessening of elasticity, which impels a man to open rather than to vault a five-barred gate. It comes to all sooner

or later, to some only too painfully evident, to others unconsciously, with no pace perceived. And with most of us this physical change has its mental equivalent, not necessarily accompanied by loss of the powers of application or of judgment; on the contrary, often the mind grows clearer and the memory more retentive, but the change is seen in a weakened receptivity and in an inability to adapt oneself to an altered intellectual environment. It is this loss of mental elasticity which makes men over forty so slow to receive new truths. Harvey complained in his day that few men above this critical age seemed able to accept the doctrine of the circulation of the blood, and in our own time it is interesting to note how the theory of the bacterial origin of certain diseases has had as other truths to grow to acceptance with the generation in which it was announced. The only safeguard in the teacher against this lamentable condition is to live in, and with the third decade, in company with the younger, more receptive, and progressive minds.

There is no sadder picture than the Professor who has outgrown his usefulness, and, the only one unconscious of the fact, insists, with a praiseworthy zeal, upon the performance of duties for which the circumstances of the time have rendered him unfit. When a man nor wax nor honey can bring home, he should, in the interests of an institution, be dissolved from the hive to give more laborers room; though it is not every teacher who will echo the sentiment

"Let me not live

After my flame lacks oil to be the snuff
Of younger spirits whose apprehensive senses
All but new things disdain."

As we travel farther from the East our salvation lies in keeping our faces towards the rising sun, and in letting the fates drag us, like Cacus his oxen, backwards into the cave of oblivion.

And let me conclude this portion of my address with a few practical observations. It is useless to disguise from the public

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or ourselves that a first class medical school well equipped in all details, is an enormously expensive affair; but in this State, and with a population of nearly half a million centered in and about this twin-city, you can look forward with confidence to a consummation of your utmost hopes. Let me indicate how much you will require from the State or your friends—or both—during the next twenty-five years. Six laboratories in the scientific branches with the necessary apparatus will cost not less than \$200,000. Radiating from a central building, which contains the general lecture room, library and museum, they would be less expensive than separate Institutes, as in the German Universities. To provide salaries for the men in charge—men who know the best that is known and taught in the world—will take, with students' fees, between four and five hundred thousand dollars, paying at the rate of from four to five thousand dollars a year. The hospital department must be in proportion, and in modern operating rooms, separate pavilion wards and clinical laboratories another two hundred thousand dollars may be spent. Were I asked what should be the cost of the equipment of a first-class, modern, medical school, one of a kind such as exists in half a dozen German towns, (any one of which would go in a ward of this city), I would say one million dollars—not less, and perhaps a little more.

Where now shall we look for those liberal endowments? Can we reasonably expect them for the medical schools of this country? Yes, the flowing tide, so long with the Arts and with Theology, is with us. It is a cheery indication here that State support has not paralyzed private beneficence, and that some of your wealthy men recognize among the pleasures of life the blessedness of giving. May many more learn the secret of the only way to perpetuate a name in this country! Senatorships are not hereditary, and it is notorious that great wealth cannot stand the pace of the third generation. There is a serious danger, too, that in the Democracy of the future the general average will be so high that oblivion will cover all but a chosen few, a poet here and there, 'born for the Universe,'

and the capitalists, who, like Johns Hopkins and Cornell, have linked their names with the imperishable things—names which in the centuries to come may attain the sweet savor of sanctity which to-day lingers on the tongue as we utter the words Harvard and Yale.

III.

Students of Medicine, Children of the Guild, with whom are the promises, and in whom centre our hopes—let me congratulate you on the choice of a calling which offers a combination of intellectual and moral interests found in no other profession, and not met with at all in the common pursuits of life—a combination which, in the words of Sir James Paget, “offers the most complete and constant union of those three qualities which have the greatest charm for pure and active minds—novelty, utility, and charity.” But I am not here to laud our profession; your presence on these benches is a guarantee that such praise is superfluous. Rather allow me, in the time remaining at my disposal, to talk of the factors which may make you good students—now in the days of your pupilage, and hereafter when you enter upon the more serious studies in which the physician finds himself engaged.

In the first place acquire early the *Art of Detachment*, by which I mean the faculty of isolating yourselves from the pursuits and pleasures incident to youth. By nature man is the incarnation of idleness, which quality alone, amid the ruined remnants of Edenic characters, remains in all its primitive intensity. Occasionally we do find an individual who takes to toil as others to pleasure, but the majority of us have to wrestle hard with the original Adam, and find it no easy matter to scorn delights and live laborious days. Of special importance is this gift to those of you who reside for the first time in a large city, the many attractions of which offer a serious obstacle to its acquisition. The discipline necessary to secure this art brings in its train habits of self-

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I need scarcely warn you against too close attention to your studies. I have yet to meet a medical student, the hey-day in whose blood had been quite tamed in his college days; but if you think I have placed too much stress upon isolation in putting the Art of Detachment first in order among the *desiderata* let me temper the hard saying by telling you how with "labors assiduous due pleasure to mix." Ask of any active business man or a leader in a profession the secret which enables him to accomplish much work, and he will reply in one word, *system*; or as I shall term it, the *Virtue of Method*, the harness without which only the horses of genius travel. There are two aspects of this subject; the first relates to the orderly arrangement of your work, which is to some extent enforced by the roster of demonstrations and lectures, but this you would do well to supplement in private study by a schedule in which each hour finds its allotted duty. Thus faithfully followed day by day system may become at last engrained in the most shiftless nature, and at the end of a semester a youth of moderate ability may find himself far in advance of the student who works spasmodically, and trusts to *cramming*. Priceless as this virtue is now in the time of your probation it becomes in the practising physician an incalculable blessing. The incessant and irregular demands upon a busy doctor make it very difficult to retain, but the public in this matter can be educated, and the men who practise with system, allotting a definite time of the day to certain work, accomplish much more and have at any rate a little leisure; while those who are unmethodical never catch up with the day's duties and worry themselves, their *confreeres*, and their patients. In one respect, too, the unsystematic physician is absolutely criminal. By the great law of contraries there is sure to be assigned to him to wife some gentle creature to whom order is the supreme law, whose life is rendered miserable by the vagaries of a man, the dining-room

table in whose house is never "cleared," and who would an he could "breakfast at five o'clock tea and dine on the following day."

The other aspect of method has a deeper significance, hard for you to reach, not consoling when attained, since it lays bare our weaknesses. The practice of medicine is an art, based on science. Working in science, with science, for science, it has not reached, perhaps never will, the dignity of a complete science like astronomy or engineering, with exact laws. Is there then no science of medicine? Yes, but in parts only, such as anatomy and physiology, and the extraordinary development of these branches during the present century has been due to the cultivation of method, by which we have reached some degree of exactness, some certainty of truth. Thus we can weigh the secretions in the balance and measure the work of the heart in foot-pounds. The deep secrets of generation have been revealed and the sesame of evolution has given us fairy tales of science more enchanting than the Arabian Nights entertainment. With this great increase in our knowledge of the laws governing the processes of life, has been a corresponding, not less remarkable, advance in all that relates to life in disorder, that is, disease. The mysteries of heredity are less mysterious, the operating room has been twice over robbed of its terrors; the laws of epidemics are known, and the miracle of the threshing floor of Araunah, the Jebusite, may be repeated in any town out of Bumbledom. All this change has come about by the observation of facts, by their classification, and by the founding upon them of general laws. Emulating the persistence and care of Darwin we must collect facts with open-minded watchfulness, unbiassed by crotchets or notions; fact on fact, instance on instance, experiment on experiment, facts which fitly joined together by some master who grasps the idea of their relationship may establish a general principle. But in the practice of medicine, where our strength should be lies our great weakness. Our study is man, as the subject of accidents and diseases.

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Were he always, inside and outside, cast in the same mould, instead of differing from his fellow man as much in constitution and in his reaction to stimuli as in feature, we should ere this have reach some settled principles in our art. And not only are the reactions themselves variable, but we, the doctors, are so fallible, ever beset with the common and fatal facility of reaching conclusions from superficial observations, and constantly misled by the ease with which our minds fall into the rut of one or two experiences.

And thirdly add to the Virtue of Method, the *Quality of Thoroughness*, an element of such importance that I had thought of making it the only subject of my remarks. Unfortunately, in the present arrangement of the curriculum, few of you as students can hope to obtain more than a measure of it, but all can learn its value now, and ultimately with patience become living examples of its benefit. Let me tell you briefly what it means. A knowledge of the fundamental sciences upon which our art is based—chemistry, anatomy, and physiology—not a smattering, but a full and deep acquaintance, not with all the facts, that is impossible, but with the great principles based upon them. You should, as students, become familiar with the methods by which advances in knowledge are made, and in the laboratory see clearly the paths the great masters have trodden, though you yourselves cannot walk therein. With a good preliminary training and a due apportioning of time you can reach in these three essential studies a degree of accuracy which is the true preparation for your life duties. It means such a knowledge of diseases and of the emergencies of life and of the means for their alleviation, that you are safe and trustworthy guides for your fellow-men. You cannot of course in the brief years of pupilage so grasp the details of the various branches that you can surely recognize and successfully treat all cases. But here if you have mastered certain principles is at any rate one benefit of thoroughness—you will avoid the sloughs of charlatanism. Napoleon, according to Sainte Beuve, one day said when

somebody was spoken of in his presence as a charlatan, "Charlatan as much as you please but where is there not charlatanism?" Now thoroughness is the sole preventive of this widespread malady, which in medicine is not met with only outside of the profession. Matthew Arnold, who quotes the above from Sainte Beuve, defines charlatanism as the "confusing or obliterating the distinctions between excellent and inferior, sound and unsound or only half sound, true and untrue or only half true." The higher the standard of education in a profession the less marked will be the charlatanism, whereas no greater incentive to its development can be found than in sending out from our colleges men who have not had mental training sufficient to enable them to judge between the excellent and the inferior, the sound and the unsound, the true and the half true. And if we of the household are not free from the seductions of this vice, what of the people among whom we work? From the days of the sage of Endor, even the rulers have loved to dabble in it, while the public of all ages have ever revelled in its methods—to-day, as in the time of the Father of Medicine, one of whose contemporaries (Plato) thus sketches this world-old trait; "And what a delightful life they lead! they are always doctoring and increasing and complicating their disorders and always fancying that they will be cured by any nostrum which anybody advises them to try."

The Art of Detachment, the Virtue of Method, and the Quality of Thoroughness may make you students, in the true sense of the word, successful practitioners, or even great investigators; but your characters may still lack that which can alone give permanence to powers—the *Grace of Humility*. As the divine Italian at the very entrance to Purgatory was led by his gentle Master to the banks of the island and girt with a rush, indicating thereby that he had cast off all pride and self-conceit, and was thus prepared for his perilous ascent to the realms above, so should you, now at the outset of your journey take the reed of humility in your hands, in token that you appreciate the length of the way, the difficulties to

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be overcome, and the fallibility of the faculties upon which you depend.

In these days of aggressive self-assertion, when the stress of competition is so keen and the desire to make the most of oneself so widespread, it may seem a little old-fashioned to preach the necessity of this virtue, but I insist for its own sake, and for the sake of what it brings, that a due humility should take the place of honor on the list. For its own sake, since with it comes not only a reverence for truth, but also a proper estimation of the difficulties encountered in our search for it. More perhaps than any other professional man, the doctor has a curious—shall I say morbid?—sensitiveness to (what he regards) personal error. In a way this is right; but it is too often accompanied by a *cocksureness* of opinion (to use a Johnsonian word) which, if encouraged, leads to so lively a conceit that the mere suggestion of mistake under any circumstances is regarded as a reflection on his honor, a reflection equally resented whether of lay or of professional origin. Start out with the conviction that absolute truth is hard to reach in matters relating to our fellow creatures, healthy or diseased, that slips in observation are inevitable even with the best trained faculties, that errors in judgment must occur in the practice of an Art which is largely the balancing of probabilities;—start, I say, with this attitude of mind, and mistakes will be acknowledged and regretted; but instead of a slow process of self-deception, with ever-increasing inability to recognize truth, you will draw from your errors the very lessons which may enable you to avoid their repetition.

And for the sake of what it brings, this Grace of Humility is a precious gift. When to the sessions of sweet silent thought you summon up the remembrance of your own imperfections, the faults of your brothers will seem less grievous, and you will, to use the quaint language of Sir Thomas Browne, “allow one eye for what is laudable in them.” The wrangling and unseemly disputes which have too often disgraced our profession arise in a great majority of cases, on the one

hand, from this morbid sensitiveness to the confession of error, and, on the other, from a lack of brotherly consideration, and a convenient forgetfulness of our own failings. Take to heart the words of the son of Sirach, winged words to the sensitive souls of the sons of Esculapius. "Admonish a friend, it may be he has not done it; and if he have done it, that he do it no more. Admonish thy friend, it may be he hath not said it; and if he have, that he speak it ^{it} again. Admonish a friend, for many times it is a slander, and believe not every tale." Yes, many times it is a slander and believe not every tale.

The truth that lowliness is young ambition's ladder is hard to grasp, and when accepted harder to maintain. It is so difficult to be still amidst bustle, to be quiet amidst noise; yet, "es bildet ein Talent sich in der Stille" alone, in the calm life necessary to continuous work for a high purpose. The spirit abroad at present in this country is not favorable to this Teutonic view, which galls the quick apprehension and dampens the enthusiasm of the young American. All the same, it is true and irksome at first though the discipline may be, there will come a time when the very fetters in which you chafed shall be a strong defence and your chains a robe of glory.

Sitting in Lincoln Cathedral and gazing at one of the loveliest of human works, as the Angel Choir has been described, there arose within me, obliterating for the moment the thousand heraldries and twilight saints and dim emblazonings, a strong sense of reverence for the minds which had conceived and the hands which had executed such things of beauty. What manner of men were they who could, in those (to us) dark days, build such transcendent monuments? What was the secret of their art? By what spirit were they moved? Absorbed in thought I did not hear the beginning of the music, and then as a response to my reverie and arousing me from it, rang out clear the voice of the boy leading the anti-

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phon "That thy power, thy glory and mightiness of thy kingdom might be known unto men." Here was the answer. Moving in a world not realized these men sought, however feebly, to express in glorious structures their conception of the beauty of holiness, and these works, our wonder, are but the outward and visible signs of the ideals which animated them.

Practically to us in very different days life offers the same problems, but the conditions have changed, and, as happened before in the world's history, great material prosperity has weakened the influence of ideals, and blurred the eternal difference between means and end. Still, the ideal State, the ideal Life, the ideal Church—what they are and how best to realize them—such dreams continue to haunt the minds of men, and who can doubt that their contemplation immensely fosters the upward progress of our race? We, too, as a profession, have cherished standards, some of which, in words sadly disproportionate to my subject, I have attempted to portray.

My message is chiefly to you, Students of Medicine, since with the ideals entertained now your future is indissolubly bound. The choice lies open, the paths are plain before you. Always seek your own interests, make of a high and sacred calling a sordid business, regard your fellow creatures as so many tools of trade, and if riches are your heart's desire they may be yours; but you will have bartered away the birthright of a noble heritage, traduced the well-deserved title of the physician as the Friend of Man, and falsified the best traditions of an ancient and honorable Guild. On the other hand I have tried to indicate some of the ideals which you may reasonably cherish. No matter though they are paradoxical in comparison with the ordinary conditions in which you work, they will have, if encouraged, an ennobling influence, even if it be for you only to say with Rabbi Ben Ezra, "what I aspired to be and was not, comforts me." And though this course does not necessarily bring position or

renown, consistently followed it will at any rate give to your youth an exhilarating zeal and a cheerfulness which will enable you to surmount all obstacles—to your maturity a serene judgment of men and things, and that broad charity without which all else is naught—to your old age that greatest of all blessings, peace of mind, a realization, maybe, of the prayer of Socrates for beauty in the inward soul and for unity of the outer and the inner man; a fulfilment, perhaps, of the promise of St. Bernard, "*pax sine crimine, pax sine turbine, pax sine rixa.*"

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PROFESSOR OF

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Tuberculous Pericarditis.

BY

WILLIAM OSLER, M.D., F.R.C.P. LOND.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY AND PHYSICIAN-IN-CHIEF
TO THE JOHNS HOPKINS HOSPITAL.

FROM
THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES,
JANUARY, 1893.

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TUBERCULOUS PERICARDITIS.

By WILLIAM OSLER, M.D., F.R.C.P., LOND.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY AND PHYSICIAN-IN-CHIEF
TO THE JOHNS HOPKINS HOSPITAL.

TUBERCULOSIS follows hard upon rheumatic fever as a cause of pericarditis. The affection is usually overlooked clinically, and possibly in some cases anatomically. In 1000 autopsies, the majority of which were made at the Montreal General Hospital, there were 275 cases with tuberculous lesions, in 7 of which the pericardium was involved. Its relative frequency may be gathered from the following figures, furnished by Dr. Welch's records at the Pathological Laboratory of the Johns Hopkins Hospital. Of instances of pericarditis, 6 were tuberculous. Of late years attention has been called to the frequency of its occurrence, and yet the records in the literature are not very numerous; thus, the *Index-Catalogue* contains only thirty references, and the *Index Medicus* to July, 1892, only twenty-seven. The *Transactions* of the Pathological Society of London include but five cases to date.

The following is a brief summary of the cases which have come under my observation in Montreal, Philadelphia, and Baltimore:

- CASE I.—Female, aged forty-three years; sixteen ounces of dark exudate in pericardium; general miliary tuberculosis.
- CASE II.—Male, aged five years; caseous masses and fresh villous exudate; miliary tubercles on the peritoneum and in lungs; bronchial and mediastinal glands caseous.
- CASE III.—Female, aged thirty-eight years; chronic pulmonary tuberculosis; fresh tuberculous pericarditis.
- CASE IV.—Male, aged sixty-four years; acute tuberculous pericarditis; acute tuberculous pleurisy; chronic pulmonary tuberculosis.
- CASE V.—Male, aged fifty years; chronic pulmonary tuberculosis; recent tuberculous pericarditis.
- CASE VI.—Male, aged forty-five years; chronic pulmonary tuberculosis; chronic tuberculous pericarditis.
- CASE VII.—Male, aged twenty-eight years; chronic pulmonary tuberculosis; tuberculosis of pleura; acute tuberculous pericarditis.
- CASE VIII.—Mary B., aged thirty-six years; tuberculous pyelitis; fibro-caseous changes at the apices; sixteen ounces of turbid hemorrhagic serum in pericardium; thickening of the layers.
- CASE IX.—John G., aged fifty years; tuberculous mediastinal abscess; tuberculous infiltration of parietal layer of pericardium; acute pericarditis.

CASE X.—Max S., aged forty-five years; primary tuberculous of bowels; chronic tuberculous pericarditis, the membranes from three to four lines in thickness; bronchial glands caseous.

CASE XI.—Male, aged seventy-two years; death from pneumonia; heart hypertrophied; pericardium adherent, greatly thickened, and tuberculous; calcification of bronchial glands; no other tubercles in body.

CASE XII.—John T., aged sixteen years; tuberculous cerebro-spinal meningitis; tuberculous of mediastinal glands; old tuberculous pericarditis.

CASE XIII.—Moses B., aged twenty-four years; tuberculous of mediastinal glands; chronic tuberculous pericarditis; dilatation of heart; a few tubercles in lung.

CASE XIV.—Wm. H. T., aged fifty-two years; dropsy; hypertrophy and dilatation of heart; chronic tuberculous pericarditis; fibroid tubercles in lungs; miliary tubercles in viscera.

CASE XV.—John P., aged thirty-eight years; dropsy and dyspnoea; tuberculous pericarditis with effusion; tuberculous pleurisy; old foci in lungs.

CASE XVI.—Emma B., colored, aged thirty-nine years; dyspnoea, cough, and anasarca; tuberculous pericarditis, with effusion; tuberculous of mediastinal and bronchial glands; scattered tubercles in lungs, liver, and spleen.

CASE XVII.—John C., aged sixty-five years, admitted with cough, fever, and signs of consolidation at left base. Death on second day after admission. Chronic pulmonary tuberculosis; fresh tuberculous pneumonia; aortic sclerosis; patch of recent tuberculous pericarditis.

ETIOLOGY.—Tuberculous pericarditis is not limited to any age. The youngest of my cases was a child of five years; the oldest a man of seventy-two years. Parrot, Duckworth, Rolleston and Letulle have reported cases in infants under a year. In Brackmann's Göttingen Thesis, of 65 cases collected from the literature 19 were in children. It does not seem to be at all uncommon in old men, and there are two cases on record in octogenarians. Males seem more prone to the disease than females; there were only four women on my list.

Tuberculous pericarditis is due in a majority of instances to infection of the membrane from caseous mediastinal lymph glands. The disease may be confined to these glands and to the pericardium; thus, in Case XI. of my series, the patient, an old man, aged seventy-two years, died of pneumonia after a short illness. There was no tuberculous of the lungs or other viscera; the pericardium was thickened, both layers adherent, and presented cheesy masses and gray nodules. The heart was enlarged, weighing seventeen ounces. The mediastinal glands were calcified, particularly the bronchial group. Case IX. is of special interest, showing the mode of extension from the anterior mediastinum to the pericardium. The patient, a man aged fifty years, had pulmonary tuberculosis, and died of acute tuberculous pleurisy with sero-purulent exudate. Upon the external layer of the pericardium, three and a

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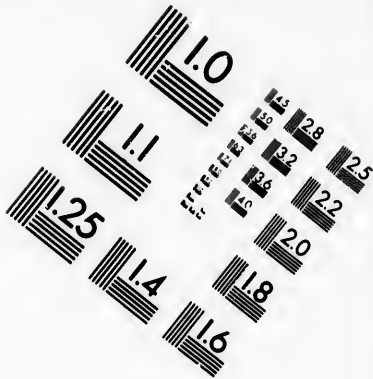
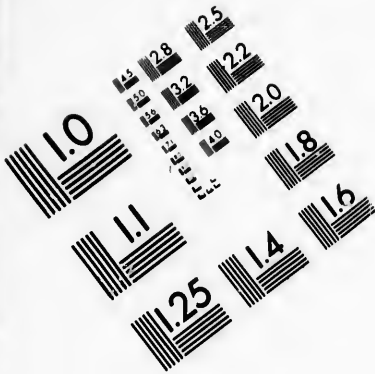
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half inches in extent, was a flattened tuberculous abscess with cheesy and purulent contents. The subjacent pericardium was much thickened, and was itself cheesy, and inflammation had extended through and produced an acute fibrinous inflammation of both layers with very little fluid exudation. Tubercles could not be seen. This association of disease of the mediastinal lymph glands with pericarditis has long been recognized. Zenker laid special stress on it in his paper on the traction diverticula of the œsophagus, caused by diseased lymph glands, and of his 54 cases there were 9 instances of total and 1 of partial synechia of the pericardial layers. Of the 101 instances of disease of the lymph glands of the mediastinum, collected by Berçty, the glands were caseous in the 18 cases in which the pericardium was involved. Kast, who quotes these figures, reports an instance (*Virchow's Archiv*, Bd. xevi.) of acute tuberculous pericarditis due to perforation of a purulent mediastinal lymph gland into the pericardial sac. In children the affection is in all probability most commonly transmitted in this way from mediastinal and bronchial glands. In Case II., a child aged five years, the bronchial glands were greatly enlarged, projected deeply into the lung tissue, and presented on section a uniform caseous appearance. Both layers of the pericardium were greatly thickened; their adjacent surfaces roughened and irregular; not covered with the usual false exudation, but presenting strands of firm tissue, and flat, slightly elevated caseous masses, which were yellow-white in color, and equally distributed on both layers. There were scattered miliary tubercles in the lung, on the peritoneum, in the kidneys, and in the liver, and these were in all probability entirely secondary to the advanced bronchial and pericardial disease.

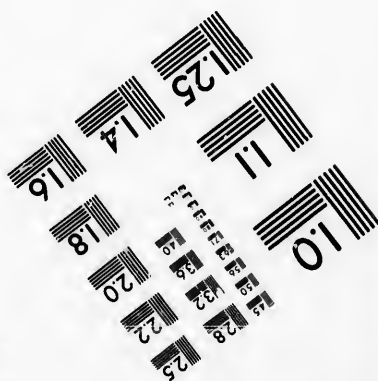
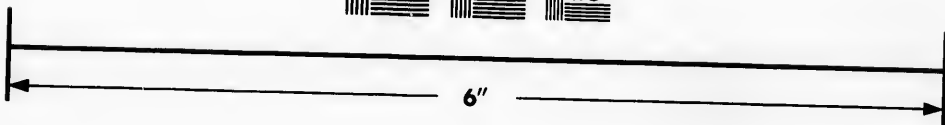
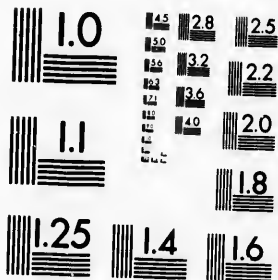
A second, less common, mode of extension is from the pleura or from the lung. A very good illustration of this was recently met with in Case XVII., a man aged sixty-five years, who was admitted to ward F of the Johns Hopkins Hospital with acute tuberculous pneumonia, and died on the following day. There was old disease of the lungs, and both acute and chronic tuberculous pleurisy. The left lung was strongly adherent to the pericardium, the cavity of which contained a small amount of clear fluid. The inner surface of the parietal layer was smooth, and presented a number of ecchymoses. At the superior reflection, where it was adherent to the underlying thickened and infiltrated pleura, there was an eruption of fresh gray miliary tubercles.

And, lastly, there are instances in which the pericardium appears to be involved with the pleura and peritoneum in a general tuberculosis of the serous membranes. In some of these cases the extension can be shown to have been directly from the pleura and pericardium into the peritoneum, while in others it would appear that the extension was from the peritoneum into the serous membranes of the thorax.





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MORBID ANATOMY.—The picture is extremely varied. Practically there are two groups of cases: those with firm adhesions between the pericardial layers, usually with great thickening; and those with recent exudation, fibrinous, sero-fibrinous, hemorrhagic, or purulent. The cases with adhesions are the most numerous. Of the 17 cases in my series, 2 cases, Nos. IX. and XVII., may be excluded, as in the first there was only tuberculous infiltration of the parietal layer, and in the other an eruption of fresh military tubercles alone. Of the remaining 15 cases, in 6 only was there thickening of the layers without exudation. The statistics, however, of Rousseau (Paris Thesis, 1882) and Lancereaux show that the chronic adhesive form is most common. Of the 35 observations analyzed by the former, in 21 there was adherent pericardium while in 12 of Lancereaux's 14 cases there were adhesions.

Both layers are, as a rule, uniformly thickened, and in the extreme instances it is impossible to separate them at any point. In other cases the process is more local, and the synechia may be limited to the front of the heart, leaving large portions of the base and of the left auricle free. The reflection of the pericardium at the great vessels and the adjacent mediastinal tissues may be uniformly infiltrated and the vessels surrounded by a solid mass. In Case X. "the layers of the pericardium were adherent and measured six to ten mm. in thickness, and showed groups of tubercles, many of which had fused together in uniform cheesy masses. The tubercles and caseous masses can be readily distinguished in each layer, since between them there is an infiltrated connective tissue which is free from tubercles. At the base of the heart the thickened pericardial layers formed a solid cheesy mass surrounding the aorta."

The membranes may reach a thickness of from three to ten millimetres, the increase being due to the growth in the leaves of tubercles, the development of caseous masses, and to the new growth of connective tissue. Frequently it can be seen that the two enormously thickened layers are united by a clear, infiltrated tissue, which may itself not present any tubercles. In the earlier stages of this process the membranes are little, if at all, thickened, the tubercles are seen just beneath the endothelial layer, and there may or may not be a fresh exudate of yellowish fibrin. In other instances the contiguous surfaces of the thickened layers are covered with flat, yellowish caseous masses, as noted in Case II. Collections of thick cheesy pus are occasionally found between the layers.

The condition of the heart in this chronic adhesive form is most interesting. As is usual in adherent pericardium, particularly when the layers are very thick, there is enlargement of the organ, which may reach an extreme grade. In Case XIV. the heart with the thickened pericardial membranes weighed thirty-six ounces. At the time of death

the cardiac muscle is more or less degenerated, and may show fatty or fibroid changes. The tuberculous process rarely invades the ventricular muscle, though the thin auricle may be much infiltrated, as in Case XV., in which the appendix was converted in great part into cheesy material, only a thin film of muscle substance remaining.

In the cases with effusion there may be—(a) a simple plastic exudate similar to that of ordinary rheumatic pericarditis, with little or no serous effusion, and with scarcely any thickening of the membrane, the eruption of miliary tubercles alone indicating the nature of the process. More commonly there is (b) extensive sero-fibrinous exudate, consisting of flakes of lymph and a turbid serum. When the process lasts for any length of time, the membranes, as in Cases XV. and XVI., may be very greatly thickened and the anatomical picture may resemble very closely that of a fatal case of rheumatic pericarditis. The tubercles, however, can be seen with distinctness in the membranes, and there are usually flat areas of cheesy infiltration beneath the fibrinous layers. (c) In some cases the exudate is hemorrhagic, as in Cases I. and VIII. of my series. The membranes here may be deeply engorged, and hemorrhagic foci may be seen in them. The color of the effusion may be bright red, but is more commonly a reddish-brown or chocolate color. The amount of the effusion may be large, ranging from 500 c.c. to 2000 or 3000 c.c. An instance of most extensive effusion has been reported by Musser, with whom, when his colleague at the Philadelphia Hospital, I had an opportunity of seeing the case. The patient, a colored man, aged twenty, was admitted to the Philadelphia Hospital on the fifth week of an illness characterized by cough, dyspnoea, and irregular chills. There was extreme orthopnoea. There was absolute dullness over the greater part of the left chest from the second rib in front and from the middle of the vertebral column in the infra-scapular region. Thirty-seven ounces of a bloody fluid were aspirated, presumably from the pleural cavity. A distinct friction sound was heard after the aspiration, and it was thought that he had both pleurisy and pericarditis. At the post-mortem the pericardial sac contained sixty-four ounces of bloody serum. There were tubercles in both layers of the pericardium, also in the left pleura. The bronchial glands were enlarged and caseous. And, lastly, (d) the effusion may be purulent, and this, too, apparently from the outset and not following paracentesis. The exudation may be enormous, and the cases have been diagnosticated as left-sided empyema. In Kast's case, already referred to, the inflammation was due to perforation of a softened mediastinal lymph gland into the pericardium. No instance of purulent exudate has come under my direct care.

CLINICAL HISTORY.—We may recognize four groups of cases.
First group: Latent tuberculous pericarditis. A considerable number

of all the cases on record belong here. The disease is discovered accidentally in individuals who have died of other affections, or of chronic pulmonary tuberculosis. An interesting illustration of this was Case XI., a well-nourished old man of seventy-two years, who was admitted to my wards in the Philadelphia Hospital with pneumonia, of which he died. There was no suspicion whatever that the pericardium was involved. As already mentioned there was found an adherent, greatly thickened, tuberculous pericardium; calcification of the bronchial glands, but no tubercles in other parts of the body.

In Cases VI., XII., XIII., and XIV. the disease was also latent, and there was no suspicion of pericarditis during life.

Second group: With symptoms of cardiac insufficiency following the dilatation and hypertrophy consequent upon chronic adhesive pericarditis. The clinical features are really those of cardiac dropsy.

CASE XIV.—W. H. T., aged fifty-two years, admitted to ward F of the Johns Hopkins Hospital, June 27th, 1889, complaining of shortness of breath, swelling of the legs, and incontinence of urine.

Family history good. Father died of acute pleurisy, mother of old age, two brothers died when young.

The patient has had scarlet fever, measles, and malaria; denies syphilis. Has had rheumatic pains, but has never been in bed with acute rheumatism. Has used tobacco freely, alcohol in moderation. He was well and strong until two years ago, when he had a "bilious attack," and was in bed three weeks. He was well last winter until February, when he began to be short of breath and had a cough, which has lasted until the present time. About four weeks ago the shortness of breath increased, and his feet became swollen.

Present condition: An emaciated man, with dry, harsh skin; legs and serotum oedematous; abdomen not swollen. Pulse, 104, tension increased; temperature, 102°.

Heart: Apex beat faintly visible in the fourth interspace; palpable in the nipple line; feeble. Cardiac dullness begins as high as second left interspace, near sternum. To the right it extends 2.5 cm. beyond the sternum; there is no thrill. The sounds are feeble; the second louder, more marked than the first. At the apex the diastolic pause is shortened—the sounds succeed each other at equal intervals of time; the second, at the left margin of sternum, is re-duplicated.

Careful examinations of the heart on the 1st and 2d of July showed as a special feature the flatness extending into the second left interspace; the impulse was extremely feeble; the sounds were clear, and in the third and fourth interspaces quite loud; the second was accentuated. At the aortic cartilage the second was feeble.

Lungs: Clear anteriorly; resonance defective at right base. There were numerous râles at base and cracking râles over the left mammary region.

Abdomen: Soft; liver and spleen normal.

Urine clear; no albumin, no casts; sp. gr., 1010.

The case was regarded as one of cardiac hypertrophy and dilatation

without valve disease. He was given tincture of digitalis every four hours, and saline purges.

He failed rapidly; the heart became very feeble; Cheyne-Stokes breathing developed, and he died on the morning of the 5th.

On admission the temperature was 102°, but after this did not rise above 99°, except on the evening of the 30th.

Abstract of autopsy (by Dr. Welch). Peritoneum smooth. In the thorax there were extensive adhesions on both sides. The pericardial sac was obliterated. The heart occupied an unusually large area. The surface was everywhere covered by a yellowish-white opaque layer, consisting of firm connective tissue and caseous matter, containing, especially on the surface, numerous gray and cheesy milinary tubercles. These exudations averaged 1 cm. in thickness over the whole surface, the thickest being over the outer surface of the ventricle. The heart, including the thickened pericardium and the base of the aorta, weighed thirty-six ounces. The myocardium was pale yellowish-brown, soft, with mottled fatty degenerations beneath the endocardium. In the apex of the left ventricle there were a few parietal thrombi. The thickness of the wall of the left ventricle was 18 mm.; of the wall of the right, 6 mm. The cavities were dilated; the aortic valves slightly thickened, but competent. The mitral orifice admitted three fingers. The valve segments were a little thickened. There were small gray tubercles on the endocardium of the right auricle about the orifice of the superior vena.

The lungs were oedematous and deeply pigmented; they contained many gray, fibroid, not cheesy tubercles.

There were abundant milinary tubercles on the omentum. The spleen contained a few milinary tubercles. The kidneys presented a number of opaque caseous masses, many in streaks. The liver, also presented a few tubercles. In the intestines there were a few scattered milinary tubercles in mucous and submucous layers, but no ulcers. There were no tubercles in the brain.

In the chronic adhesive form of tuberculous, as of simple, pericarditis, the clinical features may be those of cardiac dropsy, and a diagnosis is made either of simple hypertrophy and dilatation of the heart when, as in the case just given, there are no special auscultatory signs, or of mitral insufficiency when there is at the apex a loud blowing murmur. The diagnosis of adherent pericardium, always uncertain, is doubly so in cases admitted with dyspnoea, dropsy, and the signs of cardiac dilatation, since under these circumstances it is almost impossible to make a satisfactory physical examination.

Third group: Acute tuberculous. The clinical picture may be that of an acute tuberculosis, either general or with cerebro-spinal manifestations. The following is a good illustration of an acute milinary tuberculosis, the primary disease being in all probability in the mediastinal glands and pericardium:

CASE XIII.—Moses B., aged twenty-four years, admitted to ward F of Johns Hopkins Hospital, January 25, 1890, complaining of cough and loss of strength. Owing to mental dulness and apathy it was difficult to get any satisfactory information from the patient as to his family or

personal history. He states that his present illness began only three weeks ago, though he has had a slight cough all winter. Since the onset of the illness he has been in bed and has had fever, cough, and night-sweats. There has been loss of appetite and great weakness.

Present condition: Temperature, 100.8°. Patient looks very heavy and dull; there are sordes on the lips, and the tongue is covered with a brownish fur. The skin shows traces of a squamous syphilide and there are well-marked nodes on the shins. The respirations are 37. The expectoration is muco-purulent and is at times blood tinged. The physical examination of the lungs gives clear percussion resonance, the note perhaps a little higher in pitch at both bases behind. Anteriorly there are numerous piping and moist râles on the left side below the third rib; behind, the râles are universal.

Heart: Apex beat in fifth interspace below the nipple. The area of dullness does not appear to be increased. The first sound is very feeble and muffled at the apex, and possibly accompanied with a soft murmur. The second sound is well heard at the base, and both sounds are unusually loud to the right of the sternum in the sixth intercostal space. The examination of the abdomen is negative.

During the three days the patient was in the hospital there was irregular fever (from 101° to 103°), increasing debility, with hurried respirations, tremor of the extremities, and gradual failure of the heart. The bubbling râles were so numerous with inspiration and expiration, that it was impossible to hear the heart sounds. The examination of the sputum was negative. The urine was dark-yellow in color, acid, trace of albumin, and there were several casts seen. The diagnosis of acute tuberculosis was made.

Autopsy (by Dr. Welch). Abstract: Body of a large, strongly built, well-nourished, muscular man; macular eruption present on the skin; large node on the left tibia.

No special changes in the brain.

The deep cervical glands slightly enlarged, containing numerous small tubercles and caseous areas. Extensive pleural adhesions on both sides. Both layers of the pericardium were adherent over the entire heart, greatly thickened, and contained in the membranes numerous miliary tubercles. The anterior mediastinal lymph glands were enlarged and presented numerous miliary tubercles and caseous masses. The heart was enlarged and dilated. The length of the left ventricle from apex to edge of aortic valve, 13 cm.; thickness of wall of the left ventricle, 16 mm.; the columnæ carneæ in the left ventricle were extremely prominent.

The lungs were congested throughout, œdematous, and contained scattered tubercles surrounded by areas of pneumonia. No caseation except in the tubercles themselves. The mesenteric glands were enlarged and those near the spleen were caseous. The kidneys showed much fatty degeneration in the convoluted tubules.

In the following case the tuberculosis was chiefly manifested in the cerebro-spinal meninges, and the clinical picture was that of ordinary tuberculous meningitis:

CASE XIV.—John T., aged sixteen years, admitted to ward F of Johns Hopkins Hospital, November 5, 1889, complaining of pain in back and head. Patient is well-nourished, not emaciated.

His mother is dead; father, five brothers, and six sisters living and well; does not know of what his mother died; says he has been ill for three weeks with headaches, tired feelings, pains over the body. He has been obstinately constipated for ten days; has been in bed for two weeks; says he had a chill a week ago. When admitted he looked very ill; temperature, 95° . After having been in bed for two hours with hot bottles to his feet, temperature rose to 98° . He passed a quiet night; temperature rose to 101° at 8 p.m.; pulse, 72.

On the 6th, the examination revealed the following: Tongue heavily coated, white. Patient is rational, answers questions well, but shows a great dislike to be moved in bed; lies on the left side with the head a little drawn back, and when an attempt is made to move him he resists, saying that it is painful. There is no paralysis; pupils are of medium size and active. Abdomen not swollen, not tender. Spleen not enlarged. Heart sounds are clear at apex and at base. Examination of lungs negative.

On the 7th and 8th he was much worse; became apathetic; rambled; the temperature ranged from 97° to 102° . Heart was examined again on the 8th, and the note reads: "Sounds at apex and base are quite clear."

On the 9th and 10th the meningeal symptoms were more pronounced; he became unconscious and the discharges were passed involuntarily. At times the arms and legs seemed a little stiff, resisting flexion. Pupils moderately dilated; convergent squint in left eye; the retinal veins slightly distended and engorged; no swelling of the disks, but the physiological cupping was absent.

On the 11th there was a good deal of rigidity of the arms and of neck. Abdomen retracted. Death took place on the morning of the 12th.

The case was regarded as one of meningitis, probably tuberculous. There were no features calling special attention to the heart.

Autopsy (by Dr. Welch). Abstract: In thorax, glands at root of neck and in mediastinum enlarged and caseous. A very large caseous gland lay just beneath the ensiform cartilage. One was closely adherent to the pericardium. Some of these glands were full of miliary tubercles. The external surface of the pericardium was thickly studded with small tubercles. The two layers of pericardium were adherent, and between them was a mass of partly caseous, partly gelatinous-looking tissue from two to fourteen millimetres in thickness. Over the left ventricle was a small cavity filled with cheesy pus. The heart weighed 542 grammes. The muscle substance was firm. Wall of left ventricle, 14 mm.; of right, 3 mm. Valves were normal.

The lungs presented numerous irregular areas of hemorrhage, chiefly beneath the pleura. There were no tubercles. On the pleural surface of the diaphragm, extending from the pericardium on the right side, there were a few miliary tubercles. No special changes in liver, spleen, and kidneys. The brain and spinal cord presented a typical picture of tuberculous meningitis.

Fourth group: Cases with symptoms of acute pericarditis. This group, the most important in many respects, includes cases in which the pericarditis is acute and accompanied with more or less exudation of a sero-fibrinous, hemorrhagic, or purulent character. Here,

too, the process may be latent, as in Case VII., a young man aged twenty-eight years, who died under my care, of hæmoptysis. There was chronic tuberculosis of both lungs with extensive pleural adhesions. "The layers of the pericardium were united by soft adhesions, which could be readily torn through. On each membrane were innumerable small granulations, and here and there a nodular tubercle from one to two millimetres in diameter." This case is of special interest, as it shows the first stages of the process which ultimately causes enormous thickening of the pericardial membranes with universal adhesions. The tubercles, when small, may be readily overlooked. Acute plastic pericarditis in chronic tuberculosis is not, however, always due to the eruption of miliary tubercles. In two recent autopsies on patients with chronic pulmonary tuberculosis dying in my wards there was simple pericarditis without a trace of tubercles, and with little or no exudation. The following case, which was admitted to ward E under the care of Dr. Thayer in my absence, illustrates the mode of onset and the clinical features of a tuberculous pericarditis which came on in a strong, well-developed, muscular man, and proved fatal within three weeks:

CASE XV.—John P., aged thirty-eight years, admitted August 18th, with swelling of the legs and dyspnoea. The family history is good. He has been, as a rule, healthy, though in his childhood and youth he had many of the infectious diseases. He has been a moderate drinker. He denies syphilis. The present illness began about two weeks ago with pain in the left shoulder and about the heart. Feet began to swell ten days ago, and he has had cough and shortness of breath for about the same length of time. He has had no nausea; his appetite has been fairly good. Within the past few days he has become much worse.

On admission the patient had intense orthopnoea; pulse 130, but moderately full. He had a distressing cough, with clear watery expectoration. There was great œdema of the lower extremities and of the scrotum. The finger-tips and mucous membranes were bluish in color. In the examination of the heart at the time no murmur could be detected, but the second sound was accentuated at the pulmonary cartilage.

On the following morning the patient was quiet; respirations 28 to the minute; pulse 84, the beats irregular both in rhythm and force, the volume fair, and tension not diminished.

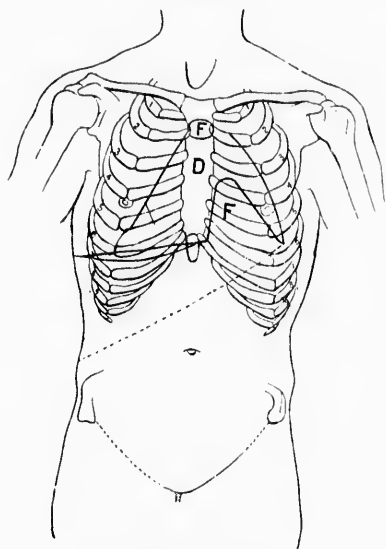
Thorax apparently symmetrical, but the manubrium very prominent, expansion equal. In front, resonance on both sides good, though on the left side flatness begins at the fifth rib midway between the nipple and axillary line, and the dulness seems here to be somewhat movable. There are numerous sibilant and sonorous râles to be heard in front. Passing down the left side and into the axilla, the breath-sounds become more feeble and fine moist râles are heard. Pitch of resonance at the extreme left base is higher than at the right, and the vocal resonance is somewhat diminished.

On auscultation there are numerous coarse and medium fine râles to be heard at both bases. At the extreme left base the respiratory murmur is almost absent.

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Heart: Point of maximum impulse difficult to localize; slight general heaving over the whole præcordial area; relative dullness begins above at second rib and extends well to the right of the sternum. The prominence, c above noted is just at the junction of the manubrium and gladiolus, and just at this point there is dullness over a very limited area. Relative dullness extends outward to a point nearly 5 cm. outside

CHART I.



D. Dull area. F. Flat area.

the nipple. (Chart I.) The heart-sounds are heard with the greatest intensity at the fifth space a little inside of the nipple line. There the first sound is full and booming; the second not so loud. Passing inward toward the sternum the sounds become associated with a superficial, soft, squeaking sound, diastolic in time, heard loudest over the mid-sternum, and pericardial in character. This is heard faintly all over the base. The murmur is more distinct in forced expiration than during inspiration. The second pulmonie is a trifle louder than the second aortic sound. The radial pulses are equal in volume, and there is no pulsation in the upper sternal notch; there is no tracheal tugging. The examination of the abdominal organs is negative. The urine is yellow-colored, acid, sp. gr. 1024, distinct trace of albumin; several hyaline casts were found. Throughout the 20th and 21st the patient remained in much the same condition. On the 22d there was a slight rise in temperature to 100.5° ; the pulse varied greatly in rate and character; at noon was slow, regular, and full, from 70 to 90 per minute,

and again was as rapid as 140. The patient, in many respects, was better. The edema of the legs had disappeared. The urine had increased in quantity. On the 19th only 180 c.c., and on the 20th 350 c.c. had been passed. On the 21st and 22d the amounts were 700 and 1100 c.c.

23d. The temperature has been between 97° and 98°; at the morning visit the pulse was 148, regular in force and rhythm; the respirations 32. The patient was lying quietly on left side. The physical signs practically those noted above with the exception that there is an extension of the edema at the bases of the lung. The patient died suddenly at 4.30 p.m. to-day.

Autopsy (by Dr. Flexner). Large, muscular man; moderate edema of the legs and of the subcutaneous tissue of trunk. Fat well retained, both beneath skin and in omentum and mesentery.

Pericardium is adherent to the left pleura; the sac thickened and contains a considerable amount of clear serum. Both layers are covered with a thick fibrous deposit, looking like a hairy coat. The thickness of the pericardium over the heart is 3 mm. When incised the thickened layer is grayish in color, with many opaque or yellowish points scattered here and there, often continuous, and having the well-recognized characteristics of tubercles of this membrane. The heart was greatly enlarged. The valves were normal. The thickness of the left ventricle was 17 mm.; length of ventricle, 8½ cm.; mitral orifice, 10½ cm. in circumference. Thickness of right ventricle, 6 mm.; tricuspid orifice, 12 cm. in circumference. The walls of the auricular appendix are almost completely converted into a grayish-white material with only a thin internal film which appears like muscle. In the endocardium of the left ventricle are numerous ecchymoses. There are also a few small ones on the right ventricle and in the auricles, and on the endocardium of the auricles are a few small, round, whitish miliary tubercles.

The left pleura is much thickened; parietal and costal layers adherent in places, but where not in actual contact there is clear serum between them. The costal pleura strips up with difficulty, and is very hard and cuts like cartilage. The diaphragmatic pleura is especially thickened, and on section it is seen to be composed of a dense, almost cartilaginous, grayish tissue, containing yellow, opaque, caseous masses. The apex of the left lung is retracted, hard to the touch, and on section contains a dense, deeply pigmented connective tissue, and old areas of caseation; no calcification. There are a few small foci of miliary tubercles, and scattered fibrous tubercles elsewhere in the lung.

The right lung is voluminous, and in the greater part of its extent free from adhesions, but the pleural surfaces present numerous grayish-white elevated masses, single and conglomerate, which can be scraped off with difficulty. The costal pleura presents similar tubercles. About these there are, here and there, fresh fibrin. In the apex the upper lobe presents a few foci of fibrous miliary tubercles.

The spleen contains a few scattered tubercles. Nothing of note in the abdominal viscera; the intestines did not present tubercles.

Here there was no suspicion before death that the process was tuberculous, nor in reality was there any clue to indicate that this was the possible nature of the trouble.

The following instance is the only one which has come under my

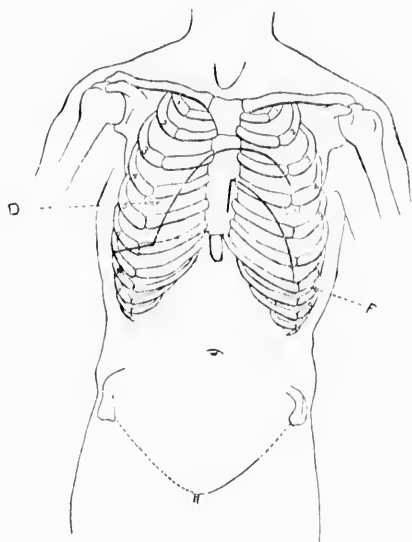
notice, in which the diagnosis of tuberculous pericarditis was made with reasonable degree of probability.

CASE XVI.—E. B., aged thirty-nine years, washerwoman, colored; admitted to ward G of the Johns Hopkins Hospital, July 18, 1892, complaining of pain and swelling in the abdomen, swelling of the feet, and cough.

So far as could be gathered the family history is good. She has two brothers and four sisters living and well.

The patient is a married woman, has had two children, one miscarriage. Has had uterine trouble at times, but has been quite regular until

CHART II.



D. Dull area. F. Flat area.

two months ago. Since childhood, during which she had the ordinary infectious diseases, she has enjoyed very good health.

Her present illness began early in May, when she had shortness of breath, nausea, loss of appetite, and pain in the abdomen. The symptoms which she narrated are indefinite, and she speaks of headache and attacks of diarrhoea. The main points are that she has, during the past three months, been in bad health, has lost in weight, has had difficulty in digestion, and shortness of breath. About a month before admission she noticed some swelling in the abdomen, and about the same time the face became puffy. The feet began to swell four days ago. She has sometimes had attacks of coughing at night, but no expectoration. On

admission, the note made by Dr. Thayer was as follows: Rather sparsely nourished woman; dorsal decubitus; lips and mucous membranes somewhat pale; tongue slightly coated; respirations 30 per minute; pulse 104, regular in force and rhythm, tension not increased; temperature on admission 98.2°.

Expansion equal on both sides of the thorax. Percussion everywhere clear. On auscultation the only abnormal signs are fine moist râles during inspiration at both apices.

Heart: There is slight heaving in the cardiac area; the point of maximum impulse is hard to determine. The area of cardiac dullness, as indicated on Chart II., begins about the second rib and extends far to the right of the sternum. Flatness begins at the third. The general outline of the area as indicated is triangular, and it extends to the left, far down into the seventh interspace. This flatness in the cardiac region is distinctly movable.

On auscultation the sounds are feeble at the apex, become louder in the fourth and fifth interspaces, and are still more distinct at the base, where the second aortic sound is accentuated.

Abdomen: The abdomen is full, generally tympanitic, and the walls are a little tense. The liver flatness begins at the seventh rib in the nipple line, and extends five fingers' breadth below the costal margin. The edge is not distinctly palpable.

The spleen is not palpable.

There is now no swelling of the legs, but she states that they were swollen four days ago.

The urine was cloudy, acid, sp. gr. 1012; slight trace of albumin, no sugar, numerous leukocytes.

During the first ten days in hospital the patient improved. The temperature chart shows a great irregularity. The morning register was at 98° or 98.5°, and in the afternoon, between four and six o'clock, rising to 101°, sometimes to 103°. An ice-bag was placed over the heart and she was given stimulants. For the second ten days, from July 29th to August 8th, there was distinct improvement: the temperature was lower and only once reached 102°. On August 1st it was noted that the area of dullness was diminished, and there was a friction rub heard in the mid-sternal line—synchronous, however, with the respiratory, not with the cardiac movements. On the 3d it was noted that there was a well-marked rubbing friction heard in the second and third left interspaces, and heard as far out as the nipple line and over the sternum adjacent to these spaces. This was the first time since her admission that there was a well-marked friction sound. The pulse has been very variable, ranging from 98 to 112. The patient is brighter and seems to be improving.

Between August 8th and 20th the irregular fever persisted, and on several occasions rose in the afternoon to 103°. She complained at times of pain in the præcordial region and of general abdominal pain. The pulse has ranged from 109 to 125. The note on the 17th was as follows: "There is moderate heaving over the lower sternum and the epigastrium; the point of maximum impulse is rather difficult to determine. Relative dullness begins at the second rib and extends well to the right of the sternum. The absolute flatness, however, scarcely exceeds the normal limit. The heart-sounds heard at the outer limit of the dullness are very feeble, and the first is followed by a short systolic puff. Passing inward the murmur becomes louder, and it disappears above the fourth rib. In

the lower sternum there is a well-marked double friction murmur, soft, close to the ear, and resembling in this respect a pericardial murmur. The murmurs are more intense on forced inspiration."

From September 1st I saw the case daily.

September 11th. Note to-day was as follows: "The intermittent type of fever has persisted, temperature in the evening rising to 102.5°, and occasionally, as on September 6th, to above 103.5°. The pulse has been more rapid, frequently over 120. There has been a good deal of tenderness over the fourth and fifth costal cartilages on the right side.

"On percussion the flatness does not begin until the fourth rib, but extends beyond the right border of the sternum. The sounds at the apex are feeble, and there is heard here a slight pericardial friction murmur which becomes more distinct toward the ensiform cartilage. No endocardial murmur is heard. Of late the cough of which the patient complained on admission has become much more troublesome, but there is no expectoration. The percussion note at the left base is somewhat higher than at the right, and the breathing is feebler, and toward the axilla somewhat tubular in character. There are numerous râles at both bases. The abdomen is a little full and she complains of pain in it."

On the 13th a small quantity of muco purulent sputum was obtained which did not contain tubercle bacilli. During all this time, although the fever has persisted, she has, curiously enough, steadily gained in weight; thus on August 8th she weighed 104 pounds; on the 16th the same; on the 29th, 109 pounds; September 5th, 110; and September 13th, 114 pounds.

September 22d. The abdomen has become more swollen. On examination there was distinctly movable dullness, though fluctuation could not be readily obtained. There was tenderness in the region of the liver, but no nodular masses could be felt. The friction murmur up and down the sternum was more marked, and there was also heard on inspiration a creaking, leathery, friction sound. The physical signs in the lungs show increase in the râles which are heard over the whole of the right back. The tactile fremitus is a little increased, and resonance is defective at the right base. There is no pleural friction.

On the 25th it was noted particularly that the pitch of the percussion toward the outer side between the scapula and the axilla was higher, but without any trace of tympanitic quality. The pericardial murmurs are loud. During the past week the patient has been worse. There is more pain in the epigastric region, the cough is very worrying at night, and there is increasing œdema about the legs and the skin of the back.

At her own desire the patient was taken to her home on September 27th.

Up to September 1st the patient had been under the care of my first assistant, Dr. Thayer, and the case was regarded as one of pericarditis with effusion, and when he left for his vacation she seemed to be improving. During the time she was under my care I made her the subject of several very careful examinations, and repeatedly demonstrated the condition to the class of graduate students, and discussed frequently the probable nature of the trouble. The persistence of the fever and the marked involvement of the lungs suggested to my mind the possibility of the existence of tuberculosis. We could not, however,

for some time obtain any sputa for examination, but after September 1st, on several occasions she brought up a muco-purulent, and once an almost purulent expectoration, which was very thoroughly examined with negative results. Notwithstanding, it seemed to me that the case was unlike any ordinary rheumatic or septic pericarditis, and I felt justified in dictating, the last morning I saw her, "that the protracted course of the illness, the signs of pulmonary trouble, and swelling of the abdomen, make it probable that the patient has tuberculosis." Three days after her return home she died, and we were fortunate enough to secure an examination, which was kindly made by Dr. Flexner. The following is an abstract of his report:

Autopsy. There was a considerable quantity of clear serum in the peritoneum, both layers of which were smooth. There were no pleural adhesions, no tubercles on either layer. The pericardial space uncovered by lung unusually large, measuring 15 by 20 cm. The parietal pericardium is everywhere free. The outer surface shows numerous white elevations, many of which are confluent and more massed in some places than in others. On incision the layer is greatly thickened, in places as much as 6 mm. About 300 c.c. of turbid serum escaped. The visceral layer was everywhere covered with flaky, yellowish-white fibrin. On section this layer is greatly thickened and contains numerous yellowish, caseous masses; thus the thickness of the wall of the left ventricle is 3 cm., nearly one-half of which is the thickened pericardium. At the root of the aorta are masses of caseous glands, adherent to the pericardium. The weight of the heart with the thickened sac was 1110 grammes. The chambers were dilated. There was no valvular disease.

The lungs were voluminous, contained many scattered and conglomerate tubercles, many of which were just beneath the pleura. There was diffuse bronchitis, but there were no cavities. The bronchial glands were caseous. Liver, spleen, and kidney contained tubercles; those in the spleen were large and caseous. There were a few small tuberculous ulcers in the small intestines. The mesenteric glands and the glands about the pancreas were caseous.

DIAGNOSIS.—The diagnosis of tuberculous pericarditis is extremely uncertain. In the large group of cases in which the membranes are thickened and united, the difficulties are those which pertain to the recognition of adherent pericardium, difficulties which are enormously enhanced by the state of cardiac insufficiency with which these cases usually come under observation for the first time. In children with a history of repeated attacks of rheumatism, the bulging præcordium, systolic retraction at the apex, the fixation of the upper limit of cardiac dulness, and the diastolic rebound, speak for adherent pericardium; and if in a case of this sort there has been no history of rheumatism, and if, on the other hand, there are indications elsewhere of tuberculosis, a probable diagnosis may be made. In the cases which set in as acute pericarditis, unless there are evidences of tuberculosis in other parts, as, for instance, in the left pleura or in the peritoneum, or there are signs

of local disease in the lung and tubercle bacilli have been found in the expectoration, the diagnosis can rarely be made. The effusion may be equally as great in tuberculous as in rheumatic pericarditis. If paracentesis be performed, the presence of a bloody exudate is decidedly in favor of tuberculosis; once, at least, tubercle bacilli have been found (Kast). The clinical features themselves offer no criteria, though it would seem probable that in the acute cases with sero-fibrinous exudation the course is more protracted and the fever more irregular than in the ordinary forms of pericarditis; and in such a case, as in XVI. in my series, the development of diffuse signs in the lungs may lead to a strong suspicion that the process is tuberculous.

TREATMENT.—It is not improbable that tuberculosis of the pericardium may, as a similar process in the peritoneum, recover completely. Possibly some of the cases of simple adherent pericardium are instances of healed tuberculosis. The chronic adhesive form persists in all likelihood for years, producing few if any symptoms until the compensation fails in the hypertrophied and dilated heart.

It is highly probable that a majority of cases which terminate in general synecchia of the membranes present no clinical features; the process is slow, insidious, essentially chronic, and not associated with definite symptoms. A case which has set in acutely must be dealt with as any other form of pericarditis, the indications being, first, to limit, if possible, the intensity of the inflammation; and, secondly, to prevent the evil consequences of the presence of a large amount of fluid in the sac. We have no medicinal agents at our command which have any positive influence in controlling the ordinary inflammation of serous membranes. In *Guy's Hospital Reports* of a year or two ago, *apropos* of the treatment of pericarditis, there is a story told of Sir William Gull which is worth quoting in this connection. "He once met a practitioner on a case of rheumatism, in which he detected a pericardial rub. He said nothing of this to the patient's friends, but approved the general treatment, and they came away together. 'Oh, Dr. Gull, it was very good of you not to let them see I had made that dreadful oversight. I cannot think how I can possibly have failed to detect the pericarditis.' 'Never mind,' said Gull, 'it is just as well; for if you had detected it, perhaps you might have treated it.'" There is one measure in the utility of which we may have great confidence, namely, the ice-bag applied continuously over the pericardium. It allays the pain when present, and appears to check the tendency to effusion, while under its use an exudate may be absorbed with rapidity. It is very much to be preferred to blisters or the thermo-cautery. In some instances the patients complain very much of the intensity of the cold of the ice-bag, and in such I was in the habit, in Philadelphia, of using Leiter's coil, through which

the water flowed continuously, and it could be arranged to have any temperature thought necessary.

A second indication holds good in tuberculous as in other forms of pericarditis—when the effusion reaches a certain grade, and the pulse is irregular and feeble, the color becoming bad, the respirations hurried, paracentesis should be performed, or, if necessary, the sac freely incised and drained.

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ON DILATATION OF THE COLON
IN YOUNG CHILDREN.

BY WM. OSLER, M.D.,
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University, and Physician-in-Chief,
Johns Hopkins Hospital,
Baltimore, Md.

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ON DILATATION OF THE COLON IN YOUNG CHILDREN.*

BY WM. OSLER, M.D.,

Professor in Medicine in the Johns Hopkins University, and Physician-in-Chief, Johns Hopkins Hospital, Baltimore, Md.

A MODERATE grade of dilatation of the colon, by no means an uncommon condition, occurs at various periods of life, most commonly associated with chronic constipation. There are, in addition, instances on record of unusually great dilatation, either of the entire large bowel or of the sigmoid flexure; thus in the index catalogue there are twelve references to cases of dilatation and hypertrophy of the colon. The most extraordinary instance on record is that recorded recently by Dr. Formad:† the case of the Museum *freak* known as the *balloon-man* or the *wind-bag*. This individual, aged at the time of his death twenty-three years, had been of a constipated habit, and had had a distended abdomen ever since his earliest infancy. Post-mortem there was found to be no obstruction; the colon was as large as that of an ox, the circumference ranging from 15 to 30 inches. Its weight with the contents, was about forty-seven pounds. I had an opportunity of seeing this specimen with Dr. Formad shortly after its removal, and it is difficult to imagine how a gut of such enormous size could have been retained within the abdominal cavity.

A remarkably interesting specimen was shown at the Philadelphia Pathological Society in 1886 by Dr. W. E. Hughes.‡ The patient, a boy aged three, was troubled in early infancy with obstinate constipation, which became more marked as he grew older, and the abdomen gradually enlarged. The stools, however, which came away after the use of laxatives, were normal, not hard. The rectal injections seemed rather to aggravate the condition. In his second year, after an attack of enterocolitis, the constipation became more obstinate, and at one time he went nineteen days without a passage. In these periods he was restless and uneasy, but there was never any pain or vomiting. Enemata seemed to do but little good, and

* Read before the Johns Hopkins Hospital Medical Society, December 19, 1892.

† *University Medical Magazine*, 1892.

‡ Transactions of Philadelphia Pathological Society, vol. xiii.

strong purgatives alone seemed to be effectual. When first seen by Dr. Hughes, the belly was enormously enlarged, everywhere tympanitic, and showed through the thin walls greatly distended coils with waves of peristalsis. The child died in an attack of acute colitis. The autopsy showed nothing remarkable except the colon, which was enormously dilated and held fourteen pints of water. The greatest dilatation was in the neighborhood of the sigmoid flexure, where it was four inches in diameter. The muscular walls were enormously hypertrophied and increased in thickness towards the anus. There were a few shallow, rounded ulcers, and about the middle of the transverse colon a large area of recent inflammation. In this case the excessive dilatation was definitely associated with constipation, and Dr. Hughes was of the opinion that the continued use of large enemata had aggravated the tendency to distention of the intestine.

One can readily understand dilatation and hypertrophy of the colon being gradually induced in consequence of protracted constipation, but there are instances in which apparently from the earliest period of life the large bowel is inert and in which there would appear to be a tendency to dilatation without any protracted impaction of feces. The following cases are of interest in this connection:

CASE I.—John T. W., colored, aged ten, was admitted to Ward F of the Johns Hopkins Hospital Feb. 17, 1892, complaining of a swollen and painful abdomen. The boy was brought to the hospital by his relatives, who live outside the city, and as they were not seen by the attending physician, no history could be obtained. It is stated, however, that he had, for many years, trouble with his bowels, and had always had a large, prominent abdomen.

Present condition: Sparely built, somewhat emaciated lad, weighing only forty-seven-and-a-half pounds; lips and mucous membranes of good color. The ends of the bones are not enlarged, and he is not bow-legged. He is able to walk about, but the abdomen looks distended and large. There is no fever; the pulse is quiet. When stripped the contrast between the distended paunch and the emaciated thin limbs is very striking. (See Fig. from photograph.)

The thorax is symmetrical, and the lower zone is much distended by the enlarged abdomen. The ribs are a little beaded. The back shows several reddish, superficial

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scars, where the child has been beaten. The heart impulse cannot be distinctly localized, but is apparently under the fifth rib and a little inside the nipple line. The sounds are clear; the second a little accentuated. The examination of the lungs is negative.

The abdomen is greatly distended, measuring sixty-three cm. just above the navel. It is uniform; on palpation tense, painless, and no tumor masses can be felt. Percussion gives everywhere a tympanitic note. The spleen is not palpable, and the splenic dulness is masked by the tympany. The edge of the liver cannot be felt, and dulness is obliterated in the middle parasternal and nipple lines.

The urine was normal.

Nothing very definite was determined at first about the nature of the lad's illness. There was certainly neither ascites nor tumor, and the suggestion that it might be tabes mesenterica was negated. The child was kept in bed and given a good diet. The first and second day in hospital he had an ordinary movement from the bowels, not specially constipated.



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On the 22d, he had diarrhœa, six large liquid movements. On the 23d and 24th there was only one movement on each day, and then for three days he was constipated. Repeated examinations showed practically the same condition; enormous abdominal distension without any obvious cause. He complained of no pain, and we very soon let him go about the ward. At intervals he would be constipated, but this was readily relieved by a dose of castor oil, and never during the months of February and March did he go for more than two days without a movement. On several occasions he had, even without castor oil, loose fluid motions. All this time he had no fever, and was up and about the ward, and gained four pounds in weight.

On the night of the 23d, the patient had four loose fluid movements, and complained of abdominal pain. On the morning of the 24th, he vomited several times, and the abdomen seemed more distended, and the contractions of the intestinal coils were very plainly to be seen. On the night of the 24th, he was given several large injections which brought away formed masses of fœces. The abdomen measured in its largest area, seventy-four cm.; was tympanitic throughout; not very tender on pressure. The individual coils during peristalsis stand out very plainly. The outline of the colon could be distinctly seen, extending obliquely from the left lumbar region to the tip of the xiphoid cartilage. The examination externally and per rectum could determine no tumor. No flatus could be obtained with the rectal tube passed high up, but relief was obtained by introducing the tube far up and irrigating the bowel thoroughly, and with this a large quantity of fluid came away. The distention persisted throughout the 25th and 26th and 27th; the vomiting, however, was less, and the injections gave relief. The tenderness was less, and the distention of the abdomen was not so marked, being only sixty-nine-and-one-half cm. on the morning of the 27th. He was very much better the next day, but on the 29th he developed facial erysipelas, and was transferred to the infectious ward. Here the erysipelas ran a regular course, with very moderate and irregular fever, which persisted with intermissions until the 10th. When in the isolating ward the abdomen was not so distended; he had several attacks of constipation, but the bowels were readily moved by laxatives. During this time he had also several attacks in which there was great pain in the abdomen with in-

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crease in distention, and at this time the coils of the intestine became very marked. He was in the isolating ward for about ten days, and after his return to Ward F the abdomen was very large, measuring sometimes as much as eighty cm. in circumference, and he had several attacks of pain and vomiting. At no time in these vomiting attacks was the material brought up faecal in character. They were always relieved by the high enemata, which were given with the hips well elevated, and letting as much run in as possible from a height of six feet.

The increased frequency of these attacks of pain and vomiting made me feel that it would be advisable to have an exploratory operation in order to determine definitely whether there was any cause for the trouble, though it did not seem possible that there could be any obstruction, as the fluids passed so freely from the siphon syringe. Accordingly, he was transferred to the surgical department on April 20th, and Dr. Halsted performed abdominal section. The following is an abstract of the notes from the surgical protocol:

Under ether a long incision was made in the median line, extending from a little below the ensiform cartilage to a little above the pubes. When the incision was completed an enormously enlarged colon rolled out upon the abdominal walls. The entire gut was enlarged. It was the greatest at the sigmoid flexure, where the measurement was exactly forty-five cm. in circumference. The cæcum was about half this size, and the bowel progressively increased in diameter in the ascending, transverse and descending portions. The sigmoid flexure was twisted on itself, but not so as to cause any obstruction. During the operation the rectum was thoroughly examined by Dr. Osler, whose finger could be readily felt by the hand of the operator, and no structure could be determined anywhere. A moderate sized faecal mass existed in the rectum, not impacted, and after removal of this the tube was passed, but the distended colon did not empty itself through this. The small intestines were normal in size and appearance, and nearly empty. The intestines were wrapped in warm gauze, which was also packed around the incision.

Dr. Halsted then proceeded to make an artificial anus, opening the bowel at the most prominent part of the sigmoid flexure. A very large quantity of yellowish fluid faecal matter escaped with gas. The muscular coats of

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the bowel were very much thickened; the mucous membrane seemed normal.

The boy did remarkably well and was sitting up in a chair on April 29th. His appetite and general condition improved; he gained in weight, and he had no further abdominal symptoms whatever. There was no tympanites, and he passed the feces through the artificial anus.

Unfortunately, we have not been able to obtain any account of the first years of this child's life, further than that he had always had a prominent abdomen, and had trouble with the bowels. It may be, of course, that the enormous distention present when he came under our observation was only the sequence of protracted constipation, but as mentioned in the history, there was not at any time during his stay in the hospital impaction of feces, and the attacks of distention, colic and vomiting were, as a rule, readily relieved by simple injections, and at no time were hard, scybalous masses seen. The grade of dilatation in this case was extreme, a circumference of forty-five cm. (about eighteen inches), which equalled the circumference of the ascending colon in Dr. Formad's case. I must say that the attacks of vomiting, with increase in the distention, great tension of the abdominal walls, and visible coils in active peristalsis, excited the suspicion that possibly there was a stricture of some sort in the sigmoid flexure. It was for the purpose of exploring the large intestine that the laparotomy was performed. To have made an artificial anus in the case seems a serious measure, but the child's condition had become very distressing, and the rapid improvement which followed the operation is itself the best justification. Dr. Platt, under whose care the boy is at present, informs me that the boy's general condition is good, and that it is his intention to try to reestablish the continuity of the bowel.

CASE II.—R. A., aged seven months, admitted June 12, 1891, with constipation. Father and mother are healthy and well. The first child, born November 20, 1889, natural labor. At about the seventh month the child had stomach trouble, continued diarrhoea, and died suddenly.

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The present is the third child. When born was a healthy, large child. It was noticed from the outset that the child's napkins were not soiled. The abdomen became swollen and very tense, but the doctor made an examination, passed a catheter, and the black, tar-like feces were brought away. From the time of its birth the child has had only five or six natural evacuations. A careful examination of the rectum was made shortly after the child's birth, but no stricture was found, and large sized dilators were passed easily. Sometimes the fecal matter was hard and was with difficulty removed. In spite of this the child thrived and seemed perfectly well, was well nourished and did not cry or was not specially distressed so long as the bowels were thoroughly relieved every day by the injection. If not relieved the abdomen would swell and the child would vomit very much, at times large quantities of material which were sometimes bile-stained. Until two weeks ago the child seemed healthy and looked natural. At this time he began to be feverish, the gums were swollen, he cried a great deal, and had much vomiting when the bowels were not relieved, and the mother is sure there was a great deal of pain when the abdomen was distended. He has lost in weight and has not nursed so well.

Present condition: Bright looking child, moderately well nourished, rather small for its age; tongue is clean; no teeth as yet cut. The abdomen is greatly distended and very tense. The costal margins and the ensiform cartilage are strongly everted. The outlines of the coils of the intestines are distinct, particularly one very large coil passing transversely between the navel and the ensiform cartilage. There are no vermicular movements visible, but the mother states that they are often to be seen very plainly. On palpation the tension is considerable; there is no pain except on deep pressure; no fecal masses; no tumor to be felt, but there is much gurgling of flatus. The liver dullness is almost obliterated; the spleen is not palpable. The examination of the rectum by the finger is negative. It did not seem to me that the sphincter was especially tight, but Dr. Halsted, who subsequently examined the child, thought that it was a little more resistant and tighter than normal. A catheter is passed without any difficulty, and when it reaches a distance of eight inches much gas escapes, and if there has been a previous injection of water, fluid feces. The usual routine the mother follows to relieve the bowels is to

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inject a few ounces of water an hour or two before she passes the catheter, which she then inserts to a distance of about six or seven inches, and gas and feces come away. The abdomen becomes flat and soft at once after the escape of the flatus and feces. The contrast between the tense, enormously distended abdomen in the morning after having been for twenty-four hours without an evacuation, and immediately after the use of the catheter is very remarkable.

The patient was only under observation for about two weeks, and presented no change during this time. The distention did not seem to be due to obstruction, nor did it appear to be influenced at all by the use of free injections. The mother was advised to relieve the child's bowels with the catheter several times in the day, so as not to allow the flatus and feces to distend the colon.

The mother wrote seven or eight months after she left the hospital saying that the child's condition remained practically the same.

Here we may possibly have an illustration of the early condition which leads ultimately to the enormous dilatation and hypertrophy met with in the last case and in the one reported by Formad. From birth there seems to have been an inability in the large bowel to empty itself, and this certainly was not, I think, associated with any degree of tightness of the sphincter, through which the index finger passed without any difficulty.

The important matter in the treatment of these cases would be the careful regulation of the diet, and in very young children relieving the distention by irrigation several times in the day so as to prevent the accumulation of liquids.

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Physic and Physicians

AS DEPICTED IN PLATO.

*Read before the Johns Hopkins Hospital Historical Club,
December 14, 1892.*

BY

WILLIAM OSLER, M.D., F.R.C.P. (LOND.),
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BALTIMORE.

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April 22 1893

17, Manchester Square.
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Dear Professor Osler

It is very kind of you to
send me a copy of your very
interesting address on *Physic and*
Physicians, as depicted in *Plato*.
I congratulate your university
on having one, who in the best
sense, is a laudator temporis
acti. I for one fully acknow-
ledge the enormous strides
taken by modern medical

you, the neurophysiologist, in the
in Epidaurus or at Athens itself. Could the Greek
live over his parental troubles at the end of the nine-

Science, which particularly in
its preventive and sanitary
aspect must be regarded as entirely
an achievement of our day.
But at the same time the more
I know of the Accidents, the more
I feel that we have scarcely done
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cultivated than historical re-
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present day is to exalt the pre-
sent unduly and I am not one
of those who regard all educa-
tion from what is called a
practical³ point of view. We
are taught needlessly by going back
into antiquity and scarcely a
day passes that I do not learn
to appreciate more and more
the *Horatius*, *Vixere* *fortes* and the
Agamemnonia. - Yours faithfully.

son, the "hero-physician," *Aesculapius*, at his temple
in Epidaurus or at Athens itself. Could the Greek
live over his parental troubles at the end of the nine-

but has been one of my aids in the
field. May I ask whether your
university library contains a copy
of the autotype reproduction of
Harvey's W. S. lectures delivered
in 1816 and onwards, brought
out under the auspices of the Royal
College of Physicians in 1886?

With renewed thanks I am
yours very truly

Edw^d H. Sieveking

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PHYSIC AND PHYSICIANS AS DEPICTED
IN PLATO.

OUR Historical Club had under consideration last winter the subject of Greek Medicine. After introductory remarks and a description of the Æsculapian temples and worship by Dr. Welch, we proceeded to a systematic study of the Hippocratic writings, taking up in order, as found in them, medicine, hygiene, surgery, and gynaecology. Among much of interest which we gleaned, not the least important was the knowledge that as an art, medicine had made, even before Hippocrates, great progress, as much almost as was possible without a basis in the sciences of anatomy and physiology. Minds inquisitive, acute, and independent had been studying the problems of nature and of man; and several among the pre-Socratic philosophers had been distinguished physicians, notably, Pythagoras, Empedocles, and Democritus. Unfortunately we know but little of their views, or even the subjects in medicine on which they wrote. In the case of Democritus, however, Diogenes Laërtius has preserved a list of his medical writings, which intensifies the regret at the loss of the works of this great man, the title of one of whose essays, "On Those who are Attacked with Cough after Illness" indicates a critical observation of disease, which Daremberg seems unwilling to allow to the pre-Hippocratic philosopher-physicians.

We gathered also that in the golden age of Greece, medicine had, as to-day, a triple relationship, with science, with gymnastics, and with theology. We can imagine an Athenian father of the middle of the fourth century worried about the enfeebled health of one of his growing lads, asking the advice of Hippocrates about a suspicious cough, or sending him to the palestra of Taureas for a systematic course in gymnastics; or, as Socrates advised, "when human skill was exhausted" asking the assistance of the divine Apollo, through his son, the "hero-physician," Æsculapius, at his temple in Epidaurus or at Athens itself. Could the Greek live over his parental troubles at the end of the nine-

teenth century he would get a more exact diagnosis and a more rational treatment; he might travel far to find so eminent a "professor" of gymnastics as Miceus for his boy, and in Christian science or faith-healing he would find our bastard substitute for the stately and gracious worship of the Æsculapian temple.¹

From the Hippocratic writings alone we have a very imperfect knowledge of the state of medicine in the most brilliant period of Grecian history; and many details relating to the character and to the life of physicians are gleaned only from secular authors. So much of the daily life of a civilized community relates to problems of health and disease that the great writers of every age of necessity throw an important side-light, not only on the opinions of the people on these questions, but often on the condition of special knowledge in various branches. Thus, as Dr. Billings has just told us, a considerable literature already illustrates the medical knowledge of Shakespeare, from whose doctors, apothecaries, and mad-folk much may be gathered as to the state of the profession in the latter part of the sixteenth century. So also the satire of Molière, malicious though it be, has preserved for us phases of medical life in the seventeenth century, for which we scan in vain the strictly medical writings of that period; and writers of our own times, like George Eliot, have told for future generations in a character such as Lydgate, the little every-day details of the struggles and aspirations of the profession of this century, of which we find no account whatever in the files of the *Lancet*.

We are fortunate in having had preserved the writings of the two most famous of the Greek philosophers. The great idealist, Plato, whose "contemplation of all time and all existence" was more searching than his predecessors, fuller than any of his disciples; and the great realist, Aristotle, to whose memory every department of knowledge still pays homage, and who has swayed the master-minds of twenty-two centuries. From the writings of both much may be gathered about Greek physic and physicians; and I propose this evening to give you what I have called from the "Dialogues of Plato." I shall first speak of his physiological and pathological speculations; then I shall refer to the many interesting allusions to, and analogies drawn

¹ For an account of "Æsculapian at Epidaurus and Athens" see Dyer's "Gods of Greece" (MacMillan, 1891), a chapter which contains also an excellent discussion on the relation of secular to priestly medicine. In Chapter III of Pater's delightful story, "Marius the Epicurean," is a description of one of the Roman Æsculapian, and an account of the method of procedure in the "cure," the ridiculous aspects of which are so graphically described in the "Plutus" of Aristophanes.

from, medicine and physicians; and, lastly, I shall try to estimate from the "Dialogues" the social standing of the Greek doctor, and shall speak on other points which bear upon the general condition of the profession. The quotations are made in every instance from Professor Jowett's translation, either the first edition, 1871, or the third, 1892.²

I.

To our enlightened minds the anatomy and physiology of Plato are crude and imperfect; as much or even more so than those of Hippocrates. He conceived the elements to be made up of bodies in the form of triangles, the different varieties and combinations of which accounted for the existence of the four elementary bodies of Empedocles — fire, earth, water, and air. The differences in the elementary bodies are due to differences in the size and arrangement of the elementary triangles, which, like the atoms of the atomist, are too small to be visible. Marrow had the most perfect of the elementary triangles, and from it bone, flesh, and the other structures of the body were made. "God took such of the primary triangles as were straight and smooth, and were adapted by their perfection to produce fire and water, and air and earth; these, I say, he separated from their kinds, and mingling them in due proportions with one another, made the marrow out of them to be a universal seed of the whole race of mankind; and in this seed he then planted and enclosed the souls, and in the original distribution gave to the marrow as many and various forms as the different kinds of souls were hereafter to receive. That which, like a field, was to receive the divine seed, he made round every way, and called that portion of the marrow brain, intending that, when an animal was perfected, the vessel containing this substance should be the head; but that which was intended to contain the remaining and mortal part of the soul he distributed into figures at once round and elongated, and he called them all by the name 'marrow'; and to these, as to anchors, fastening the bonds of the whole soul, he proceeded to fashion around them the entire framework of our body, constructing for the marrow, first of all, a complete covering of bone."³

The account of the structure of bone and flesh, and of functions of respiration, digestion, and circulation is

² The Dialogues of Plato, translated into English by B. Jowett, M.A., Master of Balliol College, Oxford. At the Clarendon press, first edition, 1871; third edition, 1892.

³ *Timæus*.

unintelligible to our modern notions. Plato knew that the blood was in constant motion; in speaking of inspiration and expiration, and the network of fire which interpenetrates the body, he says: "For when the respiration is going in and out, and the fire, which is fast bound within, follows it, and ever and anon moving to and fro enters the belly and reaches the meat and drink, it dissolves them, and dividing them into small portions, and guiding them through the passages where it goes, pumps them us from a fountain into the channels of the veins, and makes the stream of the veins flow through the body as through a conduit." A complete circulation was unknown; but Plato understood fully that the blood was the source of nourishment, — "the liquid itself we call blood, which nourishes the flesh and the whole body, whence all parts are watered and empty spaces filled." In the young, the triangles, or in modern parlance we would say the atoms, are new, and are compared to the keel of a vessel just off the stocks. They are locked firmly together, but form a soft and delicate mass freshly made of marrow and nourished on milk. The process of digestion is described as a struggle between the triangles out of which the meats and drinks are composed, and those of the bodily frame; and as the former are older and weaker the newer triangles of the body cut them up, and in this way the animal grows great, being nourished by a multitude of similar particles. The triangles are in constant fluctuation and change, and in the "Symposium" Socrates makes Diotima say, "A man is called the same, and yet in the short interval which elapses between youth and age, and in which every animal is said to have life and identity, he is undergoing a perpetual process of loss and reparation — hair, flesh, bones, and the whole body are always changing."

The description of senility, euthanasia, and death is worth quoting: "But when the roots of the triangles are loosened by having undergone many conflicts with many things in the course of time, they are no longer able to cut or assimilate the food which enters, but are themselves easily divided by the bodies which come in from without. In this way every animal is overcome and decays, and this affection is called old age. And at last, when the bonds by which the triangles of the marrow are united no longer hold, and are parted by the strain of existence, they in turn loosen the bonds of the soul, and she, obtaining a natural release, flies away with joy. For that which takes place according to nature is pleasant, but that which is contrary to nature is painful. And thus death, if caused by disease

or produced by wounds, is painful and violent; but that sort of death which comes with old age and fulfills the debt of nature is the easiest of deaths, and is accompanied with pleasure rather than with pain."

The mode of origin and the nature of disease, as described in the "Timæus," are in keeping with this primitive and imperfect science. The diseases of the body arise when any one of the four elements is out of place, or when the blood, sinews and flesh are produced in a wrong order. Much influence is attributed to the various kinds of hile. The worst of all diseases, he thinks, are those of the spinal marrow, in which the whole course of the body is reversed. Other diseases are produced by disorders of respiration; as by phlegm "when detained within by reason of the air bubbles." This, if mingled with black hile and dispersed about the courses of the head produces epilepsy, attacks of which during sleep, he says, are not so severe, but when it assails those who are awake it is hard to be got rid of, and "being an affection of a sacred part, is most justly called sacred (*morbus sacer*)."

Of other disorders, excess of fire causes a continuous fever; of air, quotidian fever; of water, which is a more sluggish element than either fire or air, tertian fever; of earth, the most sluggish element of the four, is only purged away in a four-fold period, that is in a quartan fever.

The psychology of Plato, in contrast to his anatomy and physiology has a strangely modern sense, and the three-fold division of the mind into reason, spirit and appetite, represents very much the mental types recognized by students of the present day. The rational, immortal principle of the soul "the golden cord of reason" dwells in the brain, "and inasmuch as we are a plant not of earthly but of heavenly growth, raises us from earth to our kindred who are in heaven." The mortal soul consists of two parts; the one with which man "loves and hungers and thirsts, and feels the flutterings of any other desire" is placed between the midriff and the boundary of the navel; the other, passion or spirit, is situated in the breast between the midriff and the neck, "in order that it might be under the rule of reason and might join with it in controlling and restraining the desires when they are no longer willing of their own accord to obey the word of command issuing from the citadel."

No more graphic picture of the struggle between the rational and appetitive parts of the soul has ever been given than in the comparison of man to a charioteer driving a pair of winged horses, one of which is noble and of noble breed; the other ignoble and of

ignoble breed, so that "the driving of them of necessity gives a great deal of trouble to him."

The comparison of the mind of man to a block of wax, "which is of different sizes in different men; harder, moister and having more or less of purity in one than another, and in some of an intermediate quality," is one of the happiest of Plato's conceptions. This wax tablet is a gift of Memory, the mother of the Muses; "and when we wish to remember anything which we have seen, or heard or thought in our own minds, we hold the wax to the perceptions and thoughts, and in that material receive the impression of them as from the seal of a ring; and that we remember and know what is imprinted as long as the image lasts; but when the image is effaced, or cannot be taken, then we forget and do not know."⁴

Another especially fortunate comparison is that of the mind to an aviary which is gradually occupied by different kinds of birds, which correspond to the varieties of knowledge. When we were children the aviary was empty, and as we grow up we go about 'catching' the various kinds of knowledge.

Plato recognized, in the "Timæus" two kinds of mental disease, to wit, madness and ignorance. He has the notion advocated by advanced psychologists to-day, that much of the prevalent vice is due to an ill disposition of the body, and is involuntary; "for no man is voluntarily bad; but the bad become bad by reason of ill disposition of the body and bad education, things which are hateful to every man, and happen to him against his will." A fuller discussion of the theorem that madness and the want of sense are the same is found in the "Alcibiades." (11) The different kinds of want of sense are very graphically described:

Socrates. In like manner men differ in regard to want of sense. Those who are most out of their wits we call "madmen," while we term those who are less far gone "stupid," or "idiotic," or if we prefer gentle language, describe them as "romantic" or "simple-minded," or again as "innocent," or "inexperienced," or "foolish." You may even find other names if you seek for them, but by all of them lack of sense is intended. They only differ as one art appears to us to differ from another, or one disease from another.

There is a shrewd remark in the "Republic" (VI, 491), "that the most gifted minds, when they are ill-educated, become pre-eminently bad. Do not great crimes and the spirit of pure evil spring out of a fullness of nature ruined by education rather than from

⁴ Theætetus.

⁵ "No and geni

any inferiority, whereas weak natures are scarcely capable of any very great good or very great evil."

In the "Phædrus" there is recognized a form of madness which is a divine gift and a source of the chiefest blessings granted to man. Of this there are four kinds — prophecy, inspiration, poetry, and love. That indefinable something which makes the poet as contrasted with the rhymster and which is above and beyond all art, is well characterized in the following sentence: "But he who, having no touch of the Muse's madness in his soul, comes to the door and thinks that he will get into the temple by the help of art — he, I say, and his poetry are admitted. The sane man disappears and is nowhere when he enters into rivalry with a madman."⁵ Certain crimes, too, are definitely recognized as manifestations of insanity; in the "Laws" the incurable criminal is thus addressed: "Oh, sir, the impulse which moves you to rob temples is not an ordinary human malady, nor yet the visitation of Heaven, but a madness which is begotten in man from ancient and unexpiated crimes of his race." In the "Laws," too, it is stated that there are many sorts of madness, some arising out of disease, and others originating in an evil and passionate temperament, and are increased by bad education. Respecting the care of the insane it is stated that a madman shall not be at large in the city, but his relations shall keep him at home in any way they can, or if not, certain fines are mentioned.

The greatest aid in the prevention of disease is to preserve the due proportion of mind and body, "for there is no proportion or disproportion more productive of health and disease, and virtue and vice, than that between soul and body." In the double nature of the living being if there is in this compound an impassioned soul more powerful than the body, "that soul, I say, convulses and fills with disorders the whole inner nature of man; and when eager in the pursuit of some sort of learning or study, causes wasting; or again, when teaching or disputing in private or in public and considerations and controversies arise, inflames and dissolves the composite form of man and introduces rheums; and the nature of this phenomenon is not understood by most professors of medicine, who ascribe it to the opposite of the real cause. . . . Body and mind should both be equally exercised to protect against this disproportion, and we should not move the body without the soul or the soul without the body. In

⁵ "Not by wisdom do poets write poetry, but by a sort of inspiration and genius." — Apology.

this way they will be on their guard against each other, and be healthy and well balanced."⁶ He urges the mathematician to practise gymnastics, and the gymnast to cultivate music and philosophy.

The modes of treatment advised are simple, and it is evident that Plato had not much faith in medicines. Professor Jowett's commentary is here worth quoting: "Plato is still the enemy of the purgative treatment of physicians, which, except in extreme cases, no man of sense will ever adopt. For, as he adds, with an insight into the truth, 'every disease is akin to the nature of the living being and is only irritated by stimulants.' He is of opinion that nature should be left to herself, and is inclined to think that physicians are in vain (c. 'Laws,' VI, 761 C, where he says that warm baths would be more beneficial to the limbs of the aged rustic than the prescriptions of a not over-wise doctor). If he seems to be extreme in his condemnation of medicine and to rely too much on diet and exercise, he might appeal to nearly all the best physicians of our own age in support of his opinions who often speak to their patients of the worthlessness of drugs. For we ourselves are sceptical about medicine, and very unwilling to submit to the purgative treatment of physicians. May we not claim for Plato an anticipation of modern ideas as about some questions of astronomy and physics, so also about medicine? As in the 'Charmides' (156, 7) he tells us that the body cannot be cured without the soul, so in the 'Timæus' he strongly asserts the sympathy of soul and body; any defect of either is the occasion of the greatest discord and disproportion in the other. Here, too, may be a presentiment that in the medicine of the future the interdependence of mind and body will be more fully recognized, and that the influence of the one over the other may be exerted in a manner which is not now thought possible."

The effect of the purgative method to which Plato was so opposed is probably referred to in the following passage. "When a man goes of his own accord to a doctor's shop and takes medicine, is he not quite aware that soon and for many days afterwards, he will be in a state of body which he would rather die than accept as a permanent condition of his life?"

It is somewhat remarkable that nowhere in the "Dialogues" is any reference made to the method of healing at the Æsculapian temples. The comments upon physic and physicians are made without allusion to these institutions. Hippocrates and other practitioners

⁶ Timæus.

at Athens were probably secular Asclepiads, but as Dyer remarks, "in spite of the severance the doctors kept in touch with the worship of Æsculapius, and the priests in his temples did not scorn such secular knowledge as they could gain from lay practitioners."⁷

II.

So much for the general conception of the structure and functions of the body, in order and disorder, as conceived by Plato. Were nothing more to be gleaned, the thoughts on these questions of one of the greatest minds of what was intellectually the most brilliant period of the race, would be of interest, but scattered throughout his writings are innumerable little *obiter dicta*, which indicate a profound knowledge of that side of human nature which turns uppermost when the machinery is out of gear. There are, in addition, many charming analogies drawn from medicine, and many acute suggestions, some of which have a nineteenth-century flavor. The noble pilot and the wise physician who, as Nestor remarks, "is worth many another man," furnish some of the most striking illustrations of the "Dialogues."

One of the most admirable definitions of the Art of Medicine I selected as a rubric with which to grace my text-book, "And I said of medicine, that this is an Art which considers the constitution of the patient, and has principles of action and reasons in each case." Or, again, the comprehensive view taken in the statement, "There is one science of medicine which is concerned with the inspection of health equally in all times, present, past and future."

Plato gives a delicious account of the origin of the modern medicine, as contrasted with the art of the guild of Asclepius.⁸

Well, I said, and to require the help of medicine, not when a wound has to be cured, or on occasion of an epidemic, but just because by indolence and a habit of life such as we have been describing, men fill themselves with waters and winds, as if their bodies were a marsh, compelling the ingenious sons of Asclepius to find more names for disease, such as flatulence and catarrh; is not this, too, a disgrace?

Yes, he said, they do certainly give very strange and new-fangled names to diseases.

Yes, I said, and I do not believe there were any such diseases in the days of Asclepius; and this I infer, from the circumstance that the hero Eurypylus, after he has been wounded in Homer, drinks a posset of Prammian wine well

⁷ The Gods of Greece

⁸ Republic, III.

besprinkled with barley-meal and grated cheese, which are certainly inflammatory, and yet the sons of Asclepius who were at the Trojan war do not blame the damsel who gives him the drink, or rebuke Patroclus, who is treating his case.

Well, he said, that was surely an extraordinary drink to be given to a person in his condition.

Not so extraordinary, I replied, if you bear in mind that in former days, as is commonly said, before the time of Herodicus, the guild of Asclepius did not practise our present system of medicine, which may be said to educate diseases. But Herodicus, being a trainer, and himself of a sickly constitution, by a combination of training and doctoring found out a way of torturing first and chiefly himself, and secondly the rest of the world.

How was that? he said.

By the invention of lingering death; for he had a mortal disease which he perpetually tended, and as recovery was out of the question, he passed his entire life as a valetudinarian; he could do nothing but attend upon himself, and he was in constant torment whenever he departed in anything from his usual regimen, and so dying hard, by the help of science he struggled on to old age.

A rare reward of his skill!

He goes on to say that Asclepius did not instruct his descendants in valetudinarian arts because he knew that in well-ordered states individuals with occupations had no time to be ill. If a carpenter falls sick, he asks the doctor for a "rough and ready cure—an emetic, or a purge, or a cautery, or the knife—these are his remedies." Should any one prescribe for him a course of dietetics and tell him to swathe and swaddle his head, and all that sort of thing, he says, "he sees no good in a life spent in nursing his disease to the neglect of his customary employment; and therefore bidding good-bye to this sort of physician, he resumes his ordinary habits, and either gets well and lives and does his business, or, if his constitution fails, he dies and has no more trouble."

He is more in earnest in another place ("Gorgias") in an account of the relations of the arts of medicine and gymnastics: "The soul and the body being two, have two arts corresponding to them; there is the art of politics attending on the soul; and another art attending on the body, of which I know no specific name, but which may be described as having two divisions, one of which is gymnastic, and the other medicine. And in politics there is a legislative part, which answers to gymnastic, as justice does to medicine; and they run into one another, justice having to do with the same subject as legislation, and medicine with the same subject as gymnastic, yet there is a difference between them. . . . Cookery simulates the disguise of

medicine, and pretends to know what food is the best for the body; and if the physician and the cook had to enter into a competition in which children were the judges, or men who had no more sense than children, as to which of them best understands the goodness or badness of food, the physician would be starved to death."

And later in the same dialogue Socrates claims to be the only true politician of his time who speaks, not with any view of pleasing, but for the good of the State, and is unwilling to practise the graces of rhetoric — and so would make a bad figure in a court of justice. He says: "I shall be tried just as a physician would be tried in a court of little boys at the indictment of the cook. What would he reply in such a case, if some one were to accuse him, saying, 'O my boys, many evil things has this man done to you; he is the death of you, especially of the younger ones among you, cutting and burning and starving and suffocating you, until you know not what to do; he gives you the bitterest potions, and compels you to hunger and fast? How unlike the variety of meats and sweets which I procured for you.' What do you suppose that the physician would reply when he found himself in this predicament? For if he told the truth he could only say: 'All this, my boys, I did with a view to health,' and then would there not just be a clamour among such judges? How they would cry out!"

The principle of continuity, of uniformity, so striking in ancient physics was transferred to the body which, like the world, was conceived of as a whole. Several striking passages illustrative of this are to be found. Thus to the question of Socrates, "Do you think that you can know the nature of the soul intelligently without knowing the nature of the whole?" Phaedrus replies, "Hippocrates, the Aesclepiad, says that this is the only method of procedure by which the nature even of the body can be understood." The importance of treating the whole and not the part is insisted upon. In the case of a patient who comes to them with bad eyes the saying is "that they cannot cure his eyes by themselves, but that if his eyes are to be cured his head must be treated"; and then again they say "that to think of curing the head alone and not the rest of the body also is the height of folly."

Charmides had been complaining of a headache, and Critias had asked Socrates to make believe that he could cure him of it. He said that he had a charm, which he had learnt, when serving with the army, of one of the physicians of the Thracian king, Zamolxis.

This physician had told Socrates that the cure of the part should not be attempted without treatment of the whole, and also that no attempt should be made to cure the body without the soul, "and, therefore, if the head and body are to be well you must begin by curing the soul; that is the first thing. . . . And he who taught me the cure and the charm added a special direction, 'Let no one,' he said, 'persuade you to cure his head until he has first given you his soul to be cured. For this,' he said, 'is the great error of our day in the treatment of the human body, that physicians separate the soul from the body.'" The charms to which he referred were fair words by which temperance was implanted in the soul.

Though a contemporary, Hippocrates is only once again referred to in the "Dialogues" — where the young Hippocrates, son of Apollodorus, who has come to Protagoras, "that almighty wise man," as Socrates terms him in another place, to learn the science and knowledge of human life, is asked by Socrates, "If you were going to Hippocrates, the Coan, the Aesclepiad, and were about to give him your money, and some one said to you, 'As being what, do you give money to your namesake, Hippocrates, O Hippocrates, what would you answer?' " "I should say," he replied, "that I give money to him as a physician." "And what will he make of you?" "A physician," he said — a paragraph which would indicate that Hippocrates was in the habit of taking pupils and teaching them the art of medicine; and in the "Euthydemus," with reference to the education of physicians, Socrates says, "that he would send such to those who profess the art, and to those who demand payment for teaching the art, and profess to teach it to any one who will come and learn."

We get a glimpse of the method of diagnosis, derived doubtless from personal observation, possibly of the great Hippocrates himself, whose critical knowledge of pulmonary complaints we daily recognize in the use of his name in association with the clubbed fingers of phthisis, and with the succussion splash of pneumo-thorax. "Suppose some one, who is inquiring into the health or some other bodily quality of another: he looks at his face and at the tips of his fingers, and then he says, 'Uncover your chest and back to me that I may have a better view.'" And then Socrates says to Protagoras, "Uncover your mind to me; reveal your opinion, etc."

One of the most celebrated medical passages is that in which Socrates professes the art of a midwife prac-

tising on the souls of men when they are in labor, and diagnosing their condition, whether pregnant with the truth or with some "darling folly." The entire section, though long, must be quoted. Socrates is in one of his "little difficulties" and wishes to know of the young Theætetus, who has been presented to him as a paragon of learning, and whose progress in the path of knowledge has been sure and smooth "flowing on silently like a river of oil"—what is knowledge? Theætetus is soon entangled and cannot shake off a feeling of anxiety.

Theæt. I can assure you, Socrates, that I have tried very often, when I heard the questions which came from you; but I can neither persuade myself that I have any answer to give, nor hear of any one who answers as you would have me answer; and I cannot get rid of the desire to answer.

Soc. These are the pangs of labor, my dear Theætetus; you have something within you which you are bringing to the birth.

Theæt. I do not know, Socrates; I only say what I feel.

Soc. And did you never hear, Simpleton, that I am the son of a midwife, brave and burly, whose name was Phaenarete?

Theæt. Yes, I have heard that.

Soc. And that I myself practise midwifery?

Theæt. No, I never heard that.

Soc. Let me tell you that I do, though, my friend; but you must not reveal the secret, as the world in general have not found me out; and therefore they only say of me, that I am an exceedingly strange being, who drive men to their wits' end; did you ever hear that?

Theæt. Yes.

Soc. Shall I tell you the reason?

Theæt. By all means.

Soc. I must make you understand the situation of the midwives, and then you will see my meaning better. No woman, as you are probably aware, who is still able to conceive and bear, attends other women, but only those who are past bearing.

Theæt. Yes, I know.

Soc. The reason of this is said to be that Artemis—the goddess of childbirth—is a virgin, and she honors those who are like herself; but she could not allow the barren to be midwives, because human nature cannot know the mystery of an art without experience; and therefore she assigned this office to those who by reason of age are past bearing, honoring them from their likeness to herself.

Theæt. That is natural.

Soc. And a natural, or rather necessary inference is, that the midwives know better than others who is pregnant and who is not?

Theæt. Very true.

Soc. And by the use of potions and incantations they

are able to arouse the pangs and to soothe them at will; they can make those bear who have a difficulty in bearing, and if they choose, they can smother the babe in the womb.

Theat. They can.

Soc. Did you ever remark that they are also most cunning matchmakers, and have an entire knowledge of what unions are likely to produce a brave brood?

Theat. I never heard of this.

Soc. Then let me tell you that this is their greatest pride, more than cutting the umbilical cord. And if you reflect, you will see that the same art which cultivates and gathers in the fruits of the earth, will be most likely to know in what soils the several plants or seeds should be deposited.

Theat. Yes, the same art.

Soc. And do you suppose that this is otherwise in the case of women.

Theat. No, that is not likely.

Soc. No, indeed; but the midwives, who are respectable women and have a character to lose, avoid this department of practice, because they are afraid of being called procuresses, which is a name given to those who join together man and woman in an unlawful and unscientific way; and yet the true midwife is also the true and only matchmaker.

Theat. That I understand.

Soc. Such are the midwives, whose work is a very important one, but not so important as mine; for women do not bring into the world at one time real children, and at another time idols which are with difficulty distinguished from them; if they did, then the discernment of the true and false birth would be the crowning achievement of the art of midwifery — you should think of that?

Theat. Yes, I certainly should.

Soc. Well, my art of midwifery is in most respects like theirs; but the difference lies in this — that I attend men and not women, and I practise on their souls when they are in labor, and not on their bodies; and the triumph of my art is in examining whether the thought which the mind of the young man is bringing to the birth, is a false idol or a noble and true creation. And like the midwives, I am barren, and the reproach which is often made against me, that I ask questions of others and have not the wit to answer them myself, is very just; the reason is, that the god compels me to be a midwife, but forbids me to bring forth. And therefore I am not myself wise, nor have I anything which is the invention or offspring of my own soul, but the way is this: — Some of those who converse with me, at first appear to be absolutely dull, yet afterwards, as our acquaintance ripens, if the god is gracious to them, they all of them make astonishing progress; and this not only in their own opinion but in that of others. There is clear proof that they had never learned anything of me, but they have acquired and discovered many noble things of themselves, although the god and I help to deliver them. And the proof is, that many of them in their ignorance, attributing all to themselves and despising me, either of their own accord or at the instigation of others, have gone

away sooner than they ought; and the result has been that they have produced abortions by reason of their evil communications, or have lost the children of which I delivered them by an ill bringing up, deeming lies and shadows of more value than truth; and they have at last ended by seeing themselves, as others see them, to be great fools. Aristides, the son of Lysimachus, is one of this sort, and there are many others. The truants often return to me, and beg that I would converse with them again—they are ready to go down on their knees—and then, if my familiar allows, which is not always the case, I receive them and they begin to grow again. Dire are the pangs which my art is able to arouse and to allay in those who have intercourse with me, just like the pangs of women in childbirth; night and day they are full of perplexity and travail which is even worse than that of women. So much for them. And there are others, Theætetus, who come to me apparently having nothing in them; and as I know that they have no need of my art, I coax them into another union, and by the grace of God I can gradually tell who is likely to do them good. Many of them I have given away to Prodicus, and some to other inspired sages. I tell you this long story, friend Theætetus, because I suspect, as indeed you seem to think yourself, that you are in labor—great with some conception. Come then to me, who am a midwife and the son of a midwife, and try to answer the question which I will ask you. And if I abstract and expose your first-born, because I discover upon inspection that the conception which you have formed is a vain shadow, do not quarrel with me on that account, as the manner of women is when their first children are taken from them. For I have actually known some who were ready to bite me when I deprived them of a darling folly; they did not perceive that I acted from good will, not knowing that no god is the enemy of man (that was not within the range of their ideas) neither was I their enemy in all this, but religion will never allow me to admit falsehood, or to stifle the truth. Once more, then, Theætetus, I repeat my old question, “What is knowledge?” and do not say that you cannot tell; but quit yourself like a man, and by the help of God you will be able to tell.”

Socrates proceeds to determine whether the intellectual babe brought forth by Theætetus is a wind-egg or a real and genuine birth. “This then is the child, however he may turn out, which you have brought into the world, and now that he is born we must run around the hearth with him and see whether he is worth rearing or only a wind-egg and a sham. Is he to be reared in any ease? or will you bear to see him rejected and not get into a passion if I take away your first-born?” The conclusion is “that you have brought forth wind, and that the offsprings of your brain are not worth bringing up.” And the dialogue

* Theætetus.

ends as it began with a reference to the midwife: "The office of a midwife I, like my mother, have received from God; she delivered women, and I deliver men; but they must be young, noble, and fair."

III.

From the writings of Plato we may gather many details about the status of physicians in his time. It is very evident that the profession was far advanced and had been progressively developing for a long period before Hippocrates, whom we erroneously, yet with a certain propriety, call the *Father of Medicine*. The little by-play between Socrates and Enthydemus suggests an advanced condition of medical literature: "Of course, you who have so many books are going in for being a doctor," says Socrates, and then he adds, "there are so many books on *medicinae*, you know." As Dyer remarks, whatever the quality of these books may have been, their number must have been great to give point to this chaff.

It may be clearly gathered from the writings of Plato that two sorts of physicians (apart altogether from quacks and the Æsculapian guild) existed in Athens, the private practitioner, and the State-physician. The latter, though the smaller numerically, representing apparently the most distinguished class. From a reference in one of the dialogues ("Gorgias") they evidently were elected by public assembly,— "when the assembly meets to elect a physician." The office was apparently yearly, for in the "Statesman" is the remark, "when the year of office has expired, the admiral or physician has to come before a court of review" to answer any charges that may be made against him. In the same dialogue occurs the remark, "and if any one who is in a private station has the art to advise one of the public physicians, must he not be called a physician?" Apparently a physician must have been in practice for some time and attained great eminence before he was deemed worthy of the post of State-physician. "If you and I were physicians, and were advising one another that we were competent to practise as state-physicians, should I not ask you, and would you not ask me, Well, but how about Socrates himself, has he good health? And was any one else ever known to be cured by him whether slave or freeman?"¹⁹

A reference to the two sorts of doctors is also found in the "Republic": "Now you know that when pa-

¹⁹ Gorgias.

tients do not require medicine, but have only to be put under a regimen, the inferior sort of practitioner is deemed to be good enough; but when medicine has to be given, then the doctor should be more of a man."

The office of State-physician was in existence fully two generations before this time, for Democedes held this post at Athens in the second half of the sixth century at a salary of £406, and, very much as a modern professor might be, he was seduced away by the offer of a great increase in salary by Polycrates, the tyrant of Samos. It is evident, too, from the "Laws," that the doctors had assistants, often among the slaves.

For of doctors, as I may remind you, some have a gentler, others a ruder method of cure; and as children ask the doctor to be gentle with them so we will ask the legislator to cure our disorders with the gentlest remedies. What I mean to say is, that besides doctors there are doctors' servants, who are also styled doctors.

Cle. Very true.

Ath. And whether they are slaves or freemen makes no difference; they acquire their knowledge of medicine by obeying and observing their masters; empirically and not according to the natural way of learning, as the manner of freemen is, who have learned scientifically themselves the art which they impart scientifically to their pupils. You are aware that there are these two classes of doctors?

Cle. To be sure.

Ath. And did you ever observe that there are two classes of patients in states, slaves and freemen; and the slave doctors run about and cure the slaves, or wait for them in the dispensaries—practitioners of this sort never talk to their patients individually, or let them talk about their own individual complaints? The slave-doctor prescribes what mere experience suggests, as if he had exact knowledge; and when he has given his orders, like a tyrant, he rushes off with equal assurance to some other servant who is ill; and so he relieves the master of the house of the care of his invalid slaves. But the other doctor, who is a freeman, attends and practises upon freemen; and he carries his enquiries far back, and goes into the nature of the disorder; he enters into discourse with the patient and with his friends, and is at once getting information from the sick man, and also instructing him as far as he is able, and he will not prescribe for him until he has first convinced him; under his persuasive influences and set him on the road to health, he attempts to effect a cure. Now which is the better way of proceeding in a physician and in a trainer? Is he the better who accomplishes his ends in a double way, or he who works in one way, and that the ruder and inferior?

This idea of first convincing a patient by argument is also mentioned in the "Gorgias," and would appear indeed to have furnished occupation for some of the

numerous sophists of that period. Gorgias lauding the virtues of rhetoric and claiming that she holds under her sway all the inferior art, says: "Let me offer you a striking example of this. On several occasions I have been with my brother Herodicus, or some other physician, to see one of his patients, who would not allow the physician to give him medicine or apply the knife or hot iron to him; and I have persuaded him to do for me what he would not do for the physician just by the use of rhetoric. And I say that if a rhetorician and a physician were to go to any city and had there to argue in the Ecclesia or any other assembly as to which of them should be elected state-physician, the physician would have no chance; but he who could speak would be chosen if he wish." In another place ("Laws") Plato satirizes this custom: "For of this you may be very sure, that if one of those empirical physicians, who practise medicine without science, were to come upon the gentleman physician talking to his gentle patient, and using the language almost of philosophy — beginning at the beginning of the disease, and discoursing about the whole nature of the body, he would burst into a hearty laugh—he would say what most of those who are called doctors always have at their tongue's end: foolish fellow, he would say, you are not healing the sick man, but you are educating him; and he does not want to be made a doctor, but to get well."

Of the personal qualifications of the physician not much is said; but in the "Republic" (III, 408) there is an original, and to us not very agreeable, idea: "Now the most skilful physicians are those who, from their youth upwards, have combined with a knowledge of their art, the greatest experience of disease; they had better not be in robust health, and should have had all manner of diseases in their own person. For the body, as I conceive, is not the instrument with which they cure the body; in that case we could not allow them to be or to have been sickly; but they cure the body with the mind, and the mind which has become and is sick can cure nothing."

Some idea of the estimate which Plato put on the physician may be gathered from the mystical account in the "Phaedrus" of the nature of the soul and of life in the upper world. We are but animated failures — the residua of the souls above which have attained a vision of truth, but have fallen "hence beneath the double load of forgetfulness and vice." There are nine grades of human existence into which these souls may pass, from that of a philosopher or artist to that

of a tyrant. The physician or lover of gymnastic toils comes in the fourth class.

But if Plato assigns the physician a place in the middle tier in his mystery, he welcomes him socially into the most select and aristocratic circle of Athens. In that most festive of all festal occasions, at the house of Agathon, described in the "Symposium," Eryximachus, a physician and the son of one, is a chief speaker, and in his praise of love says, "from medicine I will begin that I may do honor to my art." We find him, too, on the side of temperance and sobriety: "The weak heads like myself, Aristodemus, Phaedrus, and others who never can drink, are fortunate in finding that the stronger ones are not in a drinking mood. (I do not include Socrates, who is able either to drink or to abstain, and will not mind, whichever we do.) Well, as none of the company seem disposed to drink much, I may be forgiven for saying, as a physician, that drinking deep is a bad practice, which I never follow, if I can help, and certainly do not recommend to another, least of all to any one who still feels the effect of yesterday's carouse." The prescriptions for hiccough given by Eryximachus give verisimilitude to the dialogue. When the turn of Aristophanes came he had eaten too much and had the hiccough, and he said to Eryximachus, "You ought either to stop my hiccough or speak in my turn." Eryximachus recommended him to hold his breath, or if that failed to gargle with a little water, and if the hiccough still continued, to tickle his nose with something and sneeze, adding, "if you sneeze once or twice even the most violent hiccough is sure to go."

Upon the medical symptoms narrated in that memorable scene, unparalleled in literature, after Socrates had drunk the poison in prison, it is unnecessary to dwell; but I may refer to one aspect as indicating the reverence felt for the representative of the great Healer. Denied his wish (by the warning of the jailor, who says that there is only sufficient poison) to offer a libation to a god, Socrates's dying words were, "Crito, we owe a cock to Æsculapius." "The meaning of this solemnly smiling farewell of Socrates would seem to be," according to Dyer, "that to Æsculapius, a god who always is prescribing potions and whose power is manifest in their effects, was due that most welcome and sovereign remedy which cured all the pains and ended all the woes of Socrates — the hemlock, which cured him of life which is death, and gave him the glorious realities of hereafter. For this great boon of awakening into real life Socrates owed Æscu-

lapius a thank offering. This offering of a cock to Æsculapius was plainly intended for him as the awakener of the dead to life everlasting."

And permit me to conclude this already too long account with the eulogium of Professor Jowett — words worthy of the master, worthy of his great interpreter to this generation :

"More than two thousand two hundred years have passed away since he returned to the place of Apollo and the Muses. Yet the echo of his words continues to be heard among men, because of all philosophers he has the most melodious voice. He is the inspired prophet or teacher who can never die, the only one in whom the outward form adequately represents the fair soul within ; in whom the thoughts of all who went before him are reflected and of all who come after him are partly anticipated. Other teachers of philosophy are dried up and withered, — after a few centuries they have become dust ; but he is fresh and blooming, and is always begetting new ideas in the minds of men. They are one-sided and abstract ; but he has many sides of wisdom. Nor is he always consistent with himself, because he is always moving onward, and knows that there are many more things in philosophy than can be expressed in words, and that truth is greater than consistency. He who approaches him in the most reverent spirit shall reap most of the fruits of his wisdom ; he who reads him by the light of ancient commentators will have the least understanding of him.

"We may see him with the eye of the mind in the groves of the Academy, or on the banks of the Ilissus, or in the streets of Athens, alone or walking with Socrates, full of these thoughts which have since become the common possession of mankind. Or we may compare him to a statue hid away in some temple of Zeus or Apollo, no longer existing on earth, a statue which has a look as of the God himself. Or we may once more imagine him following in another state of being the great company of heaven which he beheld of old in a vision ('Phædrus,' 248). So, 'partly trifling but with a degree of seriousness' ('Symposium' 197, E), we linger around the memory of a world which has passed away ('Phædrus,' 250, C)."

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March 16th - 1893 -

Dear Doctor Osler:

I must write to thank
you for your kindness in sending
me a copy of "Thyria & Thyrius,
as depicted in Plato."

Littré placed on the title page of
his Complete works of Hippocrates,
which Galen says: "τοῖς τῶν παλαιῶν
ἀνδρῶν ἐπιπέσαι γράμματι" - It is
pleasant to see a conference
thus acting.

I should like to see an article
by a member of the Historical
Club, on Græco-Palæo. It would
be made very interesting & interesting

The edition in three volumes, by
Perrault. Paris. of his letters, would
make such an article an easy
one - and very amusing to any
audience. (his compactness and pro-
-decency in some respects) Montaigne
could be brought in - By the way
here is something like to Plato's
"Omnia corporis mala ab animo
procedunt" - "Le grain - his grain, may
"Je crains que c'est un traicte, il est
si estroitement appliqué au corps qu'il
m'abandonne à tous corps pour le
suivre en sa nécessité -- Si son
compagnon a la Colique, il doute
qu'il l'ayt aussi -

It is worthy of notice that the Greek
σφῆρα means the intellect, the under-
-standing, as well as the midriff

From your quotation from what Dio Tima says
in the Symposium recalls something
of Platon's: "Nous sommes réellement
physiquement comme un fleuve dont
tous les eaux coulent dans un fleuve
perpétuel. C'est le même fleuve par son
lit, ses rives, sa source, son embouchure,
par tout ce qui n'est pas lui, mais
changeant à tout moment son eau
qui constitue son être, il n'a aucune
identité, nulle identité pour ce
fleuve."

Excuse my lavender - some trees
certainly emerge frequently at
Si son
il semble
the great
the wonder
midiff
Walter F. Carter

My lavender - some trees
certainly emerge frequently at
Si son
il semble
the great
the wonder
midiff
Walter F. Carter

Walter F. Carter
P.O. Box 114, Sitka, Alaska - or
the Ship Oiler. Very sincerely yours -
Walter F. Carter

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3 Physician in Plato's Republic.—The *Lancet* has the following scholarly note that reveals the mind of the great Greek philosopher concerning the status of medicine in his own time. To those of the profession who are interested in historic reflections, it will be pleasing to note that Plato gave precedence to the physician, empirical though he was in that age, over the contemporary theologian or "hierophant." In Plato's scheme the classes that embrace the artist, the ruler and the merchant were those who stood superior to the physician. The physician stood fourth in a series of eight classes. The *Lancet* says: "In a curious passage in one of the most famous of his dialogues—the Phædrus—Plato sketches his view of the doctrine of the transmigration of souls. The soul which has seen most of truth in its former state comes to the birth as a philosopher, or artist, or musician, or lover; that which has seen truth in the second degree shall be a righteous king, or warrior, or lord; the soul which is of the third class shall be a politician, or economist, or trader; the fourth shall be a lover of gymnastic toils or a physician; the fifth a prophet or hierophant; to the sixth a poet or imitator will be appropriate; to the seventh the life of an artisan or husbandman; to the eighth that of a sophist or demagogue; to the ninth a tyrant. 'All these,' says the philosopher, 'are states of probation, in which he who lives righteously improves, and he who lives unrighteously deteriorates his lot.' The order of precedence in the above list is very curious and highly characteristic of the Hellenic mind. The philosopher at the top of the scale and the tyrant at the bottom show that even Plato was not free from the prejudices of his nation and his caste. The place he assigns to the physician—viz., fourth in the scale—is not a very elevated one, and it is somewhat singular to find him bracketed with the lover of gymnastic toils. It is something, however, to find that the 'prophet or hierophant'—the ancient representative of an important profession—is placed even lower—viz., fifth. Plato's comparatively low esteem for the profession of medicine is not difficult to understand, since at a time when anatomy consisted of a few crude facts and physiology did not exist it was impossible that medicine could command the reverence of any profound and penetrating intellect. We find Plato constantly in his dialogues alluding to medicine as if it consisted of little else but giving a purge or an emetic. No doubt Hippocrates was a man of profound genius and of immense knowledge, considering his time, but it is very unlikely that the average practitioner rose above the level of the mere drug giving empiric. Lovers of Plato, who, we trust, are not few in the profession, may read their favorite author without feeling aggrieved that in his appreciation of medicine he did not rise above the level of his time. It is probable that the average practitioner of those days combined much presumption and not a little chicanery with a plentiful lack of real medical knowledge, and it can hardly be a matter of wonder that the philosopher looked askance at such pretenders."

of the Hellenic
philosophy

some mantle burner, 100 horse

LIVED FOR THIRTY YEARS WITH BIG HOLE IN HEART

Wonderful Case of Harry
B. Travers, a Lawyer of
St. Thomas, Ont., Whose
Death Has Just Occurred
in That City.

PHYSICIANS OF TWO CONTINENTS PUZZLED

(By Special Wire to The Courier.)

St. Thomas, May 13.—Harry B. Travers, a barrister, who died suddenly in the Amos A. Wood Hospital and whose funeral took place on Sunday with military honors and six brother lawyers acting as pallbearers, had a most eventful career. His physical condition as well had been a puzzle to the leading physicians of two continents.

Mr. Travers was a son of Mayor Travers, a former governor of the Isle of Malta and came from a long line of officers in the British Army. He was born in Ceylon 46 years ago and came to St. Thomas when a young man. Here he studied law and being called to the bar entered into partnership with John Farley, K. C. He served several years in the city council and took a prominent part in public affairs. His wife, a daughter of his former partner, predeceased him several years ago and he leaves two daughters.

Origin of the Wound

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ARCHD E MALLOCH, M.D.

In Office at 2 and 7 p.

London letter / letter had / 17th April 1907

HAMILTON.

17th April 1907.

Mr Ridgeway to
company will pay 0
of forty thousand
Mr. B. Travers, barrister, St. Thomas, who served with the first Canadian contingent in South Africa, has been allowed \$2,000 from the patriotic fund on account of being permanently disabled. He is suffering from an aneurism of the shoulder.
Mrs Lena Growse, of St. Thomas hospital, was the victim of a most dastardly assault Sunday night. She was proceeding to "William street"

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Dear Sir -
I have just returned to the
find a notice in the paper
in London paper this P.M.
New York regards you all

This letter - peruse
in regard to woman?
I have just returned to the
find a notice in the paper
in London paper this P.M.
New York regards you all

With kindest regards
to all
Yours truly
Archd E Malloch

LIVED FOR THIRTY YEARS WITH BIG HOLE IN HEART

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Origin of the Wound

When a lad playing tennis on his father's estate near Dublin, Ireland, in running after a ball he ran over a short terrace and falling, a pencil in his upper waistcoat pocket entered

THE LATE H. B. TRAVERS



Whose heart was punctured by a fall when a youth, but he was able to lead a life of great activity for over thirty years.

his side near the shoulder. The wound healed up and nothing more was thought of it, until about 19 years ago, when he made application here for life insurance and was rejected by the medical examiner who found that he was suffering from a large aneurism.

Other physicians in the city and elsewhere after examinations confirmed this diagnosis and gave him but a short time to live. He went to London, England and was examined Sir Frederick Treves, Dr. McCormick and other celebrated physicians and surgeons who gave him but six months to live. His case being of such long standing occasioned considerable interest and comment in the medical journals at the time. He who examined

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the most unusual medical records. After his return to the city, Mr. Travers engaged in boxing, baseball, cricket and lawn tennis and though at times in the middle of the game he experienced a "heart burn" he would finish as fresh and apparently as well as the healthiest of his companions.

Too Much for Osler.

On two different occasions some fourteen and sixteen years ago he went to Baltimore at the request of Dr. Osler and Dr. Halstead and was put under a thorough examination and

a local physician like "an engine pumping steam."

When the Boer war broke out he was in England and he returned to Montreal just as the first Canadian contingent was about to leave for South Africa. He succeeded in being enrolled as a private and went through the campaign with his comrades, taking part in the battle of Paardeberg and the capture of Gen. Cronje.

He returned at the close of the war, but did not resume his practice, his condition being such and the pain so great that he had to remain as quiet as possible and use stimulants to relieve it. However, he made no complaints and bore his sufferings with grit and pluck for which he was noted and which no doubt had much to do with the prolonging of his life in the condition in which he was. Four or five months ago he was attacked with dropsy, a result of the aneurism, and his end came suddenly.

Heart Has Been Removed

Dr. Osler, after examining Mr. Travis, expressed a desire to see his heart after death, and that desire may be gratified, as the heart was removed by Drs. Gray and Ewin of this city, who propose to send it to London or New York in the interests of medical science. The organ was found to be three times larger than normal and a dilation of the aorta as large as a walnut was found as a result of the puncture of the pericardium. The mark of the wound of the pencil is still quite perceptible.

"There was nothing on earth," said a medical man to The Courier correspondent, "that kept Travers alive but stimulants, and how he could be kept alive for over thirty years is marvelous and breaks all records in medical annals."

A safe mantle burner, 100 horse
power.

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Drs. Gustin & Lawrence
Physicians and Surgeons

St. Thomas, Ont., May 17, 1907

Dr. J. Cole, Esq., M.B.,

Dear Sir,

Thank you for a

copy of your paper

concerning the

diagnosis of N.B. disease

and your interest

in this case is

very kind. I

was glad to

hear of the

diagnosis of

the case, and

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Drs. Gustin & Lawrence
Physicians and Surgeons

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St. Thomas, Ont.,

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Account in his
family account
Gustin & Lawrence
No. 201 Talbot St. Toronto
a copy of the account
is enclosed
Yours respectfully

J. M. Gustin
201 Talbot St.
Toronto
Ont.

A scape mantle burner, 100 horse.



... since it was accidentally discovered that he had a swelling and a characteristic thrill high up in the axilla, and in the outer half of the left clavicular space.

The history is briefly as follows: -- When 15 years of age in running down a sloping Grass plot, he fell, and forced a lead pencil which was in his watch pocket, high up into the axilla. When pulled out this was followed by a gush of blood. Shortly after the arm began to swell, and became black and blue to the wrist. He was kept in bed for a few days and had his arm in a sling for a week, after which he does not seem to have had any special trouble. He has taken a great deal of exercise, he rowed in races, and has been a very vigorous man.

The patient became worried about his condition and consulted me in Philadelphia in January 1889, and he was seen by Dr. Agnew and Dr. Ashurst, both of whom advised strongly against

operation

Sequel to case of Arterio Venous Aneurysm of the
Axillary Artery and Vein. Published in the Annals
in 1893.

Through the kindness of Dr. C. - of St. Thomas' Ontario,
and Professor J.B. Mackenzie of Toronto University I am able
to give details of the condition existing in a remarkable case
which I reported in the Annals in 1893. I saw the patient in
1898 with Dr. Mallock of Hamilton. He was then 25 years of
age, an athletic young man, much given to sport. In an exam-
-ination for Life Insurance it was accidentally discovered
that he had a swelling and a characteristic thrill upon
the axilla, and in the outer half of the left clavicular space.

The history is briefly as follows: -- When 15 years of
age, in running down a sloping Grass plot, he fell, and forced
a lead pencil which was in his watch pocket, high up into the
axilla.

... the case, sent me word that the patient died
with cardiac failure on May 8th 1909, which was about
after the accident. Year 1909

Through the kindness of Dr. Grey of St. Thomas' I had the
opportunity of examining the heart which was uniformly and mod-
-erately hypertrophied. The vessels were subsequently removed,
and I am indebted to Professor J.B. Mackenzie for the following
description and sketch.

operation. Then the patient went to London, where both Sir Wm Savoury and Lord Lister urged strongly against operation. On the other hand in Dublin he narrowly escaped; indeed the day was set.

From time to time I heard of this man through Dr. Kallach, or through friends in St. Thomas', where he lived. He seems to have kept very well, and served with the first Canadian contingent in the South African war. He was allowed £2,000 from the Patriotic Fund, on account of being permanently disabled by an aneurysm in the shoulder. Dr. Gustine, Junior, whose father frequently wrote about the case, sent me word that the patient died with cardiac failure on May 8th 1909, which was about _____ years after the accident.

Through the kindness of Dr. Grey of St. Thomas' I had the opportunity of examining the heart which was uniformly and moderately hypertrophied. The vessels were subsequently removed,





not be done, and I wish to express this in writing, as patients frequently are entitled to see specimens. I would strongly advise you not to fret yourself unnecessarily.

Yours
W. H. Wheeler

Dear Sirs

In addition to
were going to
little melinks
a knife, but
lying on what you
told me I checked
them over, against
my father's work, and
sent it to the
London.

in consultation with him, and of the same opinion, and Wheeler also seems to think that a operation would be necessary - perhaps 3. Wheeler went to the Navy (at his own expense) and he wrote me that he was still of his original way of thinking. Wheeler before I went to Henry had 1000 for coming out, and he and his brother had 5000.

JOHN FARLEY, Q. C.,
Barrister, Solicitor, &c.

Solicitor for
The Southern Loan and Savings Company.

Office—Exchange Block.

Copy

22 Merrimack Street, Boston, June 3 1879.

Dear Sir

Dear Sir

I am in receipt of your letter
for which I am obliged. There is not the
slightest doubt in my mind that the course of
dangers of your case is an operation now, or
the Treaty engaged in the lower countries. There
is not any cardiac reason why it would
not be done, and I wish to express this in
writing, so that you may be assured that it
is premature. I would strongly advise you not
to trust yourself unnecessarily.

you will.

and new, and consequent dilatation & the
adherent portion of the artery and vein,
consequent on injury received many
years ago. I have advised that at present
no surgical operation should be performed
on it.

Wm. J. Harvey



W. H. ...

ARLEY, D. C.,
Solicitor, Etc.

a Southern Loan and Savings Company

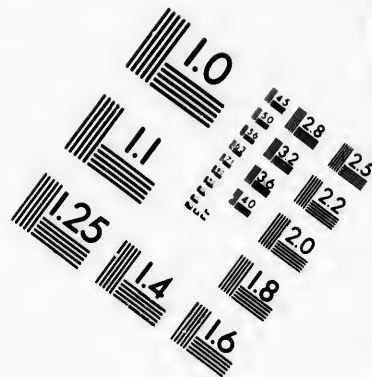
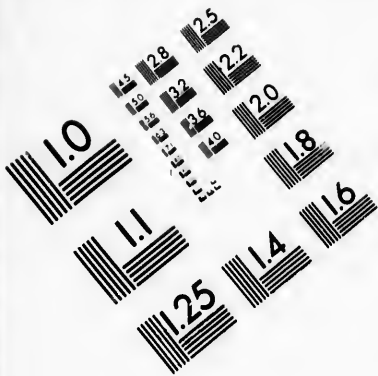
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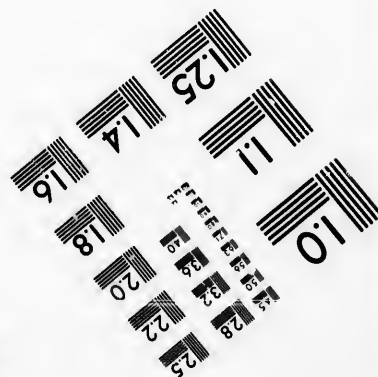
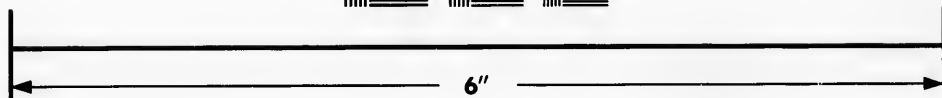
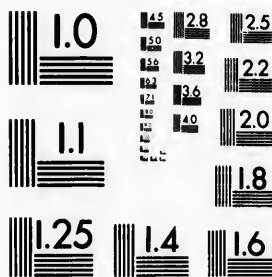
Dr. Thomas, Gent., June 2, 1891.

In my opinion the H. B. Travers is the subject
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beings. I have advised that at present
no surgical operation should be performed





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without the being indicated by this apparatus. It, however,
you should at any time reference between, in consequence
from it, it might, be largely operated upon by trying the
altering above - below the bridge of communications;
learning the real contact. It would, however, be a
matter of great importance that strict anti-static
treatment should be employed

Release me

Very cordly yours,

W. B. Swann

W. B. Swann

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Reston

1,000,
Director, etc.

London and Stratford Companies

Office—Exchange Block.

12 Park Place
Belmont Place
St. Thomas, Ont., June 24 1899

My dear Sir,

I believe that in your case

communication with the various other persons
at the various offices will be very satisfactory, and
I believe that the various other persons will be very
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Reviser

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CASE OF ARTERIO-VEINOS ANEURISM OF THE
AXILLARY ARTERY AND VEIN OF FOUR-
TEEN YEARS' DURATION.

By WILLIAM OSLER, M. D.,

PROFESSOR OF MEDICINE JOHNS HOPKINS UNIVERSITY, AND PHYSICIAN-IN-CHIEF TO
JOHNS HOPKINS HOSPITAL.

THE following case is worth placing on record, partly on account of its rarity, but more particularly on account of the long duration without serious symptoms, and the admirable illustration which it affords of the propriety of non-intervention in certain instances of aneurismal varix.

On December 28, 1888, I saw in Hamilton, Ont., with Dr. Malloch, H. B. T., aged twenty-five, who presented the following condition: He is a strong, healthy young man, with a fresh complexion, well developed muscles and a well-shaped thorax.

Inspection.—The apex beat of the heart is in the fifth interspace inside the nipple line. There is a slight fullness beneath the outer half of the left infra-clavicular space, and pulsation is seen in this region; there is also slight, but not nearly such marked, sub-clavicular impulse on the right side. The carotids do not throb visibly, but on the left side above the clavicle there is fullness in the lower cervical triangle, and a distinct impulse. The position and appearance of the left clavicle are normal. It is not elevated. There is perhaps slight fullness in the first intercostal space, near the sternum; there is no special prominence of the first rib, or of the manubrium sterni.

Palpation.—The cardiac impulse at the apex has moderate force; there is no thrill. There is no impulse upon the sternum, or beneath the inner half of the left infra clavicular region. There is a very distinct impulse in the prominence above referred to in the outer half, upon the clavicle itself, and upon the sub-clavicular fullness. There is a continuous vibratory thrill communicated to the hand, which is felt over the whole

region of pulsation, and the entire left side of the root of the neck. It is not felt on the right side, nor over the sternum, nor on the præcordia. There is no definite tumor to be felt either below or above the clavicle; the enlargements referred to are soft, and yield readily to pressure. High up in the axilla there is a fulness in the course of the artery. To the touch it does not give the sensation of a distinct tumor; there is a remarkable continuous thrill in this region which is obliterated here and in the subclavian region when the axillary artery is compressed. The left arm looks normal, the veins are not distended, the finger-nails are neither blue nor incurved, and the tips are not clubbed. The pulse in the left radial is not so strong as in the right; there is no perceptible retardation.

Percussion.—The cardiac dullness is normal. Percussion over the manubrium and on the inner half of the infra-clavicular region is clear; the outer half is distinctly resonant.

Auscultation.—The heart sounds are clear at apex and base. There is no special accentuation of the aortic second sound; no murmur in the right carotid, or in the right sub-clavian arteries. Over the outer half of the left infra-clavicular area, on the corresponding portion of the clavicle, over the lower cervical triangle from the sterno-mastoid border to the attachment of the trapezius there is a loud continuous *bruit*. This murmur is also heard with great intensity in the axilla, down the inner surface of the arm, and on the front and back of the fore-arm. It is very loud and distinct in the palm of the hand and in the finger tips. In all of these regions the murmur resembles an intense *bruit de diable*, or a venous hum at the root of the neck. At one point only, just below the clavicle, there is a slight systolic intensification of the murmur. Posteriorly the bruit is heard in the sub-scapular space and feebly upon the scapula. Subsequently, when the patient came under my care in Philadelphia, he was seen by Professor Ashhurst, who noticed that pressure upon the axillary artery high up in the arm-pit caused complete disappearance of the thrill and the murmur in the clavicular region. The diagnosis of arterio-venous aneurism was made.

The history of the patient is as follows: When fifteen years of age in running down a sloping grass plot he fell and forced a lead pencil, which was in his watch-pocket, into his side high up

in the axilla. When pulled out this was followed by a gush of blood, which instantly ceased. Shortly after, the arm began to swell and was subsequently black and blue to the wrist. His physician kept him in bed for two days and in the house for ten days with his arm in a sling. He does not seem after this to have had any special trouble. He has been accustomed to take a great deal of athletic exercise; rows in the summer, and has worked hard in the gymnasium during the winter months. He consulted Dr. Malloch for occasional pain in the lower portion of the chest and sleeplessness, but all this time he was keeping up his athletic sports and the condition above described was only discovered accidentally by Dr. Malloch, who stripped him to examine for the cause of the pain. He has had no serious interference with the use of the arm, but considered himself in perfect health. Since the discovery of the condition he has been somewhat nervous and uneasy and says that the pain has been aggravated.

The most careful examination of the axilla fails to discover the point at which the lead pencil entered. The patient was shown at a meeting of the College of Physicians in Philadelphia, in January, 1889, and the general opinion of the surgeons present was that, as the condition had lasted for so many years, and had not seriously interfered with the use of the arm, nothing should be done.

Unfortunately the friends of the patient became uneasy, and not satisfied with the opinions which had been given them, and he returned to the old country, and there sought advice in several quarters. In Dublin he very narrowly escaped operation, and even the day was set, but relying, as he said, on my strong statement, he, to use his own expression, escaped to London, where both Sir Joseph Lister and Sir Wm. Savory counselled non-interference, the former stating that life might not be curtailed at all by the affection, and that if at any time inconvenience arose, the artery might be tied above and below the orifice of communication. †

I have heard from this patient within the last six months, and he continues well.

Arterio-venous aneurism of the axillary and sub-clavian vessels is rare. Bramann, in his exhaustive article, (Langen-

beck's Archiv. Bd. 33) was able to collect only ten cases. In several of these the condition lasted for a long time; in one five; another seven; and in a third thirty-three years. In the latter, after persisting for all this length of time without anything more than slight painful sensations in the fingers, the left arm increased in volume, became œdematous, and the veins were distended, a condition which necessitated ligation of the sub-clavian artery.

In this case the lead pencil, in all probability, perforated the artery and vein high up in the axilla, and it is evident that the opening is in the axillary artery, and not in the sub-clavian, for the thrill and pulsation above and below the clavicle disappear when this vessel is compressed high in the arm-pit. The remarkable thrill and fullness in the sub-clavian triangle and the sub-clavian space is associated probably with distension of the sub-clavian vein and its branches. An interesting point in the purring murmur was its intense transmission to the peripheral vessels, and it could be heard loudly even in the finger tips.

Secured from Dec. 11th - 1896. Keeps well, no changes.

[Reprinted from THE PRACTITIONER.]

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THE CHRONIC INTERMITTENT FEVER OF ENDOCARDITIS.

BY WILLIAM OSLER, M.D., F.R.C.P. LOND.,

*Professor of Medicine in the Johns Hopkins University, and Physician-in-Chief to
the Johns Hopkins Hospital, Baltimore.*

THE type of endocarditis characterised by a protracted course and an irregular intermittent fever has been specially studied by Wilks, Bristowe, Coupland, and Lancereaux. In my Gulstonian Lectures (1885) its characters are thus described: The paroxysms may have the features of ague; the chill, hot stage, and sweating succeeding each other with regularity, and in the intervals there may be an entire absence of the fever. The quotidian type is the most common; the tertian has occasionally been described; and in rare instances two paroxysms have recurred within the twenty-four hours. The disease may be much prolonged, even to three or four months.

One of the first references I find to cases of this kind is in a footnote to one of Dr. Ormerod's Gulstonian Lectures,¹ in which a case of Dr. Bond, of Cambridge, is narrated—an instance of chronic valvular disease, with intermittent fever and diarrhœa, two paroxysms occurring in the day. The case lasted four months. In a remarkable case described by Dr. Wilks,² during a six or seven weeks' illness, rigors recurred with such regularity that a tertian ague was suspected for a time, although the patient was known to be the subject of heart disease. In some instances, the existence of ague previously has rendered the condition much more puzzling. In several of Lancereaux's cases³ the patients had had intermittent fever a short time

¹ *Medical Gazette*, 1851.

² *British Medical Journal*, 1868.

³ *Gazette de Médecine*, 1862; *Archives Générales*, 1873.

before; so also with one of Leyden's cases.¹ But the most extraordinary case of the kind is recorded by Dr. Bristowe.² A patient had ague in October, with chills once or twice a day, in an illness of six weeks. After an interval of two or three weeks they recurred in the second week in December, and continued until December 23. She was well for a few days, and then the attacks recurred after sleeping in a cold bed, and persisted until her admission to hospital on February 12. For the four weeks previous to entrance, the attacks came every twelve hours regularly. A murmur was noticed; but the history of ague was so clear, and the attacks so characteristic, that a suspicion of malignant endocarditis was at first not entertained. It was only after the failure of quinine, and a variation in the character of the paroxysms, that a diagnosis was reached. In this case, the most protracted with which I am acquainted, the condition persisted for more than five months, and Dr. Bristowe has informed me that he regarded the case as one of ulcerative endocarditis from the outset.

I have recently had under observation a remarkable case in which the symptoms persisted for nearly ten months; and through the kindness of Dr. Mullin of Hamilton, Ontario, I am able to give the notes of a second case in which the disease continued for eleven months. The clinical features of these two cases may thus be summarised:

(1) Daily intermittent pyrexia for many months, the temperature rising to $102^{\circ}5$ and 104° , occasionally preceded by a distinct rigor, more commonly by feelings of slight chilliness. Following the pyrexia there was more or less sweating.

(2) Progressive failure of strength, with varying intervals of improvement.

(3) Physical signs of cardiac disease—in the cases here reported an apex systolic murmur, with hypertrophy of the left heart.

(4) Development towards the close of the embolic symptoms more usually associated with ulcerative endocarditis, and cutaneous ecchymoses.

¹ *Zeitschrift f. Klin. Med.*, vol. iv. Berlin.

² *British Medical Journal*, 1881.

¹ But the most Dr. Bristowe.² A or twice a day, in of two or three- con- r a few days, and a cold bed, and ebruary 12. For ucks came every oticed; but the so characteristic, was at first not of quinine, and a that a diagnosis eted with which for more than ed me that he arditis from the

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The anatomical condition in both cases was the same, namely large vegetative outgrowths on the mitral valve.

Case 1.—A. B., aged forty-three, merchant, admitted from Missouri to the private ward of the Johns Hopkins Hospital on March 13, 1892, complaining of weakness and fever. The patient has an excellent family and personal history, and up to the onset of the present trouble has enjoyed good health. Twenty years ago he had an attack of typhoid fever, with which he was confined to bed for six weeks; and when a young man there is an undefined history of an attack of what he says was "chronic malaria." There is no history of syphilis or of any excesses, except perhaps in tobacco.

His present illness began, early in December 1891, with a chill, accompanied by fever, general malaise, and muscular soreness; headache, loss of appetite, insomnia, and cough were marked symptoms, and also, according to Dr. Block, who kindly gave us these details, marked suffusion of countenance. The spleen was enlarged. The severity of the symptoms abated in a few days, and he improved so far as to attempt to continue his business. In about three weeks, however, there was marked dyspnoea with increasing cough, and it was noted for the first time that he had a loud systolic murmur at the apex. He had a daily fever of an intermittent type, usually sub-normal in the morning, and ranging from 102° to 103° in the evening, with occasional sweats. He complained of pains in different parts of the body, particularly in the left inguinal region, and there was tenderness over the fourth and fifth left costal cartilages near the sternum. Throughout the winter the intermittent fever persisted, and there were weakness, cough, and dyspnoea, so that he was confined to his bed for the greater part of the time.

The condition on admission was as follows: Patient is an under-sized man of fair musculature; not emaciated; slightly anemic, and with a sallow complexion. The tongue is clean and red; the papillae prominent. Pulse is 92, regular, of medium volume, the tension about normal. The radials are not stiffened. The temperature at the time of examination was normal. The thorax is well-formed; the costal angle good. Percussion gives everywhere a full and clear resonance, and on auscultation there are heard normal breezy breath-sounds.

Heart.—The impulse is feebly visible in sixth interspace, 3 cm. outside of nipple line. The impulse extends as far as the parasternal line; it is not forcible, nor heaving. On palpitation the shock of the second sound is well felt over the whole præcordial area. There is no thrill. The impulse at the point indicated above is visible, but scarcely palpable. It is most forcible in the parasternal line in the fifth interspace. The area of absolute dulness begins on the fourth rib in the parasternal line; does not extend beyond the nipple to the left, nor beyond the mid-sternal line to the right. Auscultation—In the apex region there is a loud systolic murmur of a somewhat musical quality, which is propagated to the axilla and is well heard at the angle of the scapula. It almost completely masks the first sound. Towards the sternum it diminishes in intensity, but is well heard at the ensiform cartilage, and is feebly heard as far as the right parasternal line. Along the left sternal margin it diminishes in intensity above the fourth rib, and is only just audible in the second left interspace. The second sound is very loud along the left sternal margin, particularly below the second interspace. The sounds at the aortic cartilage are clear, and there is no diastolic murmur. Both sounds are audible in the carotids, the second not accentuated. There is no distension in the veins of the neck; the aorta is not palpable in the sternal notch. There is no tracheal tugging. Examination of the abdominal organs is negative; the edge of the spleen cannot be felt; the dulness is almost entirely masked by colon and stomach tympany. The liver is not enlarged; there is no swelling of the lymphatic glands.

Urine.—Sp. gr. 1019, acid, no albumen. The blood count showed above four millions of red corpuscles to the cubic mm., and marked leucocytosis, the ratio being one white corpuscle to seventy-five red.

The patient was under our observation from March 15 to May 10, and his history during this time may be thus summarised. Fever: the temperature was taken every four hours. During his stay he had no chills, but he frequently had slight chilly feelings. The usual course of the temperature was as follows. The morning record varied from $97^{\circ}.5$ to 98° . A rise took place through the morning hours and usually about 4 p.m.

sixth interspace, extends as far as the axilla or heaving. On percussion well felt over the chest. The impulse is scarcely palpable. The fifth interspace between the fourth rib in the left side is feeble to the left.

Auscultation—Murmur of a somewhat soft type at the axilla and is almost completely absent when it diminishes in intensity, and is feeble over the left sternal angle, fourth rib, and is absent at the axilla. The second rib, particularly in the aortic cartilage region, both sounds are present. There is no murmur of the aorta is not heard on tracheal tugging. The edge of the liver is not enlarged.

The blood count showed 5,000 to the cubic mm., and a white corpuscle to

on March 15 to 16, and may be thus summed up every four hours. The patient had slight fever, and the temperature was as high as 98°. A rise in temperature about 4 p.m.

the maximum was reached, from 102° to 103°; then, throughout the evening hours, the temperature fell, and by midnight it was generally normal. Between four and five in the afternoon, sometimes not until the evening, there was sweating, occasionally profuse; more frequently the skin was only slightly moist. From April 14 to 24 the fever was lower than at any time during his stay in hospital, and for several days was below 100°. The pulse ranged from 80 to 100, was always regular, and of medium volume. The respirations were never increased. His general condition improved somewhat, and he gained slightly in weight. The appetite was fair, and he never had any special gastric trouble. His only complaint was of pain in the left side in the splenic region, and sometimes there was very distinct tenderness on pressure.

Repeated examinations showed no apparent change in the cardiac condition. The intense systolic murmur at the apex, obliterating the first sound, persisted. No increase could be determined in the area of cardiac dulness. The sounds in the aortic region remained clear. The patient left the hospital on May 10, and the history chart was headed "chronic vegetative endocarditis."

For the subsequent history I am indebted to Dr. Block, who has sent the careful temperature chart kept by the nurse up to the time of the patient's death. From this it may be gathered that the temperature range throughout May and June was from 97° to 103°. In July the average was decidedly lower, and towards the end of the month he had several days when the temperature was almost normal. Early in July petechiæ appeared, and several groups of these were noticed. On August 19 the temperature became normal, and remained so until the 24th; but the pulse was weak and he had free sweats. During the first week in September the temperature was usually sub-normal, and only reached 98° in the evening. The morning temperature was frequently 95°. There were profuse perspirations. From the 9th until his death on the 14th the temperature only once registered 98°, and for four days was continuously below 96°. He failed progressively, became extremely emaciated, had diarrhoea, and there were blood-corpuscles and blood-casts in the urine. The pulse was feeble, irregular, and intermittent.

There were no brain symptoms, and he remained conscious until the last.

Autopsy (by Dr. Block) made on September 16 at 9.15 a.m., twenty-one hours after death.

Body extremely emaciated; abdomen strongly retracted, rigor mortis very slight; petechiæ universally distributed over the skin and mucous membranes; corneæ clouded and pupils equally dilated; dependent portions of body œdematous.

Thorax.—Left pleural cavity contains about four ounces of serous fluid; no adhesions. The right pleural cavity presented adhesions in the upper lobe, of old date. Posteriorly hypostatic congestion of the left lung; right lung healthy throughout; petechial spots well marked on both pulmonary pleuræ.

Heart.—Pericardial sac contains a small amount of fluid, no evidences of pericarditis; heart firmly contracted; left auriculo-ventricular orifice easily admits one finger; the valves, chiefly on ventricular surface, especially of the posterior leaflet, being studded with an enormous mass of vegetations, some of which had undergone calcareous degeneration; the chordæ tendinæ thickened, and studded with similar projections; right auriculo-ventricular orifice easily admits two fingers; valves normal, pulmonary and aortic orifices and valve normal, and the vessels free of clot, seemingly healthy. A few petechiæ on the serous coverings of the great vessels. Heart muscle pale and firm. The heart *in toto*, though apparently small, corresponds with the weight of the body.

Abdominal cavity.—Spleen slightly enlarged and of about normal consistence; at its inferior extremity an abscess containing about three ounces of dirty sanious pus, with thickened wall; a large anæmic infarct just above it.

Liver.—In size corresponds to the body. Gall bladder full; no evidences of disease.

Kidneys.—Relatively increased in size, pale, capsule easily detached; there is an anæmic infarct in the medullary structure near the inferior portion of the left organ.

The *peritonæum* generally studded with petechial extravasations.

Stomach.—Empty, small, coated with mucus, walls thrown into longitudinal folds and somewhat thickened; mucosa of an

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intense pinkish hue, and uniformly tinged with mucous and sub-mucous extravasations.

Lutescine.—Jejunum, ileum, and colon marked by hæmorrhagic extravasations, not so intense, however, as in the stomach; no ulcers; the mesenteric glands not enlarged; all the intestines very much reduced in volume.

Brain not examined. No bacteriological examinations or cultures made.

Case II. (Report by Dr. Mullin).—Miss E. G., aged 28. Father died of aneurysm of the first part of the arch of the aorta, at fifty-four years of age; mother living and well, except that she has suffered with gall stones on several occasions. Three brothers and one sister are living; one brother has disease of the aortic valves with regurgitation. The patient has generally enjoyed good health, but at twelve years of age she had an attack of rheumatism, apparently not severe, as she was in her room only one week, and not in bed all of the time. About four years before the onset of her last illness she had pain and slight swelling in one knee, was not confined to bed, but wore a splint for a week. She has always been pale, and when at boarding school her teacher often suggested that iron would be of use. She, however, did not feel ill, and scarcely ever thought that she required medical treatment. At times, however, upon some sudden exertion she felt a stabbing pain in the region of the heart which never lasted long. The menses were always regular until the early part of the illness. In February 1888, she caught cold when tobogganing, and had pain in the back part of the chest, but did not require to go to bed. In March she visited some friends at Niagara Falls, where she remained until July. Here her friends noticed that she looked miserable for some time before she spoke of being ill. The menses failed to appear, and she thought this was the reason why she did not feel so well as usual. She sometimes had attacks of faintness, which soon passed away on taking a stimulant. She became weaker, and had fever followed by night sweats; the fever came on in the afternoon. A physician was consulted, who said the heart was affected and that she required prolonged medical treatment and rest. She continued, however, to go about, and

frequently took long walks, though on exertion she complained of being short of breath. She had fever and sweating at night, and was often so restless that she was obliged to leave her bed and recline on the sofa.

Before she came home her hair became very thin, and much of it fell out. It was cut short, and afterwards the colour was not so dark. Menses were absent only one month, until March 1887, when they ceased and did not return.

In the first week of July she came home, and was placed under my care. In the forenoon the temperature appeared normal, but every afternoon it rose to 102° or 103°. For a time she was thought to have typhoid fever, but no distinctive symptoms appeared. A milk diet was given, but when it became apparent that the fever was not typhoid, she took such forms of nutritious food as suited her taste.

The fever, especially from September, was attended with sweating, more or less profuse. It was often noticed that when sleeping in the afternoon her hair would become wet with perspiration. No local symptoms arose to account for the fever: pain was not complained of to any great extent; sometimes, for a few hours or half a day, there would be aching and pain in the hands and different joints, but these were always transient and at no time after she came home was there marked tenderness or swelling in any of the joints. When she reached home there was some swelling of the ankles and knees, but this soon passed away as she remained in bed. Not making any exertion she did not suffer from dyspnoea. There was a loud systolic murmur at the apex; and from the first the signs of hypertrophy showed that mitral disease had existed for some time. Before she came home it was noticed at the outset of the illness that small spots appeared on the hands and feet, also on arms and legs and face, that looked like "hives." These continued to appear; they were erythematous, some as small as a pea, others as large as a five-cent piece, with a white point in the centre. They often passed away in a few hours, and never lasted longer than the evening of the day on which they appeared. They were not numerous; sometimes they would appear near the tips of the fingers, which for a short time became swollen. These spots were seen more or less throughout

she complained of sweating at night, and to leave her bed

very thin, and much of the colour was lost, until March

and was placed in bed. Her temperature appeared normal or 103° . For a long time but no distinctive symptoms, but when it began to rise, she took such

as attended with rigors, noticed that when the rigors became wet with sweat, and were violent; sometimes, the rigors and pain in the joints were always transient

marked tenderness was reached home, but this soon subsided, and any exertion was followed by a loud systolic murmur, signs of hyperæmia for some time.

At the outset of the illness, the feet, also on the face, were cold. These continued as small as a white point in the mouth, and never returned, which they appeared they would have done in a short time, but less throughout

the illness, though more of them were noticed in the early part. She had frequently, at the time of the day when fever was more marked, sensations of chilliness, and several times in the winter at distant intervals there was a severe rigor; on one occasion her sister said that "the bed fairly shook." These were followed by high fever, and very profuse sweating. The appetite was variable, never very good, and often it was difficult to tempt her to take food. The bowels required the use of mild purgative medicine. Urine was examined frequently; sometimes there was a deposit of urates, but through the greater part of the illness the urine was normal; near the end albumen was found, and there was then œdema of the face and extremities. There was a slight cough late in the illness. At no time were there any indications of lung disease. The strength failed gradually. About two weeks before death, without apparent cause, a severe attack of diarrhœa occurred, lasting from 4 p.m. until the following morning, after which the decline of strength was more rapid. About three days before death the mind, which before had been clear and active, became clouded, and she died in coma.

A careful temperature record was kept in this case from July 17, 1888, until July 7, 1889. The type of fever was in each month remarkably uniform; the morning record always at or below the normal point, and the evening record reaching $102^{\circ}5$, 103° , and sometimes 104° . At intervals for a week or two the evening temperature did not fall below 100° .

The *autopsy* showed moderate enlargement of the heart, due chiefly to hypertrophy and dilatation of the left ventricle. The aortic valves were normal; the mitral orifice readily admitted two fingers: the valve segments were thickened and presented numerous large vegetations, chiefly on the auricular surfaces, and extending from the base of the posterior segment to the wall of the left auricle. The chordæ tendinæ were a little shortened and thickened, and many of them encrusted with the vegetations. The spleen and kidneys contained numerous infarcts in all stages of change.

The diagnosis of these protracted cases is often very difficult, and not unnaturally they are mistaken at the outset for malarial fever, particularly when daily chills occur. In other instances

as in Dr. Mullin's case, the disease is at first thought to be typhoid fever. In *Case I*, prior to the onset of his illness, the patient was not known to be the subject of valvular disease while in *Case II* it is very probable that the attack of rheumatism at the twelfth year laid the foundation for chronic mitral lesions.

In chronic valvular lesions, particularly of the aortic segments there may be persistent fever, rarely however of a typically intermittent type, and in a majority of instances the cardiac features of the case predominate. The special interest of the group illustrated by these cases is the chronic intermittent fever with progressive failure of health and strength, without dyspnoea, anasarca, or other features of valvular disease.

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REMARKS ON THE VARIETIES OF CHRONIC CHOREA, AND A REPORT UPON TWO FAMILIES OF THE HEREDITARY FORM, WITH ONE AUTOPSY.¹

BY WILLIAM OSLER, M.D.,

Professor of Medicine in the Johns Hopkins University, Baltimore.

NOTHING illustrates so pointedly the widespread interest now taken in diseases of the nervous system than the rapid manner in which facts accumulate about obscure and rare affections. Twenty years have passed since Huntington, in a postscript to an every-day sort of article on chorea minor, sketched most graphically, in three or four paragraphs, the characters of a chronic and hereditary form which he, his father and grandfather had observed in Long Island. In the whole range of descriptive nosology there is not, to my knowledge, an instance in which a disease has been so accurately and fully delineated in so few words. No details were given; the original cases were not even (nor have they been) described,² but to Huntington's

¹ Read before the Philadelphia Neurological Society, Nov. 28, 1892.

² Several years ago I made an attempt to get information about the original family which the Huntingdons described, but their physician stated that, owing to extreme sensitiveness on the subject, the patients could not be seen.

account of the symptomatology no essential fact has been added. Within the past eight years a copious literature has gathered around the subject (particularly in this country), which is available to 1889 in the monograph of Huet.³ Since this date the interest has even increased, and the references stand thick and close in the Index Medicus for the past three years. The recent paper by Sinkler (*Medical Record*, March 12, 1892) gives the literature to date. The practical outcome is that we now know the clinical aspects of this form thoroughly, and I have nothing unusual to offer in the history of two Maryland families which I have to report; but the connection of the chronic choreas with each other and their relation to chorea minor are questions which may be discussed, and upon which we need fuller information.

A chronic chorea of adults and aged was recognized long before Huntington's description of an hereditary form in adults, which was itself antedated in this country by the observations of Waters, Gorman, and Lyon.

Provisionally, at least, we may place the cases of chronic chorea in four groups:

First group, chorea of infants, appearing either at birth or within the first two or three years of life. Until recently but little attention has been paid to these interesting cases, of which there have been several well-marked examples at the Philadelphia Infirmary for Nervous Diseases; one has been reported by Sinkler and two by myself. A *résumé* of the literature to date is given by Audry in his recent monograph upon "Double Athetosis." The cases heretofore described may be, as he says, divided into those in which no accurate account is given as to the existence of spasm with the movements, and those with explicit statements as to its presence or absence. A majority of these cases are examples really of spastic diplegia, plus movements which may be choreiform, tremulous, or athetoid; or there may even

³ De la chorée chronique, Paris, 1889.

be combinations of mobile spasm with more rapid movements, so that the diagnosis is extremely difficult, one observer calling the case chronic chorea, another double athetosis. This confusion was well illustrated in the discussion at the Berliner Gesellschaft f. Psychiatrie u. Nervenkrankheiten last year, when Remak showed a case of chronic chorea which Oppenheim had regarded as possibly athetosis, and which Senator thought—owing to the existence of spasm—had nothing whatever to do with chorea. In a large proportion of these cases there is also mental impairment, or even idioey. The following case illustrates choreiform movements in a child with extremely slight spastic manifestations.

Female, aged four and a half years, seen in Ontario, May 12, 1892. One of twins, born prematurely at the eighth month. Mother had one child before, also at eighth month. Nothing abnormal was noticed about the baby at birth, it was not blue, and subsequently thrived well. No abnormality was observed until the other child began to creep, when this one seemed backward and could not hold on to anything. At one year irregular movements were noticed in the arms and legs, and have continued. Teeth were cut at the twelfth month, and she began to talk at the third year; has never walked. The child is bright, intelligent-looking, with well-formed head; does not dribble. There is no nystagmus; talks a gibberish, of which I can only catch a word or two, but which the mother understands quite well. Movements slight in face, scarcely noticeable; no distinct grimaces; movements of tongue natural. The arms are in constant motion, slow and irregular as a rule, but occasionally jerky in trying to grasp objects. The fingers do not display athetoid movements. She cannot use a spoon, but can feed herself with bread, etc. The mother is sure that the arms are never stiff. She sits up well, but the head occasionally comes forward with a jerk. The feet are extended in talipes equinovarus position, and the toes spread occasionally in athetoid movements. The legs are freely movable, not apparently stiff; the muscles hard, but not very well developed. In taking off the stockings, however, the legs stiffened and were hard to bend at the knees, and the big toes became strongly flexed.

This case, belonging to the group described in literature as chorea spastica, is more properly a spastic paraplegia with choreiform and athetoid movements. The following is an illustration of a less common type, in which there was no spasm and the movements were of a more characteristic kind.

N. G., aged eight and a half years, the eldest of two children. The mother had twitching of the eyelids when young, but there are no nervous troubles of any moment in either her own or in her husband's families. The patient was a delicate infant, but throve fairly well, learned to walk and to talk at the usual time. About the fourth year it was noticed that she had irregular jerking movements in the arms, which were moved about wildly and even thrown over the head. She became excitable and irritable, and slept badly. Within a few months the face became affected, and she made grimaces, and sometimes a peculiar grunting noise. The legs were involved shortly after the face, and at times she walked with difficulty. When seen in 1890, more than four years after the onset, she seemed a well-grown child for her age, was not anæmic, a little nervous in her manner and excitable, but intelligent looking. After sitting quietly for a few moments, the arms jerked about and the face twitched. The right arm is most affected, and is twisted about in an odd way, and lifted as high as the shoulder. The legs are now not much, if at all, affected, though she fidgets about in her chair. When watched, the movements are much increased. She feeds herself with great difficulty. There is no spasm in the muscles, which are well nourished; the reflexes are not increased. There is no heart affection. Treatment has not been of the slightest benefit. She is very wayward; and though bright mentally, it is difficult to get her to attend to her studies. There have been no explosive utterances, or any of the mental features of convulsive tic.

And lastly, some of the cases of chronic progressive chorea with dementia have begun in early childhood.

Second group, comprising cases of chronic chorea without any hereditary *anlage*, in which the disease may set in in childhood, adolescence, maturity, or old age. Many of the cases in Huet's monograph had no history

of chorea in the ascendants. In scarcely any of the features are these cases to be distinguished from the variety described by Huntington, but in many instances the disease has begun in childhood or adolescence, and has gradually led, in a variable period of time, to dementia. Very many cases of this kind have been reported recently from asylums.

Only some of the cases of chorea in the aged can be classed here, since many run an acute course, and recovery is not uncommon, noted indeed in eleven instances in Herringham's critical review upon chronic chorea, in *Brain* (1888). The acute course, and the association occasionally with rheumatism, render it probable that many of these are really instances of chorea minor.

Third group, including the cases with marked heredity, the so-called Huntington's chorea, characterized by the occurrence in family groups, a late onset, psychological disturbances, and a progressive and fatal course.

Fourth group, comprising cases of chorea minor which pursue a chronic course, and persist for months or even years, and ultimately recover. They differ essentially from the other forms we have been considering, in the absence of a progressive character, the more active, quick, bizarre movements, and the retention of the mental powers. The following is a good illustration of the chronic form of chorea minor:

Alfonzo G., aged twenty-one, baker, applied to the Infirmary of Nervous Diseases, June 1, 1885, with spasmodic movements of the muscles of the face, arms, and trunk. The affection had lasted without intermission since August, 1884. There was no rheumatic history in the family, but a sister had chorea, and subsequently died of heart disease. He is a strongly built, well-nourished young man. The muscles of the head and neck and those of the face contract suddenly, jerking the head upward and rotating it slightly. At the same time he makes a grimace, and the muscles of the thorax are thrown into quick action, and the air is drawn in often with a whistling sound. The heart is not involved. The patient was under observation and treatment for three years, during which time the chorea persisted with

slight variations in the intensity of the movements. When I last saw him the twitching and jerking of the muscles of the neck and chest were present, but the facial spasm had lessened. There were no mental symptoms, and for the greater portion of the period he was able to work.

Other instances of chronic chorea minor in the records of the Infirmary are given in my "Lectures on Chorea," two of which are very interesting from the persistence of the symptoms for more than three years with ultimate recovery.

Habit spasm, beginning in childhood, may persist for years, and is often confounded with chorea minor; there are also aggravated forms of convulsive tic with movements typically choreic, but which can usually be separated from chorea minor by the existence of fixed ideas, coprolalia, etc.

The following is a record of two family groups of the hereditary form of chronic chorea. The cases present the usual peculiarities described by Huntingdon. For the opportunity of seeing the members of the first family and for the details of the pedigree, I am indebted to Dr. Ellis:

FAMILY X.—FIRST GENERATION.

A. B., an Englishman, married C. D., a native of — County, State of —, and had of issue eleven children. A. B. died aged eighty-seven, and his wife aged eighty-five. Neither of them, so far as is known, displayed any mental or bodily peculiarities. Two of the eleven children died choreic and demented.

Of the other children, two of the girls married N's. One died aged seventy-five, leaving children, all of whom are in good health; the other, Mrs. N., still lives, aged seventy-seven, and has healthy children: George, died aged twenty, a bachelor; Sarah, died aged fifty, of typhoid fever, without issue; William, died aged seventy-six, leaving a large family, none of whom have shown any symptoms of the disease; Mary, died of an acute illness, aged fifty-five, leaving healthy issue; Jane, died

⁴ Medical News, Philadelphia, October, 1887.

aged seventy, leaving a family, none of whom are affected; two other daughters died maidens, well advanced in life. The two affected children were James and Margaret.

James the first to become affected, began to exhibit remarkable muscular irregularities before he was forty. Dr. Ellis writes: "I very well remember, in my earliest youth, his grotesque movements, exciting unusual attention, and I fear more ridicule than sympathy. His swaying, jerking, and fantastically irregular walk compelled him from the sidewalk to the unobstructed roadway. Notwithstanding his infirmity, he was a great pedestrian, frequently walking from his home, eight miles distant, and returning the same day. His sudden stops and precipitate advance, his facial contortions and mobile features, I recall with great vividness after forty years. His wife died in childhood.

Margaret, married J. M. Her symptoms began to develop before she was forty. She continued to go about until a few days before her death, which occurred in her sixty-fifth year. Except a short time before her death, she was not entirely helpless, nor were the mental symptoms very strongly marked in her case.

SECOND GENERATION.

Margaret M., the last-mentioned patient, had five children, two of whom have already died of the disease, and three are in various stages of it. I have seen two members of the family, and have performed a post-mortem on a third:

First child, male, now in his sixty-first year. A year ago the first evidences began. "A man of some character, it is but charity to ascribe the eccentricities of his life to disturbed mentality. He married twice, but had issue only by his first wife. Several children died in infancy, but one surviving is now in good health." This patient I could not see.

Second child, female, married, became choreic in her fortieth year, and died demented in December, 1890, in her fifty-eighth year. She was confined to her bed for nearly a year before her death, which occurred in the Pennsylvania Hospital for the Insane, Norristown. She had four children—three girls and one boy; all are living and in good health, the oldest being now in her thirty-second year.

Third child, male, aged fifty-five. I saw this patient with the doctor. He has enjoyed good health, and has been able to attend to his business until recently. When about forty-two he began to get nervous. Irregular locomotion was the first symptom; his speech became affected about a year ago. He will make use of a nod or a grunt in place of words whenever he can. Lately he has been confined to the house, and has been obliged to abandon business. He is very irritable, and is steadily passing into a state of dementia. He has had five children: four are living and in good health, the oldest about thirty-three years of age; one died of basilar meningitis at sixteen. I saw this patient in April, 1889, and made the following note:

Bony, well-built man; face has an intelligent expression. The gait is very peculiar; he sways from side to side; the movements are irregular, very unlike those of an ataxic, but resemble rather those of an alcoholic. He does not use a cane; feet are not specially spread; eyes not directed to the ground. He can stand with his heels together, with his eyes shut; no movements of the hands or arms when at rest, but in attempting to move there are large irregular sweeps of the arms and slight tremor. He has great difficulty in feeding himself, and sometimes takes two hours or more at a meal. He still can write, though with increasing difficulty. He signs his name to a letter, but the pen, in forming the letters, is often jerked up and the signature is very irregular. With the eyes shut he touches the nose or ear with precision and quickly. The grasp of the hand is firm and strong. There is no disturbance of sensation, no numbness or tingling. Knee-jerk slightly increased; ankle clonus not obtainable. Pupils medium size; react to light and on accommodation. Speech is slow, and interrupted frequently by the interjection 'Hem, ha!' This peculiarity, his wife says, is of comparatively recent development. The mental condition is apparently good; perception clear. When questioned, however, on several occasions, it seemed to take him some time to understand our wishes. He takes an interest in what is going on; reads a good deal, particularly the newspapers. He still personally conducts his business.

Within the three years and a half since making the preceding note he has steadily declined mentally and bodily. *

Fourth child, female, aged forty-three, married, has had five children. One died of scarlet fever; the others

+ He died about 1895.

July 27, 1881,

Dear Doctor:— In your
article in the Journal of Mental
and Nervous Diseases, February
1880, on Hereditary Chorea, you will
see me described as "a young man
22 3/4", the oldest-son of the fourth
child of "M. M." I was examined by
you about 3 years since when
you said my symptoms were
more like neurax Stenia than
chorea. You said that if I did
develop the symptoms of chorea
that it probably could be cured
by a 2 years course of treatment
of which the composition of
the grey matter of the brain
would be changed, and
without stopping work.

detained
1881

Since seeing you my symptoms
 have slowly become worse
 and now cause me much worry
 I have lost 20 pounds in weight
 am very nervous, have some
 involuntary jerky movements
 of the limbs and head and
 twitching of the facial muscles
 am languid and weak, but
 restless and fidgety. Do not
 sleep at all well, and voluntary
 movements of the arms are
 unsteady; for instance, in trying
 to unlock a door the key will
 to one side of the key-hole
 in taking a spoonful of liquid
 some of it is spilled. I have
 seen the gradual development
 until death of 4 cases of this
 disease (my mother, uncle and
 aunts) and my symptoms are
 similar to the way each of them
 began. here is, in the present

my symptoms generation, one case of the
worse disease in almost its last stage
such were in this city; a woman of about
40 years described in your article
as the oldest child of the youngest
daughter of "H. M." I have not
much money to spend for
medical treatment as I am a clerk for
a small wage, and it takes nearly
all I make to keep my family
and I will do the best I possibly
can, and I must do something
to stop the disease if possible.
They will not leave my work to come
to see you, but you are the only
doctor I know of who understands
the disease. Please tell me what to do.
I am willing to do anything possible.
I have dizziness and sometimes a tendency
of the hands in use to turn backwards.

Very respectfully yours

G. M. Davis
2418 No 32 St.
Philadelphia, Pa.

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are living, the oldest a boy of twenty-three. In this case the disease has progressed with greater rapidity than in the others, and certain indications of it have been present, according to the doctor, since her thirty-fourth year. The mental symptoms were first to appear. In April, 1889, I made the following note:

Slightly built, somewhat anemic woman; talks clearly and rapidly, but occasionally she displays a certain childishness, and the doctor, who has not seen her for some years, was much struck with the change in this respect.

While sitting quietly there were no irregular movements of her limbs, but occasionally there was a slight jerk of the finger, the shoulders would move, and once or twice, while speaking, there appeared to be irregular contraction of the facial muscles. There is no tremor of the tongue, and the pharyngeal muscles act normally; the grasp is good; she can use her fingers for delicate movements, and can thread a needle, and there does not appear to be the slightest inco-ordination. The most marked change appeared to be noticed in her gait. She walks with the feet somewhat spread, but follows a straight line fairly well; she turns with a little difficulty, and, if rapidly, loses her balance. Her head is carried somewhat stiffly in walking; she does not trip, and she walks in the dark quite well. She stands with her eyes shut and her feet together without swaying.

The power of the legs is good; knee-jerk increased on both sides; no disturbances of sensation; special senses normal; the pupils are of medium size and react to light and on accommodation. In the three years since the preceding note was made she has lost ground rapidly, and the muscular inco-ordination has become much worse. She is now confined to the house, and for the greater part of the time to her bed.

Fifth child, female, aged, at the time of her death, fifty-one; married; had eight children. Dr. Ellis writes: "After the birth of seventh child, in her thirty-second year, her husband noticed the beginning of the trouble in jerking movements of the legs when sitting, and when erect she had a trick of raising her heels suddenly and standing upon the ball of the toes. Irregular movements of the arms speedily followed. When I saw her first, in 1886, she could walk a mile or two without apparent fatigue, and would insist on walking to church, nearly a mile distant, repelling the suggestion that she could not walk as well as another. At this time, in walking, her

*A very much worse & died in 1893 (son's statement
1893) all this generation are dead except the oldest son
his son is not yet*

body would be bent forward, her head jerking, with a pendulum-like motion, to and fro, and her legs making such irregular and large movements that she would make wide excursions on the sidewalk. A year later she could no longer go out without assistance. Her speech indicated marked changes very early, in her fortieth year, and this was (in 1881 and 1882) accompanied by great difficulty in swallowing and frequently with alarming spells of strangling. She was a most pitiable sight. She suffered also from proclivitas uteri; yet in June, 1883, in her forty-third year, she was delivered of her eighth child, which survived but a few days. Her menses were perfectly regular, her menopause occurring in her forty-eighth year. Six months before her death she was confined to her bed, utterly helpless, and was fed with a spoon. She was now entirely demented.

"Her deep reflexes were rather exaggerated. She could go about the house at night with as little help as in the daylight. She was exceedingly irritable and cross. The choreic movements stopped in sleep; there was no palsy of the sphincters. Of her eight children, seven are living, the oldest in her thirty-third year; all are in good health."

Post-Mortem (about thirty hours after death).—Considerable wasting of the body; no enlargements of joints; no abnormal position of limbs; face a great deal wasted, presenting several recent scars and abrasions, the result of falls.

The skull-cap of moderate thickness; dura tense; meningeal vessels looked stiff; longitudinal sinus contained recent clots. On the exposed cortex cerebri the arachnoid was somewhat turbid and universally separated from the pia by a considerable layer of serous exudate; this was especially marked over the sulci. Pacchionian granulations were numerous; cortical veins moderately full. At the base the arachnoid was turbid and the larger arteries a little stiff; the meninges were not especially adherent, and the pia could be stripped without tearing the substance. Superficial examination revealed no areas of softening, and no special lesions of hemispheres or of cerebellum. There was general wasting of the convolutions, which were also, on section, rather firm. The gray matter was dark, and in places looked thinner than normal. The crura presented no signs of descending degeneration; the pons and medulla were natural-looking; anterior pyramids had a clear, normal

aspect; the ventricles were not distended. Spinal cord was firm; arachnoid a little opaque; pia normal. Transverse sections showed no systemic degenerations; the gray matter had a rosy red tint.

Microscopical Examination.—I am indebted to Dr. Gray for an extensive series of sections from various parts of the brain and cord. The changes may thus be summarized: The arteries were thickened and in places showed hyaline degenerations, and, in the smaller arterioles, fatty changes, very marked in the fresh specimens from the cortex. Here and there the perivascular lymph-spaces were large and contained leucocytes. The ganglion cells in many sections showed very slight changes, not more than are often seen in chronic disorders associated with atrophy of the convolutions. There was the common vacuolation, and many cells seemed laden with pigment. The increase in the connective-tissue elements was more evident to the touch and on section than microscopically. Sections of the pons and medulla showed no special foci of disease. Beyond thickening of the arteries and a shrinkage in the cells of the anterior cornua (probably an artificial change), the sections of the cord showed no important lesions.

The morbid anatomy of chronic chorea is that of a neuro-degenerative disorder—diffuse changes in vascular, ganglionic, and neuroglial tissues—not essentially different to, though less pronounced than, those of dementia paralytica. We see, too, the terminal series of the process, far removed in time from, not necessarily akin to, the initial alteration which lies at the basis of the disordered function.

The doctor writes that, prior to the onset of the chorea, "these patients and their children are intelligent and bright, and the women are comely. The men are rather aggressive, energetic, and ferocious; the women are affectionate and prolific: the issue of the five numbers twenty-seven. There is no history of infantile chorea in the family, nor of rheumatism, nor of heart disease. The period of development of the symptoms covers a wide range, from the twenty-second to the sixtieth year. The symptoms have begun earlier in the women than in the men. There is at present no sign of disease in any

third generation. . . twenty ~~one~~ children, eldest 38 - shows signs (was in Philadelphia Leda Wright daughter Mrs John

son)

member of the third generation, though several of the children are past thirty-five. There seems to be a remarkable insensibility to pain in these cases; they fall about and bruise themselves severely without complaint. Shortly before the death of No. 4, she struck a cast-iron key, lodged in the door-lock, with her hand and broke it, naturally bruising and maiming her hand very much; but of this she took no notice whatever. The uncle and the mother of these patients kept about and showed much greater muscular vigor than members of the second generation, in whom, too, the dementia has apparently progressed more rapidly. The progress of the disease is marked by great emaciation; the movements are but little under control of the will and are much excited by volition. When standing, only those muscles are much affected which are concerned in balancing the spinal column and the head; the movements stop during sleep. These patients have all been light sleepers. The speech defect is not aphasic, but muscular—an indisposition to articulate on account of difficulty in moving the muscles. In case No. 4 the symptoms were very similar to those of a case of bulbar paralysis."

NEITER FAMILY.

So far as can be ascertained only four members of the family have been affected, namely: mother and three children, one of whom was our patient, Peter.

1. The mother, a German, is stated to have had trouble of the same kind as that which Peter has. For many years she made wild inco-ordinate movements with her arms, and toward the end of her life she could not eat alone and had to be fed. Her mind, also, became very weak. The exact duration of the disease in her case could not be obtained, but it extended over several years. She is said to have died of heart disease. She has one brother living, aged eighty-three, who is said to have the disease, but Dr. Simon visited him and reports that he is only subject to ordinary senile tremor. No information is available with reference to her family. Her maiden

name was Schmidt. She had four children, of whom three have been affected with the disease.

2. Lizzie N., was well up in her thirty-seventh year; married and had six children, of whom two died and four are living and well. After the birth of her last child the chorea developed, beginning in her arms first. Her husband noticed that she frequently dropped things. The trouble gradually became worse. Her mind became seriously affected, she talked incoherently, and had strange ideas. She once tried to commit suicide by jumping out of a window. The last year of her life she was helpless and could not walk alone. She died in her forty-ninth year, about twelve years after the first onset of the symptoms. Her husband, from whom these facts were obtained, says that the disease looked very much like St. Vitus' dance.

3. Nicholas Neiter, aged about forty, blacksmith, living at Edgewood, Hartford Co., Md. He was seen for me by Dr. Chas. Simon, who reports that he is evidently subject to the disease, as he displays grotesque inco-ordinate movements of the legs, arms, and face. Mentally, too, he is inclined to be childish and is very emotional. He regards himself, however, as in a condition of perfect health and not affected in any way as his brother Peter.

4. Peter Neiter, aged fifty-nine, German, a butcher, was admitted to Johns Hopkins Hospital, October 9, 1890. Patient has been in this country since 1850. He has always enjoyed good health with the exception of malaria when he first came to this country; has not had syphilis. He dates his present trouble from an attack of gastrointestinal disturbance eight years ago, which followed the drinking of large quantities of iced lemonade. At this time he had also pains in the head, and he speaks of the occurrence of something bursting in his body like a cannon. The movements began about five days after this over-heating and taking iced drinks. They did not start at any particular part of the body, but were general from the outset. They have gradually become worse, particularly when voluntary movements are made. They are severe enough to prevent him from working, and he has not been able to do much for six or eight years. He has fallen, sometimes, owing to the irregular movements of the legs. He has never at any time lost consciousness.

² The patient was shown at the Hospital Medical Society, and is reported in the Bulletin, vol. i.

Emotion or fright always exaggerates the movements. He has not had headaches; has as a rule slept well. His appetite has been good and general health excellent. Ever since the attack, eight years ago, he has been liable to a recurrence of the vomiting whenever he takes cold drinks. He says his memory is quite good. He does not think that his speech has been affected.

Present Condition.—The patient is a large, well-nourished, well-built man. The face in repose looks intelligent, but on smiling, the expression is fatuous. He answers all questions readily and freely; gives a good account of his condition, and it is more in his expression and general behaviour than an indication is found of mental impairment.

When sitting in a chair, at ease, the arms and hands are in more or less constant irregular motion. The fingers are extended and flexed alternately; sometimes only one, sometimes the entire set. At other times the whole hand will be lifted or there are constant movements of pronation or of supination. For half a minute or so they may be perfectly motionless. The head and trunk present occasional slow movements; in the latter more of a swaying character. The legs jerk irregularly and the feet are flexed or extended; but the movements are not so frequent as in the arms. The face in repose is usually motionless, but the lips are occasionally brought together more tightly and the chin elevated or depressed. There is an occasional movement of the zygomatic and of the frontal muscles. He puts out the tongue, with tolerably active associated movements of the face, and it is usually quickly withdrawn or rolled from side to side. It is impossible for him to hold it out for any length of time. There are no irregular movements of the palate muscles.

He walks with a curious irregular gait, displaying distinct inco-ordination, swaying as he goes, sitting a moment in a step, keeping the arms out from the body and in constant motion. The legs are spread wide apart; steps are unequal in length and he seems rather to drag the feet. He stands well with the heels close together.

There is a suggestion of stiffness about the gait and about the way in which he uses his legs.

Sensation is unaffected. The deep reflexes are increased. There is slight ankle clonus, exaggerated knee-jerk, and slight increase in arm-reflexes.

The special senses are unimpaired. Pupils are of

medium size—the right a little larger than the left; they react to light and on accommodation; there is no nystagmus. He has no fever; bowels are regular, and the urine shows no special changes.

A report of cases of the hereditary form of chorea does not afford a very wide scope for discussion; but there are problems in the relation of the forms to each other and to chorea minor, which, if I have read the literature aright, are still far from settled. My own point of view may be very briefly stated: Chronic progressive chorea is a malady distinct from the various disorders associated with coarse lesions of the motor centres or path known as symptomatic chorea—an affection which (like forms of muscular atrophy) may occur in families or in single individuals, and is characterized by irregular, inco-ordinate movements, a reeling gait, speech disturbances, and progressive impairment of the mental faculties. The movements differ from those seen in chorea minor, being slower, and resembling rather those of Friedreich's ataxia, without the brusque, jerky character of the former disease. Moreover, in striking contrast to the movements of chorea minor, those of chronic progressive chorea are sometimes influenced by the will. A certain number of the cases of chronic chorea beginning in infancy and childhood belong to this category, but a very much larger number are instances of spastic paraplegia or diplegia; while others represent anomalous forms of chorea minor.

Chronic progressive chorea is, I believe, a disease wholly apart from the affection described by Sydenham, having nothing in common with it but the name. The course of acute chorea minor, the incidence in children, the arthritis, the seasonal relations, the extraordinary frequency of endocarditis—to say nothing of the different characters of the movements above referred to—separate it as a well-defined affection, depending possibly on a virus as yet unknown.

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(Reprinted from the Montreal Medical Journal, April, 1893.)

NOTE ON ARSENICAL NEURITIS

FOLLOWING THE

USE OF FOWLER'S SOLUTION (34 51 m 18).*

BY WM. OSLER, M.D., F. R. C. P., LONDON.

During the first few years of practice I was in the habit of using arsenic somewhat sparingly, but after the appearance of Bramwell's paper in 1877, on the use of this drug in pernicious anæmia, I began in the cases which came under my observation to use it more freely, and since that time in various forms of anæmia, in leukæmia, in Hodgkin's disease, and chorea minor I have used it in what might be called large doses. My rule has been to begin with two or three minims three times a day, and gradually increase the dose every four or five days until the patient took ten, fifteen or twenty minims of Fowler's solution three times a day. I preferred to see the physiological effects, either itching of the skin, slight œdema, an attack of vomiting, or diarrhœa. The quantity which will induce these symptoms varies in different individuals, and in the anæmia cases those who bear the drug best seem to improve the most rapidly. The largest doses I have given were in a case of pernicious anæmia, in which the patient had taken during his primary attack with the greatest benefit for several weeks twenty minims of Fowler's solution three times a day; and had reached in his relapse thirty minims three times a day, when at the end of a week he had an attack of itching of the eye lids, and œdema over the eye brows.

* Read before the Johns Hopkins Hospital Medical Society, February 24th, 1893.

In the chorea minor of children, who, as is well known, stand arsenic well, it is a common experience to find that twelve and fifteen minims of the liquor arsenicalis may be given daily without ill effects. Until two years ago, though I had often seen the symptoms of saturation above referred to, I had never seen any serious toxic symptoms referable to the nervous system, but we had at that time in the ward a patient with pernicious anæmia who had taken for a long time large doses of Fowler's solution, and under its use had feelings of numbness and tingling in the feet and legs, which we thought might be due to the arsenic. This may not, however, have been so, since these advanced cases not infrequently have sclerosis of the posterior columns of the cord, in connection with which loss of the knee jerk and sensory changes in the legs may develop. I have repeatedly in my clinics and ward class talks referred to the apparent harmlessness, so far as my experience went, of Fowler's solution.

On October 25th, 1892, the patient before you was admitted to my wards with Hodgkin's disease, the cervical, axillary, and inguinal groups of glands being involved. Having had under observation for now nearly four years a case of this disease, which has been remarkably benefited by the prolonged use of Fowler's solution taken at intervals, we naturally placed this man upon the same drug. The details of his case, so far as they relate to the lymphatic disorder do not concern us. The arsenic was begun on October 27th, given as Fowler's solution, and gradually increased. He took it on the first occasion for ten days; it was then resumed on November 14th, and in two weeks the dose reached fifteen minims three times a day. Towards the end of November it was noted that his skin, which was naturally of a somewhat dark colour, had a much deeper tint, and that of the abdomen was very distinctly bronzed. Throughout the month of December he did not do well. The arsenic was stopped on the 19th, and begun again on the 27th. From the outset the patient has had that interesting feature in many cases of Hodgkin's disease, an intermittent pyrexia, and as may be seen by his last week's chart, the

temperature rises every afternoon and evening to about 104° . The pigmentation seemed to increase throughout December. Twice during the first two months of his stay in hospital there was slight diarrhœa, which was attributed to the arsenic. About the middle of January it was noticed that he was tender to the touch, and walked somewhat stiffly. He is a Pole, speaking no English, and as there was no one in the ward to interpret for him, these symptoms did not perhaps at first attract the attention they deserved. The most striking feature at this time was the sensitiveness on pressure. The skin itself did not appear to be painful, but if, for example, the arm was grasped, or the pectoral muscle lifted, or the thigh pinched, he winced and tears came into his eyes. By the end of January he walked with much difficulty, and could scarcely go from his bed to the closet. He has naturally, in the course of his disease, wasted a good deal, but the legs seem to have become distinctly more flabby within the past two or three weeks. The knee jerks, which were present on January 10th, are now absent.

On February 2nd, Dr. Hoch reported the *laradic* excitability of the nerves of the leg was diminished, the galvanic also to a slight extent. In the muscles the diminution to both currents was more marked, and the contraction following the galvanic stimulation was decidedly slower and the anode, if not larger, was at least equal to the K. C. C. The muscular power in the arms is not so strikingly diminished, though the grasp is feeble in comparison with what it was. The hyper-sensitiveness of the muscles does not appear to be at all diminished.

Between the 27th of October, and the 10th of January, this patient took $34 \text{ m} 18$ of the liquor potassæ arsenitis, equivalent to about $16\frac{1}{2}$ grains of arsenious acid. During these seventy-five days there were fourteen days in which the drug was omitted. The marked sensory changes, the gradual impairment of muscular power, and the progressive character of the symptoms indicate very clearly the peripheral and neuritic nature of the affection; and though he has a chronic cachexia, in which, as in cancer or tuberculosis, neuritis might develop, yet it seems more rational to attribute it to the somewhat

prolonged use of the arsenic, more particularly as he has had also another striking feature of arsenical poisoning, namely, pigmentation of the skin.

Arsenical neuritis from accidental poisoning is not very uncommon. Less commonly it results from accidental contamination in certain occupations. It is claimed by Folsom, Putnam, and others in Boston, that cases may be of "domestic origin," that is, due to the absorption of extremely small quantities of arsenic with the dust from wall papers, carpets, or curtains. Cases such as the one reported this evening, in which the toxic symptoms have developed in consequence of the administration of arsenic as a medicine are in reality extremely rare. A few years ago Dr. J. J. Putnam collected a series of cases in which serious poisonous effects had followed the long continued use of medicinal doses. A majority of them cannot be said to be very satisfactory, as the reports are imperfect as to the amount taken and as to the symptoms. Among the cases referred to are, however, some which would indicate very clearly that the prolonged use of even moderate doses may cause symptoms of a wide-spread neuritis. Individual idiosyncrasy plays, no doubt, an important role; tolerance may as a rule be established, as with the Styrian arsenic eaters, but such cases as the one before you show that we must be on our guard in the protracted administration of the drug.

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APRIL, 1893

NOTE ON A REMARKABLE HOUSE EPIDEMIC OF
TYPHOID FEVER.

By WILLIAM OSLER, M.D.,

Professor of Medicine in the Johns Hopkins University.

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NOTE ON A REMARKABLE HOUSE EPIDEMIC OF
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HOUSE epidemics of typhoid fever, to the extent and severity of the one here noted, are very rare.

November 26, 1892, I went near Darlington, above Havre de Grace, Md., to see a case in connection with which Dr. Sappington gave me the following remarkable history of a house epidemic of typhoid fever:

CASE I.—Wm. B., aged 37, had been ill early in August, at Ocean City, with what was supposed to be malaria. He returned to his home in Baltimore August 8, and on the 13th came here to his mother's home, and was ill for six weeks with diarrhea and delirium; and had, according to the doctor, a well-marked attack of typhoid fever. There had been no previous illness during the summer in the house, and it is perfectly clear that this, the first case, was imported.

CASE II.—His wife, A. B., aged 34, was taken ill about the 29th of September with typhoid fever; well-marked case; fever 101° to 104° . At the end of four weeks she was better. She was moved, had hemorrhages, and again was ill six weeks, but ultimately recovered.

CASE III.—His sister, M. B., aged 28, was taken ill about the 29th of September, had a very bad attack, and gradually recovered.

CASE IV.—J. B., a sister, aged 21, was also taken ill about the third week in September, had fever, not very bad at first, and subsequently had severe hemorrhages, and died October 12.

CASE V.—John B., aged 3, son of Wm. B. (Case I), came with his

mother from Baltimore, and was taken ill about the third week in September. He had a mild attack, with fever, abdominal symptoms, and well-marked rose spots.

CASE VI.—John B., aged 35; fever began toward the end of September. He had headaches, diarrhea, and a tolerably sharp attack. Convalescence began about October 17th; the temperature remained about normal until October 24th, then he had a definite relapse, with fever ranging to 104° and 105° . From November 8th until the 14th there was a period of apyrexia, and then the temperature rose again, and I saw him on the 26th in what appears to be a second relapse. The temperature has been up to 103° and 104° , and on several occasions 105° . On the 25th, for instance, temperature range was between 101° and 105° . He has been delirious, and has had several chills; great pain in his legs, and very great tenderness of feet, especially on the soles.

This case was away from the house at Annapolis a short time, and was the last to take the fever.

CASE VII.—Nurse T., taken ill on the 17th of October, and was removed to the Homeopathic Hospital in Baltimore, where she had a well-characterized attack of typhoid fever, of which she died. She had been in the house forty-two days.

CASE VIII.—Colored nurse of child; was taken ill about the 10th of October, went to Baltimore, and had a definite attack of typhoid fever and died. She had been in the house twenty-six days.

CASE IX.—Miss G., nurse, had been in the house forty-two days, and was taken to Philadelphia, ill with typhoid fever, and died in the third week of the attack.

CASE X.—B. B., a sister, had also, according to the doctor's description, typhoid fever, but she kept about the house, and would not go to bed for any length of time.

During the months of August, September, October and November there were ten cases and four deaths.

The house, a comfortable, old-fashioned, square stone building, is situated on a ridge in the beautiful rolling district of Hartford County, only a few miles from the Susquehanna River. In front of the house the ground slopes rapidly toward the roadway, which runs along a narrow valley. At the back of the house the land slopes more gradually. At a distance of about seventy-eight yards in front and to the left of the stone house, and about two-thirds of the way down the hill, is a comfortable frame house, occupied by the tenant, with a family of nine, of ages from 14 to 85. About seventy yards further down the valley, close to the roadway, is a spring of clear water, close to which is erected the "spring house" for dairy purposes.

Opening from the kitchen of Mr. B's house, which is a T-shaped extension, there is a covered stoop or porch, beneath the floor of which is a cistern, square, with a depth of nine feet, width of ten feet, the bottom of which is ten feet below the surface of the soil. It is cemented, and was last cleaned about May, 1892. This cistern collects the water from the roof, and at one time also received water from the spring, which was pumped up by a ram. This was abandoned years ago.

Immediately behind the kitchen, at a distance of about twenty feet, is a wood-shed, and a privy, which is situated on the slope of ground behind the house. The bottom of the privy is on the level of the ground. The difference in level between the bottom of the cistern and the top of the privy is, Mr. B. thinks, about ten feet. This practically is the situation of the surroundings. The house itself inside is comfortable; the rooms are large and convenient. There is nothing whatever in their arrangement to call for special comment.

Dr. Sappington writes that "the household consisted of another brother, who did not go into the sick rooms, but ate the food and drank the water, as did also a colored boy aged 15, also the mother (Mrs. B.), also Dr. Sappington drank freely of the spring water, and often had his dinner at the house. A cook could be kept only a short time after the third week, and many things were supplied by their friends."

The source of infection in this epidemic is very difficult to trace. One thing only is certain, namely, that the spring water was not at fault, since living close by and using the water freely was the family of the tenant, every member of which escaped. Two alternatives remain, either the food supplies or the kitchen utensils were in some way infected from the first case, which seems to be by far the most likely view, or the disease was propagated by direct contagion, a view which Dr. Sappington holds very firmly, but which, though not impossible, does not seem to be very likely when one considers the extreme rarity of direct infection in this disease.

Though the surface slope is from the cistern, yet it is quite possible that it may have been contaminated, and if the water was used for washing the kitchen utensils (upon which point it is impossible to get positive information), this would be the most likely source of infection.

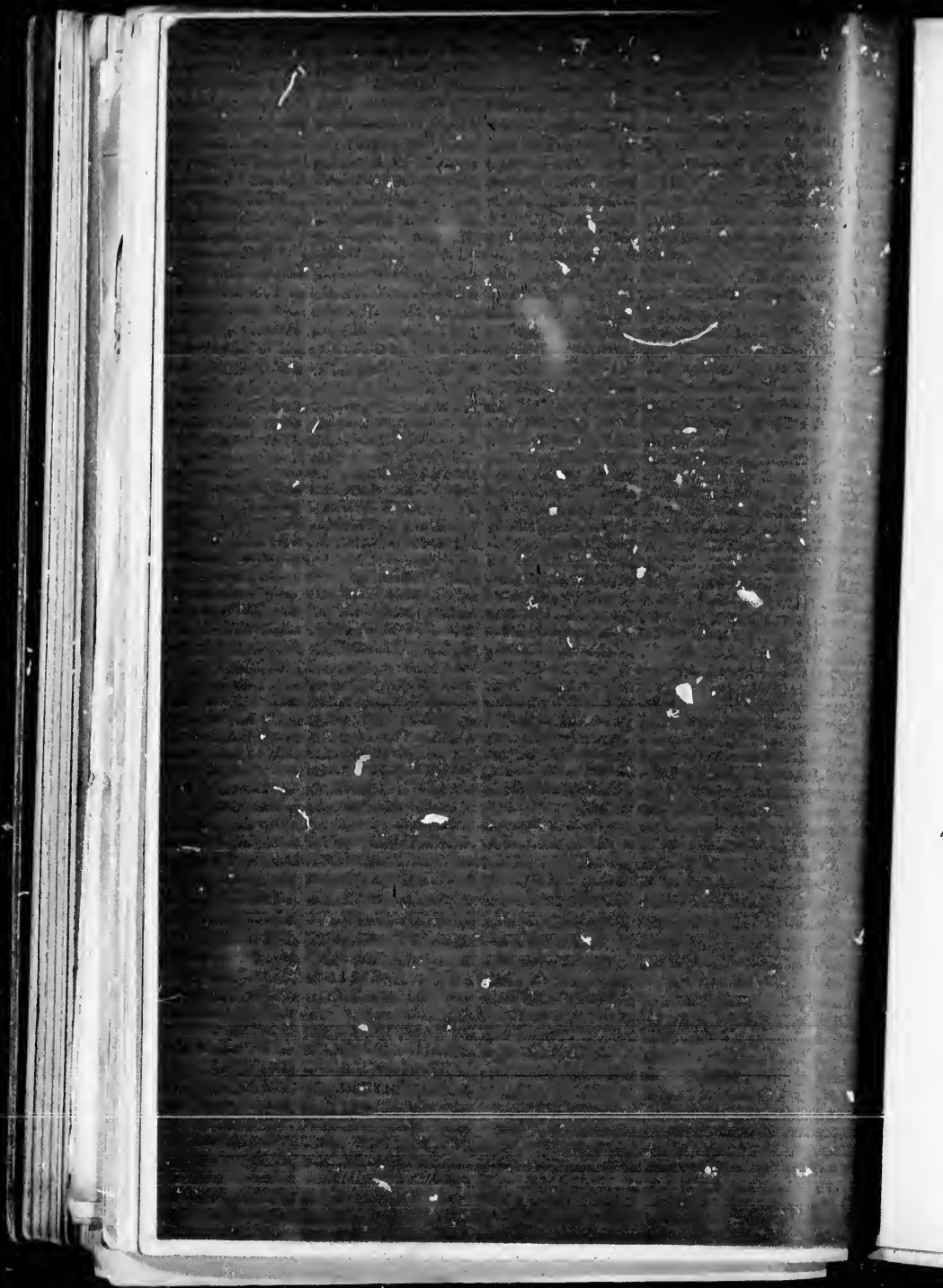


CASES
OF
SUB-PHRENIC ABSCESS

BY
WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE.

*Read before the Association of American Physicians, May, 1893,
and reprinted from "The Canadian Practitioner."*

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CASES OF SUB-PHRENIC ABSCESS.*

BY WILLIAM OSLER, M.D.,

Professor of Medicine, Johns Hopkins University, Baltimore.

THE following cases illustrate some of the forms of abscess beneath the diaphragm. Three contained air and simulated pyo-pneumothorax; in two, the condition was strikingly similar to empyema. The pus may be either in the cavity of the lesser peritoneum, which is commonly the case when perforation of the posterior wall of the stomach, or of the duodenum, occurs, and the abscess is then chiefly beneath the left half of the diaphragm; or it may be between the right lobe of the liver and the diaphragm, in which case the abscess is really within the general peritoneum, though usually shut off. The abscess may come from perforation of the ascending colon, or of the appendix, or from the liver itself. In the air-containing abscesses the most exquisite simulation of pneumothorax may occur on either side, as in the case which first called my attention to this condition, reported by Dr. Gardner,† of Montreal, in which the signs of pneumothorax extended as high as the third right interspace, and in which, *post mortem*, the diaphragm was found at the level of the third interspace.

CASE II. is of interest from the development of an air-containing abscess, in consequence of the perforation of the colon and communication with a perinephritic abscess on the right side. It had perforated the diaphragm and produced a pleurisy at the right base.

In CASE III., on the other hand, there was, following injury to the kidney, an empyema which had perforated into the lung, and the sub-phrenic abscess received its air supply from this source, which is somewhat unusual.

The two cases of simple sub-phrenic abscess are of doubtful etiology, and are of interest chiefly from the remarkable simulation of empyema and the good results which followed operation.

CASE I. is one of the few instances in which the diagnosis of pyo-pneumothorax sub-phrenicus was made during life, and in which recovery followed operation.

* Read before the Association of American Physicians, May, 1893.

† *Canada Medical and Surgical Journal*, vol. ix.

CASE I. *History of dysentery; symptoms of abscess of liver: development of a large area of tympanitic resonance in the right lower axillary region: diagnosis of pro-pneumothorax sub-phrenicus: operation: recovery.* John S., aged thirty-six, was admitted to the Johns Hopkins Hospital on January 16th, 1890, complaining of fever, diarrhea, and pain in the abdomen. There was nothing of moment in his family history. He had typhoid fever when twelve years of age. He had gonorrhoea, but not syphilis. He has been a very hard drinker for very many years. In September, 1888, he had dysentery; not a very severe attack, as he was not laid up in bed; but the stools were frequent, and he passed blood and mucus. He has not been entirely free from intestinal trouble since, but he has been able to keep at work with but few interruptions. Latterly he has lost flesh, and within the past six weeks has become very weak and feverish. On several occasions the feet have swollen. He has had no chills; has never been jaundiced, and has never had severe pain in the region of the liver. He stopped work two weeks ago.

Condition on admission. Emaciated; weight 116 pounds; anemic; muscles flabby; skin hot, dry, and sallow; conjunctivæ white; tongue pale, indented, and with numerous aphthous sores on dorsum and sides. Pulse 96; respiration 30; temperature 101°. Lungs are normal, with the exception of a few dry crepitant râles, probably pleuritic, at the right base.

Cardiac dullness begins at the fourth rib. There is a soft systolic apex murmur. The second sound is reduplicated at base.

Liver. No prominence in hepatic region. No tenderness on pressure. Dullness begins in nipple line at fifth interspace and extends about 4 cm. below the costal margin, 15 cm. in vertical extent. The edge cannot be distinctly made out. The surface beneath the costal margin is not rough, nor tender. In the median line, dullness extends 3 cm. below the tip of ensiform cartilage.

Spleen not palpable. Area of dullness not increased.

The abdomen is symmetrical, a little full, tympanitic, nowhere tender. Examination of blood negative.

Urine. Specific gravity 1019; reaction acid. Trace of albumin. No tube casts.

The stools were frequent, liquid, and contained much mucus.

From the history of the case and from the appearance of the man abscess of the liver was suspected.

For the first ten days in the hospital the patient seemed better. The number of stools in the day reduced. He had no chills. On several occasions he sweated heavily at night. The temperature range was from 98° to 102°.

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On the 24th it was noted that "there is distinct tenderness in the right renal region, best elicited on bimmanual palpation. No special fullness. No dullness in the right flank. Liver dullness is not increased in the lateral region: in the posterior axillary line it begins at the eighth rib and extends to the costal margin."

January 8th. The tenderness on the right side has increased, and it is specially noticeable at the extremity of the tenth rib when pressure is made upward. There is here a distinct sense of fullness and resistance. To-day there was noticed on percussion a remarkably tympanitic percussion note between the ninth and eleventh ribs on the right side. An exploratory puncture, in the tenth interspace, posterior axillary line, obtained a small amount of curdy, thick pus, which contained altered pus cells, and a few fat crystals. The following note was dictated:

In the right flank the fingers can be passed well toward the kidney with, perhaps, slight sense of increased resistance. With bimmanual palpation there is certainly great resistance below costal margin, and especially below points of the tenth and eleventh ribs; here there is also marked tenderness. From behind there is distinct fullness in the infra-scapular region on the right side, and intercostal spaces are here not so well marked. There is no distinct tenderness in right lumbar space beyond. Liver dullness in mid-sternal line, extends three fingers' breadth (5 cm.): in nipple line, from lower margin of the fifth to costal border. In mid-axillary line there is a pulmonary note to lower margin of sixth. There is dullness for a finger's breadth on the seventh rib, and, below, the most extreme metallic tympany, extending from exactly the seventh interspace to upper margin of eleventh, where it passes on insensibly into bowel tympany. There does appear, however, to be a slightly dull note before bowel tympany is reached. Anteriorly, the metallic tympany extends to within 4 cm. of nipple line. Behind, it extends to posterior axillary line. When turned on side, percussion in axillary line is distinctly flatter, and there is movable dullness. Altogether, tympanitic area occupies position of seventh to tenth interspace in a line drawn at the level of ensiform cartilage. A diagnosis of a sub-pirenic air-containing abscess was made, and the patient was transferred to the surgical department.

On the 29th Dr. Halsted resected about an inch and a half of the tenth rib in the mid axillary line, and removed about a litre of a thick, grumous pus, which had an acid reaction, and very distinct odor of vomit. The patient rallied well from the operation.

February 2nd. The last few days the patient has had a slight elevation of temperature. His general condition, however, is good. The tympanitic note is even more intense than before the operation, and it is almost amphoric in character. It extends anteriorly as far as the nipple line,

where it is only 10 cm. from the nipple line. The area is triangular in shape, the apex being toward the sternum. It is 15 cm. in transverse diameter. The liver seems pushed far over into the left hypochondrium.

10th. Since the last note the patient's condition has rapidly improved. The temperature has been but slightly above normal, the sweats have stopped, the diarrhea checked, and his appetite has become very good. The wound is dressed every day and the cavity irrigated. Dr. Halstead is now able to pass his finger far down into the flank, reaching quite to the level of the crest of the ilium. A flat tympany extends in the mid axillary line from the lower margin of the eighth to the iliac crest.

14th. General condition remains excellent. The cavity has reduced very considerably and the discharge has lessened.

The improvement continued, and the patient was discharged well.

CASE II. *Tuberculous pyelo-nephritis; tuberculous colitis; perforation at splenic flexure of colon, with the formation of a perinephritic air containing abscess; prominent tumor over tenth, eleventh, and twelfth ribs behind; incision and drainage; pulmonary tuberculosis; death: autopsy.* In October, 1887, I saw, with Dr. R. H. Harte, of Philadelphia, a case which illustrates a somewhat unusual form of this condition. He was a young man, aged about thirty, who, as early as 1880, had passed blood and clots with the urine, and was sent to California under the impression that he had Bright's disease. He lived a pretty hard life, and had been treated for stricture of the urethra and irritable bladder. When Dr. Harte saw him in July he had lost much flesh, was very pale, but was still fairly muscular. The urine contained pus and blood; the bladder was very irritable, and micturition was very frequent.

Early in September he had chills, which were supposed to be malarial; with these the fever was high, and he sweated heavily. In the middle of October diarrhea of an obstinate character set in. When I saw him he was pale, somewhat emaciated, with an irregular fever and occasional chills, which were evidently of a septic nature. He had profuse diarrhea, and the stools, at times, contained small quantities of pus. The urine was very purulent. On examination of the abdomen nothing of special note was observed. Behind, on the left side, beneath the skin over tenth, eleventh, and twelfth ribs, there was a prominent tumor, somewhat hemispherical in outline, and nearly equal in extent to the palm of the hand. It was soft, not specially tender, and, on percussion, when he was in an erect posture or on his belly, gave a most remarkable tympanitic note. On the other hand, when he was on his left side or back the note was dull. On coughing there was a distinct impulse in the tumor. Anteriorly, there was nothing to be felt on deep pressure, but there was evident thickening and pain in the left lumbar region. It was thought at first that this projection

is triangular in shape. Its transverse diameter, at the fundus, is small, but it has rapidly improved. The sweats have become very good. Dr. Halstead is reaching quite to the top of the axillary arch. The cavity has reduced

discharged well. *Chronic colitis; perforation of a perinephritic abscess; eleventh, and twelfth tuberculous; death;* Philadelphia, 1880, had passed California under the name of a pretty hard life, and a healthy bladder. When he was very pale, but was in good; the bladder was

supposed to be malarial; fever. In the middle of the fever and occasional profuse diarrhea, pus. The urine was nothing of special note, the skin over the tenth, and somewhat hemiparalytic note. On the note was dull. On the anteriorly, there was a thickening and that this projection

might possibly be hernial, though in an unlikely position. Aspiration, however, revealed the presence of pus, and it was thought to be perinephritic abscess which had communication with the bowel. On November 1st he was taken to the University Hospital, and Dr. Agnew laid open freely the abscess. There was evidently communication with the bowel, as fig-seeds were, on several occasions, noticed in the dressing. Gradual signs of involvement of the left lung came on, and he sank and died about January 1st.

The *post mortem* showed extensive old tuberculous disease of the left kidney. An abscess cavity, the size of a coconut, surrounded it and communicated with the colon at the splenic flexure through an opening which would admit a lead pencil. The abscess had perforated the diaphragm and produced pleurisy at the right base. There was extensive and progressing tubercular disease of the right lung. The right kidney presented a number of small tuberculous abscesses. The bladder was thickened and contracted, and presented tuberculous ulcers. There was an abscess of the prostate which opened into the bladder. The ureters were thickened and ulcerated.

The condition has been met with following injury, as in the following case, which was transferred to my wards from the surgical side at the University Hospital, Philadelphia.

CASE III. *Injury to arm and back; hematuria; amputation of arm; erysipelas; three weeks after accident signs of inflammation at the left base; development of a pyo-pneumothorax; expectoration of fetid pus; septic fever; asthenia; death; autopsy.*

William S., aged twenty-four years, was admitted to the surgical wards of the University Hospital on November 13th, 1885, having fallen under the wheels of an engine. The left arm was crushed, and he had a deep scalp wound. The arm was amputated at the upper third. For a week he had hematuria, and he complained of a pain in his left side. Subsequently erysipelas developed in both arm and face. About three weeks after admission signs of inflammation appeared in the left infra-scapular region, indicated by a rise of temperature, dullness, and feeble, blowing breathing, and he was transferred to the medical ward. The stump at this time had almost healed. Examination of the chest revealed a circumscribed dullness at the left base, extending nearly as high as the angle of the scapula, and, laterally, to the mid-axillary line. Tactile fremitus was diminished; on auscultation, feeble, blowing breathing, and, on deep inspiration, râles. Slight cough; very little expectoration. A septic pleurisy was suspected. The condition remained practically unchanged for several weeks, during which there was irregular septic fever. He complained at times of pain in the iliac region and left side, particu-

larly when he drew a deep breath. He soon began to spit up fetid pus, and in twenty-four hours brought up several ounces. It was concluded that a localized empyema had perforated the lung. On examination, tympanitic resonance, amphoric breathing, and metallic râles were found low down in the postero-lateral region, beneath the eighth, ninth, and tenth ribs, indicating pneumothorax.

The autopsy showed the existence of a large abscess behind the left kidney and descending colon, extending from the diaphragm to the crest of the ilium. The chief part of the abscess lay above the kidney and beneath the diaphragm, and in this region there was a distinct cavity, partially occupied by dirty-brown pus, similar to that which the patient had expectorated during the last two days of his life. Part of the diaphragm was in a sloughy condition, and two orifices, through each of which the point of the index finger could be passed, communicated directly with an abscess cavity in the lower lobe of the left lung. The pleural membrane of this part was greatly thickened, and there was a small localized empyema between the layers. There were areas of recent broncho-pneumonia throughout the other lobe. The left kidney was small, and presented at its upper part a distinct cicatrix, to which the capsule and adjacent tissues were strongly adherent.

The sequence of events in this case was, probably, as follows: Wound of kidney with bruising of tissue in lumbar region; sub-phrenic abscess; localized empyema, probably from contiguity with sub-phrenic abscess; perforation of diaphragm and lung, with discharge of pus; development of a sub-phrenic air-containing cavity which gave, in the lower and lateral aspects of the left side, the signs of pneumothorax.

I regarded this case, when admitted to my wards, as one of septic pleurisy, passing on to empyema and perforation of the lung. The physical signs of pneumothorax were of the most characteristic kind, and I must confess that it never once occurred to me that the air-containing cavity was below, not above, the diaphragm.

CASE 4. *Acute illness; signs of empyema; operation; pleura free; evacuation of large sub-phrenic abscess.* John M., aged twenty-four, fireman, admitted April 30th, 1892, complaining of pain in the right side of the chest. Nothing of any note in the family history. The patient had measles when young; otherwise has been remarkably healthy. Denies excess in alcohol; admits gonorrhœa, but has never had syphilis. His bowels have been regular; he has had no abdominal pains. The present illness began about a week ago, with headache, loss of appetite. He kept at work until two days ago, when the pain became very severe in the right side of the thorax, and was much aggravated by coughing and during a deep breath. He is positive that there was no chill, but he has had one

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or two heavy sweats. For three days his bowels have been loose, and he has had from five to ten stools a day, but has not noticed any blood.

On admission temperature 104° . He is a large, well-built, well-nourished man; lies upon the left side. Lips and mucous membranes of a good color; the cheeks are flushed; tongue has a whitish fur. Pulse is 92, regular in force and rhythm; respirations shallow, 36. The thorax is well formed; the left side moves more than the right.

Percussion. Resonance normal on the left side. On the right side the patient winces on percussion below the fourth rib. The flatness begins at the upper border of the sixth rib in mammillary line. Behind, the resonance is defective at the right base and in the lower axillary region, and possibly there the line of dullness in front varies slightly with the position. The fremitus is diminished over the flat area.

Auscultation is everywhere clear in the left chest and in the upper part of the right, but in the flat area the respiratory and voice sounds are diminished in intensity, and in the lower mediastinary region there are a few dry râles. The condition of the heart is normal.

The abdomen is full; the walls are tense. There was no tenderness, no glandular enlargement, and the only point of special moment was the distinct increase in the size of the spleen, the edge of which could be easily felt at the costal margin. The blood was negative as regards the malarial plasmodia. There was marked leucocytosis—18,000 white corpuscles per c.cm.

The urine presented a trace of albumin, was dark amber-colored, acid; specific gravity 1020.

The patient had a slight cough, with a muco-purulent, slightly bloody expectoration, in which there were numerous cocci, some encapsulated. It was evident during the first week in the hospital that the patient was very ill. Every day the temperature rose to between 103° and 104° , occasionally reaching 105° and once 106° . The pulse range was from 100 to 120. He had at times heavy sweats, and on the 2nd of May he had two severe chills, in one of which the temperature rose to 106.2° . The dullness at the right base persisted, beginning in the back about the ninth rib, and in front in the recumbent posture at the fifth rib. There seemed very little doubt to Dr. Thayer, under whose care the case came, that there was pus in the pleura, and an aspirating needle was inserted, but without obtaining any pus.

During the second week the patient emaciated rapidly; the fever persisted until May the 8th, and then fell to normal, the range being between 97° and 99° . The spleen remained large; there were definite sweats, but he seemed altogether better. On the 9th the blood count showed a diminution in the number of leucocytes—13,000 per c.cm. The

temperature remained low, and patient seemed to be somewhat better until the 15th, when it rose to nearly 105° , and the pain in the side had become worse ever since he sat up with the bed-rest two days ago. Yesterday it became very intense. The physical signs have scarcely changed. There is still flatness from the fourth rib, and behind from just below the angle of the scapula. The apex beat of the heart can now be accurately localized, and is in the fourth interspace 1.5 cm. outside the nipple. The respiratory sounds are feeble and distant.

On the 16th the patient was again aspirated, and this time pus was found which was a little stained, and contained the staphylococci and micrococcus tetragenus. Shortly after the aspiration the patient was seized with a fit of coughing and began to expectorate a quantity of reddish-brown, anchovy-sauce-like sputa, which was examined for ameba, without finding any. It was then determined to transfer to the surgical side for operation. Before the transfer the following careful note was made: "The patient is propped up in bed; the right side of the chest seems a trifle fuller than the left, the upper part looking more nearly equal. Motion is defective in the lower right front. On the right side flatness begins in the upper sternal line in the third space, at the upper border of the fourth in the nipple line, and at the fourth space in the mid-axillary line. Posteriorly, flatness begins at the angle of the scapula. In the erect posture the upper limit of dullness in front appears to move slightly. On the right side the percussion is clear. Respirations are clear at the apex in front, but diminish greatly in intensity over the flat areas, and is of a distant tubular character. The voice sounds have a somewhat nasal quality. The vocal fremitus is only just perceptible. In the infra-scapular regions the inspiration has a more distinctly tubular character, and there is very distinct egophony. The liver does not appear enlarged downward, and the border is not palpable."

The case was thought to be probably empyema, though the possibility of an hepatic or sub-phrenic abscess had been considered.

The following is an abstract of the report on the operation by Dr. Halsted:

The eighth rib on the right side was exposed by an incision from the axillary line to the nipple line; a portion of the rib, 5 cm. in length, was excised. It was found that the costal and diaphragmatic pleural surfaces were adherent. An incision made through these and the diaphragm opened at once into a large sub-phrenic abscess, which was freely evacuated and packed with iodoform gauze. The patient reacted well from the operation, and made practically an uneventful recovery. The discharge of pus gradually diminished, and he had fever only on two days. He had a chill on the 30th of May, and on the 3rd of June, after which he had no

be somewhat better until in the side had been days ago. Yesterday it scarcely changed. There from just below the angle v be accurately localized, nipple. The respiratory

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d by an incision from the rib, 5 cm. in length, was ragmatic pleural surfaces hese and the diaphragm s, which was freely evacu- ent reacted well from the recovery. The discharge ly on two days. He had ne, ater which he had no

further fever. His weight rose from 129 to 156 pounds, and he was discharged August 15th with only a small sinus remaining.

CASE V. *Acute rheumatism; during convalescence signs of large empyema; operation; 100 c.c. clear serum in pleura; evacuation of large sub-phrenic abscess; recovery.* Thomas F.M., æt. 14, schoolboy, admitted August 3rd, 1892, complaining of pain in the shoulders and in the stomach. His family history is good. He has had measles once, and diphtheria twice, but has been, until quite lately, healthy and strong. The present illness began three months ago with pain and swelling, at first in the ankles and knees, and subsequently in the hips and other joints. Evidently, from his account, he had a pretty sharp and somewhat protracted attack of acute rheumatism. He had been convalescent and doing very well until two weeks ago, when he had pain in the right side, cough, and slight expectoration. For at least two weeks he has had some shortness of breath, which lately has increased very much. He has had no diarrhea; the bowels have been regular, the appetite fair. He has had chilly feelings, but no definite rigors; has at times been feverish, and has sweated freely at night. He states that he has lost about twenty-five pounds since the beginning of his illness.

On admission the patient was emaciated, pale, propped up in bed, the pulse 124, regular; the temperature, 100°, rose within a few hours to 103°. The respirations were 28.

Thorax. Prominent on the right side, which does not move nearly so much as the left, and there is distinct bulging in the fourth and fifth right spaces under the nipple.

Percussion on the right side gives a somewhat tympanitic resonance in the infra-clavicular space, gradually shading into flatness at the fourth rib, the line of dullness extending through the lower axillary region to a point just above the angle of the scapula. In the erect posture the line of absolute flatness in front is distinctly higher. Tactile fremitus is absent in the flat regions. The respiratory sounds are everywhere clear except at these parts, where the respiratory murmur is scarcely audible. On the left side the physical examination is negative.

There is no expectoration. The apex beat is under the fifth rib in nipple line. The first sound is loud and sharp, and the second sound at the margin of the sternum was louder than the left. On palpation there was a suggestion of a thrill at the apex region, and there was a slight echo in diastole, but no definite murmur. The abdomen presents nothing special on inspection: the liver dullness extends three fingers' breadth below the costal margin. The border is not accurately palpable, owing to the contraction of the abdominal muscles. The edge of the spleen is not palpable. The patient remained in the medical wards for five days. The

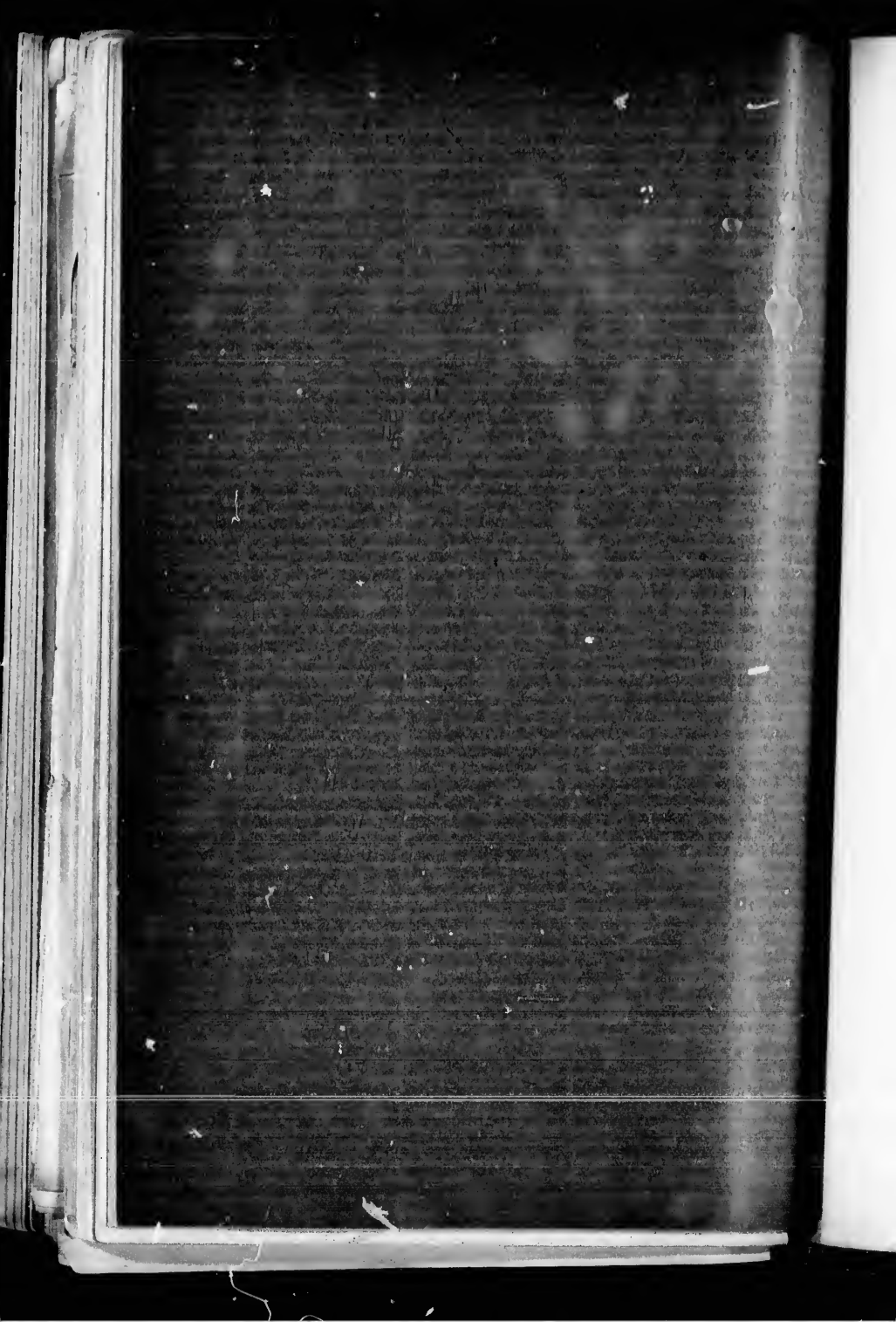
temperature range was from 98° to 103.5°. He had no chills, some sweating; the pulse ranged from 110 to 130. On the 7th, pus was drawn off with an aspirating needle, and the patient was transferred to the surgical side with the diagnosis of empyema. The pus was creamy-looking, but no micro-organisms were found.

An operation was performed by Dr. Finney on August 11th. About 9 cm. of the ninth rib on the right side was excised. An aspirator needle was then passed through the thickened pleura, but seemed to enter a solid mass, and nothing was obtained. On a second attempt, 250 c.c. of pus were withdrawn. The pleura was then incised just above the diaphragm. No pus was found, but 100 c.c. of clear serum. The diaphragm presented at the wound. The pleural cavity was shut off as completely as possible with strips of gauze, and the diaphragm was incised with the Paquelin knife, opening into a large pus cavity with numerous pockets. About 100 c.c. of pus were evacuated. A rubber drainage tube was inserted into the cavity. The patient did remarkably well, and the temperature fell. He was dressed daily; the discharge was free, and he gained in weight, and left the hospital on September 9th, still with a slight sinus.

ABSCESS.

He had no chills, some
on the 7th, pus was drawn
and transferred to the sur-
pus was creamy-looking.

August 11th. About 9
A.M. An aspirator needle
seemed to enter a solid
on attempt, 250 c.c. of pus
was drawn above the diaphragm.
The diaphragm presented
as completely as possible
was cauterised with the Paquelin
in several places. About 100
c.c. of pus was inserted into the
tube. The temperature fell. He
gained in weight, and
the right sinus.



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SHATTUCK LECTURE.

MASS. MED. SOCIETY.
1893.

TUBERCULOUS PLEURISY.

- I. INCIDENCE OF TUBERCULOUS PLEURISY IN POST-MORTEM ROOM AND IN THE WARDS.
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- III. GENERAL PATHOLOGY.
- IV. DIAGNOSIS.
- V. TREATMENT.

BY

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TUBERCULOUS PLEURISY.

MR. PRESIDENT AND FELLOWS:—

Many members of your ancient and honorable body (Bowditch, Wyman, Ellis, Garland, Sears and others) have dealt with many problems in connection with pleurisy; and without making invidious comparisons it may be said that their contributions, more particularly those of the late Henry I. Bowditch, are the most important which have been made on the subject in this country. While modesty made me hesitate to select any question relating to pleurisy as the topic for the Shattuck Lecture of this Society, I felt that differences of opinion on many points—not the least on those concerning the frequency, varieties, and sequences of the form known as tuberculous—would justify the narration of an experience gleaned during the first four years of service in the medical wards of the Johns Hopkins Hospital.

I. INCIDENCE OF TUBERCULOUS PLEURISY IN THE POST-MORTEM ROOM AND IN THE WARDS.

(a) *In the post-mortem room.*—A trustworthy estimate of the incidence of tuberculous pleurisy can be had only by anatomical investigation. Uncertainty is inherent to clinical records of an affection such as pleurisy, the diverse etiological factors of which cannot be always discriminated at the bedside, even with the help of bacteriology.

Accordingly, with the kind assistance of Dr. Rupert Norton and with the consent of my colleague Prof. Welch, I have carefully analyzed the post-mortem records of the 101 successive cases from my wards in which pleurisy—fibrinous, sero-fibrinous, hæmorrhagic, or purulent—was found; and

the record is of interest as showing the incidence of tuberculous pleurisy in a medical service varying from 70 to 90 beds. Of the 101 cases, there were 32 in which the pleurisy was definitely tuberculous. I have estimated as such only those in which tubercles were present on the pleural layers, either as fresh miliary granulations, caseous masses, or diffuse fibro-tuberculous membranes. Of these cases there were eight with purulent exudate, all associated with pneumothorax, and two with hemorrhagic fluid. Seven were cases of acute miliary tuberculosis with fibrinous and sero-fibrinous exudate; four were instances of acute miliary tuberculosis with a purely fibrinous effusion; and thirteen were cases of chronic sero-fibrinous exudate with more or less thickening of the pleural layers. In four instances the sero-fibrinous exudate was encapsulated.

There were thirteen cases of pulmonary tuberculosis in which pleurisy was present without our being able to say definitely that it was of a tuberculous nature. In ten of these cases the exudate was fibrinous, and three sero-fibrinous. It will thus be seen that the incidence of tuberculous pleurisy among these 101 cases was a little less than 32%. By far the most common forms of pleurisy are the sero-fibrinous and fibrinous secondary to acute disease of the lungs, or occurring as a terminal process in chronic affections of the heart, arteries, or kidneys.

(b) *In the wards.*—Passing now from the certain and definite data of the post-mortem room let us turn to the wards and inquire into the etiology of the cases of acute pleurisy which have been under observation. I have thought it better to review only those cases in which there has been a pleurisy with effusion coming on acutely or sub-acutely, and in which the effusion was sero-fibrinous, not simply fibrinous and not purulent. I have excluded the former from analysis because of the very great frequency, as the post-mortem reports show, of a simple fibrinous pleurisy in

so many varied conditions, often overlooked clinically, of which, of course, tuberculosis is one, indeed one of the most common. I have not included the purulent cases, partly because there is here much less dispute, as they have a more definite and well-recognized etiology, and partly from the fact that abscess of the pleura—empyema—is regarded with us as a strictly surgical affection, and the cases are either admitted directly to the surgical wards or turned over at once. This may account for the somewhat remarkable absence of purulent pleurisies in the post-mortem records of cases from my wards, apart from the instances of pneumothorax. Still it must be noted that of 14 cases of empyema operated upon, 12 recovered, exclusive of the cases of empyema with pneumothorax. The cases in the following analysis, then, have been admitted to the wards with well marked signs of pleurisy with effusion. Of the 58 cases 45 were males; 13 females; 10 were in the colored race; 48 in the white.

In attempting to estimate from the clinical side the tuberculous character of a pleurisy the following points are to be considered:

First: mode of onset. In reality this is not a criterion of any moment, since it must be acknowledged that an acute tuberculosis of the pleura may come on abruptly with a stitch in the side, or even with a chill. A slow insidious onset is more common, but by no means characteristic.

It is so difficult to obtain from hospital patients accurate information as to the mode of onset, often indeed as to the duration of their illness before admission, that we cannot place very much reliance upon the facts so obtained; but the errors, I suppose, are equally common throughout the entire class. As a general rule, too, the patients do not seek relief until the symptoms have become aggravated. Thus it is interesting to note that in the 58 cases of sero-fibrinous pleurisy the duration of illness prior to admission

was given as one week and under in 8 cases; between one and two weeks, 16 cases; between two and three weeks, 7 cases; one month and over, 25 cases.

Of the symptoms for which they sought relief the following were the most striking: In two cases no history could be obtained. Of the remaining 56 cases the symptoms for which they sought relief were as a rule cough, dyspnoea and pain in the side; more rarely fever or chills and fever. Thus in 45 cases the patient complained of cough; in 44 of dyspnoea; in 41 of pain in the side; and in 14 there was a history of chills and fever. Cough and dyspnoea are by far the most frequent causes for which the patient seeks relief in hospital. In two only of the cases did the patient give any definite account of an exposure to cold or of a wetting. As stated, the onset is no etiological criterion, and the claim at present is that a great majority of the cases of pleurisy *a frigore* are in reality tuberculous. In the history obtained from the patient, however, there may be very suggestive features; for instance, cough and loss of weight for some months previous, or hæmoptysis, or a previous attack of pleurisy. Thus, one patient, Case 1 of the series, had had a cough at intervals for three years, and when admitted the right side of the chest was full of greenish, sero-purulent fluid. After many tappings he improved very much, and, though the cough had persisted for so long, there was no sign of pulmonary disease, but subsequently bacilli were found in the expectoration. Another interesting case, No. 4, had hæmoptysis nine months before, and though he was an extremely robust, vigorous man, the insidious onset of the pleurisy led us to suspect tuberculosis. Bacilli were demonstrated in the exudate. The patient subsequently developed pulmonary tuberculosis. In two instances only the patients had pleurisy with effusion previously; in one five months before; in the other eight years before. Both did well, and both were discharged at the end of three weeks.

A second point, on which more stress has been laid than the facts justify, is the family history; but inheritance is now generally acknowledged to be of a susceptible soil, rarely of the germ itself. Local conditions are probably of most importance in influencing the susceptibility to an infectious agent so widely diffused as that of tuberculosis. Still it is interesting to note the presence or absence of tuberculosis in the ascendants or near relatives; thus in two of the fifty-eight cases the father died of tuberculosis; in four, the mother; in one, the father and mother; in six, a brother or sister; in one, a brother and sister; in four, an aunt or uncle; and in two the wife died of tuberculosis, in one the husband. In 37 of the cases positive questions as to tuberculosis in the family were answered in the negative, and in three it could not be obtained.

Third: the character and contents of the exudate. There is nothing specific in the physical characters of the effusion in tuberculous pleurisy, nothing from which on aspiration a definite opinion can be formed. The exudate may be sero-fibrinous, simply serous, hæmorrhagic and sero-purulent or purulent. Of these the hæmorrhagic and the thin sero-purulent may be called suggestive. Of the cases of acute pleurisy with effusion at the clinic seven were blood tinged. Of the cases from the wards in which pleurisy was found post-mortem, in four the effusion was hæmorrhagic; of these two were tuberculous and two were simple. The thin sero-purulent exudate, a little opalescent, often with a greenish tint, and which microscopically contains a granular, fatty matter and only a few leucocytes, is very suggestive of a tuberculous lesion. The cover-slip and culture tests, so much practised of late, yield variable results. In the first place it is conceded that the great majority of tuberculous sero-fibrinous effusions are sterile; organisms are neither found on cover slip preparations nor does anything grow in cultures. Our own experience is in accord with

this, except that in one case the tubercle bacilli were definitely determined in the exudate. This was after repeated tappings. A sterile effusion is regarded as a point in favor of the tuberculous nature. In the purulent tuberculous exudates the bacteriological results are also variable. In some of the acute cases, as in one which I shall describe shortly, the bacilli of Koch were abundant. In other instances only pus organisms or the diplococci are present, or there may be no micro-organisms. A more important and more satisfactory test is the inoculation of the exudate into the peritoneal cavity of guinea pigs, experiments which in the hands of some of the French observers have yielded positive results in the sero-fibrinous and purulent pleurisy of individuals apparently not tuberculous.

When Koch's tuberculin was in vogue it was hoped that it might at any rate give us a means of positive diagnosis. The report of the German hospitals shows that in the subjects positively tuberculous the great proportion of them present reaction, whereas in suspected individuals about 60 per cent., and in non-tuberculous subjects only about 25 per cent. Subsequently, in speaking of diagnosis I will narrate an instance in which the acute reaction to tuberculin led us into a serious error in diagnosis.

And lastly, the nature of the pleurisy may not be apparent for months or years, when the onset of a tuberculosis in other parts may indicate clearly the character of the whole process. You are all familiar with the striking statistics published of late years, none more interesting than those by Dr. Vincent Bowditch from his father's records. Such statistics from private practice are of infinitely more value, as a rule, than those from hospitals. The time has been altogether too limited at the Johns Hopkins Hospital to determine, even if we could, the subsequent history of the great proportion of the cases of sero-fibrinous pleurisy which have been under treatment. It is interesting to note, however

in striking contrast to figures from some hospitals, that so far as our records go, only five of these patients have subsequently had tuberculosis. While our hospital figures are by no means in favor of the view that a large proportion of all sero-fibrinous pleurisies are of a tuberculous nature, I must confess that in private practice I have, year by year, been increasingly impressed by the frequency with which the subjects of pleurisy with effusion subsequently become tuberculous. Such cases as the following are not uncommon.

A few months ago I saw Dr. Martinet, a man aged 40, of fine physique and general good health, and excellent family history. In the summer of 1892 he developed, without obvious cause, pleurisy on the right side, and in this attack was seen on several occasions by Dr. W. S. Thayer. He was aspirated twice and made a very satisfactory recovery, and resumed his work. Three months subsequently he developed basilar meningitis, of which he died in three weeks. There was nothing in the condition of this patient or in the character of the pleurisy to justify the suggestion of a tuberculous nature, but the onset of a meningitis which ran a long course like the tuberculous form, with strabismus, etc., rendered pretty clear the nature of the process. A very similar case I remember in the practice of my late colleague, Dr. Ross of Montreal. A young man was admitted with pleurisy on the left side and the history of having had a previous attack several months before. The effusion gradually diminished, but signs of local disease developed at the apex of the right lung. About three months after admission a purulent otitis media developed on the left side, followed shortly by meningeal symptoms, of which he died in the third week. The autopsy showed greatly thickened pleural membranes on the left side, many tubercles and local tuberculous disease at the right apex, with a tuberculous basilar meningitis.

I have seen recently a young man with an advanced pul-

monary tuberculosis, who consulted me first in Philadelphia in October, 1888, when he had the left pleura full to the clavicle with a serous exudate. There is no tuberculous history in his family. The disease set in insidiously with cough. He was tapped but once, and he rapidly gained health and strength. I did not see him again professionally until the autumn of 1892, when he had had attacks of severe prostration and shortness of breath, but very little fever. Since then, signs of local disease have developed and extended, and tubercle bacilli are present in the expectoration. Cases such as these could be paralleled from the note books of any physician in large practice. The cases from the wards which have developed pulmonary tuberculosis will be described later.

II. CLINICAL TYPES.

Tuberculous pleurisy may be part of a general miliary infection, but it is rare to find the pleuritic symptoms dominating, or even pronounced enough to attract attention. In reviewing any large number of cases, the character of the onset and the quick or slow course offer the most valuable features for classification, and separate two types, to which may be added a third, when the pleurisy forms part of a general serous membrane tuberculosis.

1. *Acute Tuberculous Pleurisy.*

It is difficult to say, in our present state of knowledge, the proportion of instances of acute sero-fibrinous pleurisy due to tuberculosis. The cases are rarely fatal; a large majority recover completely, in a few the condition becomes chronic, a variable number develop tuberculosis. More than this we cannot say, but clinical and anatomical study enable us to separate at least three groups of tuberculous cases in which the onset is acute.

(v) *Acute tuberculous pleurisy, with subsequent chronic course.*

There are cases of tuberculous pleurisy in which the disease sets in abruptly with pain in the side, fever, cough, and sometimes with a chill. There may be nothing whatever to suggest a tuberculous process; the subject may be of fine physique and of excellent family stock. Nor may there be anything in the course of the disease at first to excite suspicion. The effusion augments and the patient is tapped, perhaps repeatedly, and may get well with evidences of a greatly thickened pleura. Then the pleurisy may recur, and the case is labelled one of chronic pleurisy with thickening of the membranes, and finally the lung is infected, or tuberculosis of other parts becomes manifest. The following is a good illustrative case, of special value from the fact that the death occurred from an intercurrent affection, and we were able to study the condition of the pleura just about a year after the onset of the first illness.

Case 1.—Pleurisy, with acute onset; chronic course of nearly a year's duration; repeated tapplings; acute pneumonia; death; autopsy.

John A., aged 45, was admitted to ward F of the Johns Hopkins Hospital, June 18th, 1892, complaining of shortness of breath and swelling of the feet and legs.

His mother and four or five of her sisters died of phthisis. When young had (he was told) serofula, and had an operation performed on both hips; the wounds discharged for two years. He was not then, nor has been since, at all lame. Ten years ago he had hydrocele on the right side, which was tapped. After childhood he grew into a remarkably strong, powerful man. Previous to January, 1892, he had been working in the Belt-line tunnel for nine months, and was in perfect health, weighing 235 pounds. He went

to Virginia, and while there, in January, his present illness began. While at work on a bridge he felt dizzy, had a severe pain in the left side, followed by cough, shortness of breath, much expectoration, which was not, however, blood tinged. He went to a hospital in Washington, and was told he had typho-pneumonia. He had high fever, and was evidently very ill. The feet were swollen, and he had at times heavy sweats. He was several months in hospital, and was convalescent only about a month before his discharge on June 2d. He does not give a very clear account of his symptoms while in the hospital at Washington, but he had cough and pain in the side, and he lay principally on his right side. He lost also a great deal of weight.

Condition on admission (by Dr. Thayer): Patient is a large framed, muscular, fairly well nourished man. He is propped up in bed, inclining chiefly towards the left side. Lips and mucous membranes of good color; respirations rapid, 32; pulse, 128, regular, tension rather high; radial vessels are somewhat sclerosed. Temperature on admission, 99°; weight, 175 pounds.

Inspection. Thorax; the left side looks larger and movements are much restricted. The cardiac impulse is seen to the right of the sternum.

Percussion gives clear resonance in the right front as far as the third rib, where, close to the sternum, in the fourth and fifth interspaces, it becomes flat. On the left side there is modified resonance below the clavicle, shading into absolute flatness at the second rib, in the erect posture; at the third rib when recumbent. The flatness extends over the whole of the left back. Tactile fremitus is absent over the flat region, and the breath sounds are distant and tubular. On the right side they are clear, loud and breezy. The heart sounds are heard best to the right of the sternum, and are clear, the second loud and sharply accentuated.

Examination of the abdomen was negative. The urine was clear, yellow, acid, faint trace of albumin, no casts. The patient was aspirated, and 1500 cc. of a clear, yellow serum withdrawn.

For the first month in hospital the patient's condition did not materially improve. He lost in weight from 175 pounds to 157; the temperature range was constantly between 98.5° and 100° , rarely going to 100.5° , and only once, on the second day after his admission, reaching 101.5° . The fluid gradually re-accumulated, and he was tapped on the 21st, with a withdrawal of 1280 cc. of fluid; on the 30th, when 1000 cc. were withdrawn; and on July 8th, when 1100 cc. were removed. Early in July he began to improve,—the appetite increased, and he gained in weight. On the third of August the following note was made: "The patient has been aspirated in all six times, the last time being on the 26th of July. On inspection, there is now very marked flattening of the left front. The expansion is greatest on the right side, on which percussive note is full and clear. On the left side there is flat tympany above the second rib, below absolute flatness. Over the flat areas there is a distant, tubular breathing, of almost the same intensity everywhere. The vocal fremitus is diminished. The breath sounds very nearly absent in the supraspinous fossa." He was aspirated the seventh time on August the 3rd, with removal of 800 cc., and the eighth time on August 16th, when 600 cc. were removed; the fluid of the last four tappings was blood-tinged. In the latter part of July and the first two weeks in August he improved rapidly and gained in weight, and on the 16th weighed 175 pounds.

The patient was discharged on August 18th, when the following note was made: "The left side of the chest seems somewhat sunken; right side expands fully and well, and looks large. At the left apex there is a flat tympany, which

shades into flatness at the fifth rib, just outside the nipple line. At the left back there is a marked dulness, becoming absolute about an inch below the angle of scapula. Above this point the vocal fremitus is felt, below it is absent. Respiration is heard, though feebly, every where except at the extreme base. The point of maximum cardiac impulse is not to be made out; the sounds are heard distinctly over the normal area; the second pulmonic sound is accentuated."

The diagnosis of pleurisy with effusion was made. No suspicion was entertained by Dr. Thayer, under whose care he came during my absence, that the process was tuberculous; indeed, there was no evidence whatever to indicate this, except that the last four tappings were slightly blood tinged.

November 30th, 1892. Patient was re-admitted to-day with dyspnoea, cough and fever. He states that he has remained well since discharged, August 18th, and has been working on the streets ever since. Three weeks ago he had slight shortness of breath after an unusual exertion, and ever since that has had slight cough with white, frothy expectoration. He worked every day until November 26th. Last evening he had a heavy chill, in which he shook for an hour. This was followed by fever, which persisted all night. This morning he spat up a little blood. His appetite has been good.

Condition on admission. Weight is 170 pounds. Temperature, 100.4 at 2 P. M., rising to 103° at 4 P. M. He had a profuse sweat in the afternoon, and the temperature fell to 98° at 6 o'clock. Pulse ranged from 80 to 120; respirations from 18 to 36.

December 1st. This morning patient is lying on his back, face somewhat flushed, lips and mucous membranes and finger tips somewhat cyanotic. Pulse 104, full, of fair tension. Respirations 32. There is marked flattening

outside the nipple dulness, becoming dullness of the scapula. Above the nipple it is absent. Below it is present everywhere except at the apex. The cardiac impulse is not distinctly over the heart and sound is accen-

tion was made. No sputum under whose care the process was tubercular whatever to indicate there is slightly blood

re-admitted to-day states that he has been ill 8th, and has been ill three weeks ago he has unusual exertion, with white, frothy sputum on November 26th. He coughed which he shook for which persisted all day. His appe-

10 pounds. Temperature at 4 p. m. He has the temperature from 80 to 120;

is lying on his back, pleural membranes loose 104, full, of marked flattening

in the left side in front; the right side of the chest expands fully. Resonance throughout the right front and axilla, good. There is marked dulness over the left chest, resonance in front having a slight tympanitic quality. There is dulness everywhere over the left chest behind, shading into flatness below the middle of the scapula. On the right side behind, the resonance appeared good, and the respirations were clear. On the left side behind, the breathing was distant, tubular, and in the infrascapular region scarcely audible, vocal fremitus distinct. Dr. Hewatson put in a needle in the left back and obtained clear fluid.

Heart; well marked epigastric impulse. The maximum impulse cannot be made out. The sounds are the best heard in the fourth interspace, 4 cm. from the sternum. The spleen is not palpable; liver not enlarged.

The sputum not very abundant, muco-purulent, blood tinged, contained a few distinct tubercle bacilli, and many encapsulated *B. leucococcus*.

The urine, reddish brown, sp. gr. 1025, moderate amount of albumin, no tube casts.

December 3d. Within the past 24 hours the signs of consolidation have appeared in the right side, and have extended rapidly. This morning dulness begins at the third space in front, and is marked to the middle of the back behind. The breathing is of a modified, tubular character, and accompanied with fine crepitant rales. The temperature rose throughout December 1st, and between 6 a. m. and 4 p. m. of the 2d was continuously between 105° and 106°. For the past 24 hours the range has been between 103° and 104°. The pulse range has been from 106 to 120. The cough has been very distressing. The sputum is rusty, brown, tenacious, and contains tubercle bacilli. On the evening of to-day a moderate venesection was practised.

December 4th. The dulness has extended on the right

side behind, and there is now tubular breathing from the spine of the scapula to the base; pulse is good; the temperature fell last evening to 101° ; this morning it is high again, 104° . The respirations are about 40. There is marked leucocytosis, 33,000 white corpuscles per cubic mm. During the day patient sank gradually, the pulse becoming feeble, in spite of the persistent administration of stimulants, ammonia, etc.; the temperature kept up, and he sank, and died at 2 A. M.

Autopsy (Dr. Flexner). Body of a large framed, well nourished man. Peritoneum smooth. Thorax; universal adhesions, which were readily stripped off on the right side. On the left side dense fibroid union of the layers of the pleura to a distance of about 8 cm. from the sternal margin. The heart much distended, with firm gelatinous clots; moderate hypertrophy of the left ventricle, distinct hypertrophy of the right, the walls of which were firm and considerably thicker than normal. No endocarditis.

In removing the left lung an encapsulated serous effusion was opened, occupying the layers of the pleura over the postero-lateral region of the left chest. The costal pleura was greatly thickened, ranging from 1 to 1.5 cm.; at the diaphragm, it was in places as much as 2 cm. in thickness. The visceral layer was also thickened, but not to the same degree, only from 3 to 5 mm. Both layers were smooth, greyish white in color, in places presenting areas of congestion and hæmorrhage. There was a good deal of greyish white gelatinous fibrin in places, closely adherent to the visceral pleura. There were no caseous masses, no spots of caseous infiltration on the surface of either layer. On section, the thickened pleura had the appearance and consistence of firm, new connective tissue, and at first sight it seemed as if the process were really a simple chronic pleurisy, more particularly as no miliary tubercles were noticed on the surface, and no caseous masses. On close examination,

however, of the cut sections, particularly in places, greyish translucent fibroid tubercles could be seen projecting above the cut surfaces. These were particularly marked in the thickened diaphragmatic layers. At one or two spots there were found small areas, from 3 to 5 mm. in extent, of greyish, yellow tuberculous infiltration. The left lung was very considerably compressed, but still it everywhere contained air, except at the extreme base. There were no miliary tubercles, no caseous masses. The right lung was large, voluminous, retained its shape, did not collapse, and was everywhere airless, except at the extreme apex, and the antero-lateral margin. The pleura was a little thickened, and covered with tags of old adhesions; no tubercles were seen. On section there was at the apex an area of caseation and softening the size of a walnut, surrounded with tubercles and smaller areas of caseation. This communicated directly with a good-sized bronchus. The lower part of the upper lobe, the greater part of the middle lobe, and all of the lower lobe, were in a condition of red hepatization. There were no miliary tubercles, no caseation. The bronchial and tracheal glands were greatly swollen, tumefied, and presented here and there small caseous masses. There was nothing of special note in the abdominal organs; no tubercles. In the right testicle there was a fibroid and cartilaginous, cyst-like structure containing cholesterol.

There was a marked tuberculous history in the patient's family, and the latter tapplings were blood tinged, points upon which in a less robustly built man we would doubtless have laid greater stress. On his return with an acute pneumonia, tubercle bacilli, as well as pneumococci, were found in the sputum, and the former gave us, for the first time, a definite clue to the nature of the pleurisy, now chronic but in process of healing. It is interesting to note that the tubercle bacilli came from a very small focus of caseation and softening in communication with a bronchus.

(b) *The secondary and terminal acute tuberculous pleurisy.*

Here reference is not made to cases of general miliary tuberculosis in which the pleural membranes are involved with other parts. A miliary eruption is very often secondary to a local tuberculosis in the lung, and under these circumstances the exudate is usually fibrinous. It is interesting to note that in the 101 post-mortems from my wards, in the cases in which tubercles were found on the membranes only four had a simple fibrinous pleurisy. On the other hand, there were eleven instances of fibrinous pleurisy in persons dead of pulmonary tuberculosis in which there was no mention made of tubercles on the pleura. This accords with the well known experience that a pleurisy in the course of a pulmonary tuberculosis is not always due to the presence of tubercles. Acute miliary tuberculosis of the pleura, with a sero-fibrinous or hæmorrhagic exudate, was present in only seven of the autopsies. In every one of these cases the tuberculosis was secondary to some other affection, or occurred as the terminal event in some long standing illness. Whether or not in an instance, for example, of acute pleurisy with effusion, coming on in an apparently healthy individual, and which, for the sake of argument, we may presume to be tuberculous, the condition of the pleura is that of an acute miliary tuberculosis, I have no personal knowledge; but in my experience the condition has almost invariably been, as just mentioned, a secondary or terminal process in some already existing affection. The following are illustrative cases: In the first instance there was a chronic anæmia, induced by the hæmorrhoids, with old foci of caseous disease at the apices of the lungs. The death resulted from miliary tuberculosis, involving chiefly the pleural sacs.

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*Case II.—Hemorrhoids; anemia; chronic tuberculosis;
caseous foci in the lungs; acute military tuber-
culosis of both pleural membranes.*

R. S., male, white, aged 47, admitted October 21st, 1891, complaining of bleeding piles. He has always been a healthy man; never has had any illness, except the hemorrhoids, which have troubled him at intervals for nine years. During the past few weeks they have been much worse, and he has lost blood with every stool, having had three or four evacuations every day. He says that he has lost as much as a pint of blood at one time. He has gradually become very pale. At present the hemorrhoids are not bleeding.

Patient is a pale but well nourished man. On admission, the examination of the lungs was negative; the heart impulse was diffuse. The pulse was regular, small in volume. The spleen was not palpable, and there was no œdema. The urine contained a faint trace of albumin, but no tube casts. He was thought to have moderate grade of anemia from bleeding piles.

About the middle of November the patient began to be delirious, but the temperature was not high, not more than 100° or $100\frac{1}{2}^{\circ}$. He had slight diarrhœa, from three to six semi-solid stools daily. He did not seem very ill, and was generally up and about and dressed, though he talked in a rambling, incoherent way.

About November 28th he began to have dyspnœa, which gradually increased. The temperature had not changed specially since his admission; had been ranging from 100° to 101.5° , and very rarely reached 102° . On December 3d the note was that he was propped up in bed; very pale; lips and mucous membranes blanched; respiration 32, labored and wheezing. Pulse 120; chest hyperresonant in front; dulness at both bases; below the angle of scapula an

absence of breath sounds. There was no expectoration. He continued to have three or four loose stools daily, and died on the 5th.

Autopsy. Large, well built, well nourished man, marked anæmia. Peritoneum is smooth. Over the mesentery, and the lower surface of the diaphragm, and in the pelvis, there are numerous elevated, translucent tubercles, some of them surrounded with areas of hyperæmia. The peritoneal surface of the intestine also presents numerous tubercles. The surface of the spleen and the contiguous diaphragm presents many tubercles.

Acute miliary tuberculosis of both pleural sacs, with about two litres of serous fluid in each. The membranes were covered with a thick, fresh fibrinous exudate, after the removal of which many miliary tubercles were seen. Both lungs were compressed; no cavities; but at the apices there were old and partially softened caseous masses, with many miliary tubercles. In the lower lobes there were only few scattered tubercles. The spleen presented a few tubercles; no tubercles seen in the liver.

Intestines. One or two small ulcers, with irregular margins, in the ileum. The mesenteric glands hard and caseous.

Meninges were œdematous, but presented no tubercles.

In the following instance the patient died of an acute entero-colitis, with an acute miliary tuberculosis of the pleura as a terminal event.

Case III (abstract).—Chronic entero-colitis; acute tuberculosis of the left pleura.

Jos. A., aged 33, colored, admitted January 23, 1891, complaining of diarrhœa and colic. There was no history of tuberculosis in his family. He had gonorrhœal synovitis five years ago, and a chancre. For nearly a year he has been subject to diarrhœa. On admission, patient was

emaciated and anæmic; afebrile. The physical examination was negative. He had four or five stools daily, yellowish white in color, and containing undigested food; no amœbæ were found. He was very anæmic, had moderate fever, temperature range from 99° to 101°. The diarrhœa was uncontrollable, and he gradually sank, and died on February 28th. There was found an extensive enterocolitis, chiefly of the large bowel, with irregular ulceration. Almost the entire costal pleura on the left side was the seat of an extensive eruption of miliary tubercles, quite fresh, with hæmorrhagic zones about them, and much fibrinous exudate. These fresh adhesions extended along the diaphragmatic surface. The bronchial glands were caseous. There were no lesions in the lungs, except at the edge of the lower lobe, adherent to the diaphragm, there was a firm caseous mass, with some induration about it and colonies of miliary tubercles.

Post-mortem, we certainly see acute miliary tuberculosis of the pleura most frequently in the bodies of persons who have been under treatment for some chronic malady, affections of the heart and arteries, chronic Bright's disease, or scleroses of various sorts. Usually there will be found in these cases old foci of tuberculous disease, a caseous nodule at the apex, or in the bronchial glands, or in the mesenteric glands. Of late attention has been called repeatedly to the association of tuberculosis of the serous membranes, most commonly of the peritoneum, with cirrhosis of the liver; but a number of instances of terminal tuberculosis of the pleura have also come under my care in this disease, and it may exist without having caused symptoms enough to attract attention. In one of my wards at Philadelphia Hospital an elderly man, with cirrhosis of the liver and moderate ascites, and dulness at the right base, died suddenly of hæmorrhage from the stomach. The effusion was on the right side, which we thought to be hydrothorax, as

it had come on without any special aggravation of the symptoms, proved to be acute miliary tuberculosis, with effusion. More frequently the symptoms are pronounced, as in the following case :

Case IV.—Fatty and cirrhotic liver; hæmorrhage from the bowels; bilateral acute tuberculous pleurisy.

Mrs. L., aged 27, admitted with hæmorrhage from the bowels and tenderness over the region of the liver, which organ was slightly enlarged. There was no jaundice. She was a hard drinker, and had been in failing health for some months. Signs of pleurisy were discovered on both sides, and she had a severe cough. She sank rapidly, and died within a week or ten days after her admission.

Autopsy.—Left lung covered with a thin fibrinous exudation, thickest at base and near the edges. In places the membrane is studded with minute granular tubercles, which are best seen where the exudation is less abundant. The organ is crepitant throughout, a caseous spot is seen at apex, and a narrow fibroid area in the lower lobe. No disseminated tubercles throughout the substance. The right pleura presents a similar exudation, less abundant than on the left side. The costal pleura is thickly lined with false membrane, is congested, and presents small grey bodies scattered through the membrane. At the apex of the lung is a small caseous mass, with a cavity the size of an almond, in direct communication with a bronchus. In the neighborhood of this are several small groups of tubercles. The lower lobe also presents a couple of small caseous bodies, but no scattered tubercles. Liver weighs 2,200 grammes, is large and pale. Lobules distinct, bile-stained in centre. Organ is both fatty and cirrhotic. Other organs normal.

Such instances as the following are not rare in old hos-

pital patients with cardio-vascular and renal changes. More than once I have mistaken a terminal tuberculosis of the pleura for hydrothorax.

Case V.—General arterio-sclerosis; primary tuberculosis of right pleura.

Joseph A., aged 70, colored, laborer, admitted July 26th, 1892, complaining of shortness of breath and swelling of the feet. No family history to be obtained. His wife states that he has been a perfectly healthy man all his life. She never heard him say that he had any illness. With the exception, some years ago, of a gathering under the left arm, he has been perfectly well. He denies the use of alcohol to excess.

His present illness began suddenly four weeks ago with a shaking chill, which lasted about half an hour, and was followed by pain in the stomach and shortness of breath. He has had no return of the chills, but has complained of abdominal pain. Two weeks ago the legs began to swell, and he thinks the abdomen was also slightly swollen. For about the same length of time he has been a little irrational. There has been slight cough, and he has had to sit up in bed to sleep.

Present condition.—In bed, lying on the left side. He is somewhat emaciated; respiration rapid, 48; pulse 136, easily compressible, radials calcified; temperature 101°, rose in the night to 102.5. He is not rational, and constantly mutters to himself.

Thorax.—Resonance throughout the right front is good, but rather tympanitic; in the upper left front it is full, and somewhat tympanitic in character. Respirations everywhere accompanied by an expiratory groan, and in front they are harsh, and there are occasional râles, which, on the left side, are medium-sized. Behind the resonance is impaired at the right base, clear on the left side; on both

sides respiration is harsh, and accompanied with fine, moist râles. Heart impulse is in fourth, fifth and sixth spaces; maximum in sixth, 3 cm. outside the nipple line. Relative dulness at third rib. Sounds are feeble and heard with difficulty.

Patient was taken home August 11th; the dilatation of the heart had subsided under the use of digitalis. He had slight diarrhœa, which was checked with alum enemata. The signs of engorgement in the lungs disappeared, and he had no pulmonary symptoms. The case was regarded as one of hydrothorax, secondary to the dilated heart in chronic arterio-sclerosis. Death occurred about two weeks after he left the hospital.

Autopsy (Dr. Flexner and Dr. F. R. Smith)—(*Abstract*).—The patient was found to have general arterio-sclerosis, with hypertrophy of the heart. The pericardium was smooth. The right pleura was thickened and the pleural layers uniformly adherent. The costal membrane measured about 4 mm. in thickness, and was covered with tubercles, somewhat larger in size than miliary granules, and, as a rule, caseous. The underlying thickened infiltrated tissue was yellowish, and consisted of a diffusely caseous mass. The outermost layer was more fibrous. The pleura covering the diaphragm was greatly thickened and infiltrated. The lung was somewhat compressed, deep salmon color, and contained no tubercles. The left pleura was not especially thickened; no adhesions. There were small miliary nodules, however, on the visceral layer. The apex of the lung was somewhat retracted, and on the anterior edge of the upper lobe there was an area of caseous pneumonia, with a small central cavity. There were, however, a few scattered tubercles throughout the posterior part of the lung.

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(c) Acute tuberculous suppurative pleurisy.

A considerable number of the purulent pleurisies, designated as latent and chronic, depend upon tuberculosis, but the fact is not so widely recognized that acute ulcerative and suppurative disease, of a most severe type, may occur and run a very rapid course. In the following remarkable case the disease attacked a young, healthy woman, of good family history, and set in abruptly with a chill and severe pain in the side. On admission there was dulness in the right side, feeble breathing, but there were features about the physical examination which made us a little uncertain as to the nature of the case, and nothing was obtained on several aspirations. Within a few days, however, it seemed so clear that suppuration must be going on that Dr. Halsted was requested to operate. Instead of finding any large collection of pus, there were small pockets varying in size from a marble to a chestnut and though portions of ribs were resected in three different places no large collection was found. The symptoms persisted, and death took place about five weeks after the onset of the illness. Remarkable ulcerations were present throughout the right pleura, with pockets of pus between the adherent layers, no large accumulation, and an extensive acute military tuberculosis of the lungs. The tubercle bacilli were present in large numbers in the pus. Full details of the case are as follows:

Case VI.—Suppurative tuberculous pleurisy; numerous pockets of pus; operation without benefit; military tuberculosis of lung.

Lizzie W., aged 21, German by birth, was admitted to ward G, April 7th, 1893, complaining of chills, fever, and pain in the right side.

Father and mother living and well; one sister living; no history of hereditary disease in the family.

She has always been a perfectly healthy girl. Has been

in service; has only been in this country a short time. She had erysipelas of the head and face some months ago, and has not been quite so well since. She was seen by Dr. Salzer, who found signs, he thought, of effusion at the right base, with high fever, and he ordered her removal to the hospital.

Present trouble began, she says, fourteen days ago with pain in the right side and fever. She had a chill about six o'clock, and a had a sweat at night. The pain was of a dull character, and much aggravated on drawing a deep breath. There was no cough. The fever, pain in the side, and sweating have been the chief symptoms throughout her illness. She has been unable to work since its onset. The appetite is poor, and she has lost considerably in weight.

April 8th. Present condition. — Small framed, well nourished young woman. Lips and mucous membranes of a good color; tongue slightly coated. Temperature on admission was 101° ; this morning, at 10 A. M., it was 102.5° ; pulse 88; respirations 28. Chest is well formed; good costal angle; both sides expand well, the right much less than the left.

On percussion there is flatness on the right side from the fourth interspace in parasternal line; from the fifth rib in mammillary line; from the sixth in anterior axillary line. At the back there is flatness below the angle of the scapula. The breath sounds are clear in the infra-clavicular region, and as low as the nipple. Below this, behind and in front they are feeble, though clear. Behind, over the flat areas, respiration is feeble and distant. The vocal fremitus is absent over the flat areas. There seems to be a slight movable dullness at the level of the nipple in front. The cardiac impulse is in the fourth interspace in normal position. The sounds are clear, and of normal relative intensity. The abdomen is negative. The liver dullness reaches to

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the costal margin; the border was not palpable, and there is no pain on deep pressure. The urine is whitish yellow, acid, 1020; no albumin. It was thought probable that the case was one of empyema, and on the 10th an exploratory needle was inserted in the fifth space in the anterior axillary line, but nothing was obtained. The temperature range during the next week was very irregular, reaching sometimes to 104° or 105°. She had chilly feelings and heavy sweats at night.

On the 11th the following note was made: Pulse 130, regular, soft; she is propped up in bed; respirations are quiet. Patient lies somewhat on the right side. The left side of the chest moves freely. On percussion and palpation there is great tenderness over the sternum, particularly at the third right interspace and at the sternal end of the fourth costal cartilage. The line of dullness begins at the fourth space at the sternum, and passes through the nipple. The flatness extends across the sternum. Lower border of the liver is not palpable, but the flatness extends in the nipple line to costal margin. The respiration above the line of flatness is clear, below feeble, distant, and difficult to hear. Vocal fremitus, while practically absent in front, is to be felt in the axilla. In the back the line of flatness has not materially changed from that noted on entrance. On auscultation, as one approaches this line, there are fine, moist râles on inspiration, which are increased by coughing. The apex beat of the heart is not dislocated outward.

An exploring needle was again introduced; this time at the eighth space below the angle of the scapula, but with a negative result.

On the 12th the temperature was 105°; the pulse this morning was quieter, only 80 to the minute; tongue was not dry. There was to-day extreme sensitiveness along the right margin of the sternum, particularly in the third and

fourth interspaces. The blood count gave over 5,000,000 red to the cubic mm., and 18,000 white corpuscles.

It seemed evident that there was suppuration going on in the chest, and it was thought most likely to be an empyema, possibly diaphragmatic. The possibility also of a subphrenic abscess was considered, though this did not seem to be very likely, as the liver was not depressed. The points which made the case somewhat dubious were the extent of dullness and signs of effusion without marked dislocation of the heart apex, and without anything like a typical line of dullness and not of movable character. The absence of fluid also, on aspiration with a good-sized exploring needle, suggested that there was something unusual.

The case was transferred to the surgical department, and on the 13th Dr. Halsted operated.

Under ether an attempt was made to find the abscess cavity by means of an exploring needle, which was thrust into the right side of the chest in several places, where dullness was marked. Then a portion of the fourth rib over the painful spot was excised, and only a small pocket of pus found; portions of the sixth and of the eighth ribs were also removed, but only small areas of suppuration within the pleura were seen. The wounds were stuffed with gauze, discharged for a time freely. Tubercle bacilli were extraordinarily abundant in the pus. The patient died early on the morning of May 8th.

Autopsy (Dr. Barker).—Body somewhat emaciated. Scars of the incisions mentioned above, and two of them had slight sinuses. On making the preliminary median incision pus oozed from beneath the skin over the sternum. On stripping back the skin, fistulous sinuses were seen close to the edge of the sternum in the second, and third, and fourth interspaces.

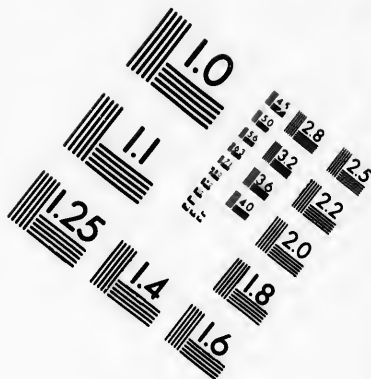
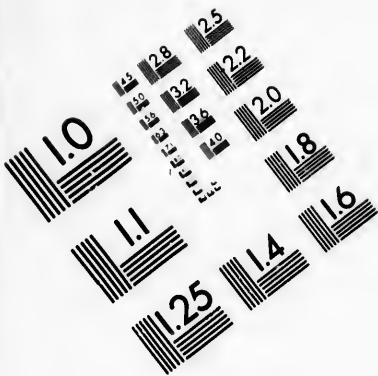
Thorax large; costal angle wide. Right pleural cavity has been largely obliterated, the visceral being intimately

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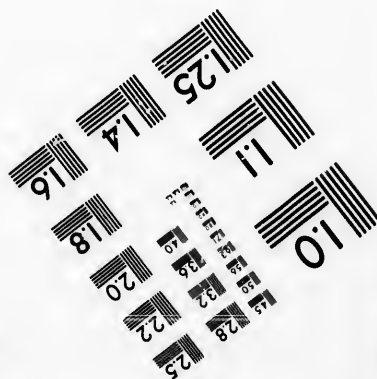
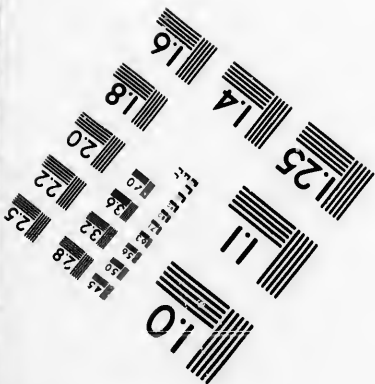
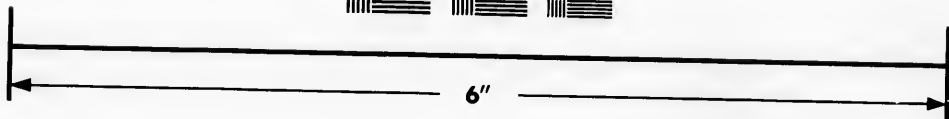
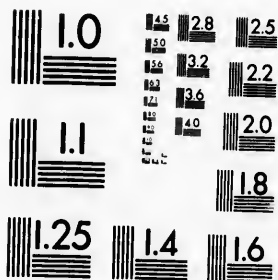
adherent to the costal pleura; both layers greyish white in color, thickened and infiltrated. Over the lower lobe it is in places fully 2 cm. in thickness, and it is adherent to the diaphragm. Tubercles have grown through the diaphragm and appear on the peritoneum. On this diaphragmatic surface of the pleura there are a number of abscesses filled with greenish pus and cheesy material; the walls are lined with necrotic tissue. In front, between the pleura and the diaphragm, corresponding to about the seventh costal cartilage, there is a large recent abscess the size of a hen's egg, which has infiltrated the diaphragm and made an ovoid indentation on the surface of the liver. Several of these intra-pleural abscesses exist along the spine, and have eroded slightly the bodies of the vertebræ. Here and there over the surface of the middle and upper lobes, between the layers of the thickened pleura, are recent abscesses, varying in size from a marble to a walnut. The whole lung is thickly studded with a minute miliary and sub-miliary tubercles, grey and translucent.

On the left side there are no adhesions, and beneath the pleura there can be seen a few minute miliary tubercles, which are thickly set throughout the lung substance. The pleura is not at all thickened. The bronchial glands are somewhat enlarged, deeply pigmented, and thickly studded with tubercles. The pericardium presents a few small miliary tubercles; no exudation. There is a small miliary tubercle on one leaflet of the mitral valve. The spleen is enlarged and soft, weighs 445 grams, and presents many miliary and sub-miliary tubercles. The same are present throughout both kidneys. In the ileum, Peyer's patches are reddened, and in some there are minute greyish white and yellowish white miliary nodules. The mucous membrane of the ileum, just above the valve, is completely studded with tubercles. Some are softened and breaking down, and there are slight superficial losses of substance.





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The mesenteric glands are somewhat enlarged and hyperæmic. There are also pale yellow areas. The glands along the aorta are enlarged, and many of them caseous. The glands along thoracic aorta are also enlarged and caseous. The cover-slips from the pus in the pleura show large numbers of tubercle bacilli. Agar Esmarch's tubes, made from the pleural pus, spleen, liver and kidneys, remain sterile.

2. *Sub-acute and chronic Tuberculous Pleuritis.*

There are two groups of cases, with effusion, and the chronic adhesive form, the former being by far the most numerous.

(a) *With sero-fibrinous effusion.*

The process may be primary, or, at any rate, most extensive in the pleura, or secondary, to manifest tuberculosis of the lungs.

The primary constitute an extremely important division of the tuberculous pleuritis, and here may be reckoned a not inconsiderable number of all the cases of the insidious form. The true character of the disease is frequently overlooked, and indeed for a long time there may be nothing positive on which to base a diagnosis. Though we speak of the disease as primary in the pleura, in almost every instance there are tuberculous foci in the lungs or in the bronchial glands, or the process has extended from the peritoneum. Frequently the cases are admitted to hospital with acute manifestations, but with advanced pleural lesions, evidently of long standing, ante-dating the pulmonary tuberculosis. The following are illustrative cases:

Case VII.—Bilateral tuberculous pleuritis; acute tuberculosis.

Henry W., aged 43, admitted July 29th, 1891. Rather

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more than a year ago, patient was in hospital for jaundice, and was discharged well. He returns complaining of cough, and shortness of breath. He states that his present trouble began about four weeks ago; he woke up in the night with shortness of breath; has had chilly feelings, though no rigors, and had felt very weak. He has had some cough, very little expectoration, no pain; no œdema of feet. He does not think that he has lost any in weight. Temperature on admission was 102° ; the following morning 103° ; pulse 128; respirations 36. The urine is dark yellow in color, clear, no albumin; Ehrlich's reaction not present.

The chest is broad and deep, expansion fair, a little more on the left than on the right. Percussion is clear on the right side at the apex, and to the fourth rib; below which there was impaired resonance. On the left side a clear note to lower border of second rib; dulness from the second to the fourth, and from the fourth rib in axilla there is flatness. Defective resonance over the central portion of the lung behind, and flatness at the base. In the left lung there are numerous rales at the apex, with pectoriloquy, and behind distant tubular breathing. Breath sounds are almost absent at the left base. On the right side there is flatness at the base, with distant tubular breathing. Effusion was suspected at both bases, and he was aspirated in the eighth right interspace behind, and a small amount of hæmorrhagic effusion found. On the following day he was aspirated at the eighth left interspace behind, and a few cc. of fluid (hæmorrhagic) removed. The sputa contained tubercle bacilli. The temperature was high, from 103° to $104\frac{1}{2}^{\circ}$. He became delirious, had rapid breathing, blueness of the finger tips developed, and the pulse became much enfeebled, 130, and he died on the morning of February 4th.

Autopsy (Dr. Councilman).—Large, well-developed, well-nourished man; circumference of the thorax in nipple line 93 cm.

Left pleural cavity partially obliterated by old adhesions, especially at the apex and posteriorly. The remainder of the cavity filled with about 300 cc. of turbid, yellow serum with flakes of fibrin. Both layers of the pleura much thickened by a new grey vascular tissue, and covered with a gelatinous fibrin. There are many opaque white nodules beneath the membranes, and the thickening is marked. The layers can be peeled off as a continuous membrane, and beneath them can be seen opaque yellow and grey miliary tubercles. The right pleural cavity presented old adhesions only at the base, and it contained 350 cc. of sero-fibrinous fluid, the surfaces covered with fresh grey fibrin; the pleura and the membranes slightly thickened.

The pericardium was smooth; heart presented nothing abnormal.

Lungs.—At the apex of the left lung there is an irregular cavity measuring 3 by 5 cm., the tissue about it in a condition of gelatinous and tuberculous pneumonia. There are clusters of tubercles and miliary granulations scattered throughout the rest of the lung. The right lung presents a few scattered miliary tubercles without any very large areas of consolidation.

A few fine miliary tubercles were found in the kidneys; mesenteric glands presented a few small tubercles.

The condition of the pleura here ante-dated evidently the more acute onset of his final illness, and he was probably the subject of a latent tuberculous pleurisy, followed by a general infection.

Case VIII.—Chronic tuberculous pleurisy with effusion.

E. S., male, aged 31, colored, admitted January 12th, 1891, complaining of cough, pain in the right side, and dyspnoea. He has had cough at intervals for a year: no hæmorrhage. About Christmas of last year he got very

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much worse, and since then has had high fever, night sweats, dyspnoea, and abundant expectoration. His family and personal history are good.

He is well nourished; face, lips, mucous membranes and finger tips are cyanosed. Temperature 102° ; pulse 128; respirations 54. On the left side there was dulness from the second rib, and the heart was pushed over to the right side. He was aspirated and 792 cc. (27 oz.) of fluid removed. After aspiration the chest was clear to the lower border of third rib, below that dulness shading into flatness at the base. The temperature range was high, 102° to 104° , and he had a good deal of cough. The patient was aspirated again on the 23d and one litre of fluid removed. The sputa was examined repeatedly, with negative results, until the 1st of February, when bacilli were found in moderate numbers. The fluid did not re-accumulate to any extent. Very marked defective expansion on the left side. Breath sounds were clear on the right side; fremitus was present on the left side to the base, though the dulness was still very marked, and distant tubular breathing with fine râles. The note states that there was no diffuse, general bronchitis, such as might occur with an eruption of miliary tubercles. Pulse became rapid; he had delirium; the temperature kept high until the 31st, and it fell to 98° on the 3d, when he died.

Autopsy (abstract).—Right pleura adherent over entire extent; firm. Left pleural cavity contains about 1200 cc. of slightly turbid serum. Left lung compressed, tough, leathery, dark red; adherent posteriorly along the spine; lower lobe presented several firm tubercles. The pulmonary and costal pleura layers were thickened and tuberculous. Right lung presented, in the upper lobe, numerous firm, grey tubercles and caseous areas. At the apex a small cavity about 2 cm. in diameter. The lower lobe was very œdematous. A few miliary tubercles scattered throughout

the lung. Small ulcer in the left vocal cord. No tubercles in the liver or spleen; one small tuberculous ulcer in the intestines.

More commonly the pleurisy sets in insidiously, and is the most prominent feature in the case. There may be no suggestions of tuberculosis, but in some instances the history of a previous attack, or of hæmoptysis, may arouse suspicions. After aspiration the fluid re-accumulates, and repeated tapplings may be necessary. The patient regains a certain measure of health, with greatly thickened pleural membranes, and persistence of the dulness on the affected side. When these cases are carefully followed, a certain number of them develop unmistakable pulmonary tuberculosis, or they die of a general infection. The following illustrative cases are of interest, from the fact that they were under observation for longer periods than is usual in hospital practice.

Case IX.—Cough and hæmoptysis a year before; gradual onset of the effusion; repeated aspirations; tubercle bacilli found in the exudate; subsequent development of pulmonary tuberculosis.

Christian T., aged 39, German, admitted September 25th, 1889. Patient is a large, well built, muscular man, very well nourished, with thick panniculus adiposus. With the exception of measles as a child, chills and fever in Germany, and a chancre with mild secondaries in 1884, he has enjoyed excellent health. No history of pulmonary trouble in his family. His wife died of consumption four years ago. He was very well and strong until about a year ago, when he had cough with much expectoration, and on one occasion he spat up a mouthful of blood. In January, 1889, he lost in weight, and for the first time began to be short of breath. He had no pain, and was able to be at work, but on any

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exertion he became breathless, and he states that this has been his chief symptom, and for it he now seeks relief. He does not think that he has had any fever; temperature on admission was 98°. The patient looks in excellent health; weight about 160 pounds; pulse is 72; tongue is clean. The chest is large, well formed. On quiet breathing there is no special difference noticed, but the right side looks fuller than the left. When he draws a deep breath the right expands very slightly. The apex beat of the heart is visible in the fifth interspace, but an inch and a half outside the nipple line. The intercostal spaces are not marked on either side. From behind, the right side of the chest looks fuller than the left. On palpation there is absence of fremitus on the right side, except just below the clavicle, and there is absolute dullness from the clavicle down, and anteriorly it extends to the left border of the sternum. Breath sounds are feeble and distant on the right side, except in the lower interscapular space, where they are tubular and distant. On the left side the breathing is breezy and loud. On the 28th, 30 ounces of clear fluid were removed. On the first of October the dullness was practically the same, and 30 ounces were again withdrawn. This time it was more turbid. On the 6th he was aspirated again; 25 ounces. Cover slips and cultures were negative. His general condition all this time was excellent. He was up and about the ward, and the temperature was normal. On the 11th he was again tapped, and 32 ounces of fluid withdrawn. He had a very slight cough with much muco-purulent expectoration, which was examined daily for seventeen successive days without discovering bacilli. Although the history of an attack a year ago, with cough and hæmoptysis, raised a suspicion that the process might be tuberculous, there was nothing whatever to guide us to that conclusion; and it was not until he had been under observation for nearly three weeks, and his convalescence was practically established, that tubercle bacilli were found.

On the 18th he was aspirated and 32 ounces were withdrawn, and the note became clear as low as the nipple. On 27th 19 ounces were removed. On November 7th the note reads: "The right lung is fairly resonant to the fourth rib, and in axilla to eighth, posteriorly to middle of scapula." The fluid again accumulated, and on the 16th 28 fluid ounces of a greenish yellow, slightly turbid fluid were removed, in which tubercle bacilli were found by two separate observers on the 16th and 17th. The measurements on the right side, 19 inches, on the left 18½ inches. On the 14th he was aspirated for the eighth time, and 32 ounces of fluid removed, of the same clear character. The note was resonant to the fifth rib and behind to the middle of the scapula. In these regions the breath sounds were loud and free from râles. Cultures from this fluid remained negative, and no bacilli were found. Patient gained in weight, lost the cough entirely, and was only short of breath when walking fast. Appetite good; sleeps well. He decided to go out, and was discharged December 19th. At the time of his discharge resonance was clear and a little high-pitched on the right side to the third rib in front; below this there was absolute flatness. Behind it is high-pitched to spine of scapula, and below the note is flat; left lung clear. Breath sounds are normal. This patient was under my observation on and off in the dispensary for many months, and at first seemed to do well. Subsequently he was lost sight of, but I heard that he had developed extensive tuberculous disease of the lungs.

Case X.—Cough for several years, but good health; gradually shortness of breath; right-sided pleural effusion; repeated aspiration; great improvement; discharge; subsequent detection of bacilli in sputum; development of pulmonary tuberculosis.

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complaining of severe cough. A sister and one brother died of consumption; father of asthma. The patient has been an extremely healthy man, and looks vigorous and well nourished. He states, however, that he has had a cough for many years, certainly for as long as three years. He has been getting short of breath lately. Patient is not at all anæmic; chest is well formed; the right side looks full, and is almost motionless on deep inspiration; the apex beat is in the fifth interspace, two inches outside the nipple line. The left side measures 19 inches, the right 20 inches: expansion on the right side is scarcely a quarter of an inch; on the left over an inch. Percussion gives on the right side a dull note to the clavicle in front, behind to the top of the lung, and to the left a little beyond the mid-sternal line. The left side is resonant. Tactile fremitus is very much lessened, but on saying 99 it is not entirely absent on the right side. Breath sounds are distant, feeble, scarcely audible. Whispered voice over the dull region behind is not heard. Exploratory puncture shows a thin, greenish yellow, seropurulent fluid. The following day he was aspirated and 2½ litres of fluid withdrawn; the accumulation was rapid, and on the 17th the condition was very much as before. He was aspirated again, and 32 ounces of fluid removed. This fluid was greenish yellow, with many fat molecules. The fluid re-accumulated rapidly, and he was aspirated again on the 19th with a withdrawal of 32 ounces, and on the 22d with a withdrawal of 29 ounces, and on the 26th with a withdrawal of 27 ounces. On the 29th it was noted that in front percussion is now clear to the level of the nipple; dullness from this point down. Posteriorly it is clear to the middle of the scapula. There are fine crackling râles in the axilla, distant breath sounds over the dull area. By the 8th of July he had improved so much that he was discharged. The heart impulse was in the fifth interspace, just below the nipple, and there were marked friction sounds

in the left mammary region and in the scapular region behind. The cover slips and cultures made by Dr. Abbott from the fluid were negative. When he entered the hospital the sputum was abundant, sero-purulent, and was examined repeatedly with negative results. Subsequently his cough lessened and expectoration was more scanty, thicker, and greyish yellow in color. At no time did the temperature rise above 100° , and it was usually between 98° and 99° .

He left the hospital with a diagnosis of pleurisy with effusion, and though there was a suspicion, based chiefly upon the fact that he had had a cough for so long, the diagnosis of tuberculosis could not be positively made, and he looked such a vigorous, healthy man that it did not seem likely. He attended in the dispensary, where I saw him repeatedly. On the 20th of July it was noted that though the apex beat was just below the nipple in normal position, there was everywhere defective resonance over the right side, not absolute flatness, and everywhere from the second rib down there could be heard a loud, leathery, creaking friction. He remained in very good condition, though the cough still persisted. He had no fever. On September 10th tubercle bacilli were found in his expectoration. The leathery, creaking friction persisted, and the defective resonance on the left side. He had lost somewhat in weight, and the cough had become aggravated. On September 4th, 1890, I made the following note: There is marked depression of the right shoulder; shrinkage of the right chest. Heart is a little drawn over; impulse in left parasternal line. The resonance is defective above, and shades to dullness below the level of the fourth rib. The tactile fremitus is felt to the base. At the right apex the breath sounds are somewhat feeble; there are numerous râles on coughing, and on drawing a deep breath the sounds are amphoric. Marked cavernous breathing at the apex behind.

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The breath sounds are feeble over the whole of the right base. Patient was under observation throughout 1891. He constantly had cough, and lost a good deal in weight. On the 22d of June the note was: He still looks well; the feet swell at intervals; temperature normal; the right chest more contracted and the spine is curved. Even on deep inspiration there is very little mobility. Marked cavernous signs at the right apex. There is no note of the patient after this date.

Case XI.—Pleurisy five months before; acute onset of second attack; effusion on left side; gradual recovery; detection of tubercle bacilli in sputum, three and a half years after signs of disease at both apices.

The following case illustrates the importance in diagnosis of a systematic examination of the sputum:

Jos. A., aged 29, German, admitted July 1st, 1889, complaining of pain in the chest, cough and shortness of breath. A brother died of consumption in 1885. Parents dead, not of tuberculosis. The patient was well as a boy and enjoyed excellent health. Five months ago he had an attack similar to the present one; was ill in bed for two weeks. He got quite well, but it left him with a little cough. Present illness began six days ago, June 24th, with fever, chilly feelings, and slight cough. He worked until the 29th, and only went to bed yesterday; temperature on admission 102° ; respiration 40; pulse 96. Well built, healthy looking man. Chest well formed, movements equal in upper zone, less on the left side below; most evident on deep inspiration, when the difference in expansion is also very noticeable. Tactile fremitus is much lessened at the left base. There is a hyperresonant note at the left apex, extending into mammary region and axilla, which shades into dulness below the seventh rib, a dulness which is

extremely movable and ascends when he sits up. Behind it reaches to the middle of the scapula. Distant, tubular breathing over the dull region. No friction. Sounds on the right side clear.

Apex beat of the heart not palpable; sounds clear. Dulness in the sitting posture at the level of the fourth rib; movable dulness very marked. The temperature 101° ; the cough is better; sputum is mucœ-purulent, and does not contain bacilli. On the 8th the temperature had fallen to 98° . The effusion had not increased, and the movable dulness is now more difficult to obtain. Though there were a few râles in the left infra-clavicular space, there did not appear to be signs of any cavity. The pleural effusion gradually diminished, and we were inclined to regard the case as one of simple pleurisy. He still had cough, with streaked mucoid and yellowish expectoration, and in it, on the 18th, well-characterized tubercle bacilli were found. He improved very much, and on the 22d decided to go out. On the left side the resonance was clear to the sixth rib. There were sub-crepitant râles over the third rib, and in the lower axilla slight friction sounds. There was dulness in the infra-scapular region, diminished tactile fremitus, and feeble breath sounds.

This man was lost sight of until February, 1893, of the present year, when he applied at the dispensary, complaining of cough and pains in the chest, and diarrhœa. He has kept pretty well since his attack in 1889, and has been at work. He is now fairly well nourished. He has very slight expectoration, and none could be obtained for examination. There is rather a high-pitched note over both apices and there are moist râles, greatly increased by coughing.

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greenish tint, is sometimes a little turbid. The fluid is not hemorrhagic so frequently as in the more acute cases. Bacteriologically it is commonly sterile, though in the case of Christian T. tubercle bacilli were found in the exudate itself.

Sero-fibrinous pleurisy, occurring in the course of pulmonary tuberculosis, does not interest us very much. The cases are by no means uncommon, and the diagnosis is readily made. It may be a very early complication and over-shadow in great part the lung disease. The insidious onset and the absence of pain in the side not infrequently lead to errors in diagnosis, and the increasing shortness of breath may be attributed to advance in the original disease, or even to a general tuberculosis. It has seemed to me that the early implication of the pleura, even with recurring exudation, gives a stamp of chronicity to the case. Sometimes it is difficult, even post-mortem, to determine which has been the primary disorder, as in the following case; though, from the great thickening, it is probable that the affection of the pleura preceded the disease at the apices.

Case XII.—Extensive pulmonary tuberculosis; chronic tuberculosis of right pleura.

Alice S., aged 20, colored, admitted October 12th, complaining of cough, shortness of breath, and weakness. She knows nothing of her family history, further than that her mother died of asthma.

Patient was healthy as a young girl. About four months ago she had a child; was in bed for eighteen days. Her present illness began, she thinks, about a month ago. She has had a cough, but has been able to work until three weeks ago. Says she has only been spitting "thick stuff" for about two weeks, and during this time she had had a great deal of shortness of breath.

Present condition.—She is emaciated ; much more so than is consistent with a history of an illness of such short duration. The thorax is long and narrow. The clavicular depressions are marked. The expansion is more marked on the left than on the right side. Briefly, the physical examination gave—at the left apex, signs of an extensive cavity, with cracked pot sounds, and amphoric breathing ; at the right apex there were indications of a smaller cavity. Behind, there was marked dulness in the supra-spinous fossae, and impaired resonance over the whole of the right side below the spine of the scapula, with feeble breathing, and râles only on full inspiration. The abdomen was swollen and tympanitic ; no signs of effusion.

The patient had an irregular, hectic fever ; her pulse was very rapid ; she failed progressively, and died on the 18th.

Post mortem (by Dr. Flexner. *Abstract*).—The pericardium is adherent to the right pleura, but is itself smooth on both of its layers. The right lung is universally adherent ; the left is adherent at apex and in places behind. The left lung presented a large, irregular cavity at the apex, numerous groups of miliary tubercles and caseous masses, with small cavities in the middle and lower lobes. Where adherent, the pleura is not specially thickened.

On the right side the pleura is everywhere adherent ; the entire lung is much reduced in volume, and measures only 12.5 cm. in length. The top of the upper lobe is occupied by an irregular cavity lined with slate colored granulation tissue. The pleura of this lung is enormously thickened, more particularly the costal layer, which measures 9 mm. on the side, and about 11 mm. on the diaphragm ; and in other places it is at least 2.5 cm. The thickened membrane is uniformly yellowish in color, and shows cheesy masses. Where the visceral and costal layers are not adherent there is fibrinous exudate on both surfaces, which, when scraped off, shows tubercles on the membranes.

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The bronchial glands are coal black in color, and caseous. There is marked intestinal tuberculosis, and the retro-peritoneal glands are enlarged and caseous.

(b) *With purulent exudate.*

I have already spoken of the acute purulent form of tuberculous pleurisy. Such cases, however, are rare. The purulent tuberculous pleurisy is much more commonly sub-acute in onset, chronic and latent in their course. The effusion is usually sero-purulent, thin, and contains a large amount of fatty matter. It is somewhat interesting to note that among the 32 cases in which tuberculous pleurisy of one form or another was present in the cases examined post-mortem from my wards, there was not an instance of purulent effusion, except in pyopneumothorax secondary to tuberculosis of the lung. In the non-tuberculous cases there were but two with purulent exudate, one consecutive to an acute croupous pneumonia, in a case, oddly enough, of tuberculous peritonitis; the other in an old man with arterio-sclerosis, who had a purulent effusion on the left side and a sero-fibrinous pleurisy on the right. In both instances pneumococci were found in the exudate.

Our clinical reports embrace ten cases of pyopneumothorax, of which eight were tuberculous, and which, of course, do not interest us specially in this connection. Of the 16 cases of empyema, nearly all of which were transferred as soon as possible from the medical to the surgical side, there was a history of tuberculosis in the father or mother in five cases; in one case two sisters died of tuberculosis; and in one an aunt. One case followed cancer of the pancreas, and one was in an old man with arterio-sclerosis; four cases followed pneumonia. Of the 14 cases which were operated upon, 12 left the hospital either perfectly well or very much improved. The only death was in the instance of empyema secondary to cancer of the pancreas.

Unfortunately I have not full particulars of the bacteriological examinations made in all of the cases. The details of the early ones, taken by my late assistant, Dr. Meredith Reese, have been mislaid since his untimely death; so that, from our personal experience here, we can draw no conclusions as to the number of these cases in which the lesion really depended upon the presence of tubercle bacilli. I would again refer to the somewhat interesting circumstance that, with the exception of the pyopneumothorax cases, not a single instance of tuberculous purulent pleurisy was met with in the 101 autopsies in which pleurisy of one form or another was present.

(c) *Chronic adhesive tuberculous pleurisy.*

The special feature of chronic tuberculous pleurisy is the enormous thickening of the serous layers. In all the cases of chronic sero-fibrinous exudate the visceral and parietal layers were greatly thickened. Post-mortem, we see three varieties of this form.

(1) Primary proliferative tuberculous pleurisy. Any one of the three great serous membranes may be primarily affected in tuberculosis, though probably in the majority of all these instances the affection of the lymph sacs is secondary to that of the glands in connection with them, or the organs which they ensheathe. In this form the tubercles developing in the pleural and pericardial membranes cause early union of the surfaces, and there is never at any time a free exudate. With the progressive growth of the tubercles the layers become greatly thickened, and united may measure from 1 to 2 or more cm. in diameter. On section the thickened membranes seem to be made up of diffuse tuberculous tissue, sometimes caseous layers, and much fibroid tissue. In the early stages of the process grey and greyish yellow tubercle nodules are seen. With the exception of involvement of the bronchial glands, this may be the only

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tuberculous process in the body. It may be unilateral or bilateral. I have seen but two instances in which it was strictly confined to the pleura, without any sero-fibrinous exudate. One was a young, vigorous Irish girl, who had recently come to the country, and was admitted to my wards at the University Hospital, Philadelphia, and died on the third day of an attack of malignant scarlet fever. The pleural layers on one side were enormously thickened, and in the condition just described. The other instance was a case of typhoid fever, which died under the care of my colleague, the late Dr. Ross, where the young man had bilateral chronic adhesive tuberculous pleurisy without any effusion. It is not infrequent to see this condition in part of the pleura, with pockets of a sero-fibrinous or curdy exudate at the sides or back, or on the diaphragmatic surface. Dr. Flexner showed at the Johns Hopkins Hospital Medical Society a remarkable case, to which I shall refer again in a few moments, in which both layers of the pleura, but particularly the costal, were enormously thickened, and miliary tubercles and larger cheesy masses were present. On the diaphragmatic surface alone there was an encapsulated sero-fibrinous exudate.

(2) Much more commonly, with very great thickening, and in the upper zone perhaps union, of the pleural membranes, there is separation of the layers below and on the diaphragmatic surface by an exudate usually sero-fibrinous, but sometimes containing curdy or even cheesy material. Thus of the 32 cases presenting post-mortem tuberculous pleurisy, there were 12 with very greatly thickened pleural membranes and sero-fibrinous exudate. Of these six were in connection with old pulmonary tuberculosis. As in Case I., referred to under the acute form, the onset may be abrupt as in acute pleurisy. The membranes gradually become greatly thickened. In that case there was an encapsulated serous effusion over the postero-lateral part of the left pleura, and in the rest of its extent the two layers

had united, and ranged in thickness from 1.5 to 2 cm. In connection with this variety there are two points of very great interest. In the first place it may be extremely difficult to recognize at sight that the process is tuberculous. In this very case of John A., who had been under our care and tapped repeatedly two and half months prior to his entrance to the hospital with an acute pneumonia, it was only the closest examination of the dense, thickened pleural membranes which revealed old fibroid tubercles. A superficial, macroscopical examination might have entirely overlooked the tuberculous character of the process, as the lung on the left side presented no tubercles or caseous areas. Of course, it would have been in any case a suggestive fact that at the apex of the right lung there was an area of caseation and softening the size of a walnut, but I repeat again, as it is a point of importance, that without the most careful scrutiny the nature of the extensive, chronic pleurisy on the left side might have been overlooked. The second point of interest is the fact, well shown in the case just mentioned, and also in the case of John P., that a chronic tuberculous pleurisy may exist for a long time, and lead to great thickening without any extension of the fibroid process into the lung itself.

(3) And lastly, in some instances the fibroid processes in the pleura may invade the lung tissue, and lead to extensive sclerosis. In only one instance out of the 32 instances of tuberculous pleurisy was there any evidence of direct involvement of the lung.

Case XIII.—Chronic tuberculous pleurisy; interstitial pneumonia.

Wm. S., aged 60, admitted November 1st, 1890. The patient is a large, strongly built man; states that his family history is good; denies syphilis; has used alcohol to excess; had typhoid fever five years ago; rheumatism six years ago.

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He came in complaining of shortness of breath and cough, which symptoms he has had since the spring of the present year. He states also that he has lost very much in flesh. Has had no diarrhoea; no hæmoptysis, and does not think that he has had much fever.

Though a large framed man he is somewhat emaciated, and is anæmic. Pulse is 100; respiration 36. Chest is broad, of good depth; costal angle 90. There is deficient expansion on the left side; no definite dullness at the apices, or axilla; at the left base the note is high-pitched. The breath sounds are enfeebled in front; expiration slightly prolonged; a few dry râles heard occasionally. There is a friction sound in the lower left axilla. At the left apex the breathing is puerile in type, with fine crackling râles. Many tubercle bacilli were found in the sputa. The case was regarded as one of senile tuberculosis, with some emphysema. He had repeated attacks of shortness of breath, and on the morning of the 9th he had a very severe attack, with small, rapid pulse, and died apparently in syncope. The temperature was very irregular, frequently sub-normal, as low as 96°, and on several occasions 95°.

Autopsy.—In right pleura cavity about 200 cc. of cloudy fluid. The pleura is divided into many compartments by fibrous septa. Both layers are thickened, and present many miliary tubercles and tuberculous granulation tissue. Left pleural cavity is obliterated by firm adhesions. The lungs are voluminous, and they do not retract on opening the chest. There are numerous, dense bands of fibrous tissue running through them, most marked at the apices, and these bands extend directly from the pleura into the lung substance, particularly from the root. There are small areas of caseous pneumonia. The bronchi of both lungs are somewhat dilated and filled with mucopurulent contents. There is a cavity the size of a hazelnut at the apex of the right lung. The condition is

that of an interstitial pneumonia, with dilated bronchi, and an extensive tuberculous pleurisy on the right side. There is a small tuberculous ulcer in the larynx.

3. *General serous membrane tuberculosis.*

There is a group of cases of tuberculosis in which the serous membranes are chiefly involved, either simultaneously or more commonly one after another, forming a clinical type fairly distinctive and readily recognized. There have been several interesting studies of this condition, notably the Paris Theses of Moran and Boulland in 1884 and 1885, and the careful study of Vierordt.* The pleuro-peritoneal membranes may be alone involved, or the pleuro-peritoneal and pericardial surfaces. There are, as noted by Boulland, three groups of cases. First, an acute tuberculosis, with rapid evolution of the disease in pleuræ and peritoneum, generally consecutive to local disease of the tubes in women, or of the mediastinal or bronchial lymph glands.

Second; cases in which the disease is more chronic in its nature, with exudation in both peritoneum and pleuræ, the formation of cheesy masses, and the occurrence of ulcerative and suppurative processes. In this group the pleural involvement is much more commonly secondary to the peritoneal, or both may be a sequence of pulmonary tuberculosis.

And, third, there are instances in which the pleuro-peritoneal affection is still more chronic, the tubercles hard and fibroid, both the membranes showing much thickening, often with very little exudation. My experience with this form of general involvement is not great, and of the 34 instances of peritoneal tuberculosis which have been under our observation at the Johns Hopkins Hospital, in only one was there involvement of the pleura.

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* Zeitschrift für Klinische Medicin, Bk. XI.

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surfaces were involved together, though many such are on record, and in some the disease has been almost exclusively confined to these membranes.

A knowledge of the existence of this combined infection is somewhat important, as such cases are often of great obscurity. More commonly the affection begins in the peritoneum and may be extremely chronic, and then gradually invades the pleura. In other instances there is a sub-acute pleurisy and subsequent invasion of the peritoneum. The cases often have a very protracted course; there are periods of great improvement, and there may be little or no fever. The following case is at present under observation:

Case XIV.—Pleuro-peritoneal tuberculosis; an illness with anasarca; great improvement; persistence of ascites; development of right-sided pleurisy; drainage of peritoneum.

R. A. B., colored, aged 30, farmer, admitted May 9th, 1893, complaining of swelling of the abdomen. Father and mother, two brothers and one sister living. Was healthy as a boy; measles at 19, scarlet fever at 27, no other serious illnesses. Married ten years, wife healthy, three children. Has not had venereal disease; has been a temperate man. For two years past patient has had failing of eye sight (cataract), which, he says, is due to irritating dust.

Present illness dates from last October, when he had an attack of gradually increasing shortness of breath, with swelling of the legs and body. Evidently this was a very severe illness, as he was confined to a chair for three months, and was not able to lie down. He had no special cough, but does not know whether he had much fever. The swelling in the legs gradually disappeared, and has been absent now for about three months. The swelling in the abdomen has persisted. He complains chiefly of shortness of breath on

exertion, and of the swollen abdomen. He has a little cough and slight, scanty expectoration. Patient is a medium-sized, moderately well built man; face not specially emaciated. The temperature on admission was 97.5° ; rose in the evening to 103° . He lies quietly in bed, head not elevated, no respiratory distress. The conjunctivæ are a little yellow, pupils are dilated. Mucous membranes are somewhat pale. Pulse is regular, 90 to the minute, the vessel-wall a little sclerosed. The brachials pulsate visibly. The chest is well formed; costal angle good; the lower part of the thorax is expanded. On deep inspiration the left side moves more than the right. Percussion gives a dull note on the right side, beginning at the sixth rib in the recumbent posture, and in the erect posture at the fourth rib, the dullness being distinctly movable. Behind, when sitting up, the line of dullness is above the angle of the scapula. Percussion is clear throughout the left side. Tactile fremitus is diminished over the dull area on the right side, and the breath sounds are feeble. There is no friction murmur heard. Apex beat of the heart is not very distinct; pulsation in the fifth space, just inside the nipple line. The sounds are everywhere clear. A needle was inserted into the pleura and a serous, greenish yellow fluid was withdrawn, containing a little blood, which did not coagulate on standing. Cover slip preparations of the serum showed no organisms, and cultures on agar remained sterile.

The abdomen is distended and large, but symmetrical in the flanks and a little prominent in the umbilical and epigastric regions. On palpation it is everywhere soft, painless, not resistant, except in the upper zone, a little above the level of the navel. In the whole of this region up to the xiphoid cartilage and the costal margin, there is an ill-defined, doughy resistance, which terminates below in a tolerably well-defined border. On three separate occasions a very definite friction murmur was felt. The edge of the liver

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is not palpable on deep inspiration, nor can the margin of the spleen be felt. On percussion there is tympany in the hypogastric and umbilical region, slight dulness in either flank, which is movable; no distinct fluctuation wave. There is a flat tympany in the epigastric and 'hypochondriac regions. The liver dulness begins at the border of the sixth rib, and extends to the costal margin in the nipple line. There are no glandular enlargements; no œdema of the feet. The urine is clear, a faint trace of albumin, a few leucocytes, and a few red blood corpuscles. The temperature during the first week of admission was irregular, ranging usually between 98° and 100° , but on three occasions rose to 103° in the evening. Frequently the morning temperature was very low. After May 16th his temperature did not go above 100° . He has gained in weight, and the small amount of sputum which has been obtained has always been negative.

A diagnosis of pleuro-peritoneal tuberculosis was made, and on the 10th Dr. J. T. M. Finney made an exploratory operation in order to drain the peritoneum. A quantity of dark, reddish-brown liquid was removed. The peritoneum was deeply injected, and the visceral layers studded with numerous grey and yellow-grey nodular tubercles. The omentum was rolled up, and there was great thickening about the stomach and colon.

It is not very uncommon to see the pleura and peritoneum involved secondarily in chronic disease of the lungs.

Case XV.—Pleuro-peritoneal tuberculosis in chronic pulmonary tuberculosis.—(Abstract).

D. W., aged 18, colored, admitted November 21st, 1889, complaining of cough, fever, and pain in the abdomen. About two months before admission he was wrecked and exposed in a boat for 24 hours. He dates his illness from

this time. He can give no details as to his family history. He had syphilis in the spring of 1889. The patient was a medium-sized, fairly well nourished young man, and at the first examination there were signs of disease at both apices, most marked at the right. There was high fever, and very rapid extension of the pulmonary disease, a large excavation developing within a few weeks at the top of the right lung. There were friction sounds heard in the axillary regions, and particularly marked on the left side. The abdomen was full and distended, sometimes painful, and he had diarrhoea. The patient did not improve in any way, but the fever persisted, and he became greatly emaciated, progressively weaker, and died January 25th.

Autopsy.—Anterior mediastinal glands caseous. Both lungs were bound down by firm adhesions. The pleural membranes thickened; the costal layer, easily stripped off, was covered with fibrinous exudate, beneath which were numerous tubercles and caseous masses. On the pulmonary pleura there were numerous tubercles and flat caseous areas. Both lungs showed large cavities at the apices, numerous caseous areas, and miliary tubercles disseminated and in groups.

There was only a small amount of clear fluid in the peritoneum; the intestines were agglutinated, and on the peritoneal surface many groups of tubercles and flat caseous masses. The mesenteric glands were greatly enlarged and caseous. There were numerous tuberculous ulcers throughout the entire intestine, beginning just beyond the pylorus and extending to the rectum. There was tuberculous ulceration of the bladder.

We have many opportunities of seeing slight extension of the disease through the diaphragm, either downward from the pleura, or more often from the peritoneum into one or other pleura. In the following case there was extension from the right pleura to the under surface of the diaphragm, and to the peritoneum covering the liver.

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Case XVI.—Pulmonary tuberculosis; chronic tuberculous pleurisy; tuberculous peri-hepatitis; circumscribed tuberculous peritonitis.—(Abstract).

A. F., female, aged 19, admitted June 6th, 1892, complaining of shortness of breath. She had been in failing health ever since the birth of her child March 19th, 1892, when she had a severe cough, which has persisted ever since. She was pale, emaciated; respirations 44; pulse 148. There was deficient expansion at the right apex and signs of commencing cavity. She was in hospital during July and August, and signs of extensive pleurisy developed on the right side, for which she was aspirated and seven and a half litres of serous fluid removed. She had marked hectic fever. The pleural symptoms were complicated by the presence of a large abscess in Scarpa's triangle, which was opened and drained. She died September 12th of hæmoptysis.

Autopsy.—In the anterior mediastinum there were miliary tubercles and caseous masses; both pleural sacs obliterated. The parietal layer of the pericardium, adherent to the pleura, presented numerous fresh gelatinous looking tubercles. The lung and visceral pleura on the left side removed together. The layers were greatly thickened, and were covered with a hæmorrhagic, rough exudate 1 to 2 mm. in thickness. The right pleural sac also obliterated, and the membranes united by old adhesions; no acute pleurisy. Throughout the left lung there were several cavities; one at the apex, 3×3 cm., and in this there was a ruptured aneurismal dilatation of a branch of the pulmonary artery.

The under surface of the diaphragm on the right side was adherent strongly to the liver and covered with numerous grey tubercles, which were also present in numbers on the upper surface of the liver, and there were numerous hæmorrhages about them.

There was tuberculous disease of the lumbar vertebrae. The mesenteric glands were enlarged, but not caseous. There were tuberculous ulcers in the ileum.

Attention has often been called to the frequent association of tuberculous pericarditis with tuberculous pleurisy. Thus of 17 cases which I recently described* there was combined disease of these membranes in Cases IV., VII., and XV. In the following case the pericarditis in all probability followed the chronic tuberculous pleurisy.

Case XVII.—Chronic tuberculous pleurisy on the left side; acute tuberculous pericarditis and pleuritis dextra.

John P., aged thirty-eight years, admitted August 18th, with swelling of the legs and dyspnoea. The family history is good. He has been, as a rule, healthy, though in his childhood and youth he had many of the infectious diseases. He has been a moderate drinker. He denies syphilis. The present illness began about two weeks ago with pain in the left shoulder and about the heart. Feet began to swell ten days ago, and he has had cough and shortness of breath for about the same length of time. He has had no nausea; his appetite has been fairly good. Within the past few days he has become much worse.

On admission the patient had intense orthopnoea; pulse 130, but moderately full. He had a distressing cough, with clear watery expectoration. There was great œdema of the lower extremities and of the scrotum. The finger-tips and mucous membranes were bluish in color. In the examination of the heart at the time no murmur could be detected, but the second sound was accentuated at the pulmonary cartilage.

On the following morning the patient was quiet; respira-

* American Journal of the Medical Sciences, January, 1893.

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tions 28 to the minute; pulse 84, the beats irregular both in rhythm and force, the volume fair, and tension not diminished.

Thorax apparently symmetrical, but the manubrium very prominent, expansion equal. In front, resonance on both sides good, though on the left side flatness begins at the fifth rib midway between the nipple and axillary line, and the dulness seems here to be somewhat movable. There are numerous sibilant and sonorous râles to be heard in front. Passing down the left side and into the axilla, the breath sounds become more feeble and fine moist râles are heard. Pitch of resonance at the extreme left base is higher than at the right, and the vocal resonance is somewhat diminished.

On auscultation there are numerous coarse and medium fine râles to be heard at both bases. At the extreme left base the respiratory murmur is almost absent.

Heart: Point of maximum impulse difficult to localize; slight general heaving over the whole præcordial area; relative dulness begins above at second rib and extends well to the right of the sternum. The prominence above noted is just at the junction of the manubrium and gladiolus, and just at this point there is dulness over a very limited area. Relative dulness extends outward to a point nearly 5 cm. outside the nipple. The heart-sounds are heard with the greatest intensity at the fifth space a little inside of the nipple line. There the first sound is full and booming; the second not so loud. Passing inward toward the sternum the sounds become associated with a superficial, soft, squeaking sound, diastolic in time, heard loudest over the mid-sternum, and pericardial in character. This is heard faintly all over the base. The murmur is more distinct in forced expiration than during inspiration. The second pulmonic is a trifle louder than the second aortic sound. The radial pulses are equal in volume, and there is no pulsation in the upper sternal notch; there is no tracheal tugging. The exam-

ination of the abdominal organs is negative. The urine is yellow-colored, acid, sp. gr. 1024, distinct trace of albumin; several hyaline casts were found. Throughout the 20th and 21st the patient remained in much the same condition. On the 22d there was a slight rise in temperature to 100.5° ; the pulse varied greatly in rate and character; at noon was slow, regular, and full, from 70 to 90 per minute, and again was as rapid as 140. The patient, in many respects, was better. The œdema of the legs had disappeared. The urine had increased in quantity. On the 19th only 180 c.c., and on the 20th 350 c.c. had been passed. On the 21st and 22d the amounts were 700 and 1100 c.c.

23d. The temperature has been between 97° and 98° ; at the morning visit the pulse was 148, regular in force and rhythm; the respirations 32. The patient was lying quietly on left side. The physical signs practically those noted above, with the exception that there is an extension of the œdema at the base of the lung. The patient died suddenly at 4.30 P. M. to-day.

Autopsy (by Dr. Flexner). — Large, muscular man; moderate œdema of the legs and of the subcutaneous tissue of the trunk. Fat well retained, both beneath the skin and in omentum and mesentery.

Pericardium is adherent to the left pleura; the sac thickened and contains a considerable amount of clear serum. Both layers are covered with a thick fibrous deposit, looking like a hairy coat. The thickness of the pericardium over the heart is 3 mm. When incised the thickened layer is grayish in color, with many opaque or yellowish points scattered here and there, often continuous, and having the well-recognized characteristics of tubercles of this membrane. The heart was greatly enlarged. The valves were normal. The thickness of the left ventricle was 17 mm.; length of ventricle, 8.5 cm.; mitral orifice, 10.5 cm. in cir-

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circumference. Thickness of right ventricle 6 mm. Tricuspid orifice 12 cm. in circumference. The walls of the auricular appendix are almost completely converted into a grayish-white material with only a thin internal film which appears like muscle. In the endocardium of the left ventricle are numerous ecchymoses. There are also a few small ones on the right ventricle and in the auricles, and on the endocardium of the auricles are a few small, round, whitish miliary tubercles.

The left pleura is much thickened; parietal and costal layers adherent in places, but where not in actual contact there is clear serum between them. The costal pleura strips up with difficulty, and is very hard and cuts like cartilage. The diaphragmatic pleura is especially thickened, and on section it is seen to be composed of a dense, almost cartilaginous, grayish tissue, containing yellow, opaque, caseous masses. The apex of the left lung is retracted, hard to the touch, and on section contains a dense, deeply pigmented connective tissue, and old areas of caseation; no calcification. There are a few small foci of miliary tubercles, and scattered fibrous tubercles elsewhere in the lung.

The right lung is voluminous, and in the greater part of its extent free from adhesions, but the pleural surfaces present numerous grayish-white elevated masses, single and conglomerate, which can be scraped off with difficulty. The costal pleura present similar tubercles. About these there are, here and there, fresh fibrin. In the apex the upper lobe presents a few foci of fibrous miliary tubercles.

The spleen contains a few scattered tubercles. Nothing of note in the abdominal viscera; the intestines did not present tubercles.

III. GENERAL PATHOLOGY.

The pathology of serous membrane tuberculosis turns on the avenues of infection rather than upon any special pecu-

liarity in the lesions. Miliary tubercles, with inflammatory exudate, serous or hæmorrhagic; acute, rapidly caseating and ulcerative processes with necrosis and suppuration; a chronic fibro-tubercle, nodular and diffuse, are here met with as in the lungs and elsewhere,—and the chief interest relates to the

Avenues of Infection.

(1) Doubtless a great majority of all cases of tuberculous pleurisy arise from direct infection from the lung, a tuberculous focus invading the membrane, as may be seen any day in the autopsy room. Rapid development of a fibrinous exudate at the spot controls the extension, blocking the lines of transmission and limiting the process. Though directly excited by contiguity, the pleurisy is not always associated with an eruption of miliary granules, but may be simple. There would appear sometimes to be an antagonism between the pleural and pulmonary disease, and it will have been noted in several of the post-mortems of the cases previously given that very extensive affection of the pleura occurs with very slight or even without any disease of the lung on the side involved. The possibility of infection of the pleura by contact from tuberculosis of the mediastinum, tuberculous abscess of this part, and indeed from cold abscess of the thoracic wall, must also be considered.

(2) Infection through the lymphatics. It was one of the great generalizations of Bichat when he spoke of the serous membranes as "grands reservoirs," a truth demonstrated by the intimate connection known to exist between these surfaces and the subjacent lymph vessels. The beautiful investigations of Klein, Arnold, and others have taught us the complicated anatomy of the lymph apparatus of the lungs and pleura, and also the course of the lymph streams, so that it is not difficult to understand how the

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serous membrane may be affected. We all inhale tubercle bacilli, perhaps not daily, but dwellers in cities and workers in hospital wards certainly inhale them very frequently, attached to the dust particles, the fate of which in the respiratory system is well known. A certain proportion in the trachea and bronchi are dealt with by the leucocytes, and are brushed by the cilia to the larynx; the sweepings of the night appear in the dark morning expectoration. Many of the particles reach the alveoli, and are here also in part attacked by the large desquamating cells of the alveolar epithelium, an important function of which is, no doubt, to help in the general scavenger work which goes on incessantly in the lungs. But a considerable number escape the phagocytes of the bronchial tree and of the alveoli, and pass through the openings in the latter into the alveolar stroma. Those from the central air-cells enter the deeper lymph channels which surround the bronchi, and in their course pass through many of the lymph nodes, at every one of which they are attacked, and many of the particles remain fixed in the cells of the follicular cords or permanently imbedded in the stroma. Those particles which reach the more superficial alveoli pass into the wide sub-pleural lymph streams. Here, too, at the periphery of the lobules, as may be seen in the lung of any adult, many of the dust particles are picked out and fixed in the peri-lobular tissue, so that often the lobules are accurately mapped out by a line of black particles. Ultimately, a certain number reach the bronchial glands, which become gradually in all of us, as the years pass, more and more deeply pigmented. The tubercle bacilli attached to the dust particles follow these routes, and their fate depends very much upon the local conditions, which, happily for the majority of us, are not favorable to their growth. It is interesting to note, however, with reference to the mode of infection in tuberculosis, the large proportion of individuals in whose *dust filters*, as the lymph

nodes of the respiratory system may be called, tubercle bacilli effect a lodgement. Indeed there have been important observations within the past few years to show that the bacilli may be present (without having caused any mischief) in apparently healthy lymph glands. There is direct communication between the sub-pleural lymphatics and the sac of the pleura, so that it is possible to conceive of a direct entrance of the bacilli in that way. More commonly, however, the disease spreads from a sub-pleural nodule or a lymph node in which the bacilli have grown. The wide and free anastomoses which have been demonstrated to exist in the lymph vessels of the pulmonary pleura favor the rapid diffusion of the virus under suitable conditions. Possibly, too, in some instances, direct infection may take place from the bronchial and tracheal lymph glands. Under all these circumstances it is the visceral layer of the pleura which is involved. The lymphatics of the parietal pleura have wide and extensive communications, discharging as they do partly into the lymph glands along the vertebra, and partly in the anterior mediastinal group, along the internal mammary artery. Infection may come from the lymphatic glands in the neck, particularly the supra-clavicular, which communicate freely with those of the axilla and of the sub-maxilla. Infection of the pleura in tuberculosis of the glands in these two groups has been frequently noted, and has been made the subject of a special essay by Hernandez.

In rare instances the disease may extend to the pleura from tuberculous caries of the bones in the neighborhood. An interesting instance of this was reported to the Johns Hopkins Hospital Medical Society by Dr. Flexner last winter. A colored man, aged 24, had a sinus in the neck which led to an erosion, involving the outer third of the right clavicle. The supra-clavicular glands in the neighborhood were involved, particularly the group between the clavicle and the upper border of the pleura, which were

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And lastly, the pleura may be infected through the wide communications which exist between the lymphatics of the peritoneum and those of the diaphragmatic pleura, and the lymphatics of the mediastinum.

IV. DIAGNOSIS.

A disease presenting clinical variations so extreme as those which I have attempted to portray must necessarily offer at times serious difficulties in its detection. At the outset it may be frankly acknowledged that often in cases of acute sero-fibrinous pleurisy, coming on with chills and fever and gradual effusion, we have not the data upon which to base a diagnosis. Neither the appearance of the individual, the family history, the onset, the course, or the character of the exudate may be in any way suggestive. On the one hand, there can be no question that many instances, as in Case I., so often referred to, occur in robust individuals of previous good health, with all the characters of pleurisy *a frigore*; and yet the subsequent history may point very clearly to the fact that the process has been from the outset tuberculous. On the other hand, the view which has of late found so much favor, that a large proportion of all acute pleurisies are tuberculous, is certainly unfounded, as shown by the post-mortem notes already referred to, in which non-tuberculous pleurisy of one form or another was present in two-thirds of an unselected series of cases from medical wards. I have already called attention to the points to be specially investigated; the antecedents, family and personal, the careful inspection of the groups of lymph glands contiguous to the pleura, the repeated examination of the expectoration, which may contain tubercle bacilli from even

She was fairly well nourished and made no other complaint but of gradual and progressive enlargement of these groups during several months. Within ten days or two weeks after admission a pleurisy developed on the same side, which we very naturally thought to be tuberculous. She was treated with injections, and the reaction on each occasion was particularly active. No benefit, however, followed them, and some weeks later she went to her home, where she shortly afterwards died. The autopsy, performed by Dr. Councilman, showed cancerous lymph glands in the sub-clavicular and axillary regions and extensive cancerous pleurisy—the primary disease being a nodule of carcinoma about the size of a walnut in the left breast. Some months subsequently, in illustration of the curious coincidences which we all meet in practice, I saw a case presenting striking similarities in the practice of Dr. Burns of Toronto; also in a comparatively young woman, but the infiltration about the pectoral muscle called my attention to the condition of the breast.

The diagnosis of the purulent form of tuberculous pleurisy is less difficult. A proportion of these, at least 75 per cent., depend upon infection with streptococci, the pneumococci, or the staphylococci. The tubercle bacillus may be present and in some acute cases, as in the one referred to, very abundant in the pus. In other instances, definitely proved to be tuberculous, staphylococci have been present, and sometimes the effusion is sterile. The course may be extremely suggestive, and it has long been known that the latent variety of empyema is not uncommonly tuberculous. As already mentioned, the fluid may not be truly purulent, but the turbidity due to the presence of large quantities of fatty material.

And lastly, a great difficulty in diagnosis may exist in these cases of sero-fibrinous pleurisy which recover with thickening of the membranes and persistence of flatness at the base. The most suspicious instances are those in which

the fluid constantly recurs in spite of repeated tapplings, and in which, with diminution apparently in the amount of exudate, the flatness persists, usually with transmission of the tactile fremitus, and sometimes, as time proceeds, marked flattening of the affected side. The records of Cases I., IX., X., and XI. show a sequence of events only too common. Possibly some of these cases, with flattening at the base and slight retraction, heal, and no further trouble occurs. Certainly they are not always tuberculous, such a process may follow a simple sero-fibrinous pleurisy or an empyæma. Thus in a young woman aged 23, who was admitted to my wards November 17th, 1890, with the right chest flattened behind and at the sides, with dulness at the right base and curvature of the spine (and who died of anemia associated with syphilis of the liver, and lymphatic nodules), the right lung was firmly adherent, the pleural membranes were thickened, particularly at the extreme base, and between the thickened layers there was a cavity containing about 70 cc. of an opaque, whitish fluid. The cavity presented adherent calcareous flakes, and there was no caseation. Such instances are by no means uncommon in post-mortem work, and unquestionably contraction and flattening at the base and slight drooping of the shoulder may persist for an indefinite number of years without leading to any more damage than perhaps a progressive bronchiectasis in the lower lobe. Clinically, too, these cases are not very infrequent, and though one may have a suspicion from the history, yet good health may be maintained for many years and evidence may be entirely wanting of any tuberculous process.

V. TREATMENT.

The indications are two-fold; first to limit and control the exudate and to promote its absorption. It would take me far away from the immediate subject to discuss here in

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full the therapeutics of pleural effusion. In the early stage it is sufficient to allay the pain, if severe, with opium, to reduce the fever, if high, by sponging, and to keep the bowels freely opened. It is doubtful whether the salicylates deserve the confidence which many claim. To promote absorption various measures are advised. It is important to remember that when fluid remains in the chest it is for the very good reason that it cannot get out, owing to blocking of the lymph paths. Absorption from the pleura goes on, as has been shown experimentally, with extraordinary rapidity, chiefly, if not entirely, from the costal layer. Probably in all instances of pleurisy with effusion, do what we may, the absorption has to await the freeing of the obstructed lymph channels. I still believe that good results are seen by putting the patient on a dry diet and giving brisk, saline cathartics. It is a rational practice, and in some instances I have seen the exudate diminish rapidly. The diuretic, when it acts, is useful in the same way. If at the end of ten days the exudate persists, and is at the level of the fourth rib in the erect posture, aspiration is advisable, and it may be repeated again in a few days if the fluid reaccumulates. So far as I know, there are no greater risks in the tuberculous than in the simple sero-fibrinous cases, and it is very important to relieve the lung early of the compression to which it is subjected by any large quantity of fluid. I think, however, the risk of the compressed lung becoming the seat of tuberculosis is not very great; more serious is the danger lest it should become bound down by such firm adhesions that it cannot expand. Gentle counter-irritation of the skin is probably beneficial in these later stages, stimulating the lymphatics of the costal pleura.*

* The relation between the sub-cutaneous and pleural lymphatics must be very close. A fluid containing colored particles in suspension, injected beneath the skin in the axillary region of a rabbit, finds its way to the costal lymphatics, and the anterior mediastinal glands become stained. (*Canada Medical & Surgical Journal*, 1875. Article on Anthracosis.)

In the cases of chronic sero-fibrinous effusion with thickening of the membranes the fluid re-accumulates rapidly, and aspiration may have to be performed very many times. In these instances systematic pulmonary gymnastics should be practised. The expansive efforts of forcing water from one large Wolff's bottle to another is a good method. When the exudate is purulent the case should be transferred to the surgeon for thorough drainage.

The second indication is to improve in every way possible the general nutrition of the patient, so as to favor conditions promoting the healing of the tuberculous process. No doubt, as in pulmonary and peritoneal infection, many instances of tuberculosis of the pleura recover and leave no more damage than that associated with slight thickening of the membrane. A life in the open air, regular habits and exercise, a nutritious diet, and the use of the remedies which promote in every way digestion and the assimilation of food should be advised. And finally we may lay to heart the words of Sir Andrew Clark: "When we have a patient with basic fibrinous pleurisy, let us hold him fast, restrict his freedom and treat him carefully until every remnant of it is gone."

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PART II.

THE DIATHETIC DISEASES.

TUBERCULOSIS.

BY WILLIAM OSLER, M. D.,
BALTIMORE.

I. GENERAL ETIOLOGY AND MORBID ANATOMY.

(a) **INCIDENCE OF TUBERCULOSIS IN INFANCY AND CHILDHOOD.**—Although it has long been known that, in the quaint language of Sir Thomas Browne, “consumptive and tabid roots sprout early,” the appreciation of the widespread prevalence of tuberculosis in the early periods of life is due to recent observations. Extremely rare in the new-born and uncommon in the first three months of life, the cases increase rapidly throughout the latter half of the first year and in the second year. In the *crèche* of the Hôpital Tenon of Paris, in the year 1890, it is stated that more than 21 per cent. of the babies died of tuberculosis. Of 2576 autopsies on infants made at Kiel, Boltz found 424 cases of tuberculosis. The following table gives the proportions at different ages:

Infants born dead	0.0 per 100		From 2 to 3 years	33.0 per 100
From 0 to 4 weeks	0.0 “ “		“ 3 “ 4 “	29.6 “ “
“ 5 “ 10 “	0.0 “ “		“ 4 “ 5 “	31.8 “ “
“ 3 “ 5 months	8.6 “ “		“ 5 “ 10 “	34.3 “ “
“ 6 “ 12 “	18.3 “ “		“ 10 “ 15 “	30.1 “ “
“ 1 “ 2 years	26.8 “ “			

The statistics of the late Professor Parrot embraced 219 cases in children under three years. Of these there were—

From 1 day to 3 months	23
“ 3 to 6 months	35
“ 6 “ 12 “	53

giving a total of 111 under one year of age, and from one to two years, 108.

Of 500 autopsies in children at the Munich Pathological Institute, Müller found tuberculosis in 150. Of 527 infants dead in hospital of various diseases, tubercles were present in 314.

A set of combined autopsies on 2230 children gave 753 tuberculous and 1407 non-tuberculous. The ages of the tuberculous cases are thus grouped:

From birth to 1 month	10
Up to 2½ years	138
From 3 to 5 years	255
“ 6 “ 10 “	226
“ 11 “ 15 “	124

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Analogous statistics are not, to my knowledge, available in this country, but the observations of Northrup at the New York Foundling Asylum show, at any rate, that the disease must prevail quite as extensively. From the third to the fifteenth year tuberculosis is also very frequent, and its manifestations in the glands, skin, and bones contribute a very considerable percentage of all cases in the out-patient departments of hospitals and in the special infirmaries for children's diseases.

The mortality, highest in the first year, sinks rapidly throughout childhood, to rise after puberty. Thus of 10,000 living, there die (U. S. Census, 1870) of tuberculosis in the first year 18.5; in the second, 10.5; in the third, 5.9; from the third to the fifth, 2.9; from the fifth to the tenth, 2; from the tenth to the fifteenth, 3.3. The Kiel mortality statistics (Heller) also show this in a striking manner: of 10,000 living, there died in the first year 245; in the second, 114; in the third, 76; from the third to the fifth, 34; from the fifth to the tenth, 14; from the tenth to the fifteenth, 16.

(b) THE BACILLUS TUBERCULOSIS.—It is acknowledged by those most capable of expressing an opinion that the essential cause of tuberculosis is the organism discovered by Koch. The bacillus is a short, fine rod from 1 to 5 μ in length, and usually a little curved. In the sputum and in tuberculous tissue the bacilli are often in little clumps, or two lie crosswise at an acute angle.

For demonstrating the bacilli in sputa the following method will be found satisfactory: The thicker and more purulent parts of the sputum are picked out with a small sharp-pointed forceps and spread over the cover-glass, which is allowed to dry in the air and then passed three or four times through the flame. A few drops of Ziehl's solution of fuchsin—namely, distilled water 100 grams, carbolic-acid crystal 5 grams, alcohol 10 grams, fuchsin 1 gram—are placed upon the cover-glass, which is held over the flame until it begins to boil. The glass is then washed in water, and a few drops of Gabbet-Ernst's solution—namely, methylene blue 1 to 2 grams, 25 per cent. sulphuric acid 100 grams—are placed upon the glass and allowed to remain there for about a minute. The glass is then washed in water, and mounted either in water or, after drying between filter-paper, in oil or balsam. The tubercle bacilli are stained red, while the nuclei of the cells and any other bacteria are stained blue.

In sections the following method is pursued at the Pathological Laboratory of the Johns Hopkins Hospital: The tissues should be hardened in absolute alcohol and imbedded in celloidin. After the sections have been cut, the celloidin should be removed either with oil of cloves or with absolute alcohol and ether. After this they are passed through strong alcohol (to remove the oil or ether), and then placed in water previous to staining. The most satisfactory dye is the carbol-fuchsin solution of Ziehl. The sections are left for two hours at a temperature of 60° C. (or, if this be inconvenient, they may be stained for six or eight hours in the thermostat at 37° C., or for twenty-four hours at the room temperature). The tissue-elements and the bacilli are thus stained deeply in the fuchsin. A good decolorization solution is the ordinary acid alcohol of the laboratory (acid, hydrochloric, 1, aq. destill. 30, alcohol 70). The decolorizing process must be carefully watched, as too much of the dye may be easily extracted, the tubercle bacilli along with the tissue-elements losing their stain. It is best to remove the sections from the acid alcohol while they still retain a decided pink tint. A counter-stain is then used, the most desirable being a 2 per cent. aqueous solution of methylene blue. This removes all remaining fuchsin color from the tissue-elements and stains them a delicate blue. The tuber-

ele bacilli are stained a bright red. The sections are to be dehydrated in absolute alcohol, cleared in oil of cloves or preferably in xylol, and mounted in xylol balsam. It is best to examine with an oil-immersion lens, although if the bacilli are numerous they can readily be made out with a good high-power dry lens (Zeiss 3, or Leitz 7). Tubercle bacilli may be demonstrated in tissues by means of the rapid method used for staining them in sputum, but the results are very unsatisfactory, owing to the distortion of the tissues resulting from the action of the heat and the strong acids.

The bacillus is aerobic, and, although somewhat difficult to cultivate, may be grown on blood-serum, glycerin agar, or even on potato. The colonies form dry, grayish-white, scale-like masses. In the growth the bacillus forms certain soluble product or toxins, which, if introduced into the body, produce lesions similar to those induced by the bacilli themselves.

The bacilli are tolerably tenacious, and retain their virulence after freezing, desiccation, and salaison. It is stated that the bacilli have been found alive after burial of the subject for two years. The combined action of dryness and exposure to air is stated to diminish the virulence, but tuberculous sputum exposed to the air for from fifty to one hundred days still retains its virulence. The bacilli are rapidly killed in a few minutes by moist heat, as in boiling; dry heat is much less effectual. The bacilli are found in variable numbers in all tuberculous structures—the acute miliary nodule, the caseous, fibrous, and fibro-caseous nodules. They are most abundant in rapidly-growing tubercles and in the old ulcerous lesions of pulmonary tuberculosis. They are scanty, as a rule, in the more chronic tuberculous processes of glands and of bones, and in the lesions associated with extensive caseation. When not easily demonstrable by histological methods, inoculation in animals may alone determine the tuberculous nature of a structure.

Outside the body the bacillus has been shown to be a very widely-distributed organism, the number in any locality depending upon the number of cases of pulmonary tuberculosis and the carelessness or thoroughness with which the sputa of infected individuals is destroyed. In an ordinary case of pulmonary consumption countless millions are thrown out daily and scattered widely in the sputum dried as dust. Cornet found the dust of hospital wards and places occupied by tuberculous patients to be infective in a number of cases. Thus of 118 samples of dust from the wards of hospitals and rooms occupied by tuberculous individuals, 40 proved capable, when inoculated in animals, of producing tuberculosis. The infectiveness of the dust of the medical and surgical divisions of a hospital was found to be in the proportion of 76.6 to 12.5.

(c) MODES OF TRANSMISSION.—(1) *Experimental Tuberculosis*.—Our knowledge of the disease has been derived from experiments, and we owe to Villiman the demonstration of the infective character of all tuberculous processes. The receptivity of animals varies very much: the rabbit and guinea-pig are particularly susceptible; dogs and cats are very resistant. Bovines are very susceptible, and one of the most important facts in the etiology of the disease is the frequency with which the disease occurs in them.

Subcutaneous inoculation of tuberculous material in a susceptible animal, as a rabbit or a guinea-pig, is followed in a short time by the production of a little nodular growth, which softens, and even ulcerates, and which in time may be absorbed. The corresponding lymph-glands swell, tubercles develop in them, and then caseate. The animal dies in from six weeks to three months. Tubercles are found in the lymph-glands, and there is, as a rule, general tuberculosis of the organs. The most satisfactory method is the inoculation of

FIG. 1. Section of a small fresh tubercle, showing large giant cells surrounded by epithelioid cells. Tubercle bacilli are seen in the giant cells and scattered in the tissue about it. FIG. 2. Section of tuberculous lesion under a low power, showing the exudate with groups of bacilli scattered in it.



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The transmission by inhalation is more difficult in animals, and the results of causing animals to breathe air charged with tubercle bacilli are discordant, but in some instances undoubted pulmonary infection and general tuberculosis have followed. Experimental infection through the digestive passages has also been demonstrated, particularly in the feeding of animals with the milk of tuberculous cows.

(2) *Hereditary Transmission.*—Current opinion on this point may be expressed as follows: While in a few rare cases tuberculosis is transmitted directly from parent to offspring, in the great majority of all cases the heredity does not relate to the transmission of the seed itself, but of a disposition of body, a type of tissue-soil favorable to the development of the disease in case of accidental infection.

Congenital tuberculosis has been observed in some six or eight cases. In the case of Chrina there was generalized tuberculosis in a fetus seven and a half months old, the mother of which died of phthisis. In Berti's case the child, born at term of a phthisical mother, died on the ninth day, and two small cavities were found at the posterior border of the lower lobe of the right lung, which were shown microscopically to be tuberculous. In Merkel's case the tuberculous mother died two days after confinement. The child had tuberculosis of the palate and an abscess of the left trochanter major. In Jacobi's case the fetus, born at the seventh month, had miliary granulations in the liver, peritoneum, spleen, and right pleura. In the case described by Sabouraud the child born of a tuberculous mother died on the eleventh day. The liver and spleen were tuberculous.

In all of the cases reported it was direct maternal heredity. The mode of transmission is not at all certain, but it is probably transmission through the placenta. Tuberculosis of the placenta is very rare. Lehman has recently reported an instance in a woman aged twenty-nine dead of acute tuberculosis in the eighth or ninth month of pregnancy. The fetus was not affected, but on both surfaces of the placenta there were a few grayish nodules, which showed the characteristic structure of tubercle, with bacilli. It has been shown also that the placenta of a tuberculous woman proved infective; and, indeed, it is stated that the amniotic fluid of a tuberculous subject may produce the disease in a guinea-pig.

There are several experiments (Landouzy and Martin, Birch-Hirschfeld, and Armani), which indicate that the virus may be present in the fetus without the presence of actual tubercles, since they found that portions of the viscera of fetuses born of tuberculous mothers were infective to guinea-pigs.

A modified view of this direct heredity is advocated by Baumgarten, who holds that the virus is directly transmitted, but remains latent, and does not develop until some time after birth. In support of this he quotes the large number of cases of tuberculosis in the early months, the figures illustrating which have already been given. He also lays great stress upon the occurrence of tuberculosis in the bones and the joints of children, regions to which the

bacilli would not be likely to be conveyed in accidental infection. This post-natal development he regards as analogous to *syphilis hereditaria tarda*, and he suggests that the actively growing tissues of the child restrain or inhibit the development of the germs.

There is no evidence to show that a tuberculous father can directly transmit the disease. The experimental evidence is also negative. Gärtner (whose recent article on "Heredity in Tuberculosis" is the most important contribution made to the subject of late years) found that in rabbits and guinea-pigs, with artificially induced tuberculosis of the testes, and whose semen contained bacilli, the embryos were never infected. On the other hand, of 65 female guinea-pigs which had consorted with the tuberculous bucks, 5 presented genital tuberculosis, and of 59 female rabbits under similar conditions 11 became infected.

In support of the view that tuberculosis is hereditary great stress is laid naturally on the frequency with which a history of the disease is met with in the parents. The estimates of various authors on this point vary from 10 to 50 per cent. Of 427 cases at the Johns Hopkins Hospital, there were only 53 in which the mother was affected, 52 in which the father had had tuberculosis, and 105 in which sister or brother had had the disease. The fact that the children and relatives of tuberculous individuals are more directly exposed to contagion than other individuals render it difficult, as Fagge remarks, to draw a clear line between heredity and accidental infection.

(3) *Inoculation*.—This is not very common in man, as the skin does not offer a very suitable soil for the development of the tubercle bacilli. This mode of infection is, however, seen in persons whose occupations bring them in contact with dead bodies and animal products. Demonstrators of anatomy are particularly subject to a local tubercle on the finger or back of the hand—the so-called post-mortem wart, *verruca necrogenica*, the "lichen" tubercle of the Germans. Only in very exceptional instances is this followed by serious results. Cases have been reported of infection from the bite of a tuberculous patient, inoculation from a cut by a broken spit-cup and the puncture of a hypodermic needle. There is no reliable observation of the transmission of tuberculosis by vaccination. In the performance of the rite of circumcision children have been inoculated, the infection in these cases being associated with disease in the operator, and occurs in connection with the habit of cleansing the wound by suction.

(4) *Transmission by Inhalation*.—The expired air of tuberculous patients is harmless, but the sputa, dried and widely diffused in the form of dust, constitute one important medium of transmission in the disease. The investigations of Cornet have shown the greater infectiveness of the dust of localities frequented by patients with pulmonary tuberculosis. The frequency with which the disease is met with in the lungs and in the bronchial glands finds here its explanation.

In institutions the residents of which are restricted in the matter of fresh air and exercise, as in jails and convents, the death-rate from tuberculosis is very much higher than in the general population. Cornet found that in some of the religious communities more than three-fourths of the deaths were due to this disease. The mortality in prisons from tuberculosis is from 10 to 50 per cent., while in the general community it is not more than 15 per cent. Flick has brought forward evidence to show that the distribution of tuberculosis in one of the wards of the city of Philadelphia is more particularly with certain houses in which individuals have died of this disease. There are also some striking local epidemics of tuberculosis: thus Marfan gives an instance of a

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place confined and badly ventilated, occupied by twenty-two employees, who were joined in 1878 by two consumptives, who for several years coughed and spat about the floor indiscriminately. The employees arrived at an early hour and breathed the air charged with the dust raised by the morning cleaning.

Between 1884 and 1889 thirteen of these persons fell victims to tuberculosis. Against these facts, however, are the statements that at hospitals for consumptives, as at Brompton, in London, the doctors and nurses are rarely attacked. Dettweiler claims that at his institution in Falkenstein no case of tuberculosis has been contracted. On the other hand, Marfan states that in the Paris hospitals tuberculosis is extremely frequent in the attendants and deimates the lay contingent. At the Hospital Necker half of the attendants are attacked with phthisis, and he notes as a significant fact that it is particularly the attendants in the medical wards.

The danger is enhanced when the contact is particularly intimate, as between a tuberculous mother and her child or between man and wife. In the latter case there are figures which indicate that contagion is not at all infrequent.

(5) *Transmission by the Food.*—Experiments have shown that infection may be communicated by ingestion of tuberculous material, and one of the most important problems relates to infection with the milk of tuberculous cows. Experimentally, it has been conclusively demonstrated that such milk is infective, even when the disease is localized in the lungs of the animal, and that it is not necessary that the udder should be diseased. Ernst has shown that the bacilli may be present in the milk when there is no tuberculous mammitis. The danger of infection from this source in children is very urgent, and systematic sanitary inspection should be made of the cows, and, if necessary, inoculation experiments made with the milk.

The percentage of tuberculous animals in the dairy-stables of our cities is very much larger than has been supposed. The figures in this country for large numbers are not available. It has been stated that from 10 to 15 per cent. of the dairy stock in the Eastern States is tuberculous. This is probably a low estimate.

The virulence is retained in the cream and in the butter. Other conditions than the presence of the bacilli in the milk are probably necessary for infection, and, fortunately, all children who drink tuberculous milk do not become consummated. In some instances the gastric juice may destroy the bacilli; in others, conditions of the tissues may not be favorable to the development of the seed. Experimentally it has been shown that lesion of the intestine itself is not necessary, and infection of the mesenteric glands may take place through a normal mucosa. Possibly the great frequency of mesenteric tuberculosis in children finds here its explanation. In 127 cases of fatal tuberculosis in children noted by Woodhead these glands were involved in 100. It is not definitely determined whether the milk of a tuberculous woman is virulent.

Infection by meat is probably very much more rare. When the tuberculosis is generalized in the internal organs the flesh should be confiscated. The virulence, however, is only marked when the disease is very extensive. It has been shown that the flesh of tuberculous subjects is infective to guinea-pigs. Noard, however, in a series of experiments found that the juices of the muscle of twenty-one cases with general tuberculosis, when injected into the peritoneum of guinea-pigs, only once produced tuberculosis.

(6) *CONDITIONS INFLUENCING INFECTION.*—(1) *General.*—These, dealing specially with the environment of individuals, explain in a great measure the

frequency of the disease in certain localities. Thus one of the most important is residence in the large centres in which many people are crowded together. The death-rate from tuberculosis is very much higher in towns than in the country, and a very considerable share of the high infant mortality of cities is to be attributed to it. Not only is the air of the large towns less pure, but the chances are very much greater that the dust, blown in all directions, has with it the germs of the disease. The inhalation of impure air in certain occupations, which in adults is an important predisposing factor in pulmonary tuberculosis, does not prevail to any special extent in children. Climate in itself does not influence the conditions materially, but, as a rule, the disease is more common in the temperate regions, largely because in these are found the largest collection of human beings. Soil and locality have an important influence, cold and dampness increasing the personal liability by favoring the development of catarrhal affections. There are fewer cases of tuberculosis and fewer foci of infection in regions such as the Alps and in elevated plateaux as in Mexico, but altitude itself does not confer immunity, and there are many mountainous regions in which the inhabitants are much affected by tuberculosis.

More important than these are the factors relating to personal environment, as of the dwellings. The constant breathing of a vitiated air, as in the small crowded rooms in the tenements and narrow alleys of our large cities, and the absence of sunlight, are two of the most important predisposing elements in tuberculosis in children. These influence infection in two ways: first, by favoring the distribution of the bacilli; and, second, by lowering the nutrition of the individual and leading to conditions favoring the entrance of the bacilli to, or their development in, the body.

(2) *Individual Predisposition.*—From the time of Hippocrates it has been thought that there was a certain conformation of body which rendered an individual more prone to the disease. His words are: "The form of body peculiar to subjects of phthisical complaints was the smooth, the whitish, that resembling the lentil; the reddish, the blue-eyed, the lenco-phlegmatic; and that with the scapulae having the appearance of wings." In children it may be said that the build and type such as here described is certainly more prone to tuberculous affections. Two types of conformation have long been recognized as predisposing in some way to infection; the *tuberculous*, with bright eyes, oval face, thin skin, and long thin bones, and the *scrofulous*, with a heavy figure, thick lips and hands, opaque skin, and large thick bones. But, as in adults, well-developed, healthy infants and children may become subject to the disease. In addition to the conformation of the chest, the respiratory capacity, the relation between the volume of the lung and of the heart, a relatively small heart with narrow arteries, and a pulmonary artery relatively wider than the aorta (Bencke), and relatively large-sized viscera, have all been brought forward as causes predisposing to tuberculosis.

Among others which may be mentioned is race: the negro seems more liable to the disease than the white races, and it is stated that the Hebrews possess a relative immunity.

More important in children are the local conditions influencing infection. Acute and chronic catarrhal troubles of the throat and upper air-passages, and of the lung, undoubtedly favor infection, either by allowing the freer entrance of the germs or by weakening the powers of resistance. The infectious diseases, particularly whooping-cough, measles, and influenza, act probably in this way, while small-pox, typhoid fever, and syphilis influence the conditions rather by reducing the power of resistance. In institutions the frequency with which tuberculosis follows the infectious disorders is very striking.

Of local affect which was regarded rather of the exhalation of the bronchi and pleurae in the latter case many outbreaks of tuberculous

The subjects of pulmonary artery disease, especially in the development of the disease, notably chlorosis, and other diseases of the system, increase the susceptibility

Blows and contusions, particularly in children, are particularly liable to injury; less often, however, may be a tuberculous joint

With reference to the disease, it may be stated

(a) In a few cases it appears in the child

(b) The primary form of early youth is very common (Baumgarten, Gärner)

(c) Direct patentence is strongly a

(d) In a large number of lungs, intestines, o

(e) Heredity in expression, and very early develops depend secondly, upon the

(f) Immunity, inherited tissue-resistance, such as bad air, the germ, a vulnerability or acquired, is the

(3) *The Relation of Tuberculosis to Other Diseases.*—Tuberculosis are tuberculous so that the term scrofula, though the so-called in origin, yet it has of the tuberculous killing, when injected into pigs. This corresponds to the termination of the scrofulo-tuberculous attempt has been made to tuberculous lesions, primary tuberculosis, b

(c) ANATOMICAL lesions induced by t

Of local affections of the lungs which predispose to tuberculosis, hæmoptysis, which was regarded as an important cause, is now thought to be an indication rather of the existence of the disease. Such disorders as dilatation of the bronchi and pleurisy also heighten the liability to infection, though in the latter case many of the instances believed to be simple are in reality from the outset tuberculous.

The subjects of congenital or acquired contraction of the orifice of the pulmonary artery usually, as is well known, die of tuberculosis. Prior to the development of the disease many subjects show a marked anæmia, and unquestionably chlorosis offers favoring conditions for the development of this affection. Diseases of the stomach and intestines, particularly chronic enterocolitis, increase the susceptibility to infection.

Blows and contusions favor in some way the development of tuberculosis, particularly in children, in whom spinal caries and hip disease may follow an injury; less often does trauma play any part in pulmonary tuberculosis. Here, too, may be mentioned the favoring influence of operation: resection of a tuberculous joint is occasionally followed by an acute infection.

With reference to infection and the conditions which influence it the following may be stated:

(a) In a few cases the disease is directly transmitted from the mother, and appears in the child at birth.

(b) The primary tuberculosis of the bones, joints, kidney, spleen, liver, etc. of early youth is very possibly associated with a fetal hæmatogenous infection (Baumgarten, Gärtner).

(c) Direct paternal transmission has not been proved, and experimental evidence is strongly against it.

(d) In a large proportion of cases the infection is post-fœtal—through the lungs, intestines, or skin.

(e) Heredity influences the soil. All are *tuberculizable*, to use a French expression, and very many of us actually become infected. Whether or not the seed develops depends, firstly, upon the character of the tissue-soil; and secondly, upon the existence of special favoring circumstances.

(f) Immunity, a relative condition, enjoyed chiefly in consequence of inherited tissue-resistance, is lessened by all circumstances which depress nutrition, such as bad air, bad food, and imperfect hygienic surroundings. Next to the germ, a vulnerability of tissue, however brought about, whether congenital or acquired, is the most important factor in the etiology of the disease.

(3) *The Relations of Tuberculosis and Scrofula.*—The lesions known as scrofulous are tuberculous, and due to the development of the *bacillus tuberculosis*, so that the term scrofula is now almost, and may well be entirely, abandoned. Though the so-called scrofulous lesions of glands and bones and skin are bacillary in origin, yet it has been shown that their virulence is not so extreme as that of the tuberculous products in the viscera, the latter, according to Arloing, killing, when injected, both guinea-pigs and rabbits, the former only guinea-pigs. This corresponds with the more protracted course and the more favorable termination of the so-called scrofulous affections. It has been suggested that the scrofulo-tuberculous manifestations are caused by an attenuated virus. An attempt has been made by writers, particularly Marfan, to show that the scrofulo-tuberculous lesions, when recovered from, confer a sort of immunity to pulmonary tuberculosis, but the evidence for this is not yet very strong.

(c) *ANATOMICAL CHANGES PRODUCED BY THE TUBERCLE BACILLI.*—The lesions induced by the bacilli are in the form of small nodules which, fused

together, may form large infiltrated areas, so that a distinction is often made between the nodular and the diffusely infiltrated varieties. The studies of Baumgarten and others have enabled us to follow accurately the primary changes induced by the bacillus. These are—

(1) The multiplication of the fixed tissue-elements by a process of karyokinesis. The cells of the vascular epithelium, of the ordinary epithelium, and of the connective tissue proliferate, and gradually there is produced from them the large, rounded, cuboidal, or polygonal cells with vesicular nuclei—the so-called *epithelioid* cells—inside some of which the bacilli are seen. This reaction of the fixed elements of the tissue would appear to be the primary effect.

(2) Leucocytes, chiefly polymuclear, migrate, and accumulate about the focus of infection. These form the lymphoid cells which were formerly thought to be so characteristic of the tubercle. They do not, however, undergo subdivision. Some believe that they attack and destroy the bacilli. There would appear to be successive invasions of leucocytes at the focus of irritation, and many of them undergo rapid destruction. It is stated, too, that later, as the little tubercle grows, the leucocytes which surround it are of the mononuclear form, or lymphocytes, and that these persist and do not undergo the rapid degeneration of the polymuclear forms.

(3) A reticulum of fibres is formed in the tubercle by the fibrillation and rarefaction of the connective-tissue matrix, most apparent, as a rule, at the margins of the growth.

(4) In some, but not in all, tubercles giant-cells are formed by an increase in the protoplasm and in the nuclei of an individual cell, or possibly by the fusion of several cells. The bacilli are usually, but not always, seen in the giant-cells. There seems indeed to be an antagonism between the number and virulence of the bacilli and the giant-cells: thus in joint and gland tuberculosis and in lupus, in which the former are scanty, the latter are abundant; while in miliary tubercles, and, as a rule, in all lesions in which the bacilli are abundant, the giant-cells are scanty.

The tuberculous nodule thus formed may undergo necrosis and caseation, or may gradually be converted into a connective-tissue mass. Caseation begins at the central part of the growth, and appears to be owing to the direct action of the bacilli. The cells undergo coagulation necrosis, lose their outline, become irregular, and are finally converted into a homogeneous, structureless material in which the cells are no longer distinguishable, and which no longer takes the stain. As this process extends involving several nodular tubercles, they are gradually converted into uniform yellowish-gray masses. No blood-vessels are found in the central portion, but the bacilli are usually abundant. By the union of many of the nodular tubercles large masses may be formed which may undergo either (1) softening or liquefaction with the formation of cavities; (2) fibroid limitation, leading ultimately to encapsulation; (3) in the older caseous masses, particularly when encapsulated, lime salts may be deposited (calcification); and (4) sclerosis. There is necrosis of the tissue-elements in the centre, gradual hyaline transformation, with great increase in the fibrous reticulum, so that the tubercle is ultimately converted into a firm, hard structure. Sometimes increase in the fibrillation and caseation go on together, with the production of fibro-caseous tubercle.

Diffuse Infiltrated Tubercle.—It was formerly thought that the products of any simple inflammation might become caseous, and the identity of the caseous pneumonia and of serofulous lesions with tubercle, which Morton (1685) maintained, and which Laennec laid down as a fundamental proposition, was for a long time disputed, particularly by Virchow. Now, the researches of Koch

have demonstrated tuberculous.

Infiltrated tubercles, sometimes small, sometimes large, for instance, the lungs, for instance, are surrounded by zone of products of the bacilli occasionally in an irregular way. There is irregularly infiltrated tubercle.

Secondary infection of tubercle: (1) Growth is in reality which may be limited to the lungs there is infiltration of the blood and lymph.

(2) The bacilli in tuberculosis; especially Koch's tubercle bacillus of the lungs, result of a mixed infection.

(3) A slow, regular growth, and constant in the disease.

II.

Forms of tubercle common in infants are in superficial lymphatic nodes encountered in which either that of an acute intense infection with meningitis of the brain is no hard-and-fast rule. Granulations occur from three to six organs there are clinical course is of even sixteen weeks, into three groups, a very often typhoid fever of the lungs. The majority of the cases, occurring in children the symptoms of a primary form, which is

have demonstrated that these infiltrated caseous lesions are definitely tuberculous.

Infiltrated tubercle results from the fusion of many small nodular foci, too small sometimes to be visible to the naked eye. Histologically, however—in the lungs, for instance—they may be seen to be composed of scattered centres surrounded by zones in which the air-cells are filled with leucocytes and the products of the proliferation of the alveolar epithelium. Under the influence of the bacilli caseation takes place, usually in small groups of lobules, but occasionally in an entire lobe, or it may be throughout the greater part of a lung. There is really no essential difference between the nodular and the infiltrated tubercle.

Secondary inflammatory processes accompany the growth and development of tubercle: (1) The exudation of leucocytes and serum about the primary growth is in reality an inflammation, which varies with varying conditions, and which may be limited or very extensive. For example, about the tubercles in the lungs there is always inflammation of the alveoli with infiltration and proliferation of the connective-tissue elements of the septa, and changes in the blood- and lymph-vessels.

(2) The bacilli themselves may induce suppuration, as in joint and bone tuberculosis; experimentally, the products of the growth of the tubercle bacilli, particularly Koch's tuberculin, produce an active suppuration. In tuberculosis of the lungs, as well as in other regions, the suppuration is largely the result of a mixed infection, and is due to pus-organisms.

(3) A slow, reactive inflammation occurs about many tubercles, resulting in the formation of a cicatricial connective tissue, limiting and restricting their growth, and constituting, in reality, the important conservative and healing element in the disease.

II. GENERALIZED FORMS OF TUBERCULOSIS.

(1) ACUTE MILIARY TUBERCULOSIS.

Forms of tuberculous infection running a rapid course are decidedly more common in infants and children than in adults. Practically, there is always a focus of local disease in a bronchial or mesenteric gland, a joint, or on the skin, or in superficial lymph-glands. In a few rare instances a miliary tuberculosis is encountered in which caseous foci cannot be discovered. The picture may be either that of an acute infection without definite local manifestations, or of an intense infection with pronounced symptoms pointing to involvement of the meninges of the brain, the lungs, or the serous membranes. In children there is no hard-and-fast line to be drawn between the acute forms in which miliary granulations occur throughout all the organs, and in which the clinical course is from three to six or eight weeks, and forms in which throughout the various organs there are coarser, larger grayish-yellow tubercles, and in which the clinical course is of more subacute character, lasting from eight to twelve or even sixteen weeks. As in the adult, the cases may be divided for convenience into three groups, as the symptoms are those of a general infection, simulating very often typhoid fever, or those of an acute meningitis or of an acute affection of the lungs. These cerebral, general, and pulmonary types cover a majority of the cases. There may be mentioned, in addition, an acute affection, occurring in children the subjects of a local tuberculous process, in which, with the symptoms of a profound infection, there is no general miliary tuberculosis. This form, which has been described by several French writers as the *fièvre*

infectieuse tuberculeuse suraigue, is not generally recognized, but the cases described by Laudouzy and others presented quite minor tuberculous lesions of the lungs or of other organs, with the clinical symptoms of very intense infection, the severity of which was out of all proportion to the local lesion and to the number of miliary granulations found throughout the body. It is thought to be due to the action of the tuberculous toxins.

The acute tuberculous meningitis will be described separately. We shall here speak only of the typhoid and of the pulmonary types.

Typhoid Type.—The onset is usually insidious, and commonly there has been an indisposition or slight cough, but prior to the fever the child may have been in good health. The fever is noticed in the afternoon or evening, and with it there is loss of appetite, and the child loses in weight and is listless and not inclined to play. A bronchial cough is by no means uncommon, but it is to be remembered that the disease may set in quite abruptly in a child believed to be in good health. Within a week, or even earlier, the child takes to bed, and the symptoms of an infection are well pronounced. The tongue is white and furred. The abdomen is distended, sometimes painful on pressure, and there may be diarrhoea. The spleen is usually enlarged, and can be readily felt. The liver may be also distinctly swollen. The gastro-intestinal troubles with the continued fever may be strongly suggestive of typhoid fever, but rose spots are not detected. There are usually some symptoms pointing to the involvement of the bronchi or the lungs, and the respirations are hurried, only, however, in proportion to the fever, and the physical signs indicate rather a catarrh of the larger than of the smaller tubes; there is no dulness. There are headache, delirium, particularly at night, and sometimes marked hyperaesthesia of the skin. Albuminuria is often present, and there may be complete suppression of urine. The fever varies greatly in intensity, but usually has not the regularity of typhoid, and the daily exacerbations are more marked. It may rise to 104° and 105° F. On the other hand, there are cases in which the fever is moderate, not more than 101° or 102°, and very rarely there may be no fever. There are also instances in which there have been rigors throughout the course of the disease. The condition of the child becomes aggravated, and with a dry tongue, delirium, unconsciousness, distended abdomen, and swollen spleen, the similarity to typhoid fever is very close. The course is extremely variable, and while death may occur at the end of the second or beginning of the third week, in other cases the disease is prolonged to five or six weeks. In the more protracted cases definite local signs are met with: thus, with an increase in the dyspnoea and cough bronchitis of the smaller tubes is found, and patches of consolidation at the bases, so that aëration is very defective. The eruption of tubercles on the meninges may intensify the cerebral manifestations, and there may be from the outset severe headache, with a gradual and progressive coma, dilated pupils, and sometimes strabismus.

Pulmonary Type.—The clinical features are of an intense capillary bronchitis (broncho-pneumonia). This, the more common variety, is very often mistaken at its onset, and even throughout the course, for simple broncho-pneumonia. The onset may be abrupt, and even with a chill, but, as a rule, the child has been failing in health or is at the time convalescing from some acute illness or is the subject of an acute naso-pharyngeal catarrh. The fever is high, and may reach from 103° to 105°; the pulse is rapid, from 130 to 140. The respiratory symptoms are marked. At first the shortness of breath is slight and proportionate to the fever, but gradually it increases, and the respirations may be from 60 to 70 per minute. The cough is frequent, dry, and very troublesome. As the dyspnoea becomes more marked the color of the face changes,

and there is slight cyanosis. There are rarely rales, but the rhonchi are not infrequently audible. The wheezing is due to the physical examination of the lower zone of the lungs, and auscultation of the smaller tubes, which the resonant blowing breathing does not detect.

The course of the disease may die at the end of the first or second week, from a progressive catarrh of the bronchi, or from a progressive pneumonia.

Diagnosis.—The disease is not easy or beset with difficulties, but it is not to be taken into account; the child has been instances of it. Much more important is the patient. Inquiries should be made of diseases not infrequently of failing health. The cases are those in which the acute disease. Sometimes the acute disease of the neck or the eye, or, in very rare instances, in the type, when the fever may be extremely high. If the record be kept, it is not infrequently in tuberculosis, and in remissions. As no even subnormal, in some in both diseases, usually present in the acute sign. Expectations should be looked for in miliary tuberculosis, which tubercle bacilli are present.

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Prognosis.—The disease is not to be mentioned a type of others, which they are either the first manifestation or the expression of the tuberculous process.

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and there is slight cyanosis. Though the fever is high and the symptoms grave, there are rarely severe cerebral manifestations. There may be slight diarrhoea, but the abdomen is not specially distended; the spleen is easily palpable. The whole clinical picture is that of an acute broncho-pneumonia. The physical examination shows hurried respiration, and there may be retraction of the lower zone of the thorax; the percussion note is clear, even hyperresonant, and auscultation at first shows signs of a general bronchial catarrh, chiefly of the smaller tubes. Subsequently, as the case progresses, there are areas in which the resonance is higher in pitch or even tympanitic, and in places distinct blowing breathing may be heard, or even the signs suggestive of cavity.

The course of the disease in this type is much more rapid, and the child may die at the end of a week, or even earlier, with the signs of an acute suffocative catarrh—more commonly in from ten to twelve or fourteen days, usually from a progressively advancing asphyxia.

Diagnosis.—The diagnosis of acute tuberculosis in children may be very easy or beset with the greatest difficulties. The family history should be taken into account; the surroundings of the case, particularly whether there have been instances of tuberculosis in the same house or occupying the same room. Much more important is the previous history and personal condition of the patient. Inquiries should be made about whooping-cough and measles, diseases not infrequently followed by acute tuberculosis. Sometimes a history of falling health or of protracted catarrh may be obtained. The most evident cases are those in which there are signs of local glandular or bone tuberculosis. Sometimes the acute affection follows an operation on the tuberculous glands of the neck or the opening of a joint abscess, or even of a so-called cold abscess, or, in very rare instances, the tapping of a pleural effusion. In the typhoid fever may be extremely close. Here, if from the outset a careful temperature record be kept, it will usually be found that the fever is much more irregular in tuberculosis, and early in the disease there may be quite marked morning remissions. As noted before, in a few instances the temperature may be low, even subnormal, in the morning. The general features of infection are much the same in both diseases. The absence of typhoid rash, unless it is there, which is usually present in children, and very distinctive, is a most important negative sign. Expectoration is rarely obtained, but should the child vomit, sputa should be looked for in the vomitus, since it sometimes happens that an acute military tuberculosis takes its origin in a small focus of disease in one lung, from which tubercle bacilli may reach the sputum.

The examination of the urine is important, but Ehrlich's reaction is present as frequently in acute tuberculosis as in typhoid fever. Pus in the urine should be carefully examined for bacilli, since instances of general infection have resulted from urogenital tuberculosis.

The profound infection associated with malignant endocarditis may simulate that of acute tuberculosis. The special heart-signs, if present, and embolic features, would be important distinguishing marks. The diagnosis of the catarrhal or broncho-pneumonic type will be more fully considered when speaking of the acute tuberculous broncho-pneumonia of infants.

Prognosis.—The prognosis is always unfavorable. Here, however, may be mentioned a type of acute tuberculosis recognized by Empis, Landcazy, and others, which they call *typho-tuberculose* or *typho-bacillose*, and which may be either the first manifestation of the invasion of the organism with the bacilli or the expression of an acute, but aborted, tuberculosis, following some local tuberculous process. The clinical aspect is really that of typhoid fever, and

the temperature curve would not appear to give any definite criterion. Unless, in fact, there is some local tuberculous focus, I do not see how this form can be recognized, and many of the cases reported by Aviragnet in his monograph are not at all convincing. That there may be, however, either early in tuberculosis, or as a secondary event in a local process, an infection of the system with the toxins is extremely likely. In adults it is not very uncommon to find a tuberculous focus completely overlooked in a general infection believed to be typhoid fever, and in which the secondary development of miliary granulations seems scarcely sufficient to account for all the symptoms.

(2) CHRONIC DIFFUSE TUBERCULOSIS.

This, one of the most common forms of tuberculosis in children, is characterized anatomically by the gradual development of tubercles in many different parts of the body: they are not, however, the miliary granulations of the acute tuberculosis, but coarse, grayish-yellow tuberculous masses, varying in size from a pea to a walnut. In the lungs, for instance, there are caseous tubercles of all sizes, areas of caseous broncho-pneumonia, some of which have undergone softening; but cavities are not common except in children above four or five. The bronchial glands are often greatly enlarged and caseous, and sometimes present abscesses. The abdominal organs show extensive tuberculosis. The spleen is greatly enlarged, and on section presents numerous grayish-yellow tuberculous masses, varying in size from 2 to 10 mm. The liver is enlarged and may show miliary tubercles on the capsule, but in many instances there are coarser yellowish-gray masses which have developed about the bile-capillaries, and which, having softened in the centre, present a yellowish-green bile-stained pus. The small intestines may show tuberculous ulceration to a greater or less extent. The mesenteric glands are usually enlarged and caseous. The kidneys may show coarse tubercles, sometimes an intense tuberculous peritis. In the brain there may be either an acute terminal meningitis or there are coarse tuberculous nodules scattered throughout the substance, particularly in the cerebellum. The chronic diffuse tuberculosis is much more frequent in infants than in children above the age of two. The symptoms are those of a progressive enfeeblement of the nutrition, as a rule *without fever*, and with manifestations in different organs varying with the degree of tuberculization. The affection may set in acutely as a bronchitis or a broncho-pneumonia, the symptoms of which gradually subside. Very often the condition follows whooping-cough, measles, or acute gastro-intestinal catarrh. Less frequently it is insidious, and the child presents simply progressive failure in health. The appearance of the child is that of marked cachexia. It is thin; the skin is loose and pale, sometimes covered with fine scales, and occasionally pigmented. The eyes are large, and the expression often bright and animated. The thorax is thin, the ribs readily noted, and there may or may not be the signs of co-existing rickets. The abdomen is usually tumefied, and both the liver and spleen are enlarged. When the abdominal features are marked, the clinical picture is that really of some cases formerly described as *tabes mesenterica*. The superficial glands may be enlarged and hard. Cough may be present, usually dry, and very rarely there is dyspnoea. The physical signs throughout the lungs are either dulness in the interscapular regions or scattered areas of defective resonance with bronchial rales and blowing breathing. The appetite is poor, the digestion feeble, vomiting is frequent, and diarrhoea is common. Not only may there be no fever, but the temperature may even be subnormal. Death usually results from some complication, either a secondary invasion of pneumococci or streptococci, or an acute meningitis.

The diagnosis, in the first instance, in institutions, may be made, but close observation may show signs again of the infant must be catarrh, and of an atresia the enfeebled and absence of enlargement important negative cases of progressive enlarged and the history, the failure improvement in nutrition.

(a) TUBERCULOSIS OF THE DISSEMINATED (SEVERAL SURFACES), OF THE VISCERA OR BEFORE SUPPOSED. In children there are many doubtful cases and Pascal have involvement of the axilla, the affection in some they believe the diminished enlargement without much fever of the organs, and from the cases must be the lymph disease in children the involvement of the lymph-glands, however superficial lymph-gland disease, Hodgkin's disease. The enlargement of the axilla of the upper part of the abdomen a condition of the Peyer's follicles of the children dead of an illness.

(b) CERVICAL ADENITIS OF THE NECK ENBRACE THE

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The diagnosis may present difficulties if one does not constantly bear in mind, in the first place, the frequency of tuberculosis in infants, particularly in institutions; and, secondly, the fact that this diffuse form, which is very common, may pursue its course without fever, and only perhaps toward the close show signs of active disease, now of the meninges, now of the lungs, or, again, of the intestines. This cachexia of the chronic diffuse tuberculosis of infants must be distinguished from that of rickets, of chronic gastro-intestinal catarrh, and of syphilis. In rickets the changes in the bones and cartilages, enfeebled and senile look of the child, serve as distinguishing features. The absence of enlargement of the spleen and liver or of the lymph-glands is an important negative sign. A greater difficulty exists in distinguishing some of the cases of profound syphilitic cachexia, as here the superficial glands may be enlarged and the spleen and liver hypertrophied; but, on the other hand, the history, the facies, the skin-rashes, rhagades, and, above all, the prompt improvement under antisyphilitic treatment, are important points of differentiation.

III. LOCALIZED TUBERCULOSIS.

(1) TUBERCULOSIS OF THE LYMPH-GLANDS.

(a) TUBERCULOUS POLYADENITIS.—The lymphatic system may be the chief seat of the disease, and the glands, internal and external, or the lymph-sacs (serous surfaces), may present advanced tuberculosis without much involvement of the viscera or other parts. This is more often the case than we have heretofore supposed. In some instances of general tuberculous infection in young children there may be what Legroux calls micro-polyadenopathy, which in doubtful cases may give an important diagnostic hint. More recently Lesage and Pascal have described cases in children in which there was progressive involvement of the lymphatic glands, usually at first those of the groin, then those of the axilla, and lastly the cervical and external groups. They regard the affection in some of the cases as due to congenital tuberculosis; in others they believe the disease to be congenital. The symptoms of this form of generalized enlargement of the superficial lymph-glands are progressive cachexia without much fever and without signs of disease of the lungs or of the abdominal organs, and frequently a ravenous appetite.

The cases must be carefully distinguished from the general slight enlargement of the lymph-glands in syphilis, and from the rare cases of Hodgkin's disease in children, in which, however, the enlargement is much greater and the involvement of one group is generally much more marked. It must not be supposed, however, that every case of general moderate enlargement of the superficial lymph-glands in children is due either to tuberculosis, syphilis, or Hodgkin's disease. Following the infectious fevers, and associated with chronic catarrh of the upper air-passages, I have seen on more than one occasion enlargement of the glands of the neck, of the groin, and of the axillæ—a condition of the superficial lymph-apparatus comparable to the swelling of the Peyer's follicles and of the mesenteric glands found so frequently in children dead of one of the infectious diseases, or, in fact, of any prolonged illness.

(b) CERVICAL ADENITIS.—The drainage-areas of the lymphatic glands of the neck embrace the superficial and deep structures of the head and neck.

The most important groups are the superficial cervical, beneath the platysma, which drains the side of the head and neck and face and external ear, and the deep cervical along the carotid sheath, which drains the mouth, the tonsils, palate, pharynx, and larynx. In addition there are the submaxillary and suprahyoid groups draining the lower gums, the front of the mouth and tongue, and the chin and lower lips.

Tuberculous adenitis of the glands of the neck, so extremely common, which fortunately often remains a local and curable affection, was regarded as one of the most typical and characteristic manifestations of scrofula. Cornet's observations upon the presence of tubercle bacilli in the dust of cities and of rooms shows how widely spread the virus is, and how liable we are in crowded cities to inhale, and even to swallow, bacilli with the dust. Whether the bacilli are capable of passing through the healthy mucous membrane is perhaps doubtful, though there are experiments which would seem to prove the liability of infection through the healthy mucous membrane of the intestines. More probably the slight catarrhal troubles about the naso-pharynx, so frequent in children, open, as one may say, the portals and allow the bacilli to reach the lymph-glands. Preliminary irritation and enlargement of the glands in eczema of the scalp and in sore throat in children may weaken the powers of resistance. Here, no doubt, if the tissue-soil be unfavorable, they may exert no influence whatever, but with that vulnerability of tissue, regarded by former writers as the characteristic feature of scrofula, the bacilli find a suitable nidus, and a local tuberculous is the result—a process characterized usually by extreme chronicity.

The glands may enlarge rapidly at first and become soft and painful; more commonly, they swell slowly, and can be felt as firm rounded masses freely movable beneath the skin. They may gradually subside and undergo spontaneous healing. In other instances the glands increase, areas of softening are found, the process involves the skin overlying the gland, which becomes red, and finally ulcerates, discharging a cheesy matter and a thin watery sero-pus. The sore thus left is very indolent, does not tend to heal; the skin about it is livid and undermined. Many of the glands may suppurate in this way, and when healing ultimately takes place the sides of the neck are disfigured by irregular, unsightly scars. In the neck of young or old these are usually a certain sign of healed tuberculous.

It is to be borne in mind that involvement of the cervical glands may be due to extension of tuberculous processes from the axillary glands or even from the cervical vertebrae. When the glands are large and growing actively there is fever; death very rarely follows, and even aggravated cases in children may recover. In some instances the general nutrition is very slightly disturbed. Tuberculous adenitis of the cervical or axillary groups may precede the development of tuberculous of the pleura or of the lung.

(c) TRACHEO-BRONCHIAL GLANDS.—Within the thorax the groups of lymph-glands are of great importance. The sternal are placed along the course of the internal mammary vessels; the intercostal along the heads of the ribs, and sometimes extending outward; the anterior mediastinal group between the lower part of the sternum and the pericardium; the cardiac group in the interpleural space about the arch of the aorta; and, lastly, the tracheal glands on either side of the windpipe, and the bronchial proper, continuous with them, which surround the main bronchi and pass deeply in the hilus of the lung. There are also glands in the posterior mediastinum along the thoracic aorta and œsophagus. Tuberculous of the tracheo-bronchial glands is extremely

common. O glands bacilli very large pro that the first i contrary to the involved witho Northrup, the masses in the l and elsewhere; may present g of softening w cases there is m very differentl great involveme glands are invol large caseous ma and penetrating parate the absces enlarged glands a elaborate section faient here to sa superior cava, of and bronchi, tho pneumogastric ne trachea. More i softened glands int formed between the vessels are much le formation of the œs most serious effects situated deep along be by direct contact the caseous bronchi other instances it t Among rarer sequen the adhesion of an case of the anterior tuberculous adenopa softened gland into

Symptoms.—In whatever, and even in present. Authors di and I think correctly. pression of the veins ses and hemorrhages the character of the h embled by the same w ears, frequently in th breathing, cyanosis, an These paroxysms may much to pressure at the pressing in this way lar pression of one or other

common. Observations of Loomis (Jr.) show even that in apparently normal glands bacilli may be present and the gland-tissue infective. Certainly in a very large proportion of all cases of tuberculosis in children it would appear that the first infection was in these structures, while common experience shows, contrary to the so-called law formulated by Parrot, that the glands may be involved without any local lesion in the lungs. Of 125 cases examined by Notturup, the bronchial glands were tuberculous in every case; 42 had cheesy masses in the bronchial lymph-nodes only, with recent tubercles in the lungs and elsewhere; in 13, it was limited to the bronchial glands alone. The glands may present gray miliary tubercles, large, unpigmented, cheesy areas, foci of softening with suppuration, or old calcified masses. In the long-standing cases there is much sclerosis and pigmentation. The different groups may be very differently involved; thus the tracheal may be much affected without great involvement of the bronchial nodes proper. More commonly all the glands are involved, and very often those deep in the hilus of the lung form large caseous masses uniformly surrounding the main bronchus and its divisions, and penetrating deeply between the lobes of the lung. When the glands separate the abscesses may perforate in different directions. The glands enlarged and elaborate section in the *Traité de Barthez* and *Sannéc* (tome 3). The effects of these arement here to say that there are instances on record of compression of the superior cava, of the pulmonary artery, and of the azygos vein. The trachea and bronchi, though often flattened, are rarely seriously compressed. The pneumogastric nerve may be involved, particularly the recurrent laryngeal branch. More important, really, are the perforations of the enlarged and softened glands into the bronchi or trachea, or a sort of secondary cyst may be formed between the lung and the softened bronchial gland. Perforations of the vessels are much less common, but the pulmonary artery has been opened. Perforation of the œsophagus has been described in several cases. Perforations of the most serious effects is infection of the lung or pleura by the caseous glands stimulated deep along the bronchi. The infection may, as is often clearly seen, be by direct contact, and it may be difficult to determine in some sections where the caseous bronchial gland terminates and the pulmonary tissue begins. In other instances it takes place along the root of the lung, and is subpleural. Among rarer sequences may be mentioned diverticula of the œsophagus following adhesion of an enlarged gland and its subsequent retraction, and, in the case of the anterior mediastinal and aortic groups, the frequent association of tuberculous adenopathy and pericarditis, either by contact or by rupture of a softened gland into the pericardium.

Symptoms.—In the great majority of instances there are no indications whatever, and even in enormous enlargement pressure-signs may not have been present. Authors differ extremely in their views on this point. Many hold, and I think correctly, that the manifestations, as a rule, are very slight. Compressions of the veins leading to dropsy, dilatations of the veins causing cyanosis, and hemorrhages are referred to by Barthez and Sannéc. Alterations in the character of the heart-sounds and attacks of paroxysmal dyspnoea are described by the same writers. The latter come on suddenly, often at regular hours, frequently in the afternoon, and there is extreme oppression with rapid breathing, cyanosis, and cold sweats, almost like an attack of severe croup. These paroxysms may succeed each other, and they have been ascribed not so much to pressure at the bifurcation of the trachea as to compression of the vagi, causing in this way laryngeal spasm. More definite, undoubtedly, is the compression of one or other bronchus, causing feeble breathing on the side most

affected, with sibilant and fine râles. Usually, however, when the glands are very much enlarged the lung is also involved, and it may be difficult to say how far the alterations are due to the changes in it. Still less reliable is the information obtained on percussion, for the dullness in the upper part of the sternum and in the interseapular spaces is, when present, by no means a positive sign. The thymus may cause sternal flatness on percussion; and behind, unless the glands are enormously enlarged and the child very thin, it is difficult to determine any special modification of the resonance in the interseapular space between the first and third dorsal vertebrae.

(d) MESENTERIC GLANDS (TABES MESENTERICA).—The glands involved are those of the mesentery and the gastro-hepatic omentum and the chain of retroperitoneal glands along the aorta; more rarely those of the pelvis. Tuberculous disease of these glands is extremely common; thus of 127 cases of fatal tuberculous in children, noted by Woodhead, these structures were involved in 100, while Ashby states that of 103 consecutive post-mortems on children dying of tuberculous, in 62 there was tuberculous ulceration of the intestines; in 71, cheesy mesenteric glands; in 55, both ulcers and cheesy glands; in 7, tuberculous ulcers without involvement of the glands; and in 16, cheesy glands without ulcers. Of 144 children in which the mesenteric glands were tuberculous, only 44 showed neither ulcerations nor tubercles in the intestines (Barthez and Sannée).

In a great many instances the condition is found accidentally in children who have died of other diseases. Unquestionably, as is indicated by these figures, the infection in many of these cases is primary in the glands. Lesion of the intestines is not necessary. Some experiments have shown that the bacilli may gain entrance through a healthy mucosa. A special interest relates to the possibility of infection by the bacilli in milk, more particularly as it is well known that in animals experimentally fed with infected milk primary tuberculous of the intestines, with extensive disease of the mesenteric glands, has been produced. The question will be referred to again on the subject of primary tuberculous of the intestines. The cases fall into four groups:

(1) Very slight tuberculous affection of a few glands (which may be the only ones), met with accidentally in children who have died of various disorders.

(2) In the chronic generalized tuberculous, in both the acute and chronic pulmonary tuberculous, and in the more chronic forms of tuberculous of any of the organs in children, the mesenteric glands may be found enlarged and caseous. There are instances, too, in which the affection of the mesenteric and retroperitoneal glands with those of the thorax constitutes the chief lesion.

In both these groups the disease of the glands does not necessarily cause any symptoms pointing to abdominal disorder.

(3) In a third group there are signs of chronic intestinal catarrh or ulceration and very marked disturbance in the general nutrition. These cases are seen chiefly in children between the ages of eighteen months and five years. The abdomen is distended, tympanitic, usually a little painful on deep pressure, but no nodules are felt. The diarrhoea is the most troublesome symptom: the stools are frequent, brownish or yellow-brown in color, containing mucus, not often blood. The diarrhoea is variable, and may sometimes persist for several weeks. There is usually slight fever, but the general wasting and debility are the most characteristic features. The name *tabes mesenterica* is often applied to this condition. The course is chronic and may extend over a

year or two, difficult to determine or not, as a case of extreme debility is laid upon it. (4) And, in the mesenteric involved. Hoarse wasting and disease of may be considered under Peritone

(2) TUBERCULOUS

(a) TUBERCULOUS involved; thus gastro-intestinal involved; in 66 remarkable, course of the stomach. That it experimentally in the feeding of calves, now many series infected through in children is accidental cases foci in the instances of primary

In a great many general infection chiefly in the ileum tubercles may be whole ileum may nodular tubercles mucous membrane be very extensive beyond their limits is transverse to edges and base are also involved tubercles or well-

Primary tuberculous extensive ulceration case may be regarded to my wards with children there were only a extensive disease, circling ulcer, the worm-eaten, and when it was thick and opaque of these girdling

in the glands are difficult to say how probable is the infarct of the sternum as a positive sign. Behind, unless the difficult to determine scapular space

glands involved and the chain of the pelvis. Cases of 127 cases in autopsies were in most-mortems on ulceration of the cæca and cæcocolic glands; and in the mesenteric or tubercles in

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These cases months and five months on deep pleuritic symptoms, containing sometimes persisting wasting and tuberculosis is extend over a

year or two, leading to the most extreme emaciation. It is sometimes very difficult to determine whether actual tuberculous disease of the bowel is present or not, as a chronic intestinal catarrh may lead to just such a condition of extreme debility and wasting. In the diagnosis of these cases much stress can be laid upon the presence or absence of tubercles in other parts.

(4) And, lastly, there are cases in which with ulceration of the intestines the mesenteric glands are greatly enlarged, and in addition the peritoneum is involved. Here the diarrhoea, the slight fever, the malnutrition, and progressive wasting are as in the previous group; additional symptoms are associated with disease of the peritoneum, in which nodular masses may be felt, and there may be considerable ascites. These cases will be referred to more particularly under Peritoneal Tuberculosis.

(2) TUBERCULOSIS OF THE INTESTINES AND OF THE ABDOMINAL ORGANS.

(a) TUBERCULOSIS OF THE BOWELS.—The small intestine is most frequently involved; thus, of 141 children presenting tuberculous ulcerations in the gastro-intestinal canal (Barthez and Sarcey) in 134 the small intestine was involved; in 60, the large intestine; in 71, the small intestine alone. It is remarkable, considering the comparative rarity in the adult of tuberculous diseases of the stomach, that in this series it should have been met with in 21 cases. That tuberculosis may originate in the alimentary canal is shown experimentally by the feeding of guinea-pigs with cultures of the bacillus and the feeding of calves and pigs with the milk of tuberculous animals. There are now many series of cases demonstrating the facility with which animals may be infected through this latter source. That the intestinal lesion may be primary in children is acknowledged. The comparatively large number of children with caseous foci in the mesenteric glands is very suggestive. On the other hand, instances of primary intestinal tuberculosis are not very common.

In a great majority of the cases the tuberculous lesions are part of a general infection, and are undoubtedly secondary. The ulcers are situated chiefly in the ileum, involving the solitary and agminated follicles of Peyer. The tubercles may be seen as small granulations in the submucosa; sometimes the whole ileum may present a remarkable appearance from the grayish-yellow nodular tubercles, the size of split peas, occupying the submucosa and the mucous membranes. The caseation and necrosis lead to ulceration, which may be very extensive, involving at first Peyer's patches, but ultimately extending beyond their limits. The tuberculous ulcer has the following characters: It is transverse to the long axis, rarely ovoid, often irregular in outline; the edges and base are infiltrated, often caseous; the submucosa and muscularis are also involved in the tuberculous process; and, lastly, colonies of young tubercles or well-marked lymphangitis may be seen on the serosa."

Primary tuberculosis of the bowel is, as stated, rare; but in children with extensive ulceration in the ileum and very slight lesions of other parts the disease may be regarded as primary; thus in a child aged nine who was admitted to my wards with dropsy and emaciation after an illness of six months' duration, there were only a few small foci in the lungs, while the intestines showed most extensive disease. About 50 cm. below the duodenum there was a large circling ulcer, the edges of which were undermined, the bases irregular and worm-eaten, and containing necrotic, grayish material. The peritoneum over it was thick and opaque. Throughout the whole of the ileum there was a series of these girdling ulcers at varying intervals. The cæcum presented a very

large, deep ulcer, while the mesenteric attachment about the ileum formed a large tumor-mass from the extent of the involvement of the glands. The peritoneum presented scattered tubercles and the mesenteric glands were enormously enlarged.

In a few instances tuberculous disease of the bowels extends from a chronic tuberculous peritonitis in which the coils of the intestine become matted together, caseous and suppurating foci develop between the folds, and perforation may occur in several places.

Symptoms.—The symptoms of intestinal tuberculosis are very varied. The most common indication is a persistent diarrhoea. It is not always, however, proportionate to the extent of the ulceration, and large ulcers in the ileum may exist with constipation. When the ulceration is extensive in the large intestine the diarrhoea is usually profuse and obstinate. The mode of onset is variable. In a few instances of general tuberculosis there is diarrhoea from the start. In a large number of cases the existence of intestinal complication is not suspected until the signs of disease in other organs are well marked; and in perhaps a majority of the secondary cases the diarrhoea is rather an event of the latter part of the illness. Of other symptoms, hæmorrhage may occur, or peritonitis from extension—a condition not very uncommon, and often associated with disease of the mesenteric glands. The abdomen in these cases is usually enlarged and painful, and the nodular masses may be felt. In a few instances there are gastric symptoms, which do not necessarily indicate ulceration in the stomach, but there may be loss of appetite and occasional vomiting, and there are instances on record of profuse hæmatemesis or melæna from erosion of an artery.

The outlook is unfavorable, and death may be caused by the severity of the intestinal symptoms, or more rarely by the accidents, such as perforation or hæmorrhage.

Recognition is rarely difficult, except in the primary cases, which are regarded at first as simple entero-colitis. Usually, however, when well established, the diagnosis is easy, particularly when other organs become involved. In suspected cases the stools should be carefully examined for tubercle bacilli.

(b) **TUBERCULOSIS OF LIVER.**—In all cases of acute miliary tuberculosis granulations are found in this organ; sometimes they are extremely minute and are only detected microscopically. The liver is usually somewhat enlarged, pale, and fatty. In more chronic cases, particularly the diffuse generalized tuberculosis of young children, the tubercles may attain considerable size and develop about the finer bile-duets. They undergo rapid softening, and give a very remarkable appearance to the liver, which is in extreme cases almost honeycombed with tuberculous abscesses, varying in size from a pea to a marble; the pus is usually bile-stained.

Occasionally large, coarse, caseous masses are found forming irregular tumors, most frequently in association with perihepatitis or tuberculous peritonitis. The so-called tuberculous cirrhosis of the liver does not, I believe, occur in children, though there may be in chronic cases of tuberculosis a marked increase in the connective tissue of the organ.

(c) **TUBERCULOUS PERITONITIS.**—Tuberculosis is one of the most common causes of peritonitis in children. It is more common about the eighth and tenth years, and attacks boys more frequently than girls; thus of 86 cases analyzed by Barthez and Sannée, there were from

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3	to	5½	"	26	"
6	to	10½	"	40	"
11	to	15	"	9	"

The ratio of frequency in children may be gathered from the large statistics of Alibert, who found in 326 cases of tuberculous peritonitis, 52 in children. As in the adult, the disease may be primary, but in a majority of the cases it is secondary to tuberculosis of the intestines, mesenteric glands, or of the genitalia.

Morbid Anatomy.—Tubercles in the peritoneum are not infrequently met with in the bodies of children dead of tuberculosis. Ashby noted them 38 times in 105 post-mortems on tuberculous children. They occur either as (1) the gray granulations with or without exudation, serous or sero-fibrinous. Sometimes the entire peritoneum is found studded with (2) firm, hard, fibrinous tubercles surrounded by a pigmented and firm connective tissue. In both of these varieties the process may be latent, and the condition is met with accidentally post-mortem. More frequently (3) when symptoms have been present, the tubercles are in the form of caseous nodules, yellow-gray in color, often forming flattened tuberculous plaques. The exudate is purulent or sero-purulent, the coils of intestines are much matted together, and between them there may be large caseous masses. It may be impossible to separate the coils, and in advanced cases extensive ulceration occurs, with multiple perforation of the intestine. There are three anatomical points of special interest in these cases: First, the effusion may be sacculated and form a definite tumor; sometimes the process is confined to the cavity of the lesser peritoneum; in other cases it is in the pelvis, less frequently in the middle portion. The cysts may be multi- or mono-locular.

Second, there are cases in which occlusion of the intestine has resulted, sometimes from compression of the coils by the large caseous masses; more frequently by the bands of connective tissue in the healing of the process. Alibert has found five instances of this sort in children.

Lastly—and much more frequently in children than in adults—there is perimembranous suppuration. The intensity of the inflammation is in the central portion of the abdominal cavity, adhesions take place, and a definite cyst is formed, usually purulent, which projects at the umbilicus, and often opens spontaneously, leaving a fistula, sometimes stereocoral, which persists for months but may ultimately heal.

Symptoms.—The symptoms of tuberculous peritonitis are extremely varied, and it is very difficult to give a clear and definite picture of the disease. For convenience three clinical types may be considered:

(1) *The Ascitic Form.*—The symptoms may come on acutely with a diffuse eruption of miliary tubercles. So abrupt is the onset that cases have been mistaken for acute enteritis, or even for acute obstruction or hernia. More frequently the onset is subacute, and ascites gradually develops. Fever of some degree, indigestion, and diarrhoea are present, and there may be abdominal pain; but in many instances the process is latent, and the enlarging abdomen is the symptom for which the physician is consulted. The effusion, indeed, may proceed to considerable degree without fever, and with no symptoms other than those of gradually-failing health and progressive emaciation. Intestinal disorder occurs in some instances, diarrhoea, colicky pains, or often attacks of diarrhoea alternating with constipation. The local symptoms are by no means characteristic. The abdomen is distended, the skin thin, the superficial veins

enlarged. Percussion gives dullness in the flanks, which is movable, resonance in the umbilical region, and there is a well-marked fluctuation wave. Palpation may be entirely negative; no nodular masses are felt. The liver and spleen are not often enlarged. It may be extremely difficult, or quite impossible, unless there are tuberculous lesions in other regions, to speak definitely of the nature of the gradually-developing ascites. The clinical picture is very similar, indeed, to that of the cases of ascites from cirrhosis, and an identical condition is met with in the rare cases of simple chronic peritonitis in children. The ascites may demand tapping, but the fluid reaccumulates rapidly. The exudate may be encysted, forming a prominent tumor in the epigastric or umbilical regions (in which case the effusion is probably within the lesser peritoneum), or it may be situated in the pelvis or in the flank, and simulate very closely cystic ovarian disease. This form is not very uncommon in children, and very good results have followed operation; of nine instances in the literature, all recovered. This ascitic form, developing slowly, and ultimately presenting the picture of a chronic ascites or an encapsulated exudate, is by far the most favorable variety, and cases may recover spontaneously or after operation.

(2) *The ulcerative form* is much more serious. The peritoneum here contains larger caseous masses which break down, and there is a diffuse purulent peritonitis. The coils of intestines are matted together, nodular tuberculous masses develop on the parietal and visceral layers, the glands are greatly enlarged, and in protracted cases extensive ulcerations occur. The onset in this form is usually gradual, but the abdominal symptoms are pronounced. The child complains of colicky pains, diarrhoea, and chronic indigestion. The abdomen is enlarged and painful. The condition on examination may be entirely different from that of the ascitic form. The outline is often symmetrical, not flattened in the flanks; nodular projections may sometimes be seen beneath the skin. Unless there is a very extensive purulent effusion there is no movable dullness. There is a flat tympany or there are alternating areas of resonance and dullness. On palpation there is a boggy, doughy feel, and nodular masses may be felt in different regions. The liver and spleen may both be enlarged. In this suppurative form the effusion may be general, or it may be encysted either in the upper abdominal region or in the pelvis. One form of this encysted suppurative variety requires special consideration—namely:

Peri-umbilical Tuberculous Abscess.—This is seen most frequently in children, and is in reality a localized suppurative peritonitis, which points at the navel and frequently opens and discharges. The condition is almost constantly tuberculous in the child. There may be a fistula discharging pus for weeks or months, and recovery may ultimately take place. In other instances the fistula communicates with the bowel. In the case of a colored child, aged five, operated upon by my colleague, Dr. Halsted, there was distention of the abdomen, marked protrusion of the umbilicus, and here a spontaneous opening discharging yellowish material for months. Then the opening healed and the condition of the child improved. At the time of the operation there was a large, prominent, cone-shaped, umbilical tumor. The child died some time after the operation; creamy pus was found between the intestinal coils, and there were many tuberculous ulcers in the intestines. There was an extensive caseous salpingitis.

There are instances also of perihepatic tuberculous abscesses.

(3) *Chronic Adhesive or Dry Tuberculous Peritonitis.*—In a very considerable number of all cases of tuberculous peritonitis there is little or no serous or purulent exudate, but the tubercles are surrounded with a fibrinous lymph

and they tend to give symptoms, adults has often seen. In long-standing cases, by deeply pigmented areas of the peritoneum, or in the more advanced instances in which it forms a rind. This chronic adhesive peritonitis, every where in protracted cases of the abdomen, wasting and cachectic forms, adhesive forms, indeed, may be a simple form, may be no symptom, complicated with other organs may be excluded, recovery is not infrequently seen.

Diagnosis.—The fever is in itself many of the cases.

The condition and from chronic peritonitis, is a rare disease, but after withdrawal of the fluid, the abdomen is unusually hard, and the general condition is frequently a slight fever, not so marked. In the simple chronic peritonitis, exploratory laparotomy reveals small nodular tubercles, important in these cases, in order to determine the nature of the fibroid, the experience of reports of instances of reports have been instances of the ulcerative form in the peritoneum with difficulty in diagnosis. Tuberculous forms also may be a simple or a fistula, simple or stricture.

Prognosis.—The chronic adhesive variety has gradually disappeared, when the operation of incision is a considerable number of

Treatment.—The treatment of the end of the section

and they tend rapidly to cicatrize. The growing tubercles may not have caused any symptoms, and the condition is found accidentally post-mortem, and in adults has often been met with in exploratory laparotomies for various conditions. In long-standing cases the tubercles are hard, firm, often surrounded by deeply pigmented fibroid adhesions. In some of these instances the tuberculosis of the peritoneum is localized; thus it has been found in a hernial sac alone, or in the region of the cæcum and appendix, or on the epiploön. There are instances in which this membrane has been gradually curled and rolled until it forms a ridge-like tumor lying across the upper portion of the abdomen. This chronic adhesive form is not so frequent in children as in adults. The symptoms are very indefinite. The abdomen is usually distended and tympanic, everywhere resonant, sometimes distinctly painful on pressure. In protracted cases the omentum may be felt as a firm ridge in the upper portion of the abdomen. The general symptoms are very variable. There may be wasting and cachexia, sometimes with marked fever, though these chronic adhesive forms are not infrequently afebrile throughout, or the temperature, indeed, may be subnormal. With the exception of the colicky pains there may be no symptoms directly from the peritoneum, but the cases are very often complicated with tubercles in other parts, and the mesenteric glands or the lungs may be extensively diseased. These are cases in which spontaneous recovery is not infrequent.

Diagnosis.—A gradually developing ascites in a young child with moderate fever is in itself very suggestive of peritoneal tuberculosis. Doubtless very many of the cases of simple ascites with recovery belong to this disease.

The condition is to be distinguished from ascites due to disease of the liver and from chronic simple peritonitis. Cirrhosis of the liver, syphilitic or simple, is a rare disease in children. The local symptoms may give us no clue, but after withdrawal of the fluid the liver in a cirrhotic case may be felt to be unusually hard, and perhaps small, and possibly, when due to syphilis, irregular. The general symptoms are more important. In cirrhosis there is more frequently a slight jaundice. The fever and gastro-intestinal symptoms are not so marked. An encysted exudate is always in favor of tuberculosis. A simple chronic peritonitis, though rare, occurs in children, and, even after the exploratory laparotomy, the diagnosis may not be clear, inasmuch as there may be small nodular fibroid bodies scattered over the membranes. It is very important in these cases to have a careful microscopical examination made, in order to determine the presence of bacilli, or, if the nodules are very firm and fibroid, the experimental test should be made. It is quite possible that some instances of reported recovery in peritoneal tuberculosis after laparotomy may have been instances of this chronic simple peritonitis with fibroid nodules. The ulcerative form with suppuration and the development of nodular masses in the peritoneum with fever and a marked cachexia, rarely offers the slightest difficulty in diagnosis. It is to be remembered, of course, that the suppurative forms also may be encysted, and the periumbilical abscess with umbilical fistula, simple or stercoral, is almost constantly tuberculous.

Prognosis.—The prognosis is often good, particularly in the ascitic and chronic adhesive varieties. Many instances, no doubt, in which the ascites has gradually disappeared have been tuberculous, and even in the ulcerative variety, when the abscess has discharged at the navel, recovery has followed. The operation of incision and drainage has certainly favored recovery in a considerable number of cases.

Treatment.—The general treatment of tuberculosis will be discussed at the end of the section; here reference will be made more particularly to incision

ion and drainage in tuberculous peritonitis. The results which have been obtained are exceedingly satisfactory, even if we suppose, as is probable, that many cases relapse and are not fully healed at the time of reporting. The figures given in the monograph of Aldibert are extremely interesting: in the ascitic form, of 32 instances in which laparotomy was performed, there were 3 deaths and 29 recoveries, 4 of which had persisted for more than one year. This demonstrates the impunity with which the abdominal cavity may be opened, and the large percentage, at any rate, of those which are benefited immediately by the operation. In the chronic adhesive form an operation is really not indicated, as in the majority of the instances the tuberculosis is in process of healing, but there are cases in which pain, associated with the adhesions, has been relieved by an exploratory incision. In the ulcerative variety, when generalized, the results have not been so satisfactory, but many instances with an encysted purulent fluid have been opened and drained successfully. The drainage favors the process of cicatrization in the tubercle, lessens the tendency to effusion, and exerts a favorable influence on the whole process. Of the 52 cases in children in which laparotomy was performed, there were 45 recoveries and 7 deaths. Of these 45, 9 had persisted for more than a year, and 2 for more than two years (Aldibert).

(3) TUBERCULOSIS OF THE LUNGS.

In speaking of acute miliary tubercles and of chronic diffuse tubercles we have considered affections in which the lungs are almost constantly involved—in the one case the seat of miliary granules; in the other of larger, coarse, grayish-yellow tubercles. We shall speak in this section more particularly of those forms in which the lungs are so involved, that the clinical features are those of an acute or of a chronic pulmonary disease. Two groups of cases may be recognized: the acute tuberculous broncho-pneumonia, and the chronic ulcerative form, the first corresponding to the acute galloping phthisis, and the other to the chronic phthisis, or, as we call it now, chronic pulmonary tubercles.

(a) ACUTE TUBERCULOUS BRONCHO-PNEUMONIA.—In infants and children we very rarely see pulmonary tubercles set in with the clinical picture of an acute lobar pneumonia. Personally, I never remember to have met with an instance, such as is not very rare in adults, in which the tubercles came on abruptly, and at first ran the course of an ordinary lobar pneumonia, with pain in the side, high fever, and rapid consolidation of an entire lobe. Such cases are, however, on record, and it is only the absence of the crisis, the persistence of the local signs, the gradual softening, and the development of hectic and progressive debility which lead to a revision of the diagnosis. It is to be remembered that while clinically the physical signs may be those of a lobar affection, anatomically it is clearly seen that many groups of lobules are involved, separated by strands of air-containing or collapsed lung-tissue. These *pseudo-lobar* cases are almost impossible to differentiate during life.

Tuberculous broncho-pneumonia is common in children from the sixth month to the fifth year. A large proportion of the cases occur after the second year.

The disease is most common in children in institutions, in those debilitated by previous illnesses, and more particularly in convalescents from one of the infectious diseases—measles, whooping-cough, scarlet fever, or diphtheria. It is most frequent perhaps after measles and whooping-cough. Its sequence in the latter disease has been common knowledge in the profession since the days

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of Willis, whose axiom, "Tussis convulsiva vestibulum tabis," has been quoted through two centuries. Children the subject of chronic naso-pharyngeal catarrh and tonsillitis, and mouth-breathers seem more prone to the affection. But it is to be remembered that it may develop in perfectly healthy, well-nourished children.

And lastly, like miliary tuberculosis, it may be a terminal process in cases in which local tuberculous disease exists in other parts—the skin, bones, lymphatic glands, or the urogenital tract.

Morbid Anatomy.—The condition varies considerably with the intensity and duration of the process. The lungs may be voluminous and crepitant, with firm and nodular masses scattered throughout the lobes. On section these are seen to be peribronchial nodules ranging in size from a pea to a walnut. Some of the more recent are reddish in color; the older are grayish-yellow, with, perhaps, central softening. Many of these peribronchial nodules are seen to be composed of aggregations of tubercles undergoing caseation. In the very acute cases the process is more extensive in the upper lobes or central portion of the lungs, certain parts of which may be almost solid and scarcely contain any air. The consolidation may indeed look uniform, but on section it is noted that the process is not actually diffuse, as in a lobar pneumonia, but the general consolidation has arisen from the involvement of a very large number of the lobules, groups of which are separated by strands of reddish collapsed tissue. The consolidated areas have undergone caseation, and may in places have softened, forming cavities. The older the process the more extensive usually are the areas of caseation. Though primarily tuberculous, many of these cases show a mixed infection, and there may be areas of simple broncho-pneumonia due to streptococci, staphylococci, or pneumococci. The pleura may show many nodules or a fresh, fibrinous exudate, sometimes a sero-fibrinous or even purulent exudate. The bronchial and tracheal glands are enlarged, tumefied, and studded with tubercles or uniformly caseous, not infrequently having softened to form definite abscess. The glands at the hilus may be greatly enlarged and extend deeply between the lobes, and in some instances there would appear even to be an invasion of the lung-tissue from these deeply-placed large caseous glands. The other organs may present a few scattered tubercles or there may be a generalized miliary tuberculosis.

As in other forms of broncho-pneumonia, the essential lesion is a bronchitis and peribronchitis excited by the tubercle bacilli, with inflammation of the contiguous air-cells, which become filled with epithelial products, the so-called catarrhal alveolitis. The accompanying phenomena of atelectasis and emphysema occur just as in simple broncho-pneumonia, and the distinguishing features are the caseation and necrosis with the presence of the bacilli.

Much discussion has taken place upon the relation of broncho-pneumonia to tuberculosis, and some French observers have maintained that in many instances the form following measles and diphtheria, and which anatomically looks simple in character, is in reality tuberculous and due to the bacilli. It may be difficult sometimes to determine whether a given patch of broncho-pneumonia is tuberculous or not, but as a rule, macroscopically, there will be seen small tubercles or areas of caseation, while in stained sections the bacilli are readily demonstrable. The simple broncho-pneumonia in some cases precedes the tuberculous, particularly after measles, scarlet fever, diphtheria, and whooping-cough. In institutions it is by no means uncommon to meet with cases in which broncho-pneumonia has gradually subsided, and then symptoms have developed pointing to fresh invasion, and ultimately death follows with the lesions of an acute, recent, tuberculous broncho-pneumonia. Sometimes the

infection is less intense, and a subacute or chronic pulmonary tuberculosis is established. In cases of tuberculosis consecutive to broncho-pneumonia we find the lesions of two sorts: simple, inflammatory, non-tuberculous, such as peribronchial suppuration, dilatation of the bronchi, lesions of the alveolar epithelium, and peribronchial and peri-alveolar sclerosis; then, in addition, there are the true tuberculous processes, peribronchial nodules, tuberculous infiltration, and caseous areas (Mosny).

In other instances the tuberculosis precedes the broncho-pneumonia. This is met with particularly in children the subject of latent tuberculosis, in whom, following one of the infectious diseases, a simple broncho-pneumonia develops. According to Mosny, the lesions may be seen as an alveolitis surrounding the tuberculous peribronchial nodules, or foci of simple and tuberculous broncho-pneumonia occur scattered throughout the apices of the lung. It is a broncho-pneumonia dependent upon pneumococci or streptococci invading a lung already the seat of local tuberculosis.

Symptoms.—Clinically, tuberculous broncho-pneumonia scarcely differs in any feature from the simple form. The onset may be acute in a previously healthy child, but more frequently the disease sets in during convalescence from one of the infectious diseases. In the tuberculous form the fever is sometimes not so high and not so persistent, showing more variations throughout the day. Cough and dyspnoea are prominent symptoms. The physical signs are those of broncho-pneumonia. The localization of the lesion is more commonly at the apices of the lung, where there may be signs of consolidation with fine crepitant and subcrepitant râles. There are no physical signs of any moment in differentiating a simple from a tuberculous broncho-pneumonia, and indeed even the localization of the disease at the apex, upon which so much stress is laid, is not of very much value, since we frequently find in young children a tuberculous process beginning at the base or in the central portions of the lung. In the course of the disease, however, indications of great value develop; thus toward the end of the second week there are more marked oscillations in temperature, often with profuse sweats. The child emaciates rapidly, and there may sometimes develop signs indicating softening. In the acute cases the duration is from three to five weeks. Throughout the course of the disease there may be no single indication of much value in definitely determining the nature, and we often have to depend more on the general features of the case. Careful inquiries should be made as to heredity; also the personal history immediately preceding the onset. Sometimes important information may be gathered by a systematic examination of the child. There may be a tuberculous adenitis, local bone disease, or a tuberculous testis. Simple broncho-pneumonia tends as a rule to recovery; in exceptional cases, however, it becomes subacute, and ultimately chronic. In the more subacute and chronic cases tuberculous broncho-pneumonia may present large areas of caseation, which give the physical signs of consolidation, perhaps of an entire lobe. In such instances softening and the signs of cavity not infrequently develop, and give very definite indications of the nature of the process. As the little patients rarely expectorate, examination for bacilli can seldom be made. Sometimes, if vomiting occurs, portions of mucus may be picked out, and important evidence in this way obtained.

(b) CHRONIC PULMONARY TUBERCULOSIS.—In infants and very young children we find the lungs either involved in a generalized tuberculosis or the seat of an acute tuberculous broncho-pneumonia. After the sixth or eighth

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near cases are not very uncommon in which the picture resembles that of chronic tuberculosis pulmonum of the adult.

Morbid Anatomy.—The lesions are similar to those met with in the tuberculosis of adults—miliary tubercles, peribronchial nodules, caseous blocks, areas of softening and of fibroid induration, and cavities of various sizes. We do not see so frequently the invasion of the lung from the apex downward. The chief seat of disease may be in the central portion of the lung, or even at the base. As already mentioned in speaking of tuberculosis of the lymph-glands, the groups along the trachea and about the bronchi may be greatly enlarged and caseous, forming on section a very striking feature in the chronic pulmonary tuberculosis of children. Indeed, in some instances the process seems to spread directly from the deeply-placed glands in the hilus of the lung, which may be enormously enlarged, uniformly caseous, and the organ may be directly invaded from them. Large areas of caseous pneumonia are not uncommon, and often present foci of softening. Small cavities are by no means infrequent in chronic pulmonary tuberculosis of children, but very large excavations are rare; thus in the 265 cases noted by Barthez and Saunée there were 77 cases with excavation, chiefly, too, in the upper lobes. In the analysis by Leroux of the cases of the late Professor Parrot, in 219 children under two years of age there were 57 instances in which cavities existed. In 5 of these the children were under three months. In long-standing cases hard, firm, fibrous tubercles are found, and sometimes cretaceous nodules. The primary lesion in a great majority of instances is a tuberculous broncho-pneumonia, taking its origin in the smaller bronchioles, leading to peribronchial nodules and subsequent peribronchial alveolitis.

Symptoms.—The general symptomatology of chronic pulmonary tuberculosis in the child is similar in essential details to that of the adult, but presents, however, as might be expected, certain peculiarities. The onset is generally more abrupt, and the first symptoms may be those of a broncho-pneumonia at the apex. The child may have been in failing health or come of a markedly tuberculous stock, or there may have been local glandular or bone disease. Occasionally failing health, with repeated attacks of chills and fever, may arouse the suspicion of malaria, but this mode of onset is not so frequent as in adults. Some cases follow a protracted naso-pharyngeal catarrh with recurring bronchitis. Progressive failure in health and strength, cough and fever, are the first symptoms to attract attention. There is loss of appetite, but rarely the extreme anorexia which we find in some cases of pulmonary tuberculosis in older subjects. Cough is rarely absent among the initial symptoms, and, with variations, persists. It is short and dry at first, subsequently looser. It may be distributed equally throughout the day or is most troublesome at night, and paroxysms of coughing may return at fixed hours, so that the case may be mistaken at first for whooping-cough; but there is never the noisy crowing inspiration. Expectoration is absent in very young children. Children above the age of ten can often be taught to expectorate. The sputum is mucoid at first, with grayish-yellow streaks; sometimes it is more sero-mucoid, and in the later stages more definitely purulent. Hemoptysis may be said to be infrequent in children under ten. Certainly it is very rare at the onset. It is usually small in amount. The terminal hemoptysis, common in the adult, but rare in children, results from the rupture of an aneurism in a small cavity or erosion of a branch of the pulmonary artery. The fever of onset and during the early periods is remittent, the daily excursions slight—a range between 102° and 104° is common. Subsequently, when the disease is more extensive and softening has taken place with the formation of cavities, the temperature is more

hectic in character, and the morning observation may be normal or sub-normal, while in the evening the thermometer may register 103.5° or 104° , or even higher. Chills are not very common. Drenching sweats are frequent, particularly toward the close. Dyspnoea may be present at the onset and during the early stages, and may be due in part to the fever, sometimes to the presence of a diffuse bronchitis. Marked increase in the respirations, with cyanosis, indicates very rapid progress in the disease. In protracted cases, just as in the adult, there may be very extensive destruction of the lung without the slightest dyspnoea. The child may complain of pains in the chest, usually associated with pleurisy. In a majority of instances the disease is painless throughout its course. Quisling states that an early sign is tenderness on percussion of the affected side, or on pressure in the intercostal spaces, particularly in the first space at the apex.

Progressive weakness and wasting are very pronounced symptoms, and there is usually progressive pallor. Frequently the abdominal viscera become involved, and there is diarrhoea due to tuberculous ulceration, and the liver and spleen may become enlarged. The urine does not often show changes, but as the disease progresses albumin is common and a secondary nephritis may develop. A child may come under observation with general anaemia, due partly to the anaemia, partly to the renal condition, and the pulmonary tuberculosis may be entirely overlooked.

Physical Signs.—*Inspection* frequently shows in advanced cases an extremely thin chest, with marked intercostal spaces. Deformities due to mouth-breathing or to rickets are not uncommon. On the affected side the respiratory movement may be decidedly less marked, or the clavicle may stand out prominently; or there may be subclavicular depression at the affected apex—a sign usually of a chronic process. In very long-standing cases with much fibroid change there may be flattening of the affected side, with depression of the shoulder.

By *palpation* one appreciates any differences in expansion on the two sides, and the differences in the tactile fremitus, and it may be of value in eliciting painful points.

Percussion.—In the early condition, when the tubercles are scattered or the areas of broncho-pneumonia are limited, there may be no change in the percussion note. Indeed, the emphysema about the affected areas may cause slight hyper-resonance over the part affected. Extensive involvement at one apex usually gives loss of resonance beneath the clavicle, which may amount to dullness and is accompanied with marked increase in the resistance. Absolute flatness is rarely met with. Skoda's resonance, the flat tympany, is not frequent. The cracked-pot sound has very little value in children, as it may sometimes be elicited in a thin-walled healthy subject.

Auscultation may give only the signs of bronchial catarrh, piping râles and moist sounds, but when there is definite dullness there is usually change in the character of the respiratory sounds, which have lost their vesicular character and are harsh, broncho-vesicular, or definitely bronchial. Sometimes with defective resonance there is enfeeblement of the respiratory murmur, with prolongation of expiration. The auscultatory phenomena are often very deceptive. Diffuse bronchitis may lead us to suppose that there is much greater involvement of the lung than in reality exists. In very young infants signs of cavity are rarely present, but in older children in advanced cases, with hectic and emaciation, the metallic splashing or amphoric quality of the râles, with the loud cavernous breath-sounds, leave no doubt as to the existence of a vomica. In children, more frequently than in adults, we are deceived by the

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so-called pseudo-cavernous signs. Over an area of slightly defective resonance or of positive dullness inspiration and expiration are cavernous, the râles large and resonant, and the whispered voice may be conveyed intensely to the ear. In acute cases with high fever one is not so apt to be deceived; these signs are also met with in broncho-pneumonia and in pleuritis.

Course.—The course of chronic pulmonary tuberculosis is more rapid in children than in adults, and a majority of cases die in from six to twelve months. The disease is marked, now by intervals of improvement, in which the fever subsides and the severity of the symptoms subsides, now by aggravation of the local and constitutional condition, sometimes with attacks in which the fever and dyspnoea increase, and the child may become quite cyanotic. Some of these intercurrent attacks simulate closely acute tuberculosis, but often pass away at the end of a week or ten days. In the chronic cases they probably indicate the invasion of other portions of the lung.

Occasionally, in a case of chronic pulmonary tuberculosis extensive fibroid substitution takes place, with gradual retraction of the affected side, depression of the shoulder, and all the signs of so-called fibroid phthisis. Usually in such instances there is dullness at the base and side with modified resonance, and cavernous signs at the apex. When involving the left lung, the heart is drawn over, and there may be a very extensive cardiac pulsation from the second to the fifth interspaces. A child may gradually regain a fair measure of health and for years live a tolerably comfortable life, troubled only by one or two spells of coughing through the day. There may be dyspnoea on exertion, and gradually the terminal phalanges become clubbed. Haemoptysis is rare, but occasionally terminates the case.

Diagnosis.—Progressive emaciation with hectic and cough in a child should always arouse the suspicion of chronic pulmonary tuberculosis. In the early stages the condition is usually that of tuberculous broncho-pneumonia. Careful and repeated physical examination may be necessary to establish the diagnosis, and one should take into consideration carefully the condition of the other organs. The position of the physical signs at the apex or central portions of the lung, the increased fremitus, the moist sounds, are all suggestive, and frequently one may trace the progressive character of the lesion. The disease most frequently confounded is empyema, but here the movable dullness, the bulging of the intercostal spaces, and the absence of fremitus are valuable points.

Auscultation is an extremely fallacious guide, and in several instances the persistence of a loud, almost cavernous, respiratory murmur at the base has led the practitioner astray. When in doubt the exploratory needle should be freely used for the purpose of diagnosis. The differentiation of chronic simple broncho-pneumonia sometimes gives a great deal of trouble, and the time element alone may determine whether we have to do with a tuberculous process or not. These are the very instances in which any fragments of sputum should be carefully sought for and examined. In a paroxysm of coughing the child may bring up a mouthful of food, and with it the expectoration, which should be carefully picked out and examined for tubercle bacilli.

Prognosis.—The prognosis in a large majority of the cases is bad, particularly when hectic is established and there is disorganization of one lung. On the other hand, when cases are seen early and placed under suitable conditions recovery may take place. The large number of individuals whose lungs and bronchial glands present traces of old tuberculous processes shows how considerable a proportion of all those who are infected must survive. We do not see many cases of chronic pulmonary tuberculosis in children between the ages

of six and fifteen, for the reason, no doubt, that the tuberculous broncho-pneumonia is so often an acute process, carrying off the victim before it has assumed the characters of a chronic affection.

(4) TUBERCULOSIS OF THE PLEURA.

This is usually secondary to existing disease in the lung or in the bronchial glands. A certain number of acute serofibrinous pleuritis in children may be, as in the adult, due to tuberculosis; but the cases, as a rule, run a favorable course, and unless the child has definite manifestations of tuberculosis in other parts the assumption in any given case is of course purely gratuitous. Purulent pleuritis in children are most commonly associated with lobar or broncho-pneumonia, but in a certain proportion of the cases the process is tuberculous. The disease is usually latent, and failing health, pallor, and shortness of breath are the symptoms for which relief is sought. The general symptomatology and diagnosis of tuberculous pleurisy are practically those of the simple forms which are elsewhere considered.

(5) TUBERCULOUS PERICARDITIS.

This is by no means rare in children, and cases have been reported in infants under a year. In 65 cases collected from the literature by Brackman, 19 were in children. The disease is associated in almost all instances with tuberculosis of the mediastinal or bronchial glands. An enlarged and softened gland may perforate the pericardium and produce an acute sero-fibrinous or suppurative inflammation; and no doubt a considerable number of all the cases of so-called idiopathic suppurative pericarditis have been due to this cause. The tuberculous process may slowly invade the pericardium from the mediastinal glands, and produce a chronic adhesive pericarditis, leading to great thickening of the membranes and gradual hypertrophy of the heart. The patient may die with all the symptoms of cardiac dropsy.

(6) URO-GENITAL TUBERCULOSIS.

(a) TUBERCULOSIS OF THE KIDNEYS.—As part of a general diffuse tuberculosis these organs are very frequently affected—more commonly, indeed, than in adults. Usually there are scattered gray tubercles or coarse yellow nodules in the cortical substance. Sometimes, however, the lesion is primary, and one or other kidney is extensively diseased. The affection in these cases appears to begin in the papillae and calices, gradually invades the substance, and may ultimately destroy the entire organ, converting it into a series of excavations containing a cheesy material. When confined to one kidney, this (known as the *serofulous* kidney) is sometimes met with in children, the other kidney being healthy and greatly enlarged. When there is extensive tuberculous pyelonephritis there is often pain over the kidney; the urine contains pus, very rarely blood. Irregular fever and chills are common. Frequent micturition may lead to the diagnosis of cystitis, with which, of course, it is frequently associated; but it is to be borne in mind that in connection with either calculous or tuberculous pyelitis frequent micturition may be a marked symptom. Sometimes the tuberculous organ is large enough in a child to be palpable. Tuberculosis rarely produces so extensive pyonephrosis as that due to stone.

The diagnosis can rarely be made from calculous pyelo-nephritis except by the detection of bacilli in the urine.

Tuberculous is nearly always a disease of the

(b) TUBERCULOSIS OF THE LUNG.—Present in the lung is rare in children. It is the test of the disease by Jullien. 6 organs may be affected. The nodular form is described by tubercles from enlargement. Usually associated with the disease always be born. The presence of nodules in the lung may gradually become much enlarged.

(c) TUBERCULOSIS OF THE SPLEEN.—These parts are generally affected in general

While the possibility cannot be denied of tuberculosis of the bronchial and mediastinal glands, the chief sources of infection are

To ensure freedom from infection should be taken in every manner. Every article of food should be boiled, and the water changed. The liability of children to tuberculosis is that of adults, particularly in the case of the mother. It may happen to be disseminated by putting every thing in the mouth.

The second danger is from tuberculous animals, such as pigs and calves. We have, unfortunately, more than calves. For the importance of care in the preparation of boiled milk, and the prevention of contamination, is a matter of great importance in a community.

Individual protection of delicate parents or children reared with the greatest care against catarrhal affections

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in the bronchial in children may be, run a favorable course, and are rarely gratuitous. It is usually associated with lobular or miliary process is tubercular, and shortness of breath is a general symptom of the simple

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diffuse tuberculous, indeed, than yellow nodules in the primary, and one case appears to be of an excavation of this (known as the kidney being tuberculous pyelitis pus, very much enlarged, but micturition is frequently either calcified symptom. It is frequently to be palpable. It is a stone. It is pyelitis except by

Tuberculosis of the ureters and bladder, very rare as a primary affection, is nearly always secondary to disease of the pelvis of the kidney, sometimes to disease of the prostate.

(b) TUBERCULOSIS OF THE TESTIS.—Disseminated miliary tubercles may be present in the testicles, but primary tuberculosis of these organs is not at all rare in children. Dreschfeld has reported an instance of congenital tuberculosis of the testis. Many cases have been reported of late years. Of 20 cases by Jullien, 6 were under one year, and 6 between one and two years. Both organs may be affected. The disease most commonly develops in the tunica albuginea or in the epididymis, and may lead to the formation of hard circumscribed tumors. In other instances the process may be more diffuse. When the nodular masses are large the testis may have a dumb-bell or double outline from enlargement of the epididymis. It is a serious affection in children, usually associated with tuberculous disease in other parts. Its existence should always be borne in mind, as in obscure abdominal or thoracic affections the presence of nodular masses in the testicles is of great help in diagnosis. The lesion may gradually heal. The cheesy masses may break down and suppurate, and, forming adhesions to the skin, the pus discharges, and the organ may become much enlarged—the condition formerly known as strumous orchitis.

(c) TUBERCULOSIS OF THE FALLOPIAN TUBES, OVARIES, AND UTERUS.—These parts are rarely affected primarily in children. It is not very uncommon in generalized tuberculosis to find, even in infants, a double salpingitis.

IV. PROPHYLAXIS.

While the possibility of inherited transmission from an infected mother cannot be denied, we have to face the fact that in a large proportion of all cases of tuberculosis the infection is at the gateways of the body—namely, in the bronchial and mesenteric lymph-glands—and we have here a clue to the two chief sources of danger.

To ensure freedom from contamination through the air the greatest care should be taken to prevent tuberculous patients spitting about in a careless manner. Every part of the expectoration should be carefully collected and boiled, and the patient's handkerchiefs should be thrown into boiling water. The liability of children to infection from this source is very much greater than that of adults, possibly on account of the intimate relations which the child has to the members of the family, more particularly the mother should she happen to be diseased. The habit of young infants, as they creep about, of putting everything in their mouths enhances greatly the liability to contamination.

The second danger to be avoided in children is the use of milk from tuberculous animals. Experiments have shown the readiness with which young pigs and calves become infected when fed on the milk of tuberculous cows. We have, unfortunately, no reason to believe that children are less susceptible than calves. Fortunately, the health authorities have at last awakened to the importance of careful inspection of dairy herds. The safeguard lies in the use of boiled milk, unless the source is known to be free from all possibility of contamination. The infection through meat is probably a very slight danger in a community.

Individual prophylaxis is of almost equal importance. A child born of delicate parents or in a family in which tuberculosis has prevailed should be reared with the greatest care. Very special pains should be taken to guard it against catarrhal affections of all sorts, particularly of the nose and throat, and

on the first indication of mouth-breathing a thorough examination of the nasopharynx should be made and any adenoid vegetations removed; and if the tonsils are at all enlarged, it is better to have them cut out. The child should live in the open air as much as possible, and the nursery should be thoroughly ventilated, more particularly at night. The meals should be at regular hours, the food plain and nutritious. Every encouragement should be given to take fats, and milk and cream should be used freely. It is a good practice for the mother to sponge the throat and neck of the child night and morning with cold water.

The trifling ailments should be carefully watched. The convalescence from measles, scarlet fever, diphtheria, and whooping-cough should be specially guarded. As the child grows older a systematically regulated exercise or course of pulmonary gymnastics may be taken.

V. TREATMENT.

Fortunately, a very large proportion of all cases of tuberculosis recover. Many instances of adenitis and disease of the bones heal spontaneously. Even in pulmonary tuberculosis it is remarkable how often we find post-mortem evidences of healed lesions, the percentage in some series being as high as 38. In fact, one may say that in a very large number of all cases in which the bacilli find a lodgment in the glands and in the solid organs, the conditions not being favorable, the growth remains local and tends to heal spontaneously. The essential point in the treatment of tuberculosis is the maintenance of nutrition at the highest possible grade. To aid in this three measures are to be practised:

First: A life in the fresh air and sunshine. The importance of environment is well shown in Trudeau's experiments with inoculated rabbits. Those confined in a damp, dark place succumbed rapidly; those allowed to run wild recovered or showed very slight lesions. By far the most important single element in the treatment of tuberculosis of all forms is the constant inhalation of fresh air. The good effects obtained at Göbersdorf, Falkenstein, Saranac Lake, Davos, and Colorado are due primarily to the fact that the patients live a life in the open air and sunshine. Even in cities much can be done by insisting upon open windows night and day, except, of course, in the very inclement seasons. It is an easy matter to protect the patient from draughts, and neither fever, cough, nor night-sweats contraindicate in any way fresh air. This is in reality the very essence of the climatic treatment of tuberculosis; that other considerations, such as moisture, barometric pressure, temperature, etc., are secondary is well shown by the fact that cases of various types of tuberculosis recover completely at places so diametrically opposite as Colorado Springs and Torquay. The regions of high altitudes with low barometric pressure are certainly more stimulating, and, according to Jaccoud, are better for cases of early pulmonary tuberculosis. Cases of bone and gland tuberculosis do remarkably well at the Adirondacks and in Colorado. The level regions with low barometric pressure, such as Riviera, Florida, and Southern California, are reputed to be more sedative in their action and better for tuberculosis in the more advanced grades and with high fever.

The second important measure is feeding, and the outlook in any case, particularly of pulmonary tuberculosis, depends very much upon the stability of the digestive powers. In no way does the open-air treatment do more good than in improving the appetite and digestion. A highly nitrogenized diet, consisting of broths, eggs, milk, and meat, should be taken. In children the milk

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diet is particularly to be commended while fever persists. Raw meats scraped, various meat extracts, and peptones may be used when the digestion is feeble. In tuberculous children it is sometimes extremely difficult to manage the diet, and many patients have an aversion to the very articles of food which seem best adapted. Gavage can rarely be resorted to with any advantage in them.

Third, the use of such remedies as cod-liver oil, hypophosphites, and arsenic, which improve the general nutrition. Other measures are frictions, rubbing, and bathing, all of which stimulate and improve the general metabolism.

Treatment directed to the Tuberculous Processes.—The specific treatment by the tuberculin of Koch, which consists of a glycerine extract of the cultures of tubercle bacilli, has been practically abandoned, though the good results obtained in the hands of Trudeau and others with Hunter's modification raise the hope that something yet may be accomplished by its use. Antibacillary medication is as yet unknown, and the introduction of various antiseptic agents by inhalation, subcutaneously, or directly into the local lesion has not been followed by very brilliant results. The direct action of iodoform on local tuberculosis is of great interest, and the remarkable effects in joint tuberculosis should encourage a more widespread use in other forms of the tuberculous processes. It probably has no definite antibacillary action, though it is stated to influence powerfully the secondary and associated infections so common in tuberculosis. It seems rather to act as a general nutritive stimulant, improving the appetite, diminishing the fever, and promoting tissue-metabolism and, according to some, sclerotic processes. It is probably at present more widely used than any other single remedy. It has been a favorite with some practitioners for many years, and its reintroduction has been due to the powerful advocacy of Sommerbrodt, Bouehard, and others. It should be given in large and increasing doses, beginning in young children with a minim three times a day, and increasing to five or even ten minims. It may be given in *perles*, or in pills or in mixture; in the latter a convenient way is with tincture of gentian, alcohol, and sherry. As a rule, it is well borne by the mouth. It may also be given in the form of inhalations, the so-called *vapor creasoti* consisting of creasote, 86 minims, light carbonate of magnesium, 30 grains, water to one ounce; a teaspoonful in a pint of water at 140°. Inhalations with this are strongly recommended. Intrapulmonary or intratracheal injections of creasote in oil have been practised. The active principle of it, guaiaecol, has been much used, both by the mouth and hypodermatically. Given in solution, it may be made up with tincture of gentian, rectified spirits, and sherry. Hypodermatically, it is used with sterilized olive oil. 5 per cent. solution: 1 or 2 per cent. iodoform may be employed with it, and 1 cc. of the mixture injected, gradually increasing to 3 cc. or even 4 cc. One rarely sees bad effects from creasote: the beneficial results are most marked in individuals who can take large quantities and who can enjoy the associated action of fresh air and a good diet. Creasote without these accessories is not of very great service, as witnessed in ordinary hospital practice. Patients are remarkably tolerant of it, and one rarely sees any ill effects. Other balsamic substances, such as eucalyptol, terebene, terebinthine, thymol, and menthol, have been recommended.

Symptomatic Treatment.—In this we shall refer more particularly to pulmonary tuberculosis.

The fever of tuberculosis is serious and obstinate. It will be found in the early stages that the combination of rest with fresh air is the most beneficial.

The child may be wrapped up and taken into the fresh air for the greater part of the day. We have no thoroughly satisfactory medicinal means for reducing the temperature. Antipyrine, antifebrin, and acetanilide, if used at all, must be given with great care. Quinine and salicylic acid are still used by many practitioners. When the temperature is persistently high in the early stages of tuberculous broncho-pneumonia, cold in various forms will probably be the most efficient measure, and by careful sponging the temperature may be reduced several degrees. The most satisfactory antipyretic is found in the fresh air, more particularly the change to a resort such as the Adirondacks or Colorado.

In the chronic pulmonary tuberculosis of children, when the fever is of a hectic type, sweating is a very troublesome and disagreeable symptom, for which atropine, aromatic sulphuric acid, and tincture of *nux vomica* may be used. In young children great care should be taken to prevent the chilling of the body after a profuse night-sweat. For the cough, if troublesome at night, paregoric or small doses of Dover's powder may be used. Codeine or, in extreme cases, small doses of morphine may be given. Where there is marked tenderness of the chest or pleuritic complications the cough is sometimes relieved by mild counter-irritation or the application of a warm poultice. Inhalation of terebene and oil of eucalyptus may sometimes diminish the profuse expectoration.

Hæmoptysis in the pulmonary tuberculosis of young children is usually a terminal and fatal symptom, quickly beyond treatment.

The diarrhoea may demand very careful regulation of the diet, and if profuse the acetate of lead, alone or with opium, may be used. Preparations of tannin and gallic acid are also beneficial. In all tuberculous processes there is a more or less marked tendency to anæmia, and many patients improve quickly under the administration of iron. Careful attention should be paid to the gastric symptoms. If the digestion is poor, dilute hydrochloric acid may be used, and if heartburn and pain be present some time after eating, the carbonate of sodium or the alkaline mineral waters.

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DISEASES OF THE BLOOD.

BY WILLIAM OSLER.

INTRODUCTION.

THE blood may be looked upon either as a fluid tissue in which the corpuscles represent the cells and the plasma the matrix, or as an internal medium bearing the same relation to the constituent tissues of the body as the external medium does to the individual as a whole. The corpuscles make up a little less than one-half of the weight of the blood, the rest being plasma. The latter contains in solution the fibrin-forming factors, various proteid substances, extractives, gases, and salts. In healthy persons the composition of the blood varies within extremely narrow limits, so well compensated are the "outgoings" by the "incomings" in the different regions of the body.

During the past half century, and more particularly during the last decade, much has been added to our knowledge of the blood and its functions, most of the advances having been gained through improved methods of histological and microscopical technique.

In the healthy adult human body there are three kinds of corpuscles to be made out: (1) the red; (2) the white; and (3) the so-called blood-plaques.

The red blood-corpuscles are homogeneous, circular, biconcave disks, averaging 7.5μ ($1 \mu = 0.001$ millimetre) in diameter. They are non-nucleated cells, consisting of a colorless framework or stroma (discoplasma), to which is united in a peculiar way the red coloring matter, hæmoglobin (paraplasma), the combination being such as to prevent the extraction of the hæmoglobin by the serum, in which it is easily soluble, and at the same time protect it from faulty processes of oxidation.

The white blood-corpuscles, on the other hand, are larger cells, all nucleated. There are several varieties of them differing in their size, contractility, nuclear form, protoplasmic granulation, and probably in function, although on this latter point we are as yet profoundly ignorant. Some of them are capable of active amœboid movement, which may be watched with ease in fresh blood specimens. The leucocytes will be classified and further described when we speak of the differential methods of staining them.

The blood-plaques, or blood-plates, of Bizzozzero are now generally recognized as normal blood-elements. They have been described under different names, and the most various functions have been assigned to them. Thus Hayem regards them as the ordinary red corpuscles in an earlier stage

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and so calls them haematoblasts. They are small, roundish, colorless protoplasmic disks, which in fresh blood specimens have a tendency to adhere to one another, forming little aggregations resembling bunches of grapes. They stain well in aqueous solutions of the basic anilines, particularly in gentian-violet. These clumps of blood-plates have long been known as Schultze's granule-masses. The idea of Löwit, that they are formed in part by a precipitation of globulins from the blood-plasma and in part represent portions of broken-up white blood-corpuscles, is scarcely tenable. Personal observation¹ of the blood of newly-born rats convinced me, and I think will convince any experienced histologist, that these bodies are as much independent elements as are the red or white cells. They have a diameter of from 1.5 to 3.5 μ , and, according to Schiefferdecker and Kossel, are of high specific gravity. The blood-plates must not be confounded with the so-called "invisible corpuscles" described by Norris, the latter being simply ordinary red globules deprived of their haemoglobin. I described them as main constituents of white thrombi—an observation confirmed by Bizzozero, and still more clearly demonstrated by the investigations of Eberth and Schimmelbusch, and later by Welch.

The Origin of the Corpuscles.—Although Oppel in a recent exhaustive review of the literature of the subject has been able to refer to the contributions of over one hundred investigators in this field, it must be admitted that our knowledge of the origin of the blood-corpuscles either in embryonic or post-embryonic life is even now in an unsatisfactory and unsettled state. We shall briefly mention here the views which seem to be best founded.

During the first few weeks of embryonic life there are no blood-corpuscles formed. When they do appear they come chiefly from mesoblastic cells, of which certain solid columns are laid down—the rudiments of the future blood-vessels; the central cells become loosened and break apart, gradually accumulate haemoglobin in their perinuclear protoplasm, and form the first blood-corpuscles. The cells lining the hollowed-out columns are differentiated to form the vessel walls. These first corpuscles, which are nucleated, are large and oval, resembling somewhat the red corpuscles of amphibians. Many workers believe in an endoblastic origin for the red blood-cells at this stage. In the latter embryonic period the question of corpuscular origin becomes more complex, and to explain it the most divergent theories have been advanced. The writers of the early half of the century were of the opinion that the liver manufactured most of the red blood-corpuscles, either from cells of the parenchyma or from the interior of its rudimentary vascular columns. Later investigators favored the idea that other organs (*e. g.* the spleen and bone-marrow) also took on a blood-building function. Bizzozero, basing his conclusions on his own work and on the investigations of Foà and Salvioli, is of opinion that in mammals during fetal life the circulating blood, the liver, the spleen, and finally the bone-marrow, represent successive centres for the formation and multiplication of the red cells. Howell substantially agrees with this,

¹ Cf. *Proceedings Royal Society*, 1874; *Med. News*, 1886, Apl. 3; *Centralblatt f. med. Wissenschaften*, 1882, No. 301.

and thinks that the newly-forming vessels all over the body give rise to blood-cells by a softening of the central cells of the columns—a fact which has been proven at least for the vessels of the posterior limb.

The nucleated corpuscles formed in the later embryonic period are smaller, and non-nucleated forms soon appear, so that by the fifth month in the human fetus the majority of red cells are non-nucleated. At birth there are very few nucleated red blood-corpuscles present in the blood, and they soon disappear entirely. In the adult the red corpuscles are formed almost entirely from the nucleated red cells which are found in the red marrow of bones, discovered independently by Neumann and Bizzozero in 1868, and since then carefully studied by many prominent histologists. The transformation of these nucleated cells into the ordinary red globules probably takes place by a process of extrusion of the nucleus, although many still believe that the nucleus gradually vanishes within the cell. The number of nucleated globules in the marrow becomes enormously increased where there have been great losses of blood, and in all severe anemias they may be found in the circulating blood. The nucleated cells may divide at least once in the bone-marrow by a karyokinetic process. It is from certain light-bordered, homogeneous, colorless marrow-cells (erythroblasts) that these true hæmatoblasts arise, which, as I¹ have pointed out, are not to be confused with leucocytes. The leucocytes probably never change into red globules, although that idea first advanced by Wharton Jones is still maintained by some authors. The view of Hayem, that the red globules develop from the blood-plaques, has not been confirmed by other observers.

As to the origin of the white blood-corpuscles still less is known. A certain number come from the lymph-glands, while others apparently have their birthplace in the spleen or bone-marrow.

In a most interesting series of articles on blood-formation Löwit regards the lymph-glands, spleen, and bone-marrow as blood-forming organs, and claims that in each, from a common mother-cell, two kinds of cells free from hæmoglobin are formed, erythroblasts and leukoblasts, the latter having amoeboid movement. The nucleus of the leukoblasts is relatively large, and contains one or more lumps of chromatin connected by radiating lines with the chromatin nuclear membrane. The erythroblasts are never amoeboid, and have no true nucleoli; they divide through mitosis, the leukoblasts dividing through amitosis (*divisio indirecta per granula*). His erythroblasts go over into the blood, as a rule, free from hæmoglobin. They gradually accumulate coloring matter there, and so become nucleated red blood-corpuscles; the nucleus in the main becomes disintegrated and gradually disappears by absorption.

An exhaustive review of the different theories of blood-formation, together with the results of his own experimental work, will be found in Howell's article in the *Journal of Morphology* for June, 1890. Howell maintains that the red blood-corpuscles in extra-uterine life are derived from the nucleated red cells (normoblasts) by a process of nuclear extrusion (the process in health

¹ *Centralblatt f. med. Wissenschaften*, 1878.

goes on in the marrow), while in anemia some normoblasts are allowed to pass over into the circulating blood. The nucleated red cells divide by karyokinesis, and have their origin in still less mature forms, which in their successive mitotic divisions of the well-known erythroblasts, the latter having resulted from such. He believes that under certain pathological conditions with vascular nuclei, the spleen may again assume its red-cell building function, which under normal conditions it gives up at birth. The view advanced by Howell, that all the white elements of the blood are developed from the small lymphocytes, cannot be regarded as proven, but most histologists agree with him in thinking that a polymorphous nucleus in the ordinary leucocyte indicates a commencing retrogressive change.

The fact that the nucleus of the normoblasts is extruded rather than absorbed has been supported by numerous observations of the blood of anemic patients in my wards, but as to the ultimate fate of the extruded nucleus nothing definite can at present be said.

Briefly summing up our knowledge of the hæmopoietic organs, we may say that in the adult the bone-marrow undoubtedly takes the most important part in the formation of the red globules. There is also much evidence in favor of its being a developmental centre for white blood-corpuses. The spleen has always been regarded as a blood-making organ, yet we must admit that if we look for confirmation from experimental work we find almost no support for this theory. The lymphatic glands and adenoid tissue generally are the seats of a constant production of colorless corpuscles, but there is no proof that they stand in any developmental relation to the red cells. The liver in adult life does not manufacture blood-corpuses, but must rather be looked upon as a seat of blood-destruction. We may say, therefore, that as to the exact origin of the formed elements of the blood we are still far from having reached any unanimity of opinion. Only a few points are definitely settled, and we must wait for further investigations to clear up the subject.

Whatever may be the mode of blood-regeneration, every clinician must have been struck with the remarkable rapidity with which, after profuse bleeding, the normal proportion of red blood-corpuses may be restored, the new corpuscles sometimes, under favorable conditions, being manufactured at the rate of thirty, forty, or even fifty, thousand per c. mm. a day.

The lifetime of a red blood-corpusele we do not know; it probably varies considerably. The bile-coloring matters and certain of the urinary pigments would appear to have their origin in an altered hemoglobin—a condition which, if true, would call for the daily destruction of many red globules. So far as we are able to see, however, the corpuses when worn out are removed from the blood before they have undergone any marked changes. Though it is impossible as yet to speak with certainty with regard to the mode of disintegration, the spleen and liver are believed to be the organs in which the red cells are broken up. Occasionally in the normal spleen, liver, and bone-marrow large cells can be seen filled with red corpuses, and it has

been thought that these are blood-destroying cells. The changes which the red corpuscles undergo in the marrow, liver, and spleen have been especially studied by Quincke and Peters, who have seen the pigment stored up within the cells of those organs in the form of an albuminate of iron, ready probably to be used over again in the development of new corpuscles.

Blood-plasma.—The study of the blood-plasma is daily assuming a greater importance, notwithstanding the tendency to attribute all serious blood-changes to corpuscular alterations. It contains water, a certain amount of serum-albumin and serum-globulin, with small quantities of inorganic salts—sodium, calcium, potassium, and magnesium.

The investigations recently carried on in connection with the question of immunity have led to a knowledge of certain previously unsuspected properties of the serum. Grohman, Nuttall, Behring, Nissen, Buchner, and others have proved experimentally that the fresh blood-serum of mammals has powerful germicidal properties. This bactericidal power of the serum of different animals varies, and, what is still more interesting, the mixing of the serum of one animal with that of another results in the destruction of the germicidal powers of both. What the substance is that possesses these peculiar powers is difficult to say. It must be an exceedingly unstable body, since it is rendered inactive by warming at a temperature of 55° C. for half an hour, and exposure to light also robs the serum of its germ-killing influence.

Laudois some time ago pointed out that the blood-serum of one animal had a destructive action on the red blood-corpuscles of an animal of a different species—a fact which explains the worse than useless practice of blood-transfusion from lower animals to man. Buchner has shown that this "globulicidal" action of the serum is quite analogous to its germicidal action. Not only are the red blood-corpuscles destroyed by the foreign serum, but the leucocytes are killed, as shown by examination on the warm stage. Buchner further refers the antitoxic action of the blood-serum of immune animals to a quite analogous chemical action. He does not believe that these substances, germicidal, globulicidal, and antitoxic, can be simple "dead" proteids in solution, but regards them as highly complex molecular combinations which in some peculiar way are dependent for their integrity on a loose combination with salts of the alkalies. Hankin terms these bodies alexins and believes them to be derived from the leucocytes, particularly the eosinophile variety, which secrete them on suitable provocation.

The whole question is particularly interesting from a therapeutic standpoint, and at present "blood-serum therapy" (*i. e.* the injection of the serum of immune individuals into others as a protective or curative measure) is full of promise. Some astonishing results by this method in cases of tetanus are claimed by the Italian school, and in Berlin experiments are being carried on by the Klemperers and others in connection with pneumonia and the so-called anti-pneumotoxin.

Isotonia and Hyperisotonia of the Blood-serum.—The term "isotonic solution" was introduced by Hamburger in 1886. It is well known that the

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hemoglobin of the red blood-corpuses is extracted from the stroma when blood is mixed with distilled water. If one uses in place of the distilled water a solution of sodium chloride of certain strength as a diluent, the coloring matter will not be dissolved out. The salt solution which is just strong enough to prevent the solvent action has been called by Hamburger "isotonic." Several methods of determining the isotonic concentration of the serum clinically have been devised by Landois, Hamburger, Limbeck, Lakers, and others. Of course the less the concentration of the salt solution necessary to conserve the corpuses in any given case, the greater, if we may say so, is the *isotonia* of the serum. We say the same thing when we state that the *resistance* of the corpuses depends upon the isotonic concentration of the serum or plasma. Strictly speaking, an isotonic serum would be one in which there were just enough salts to prevent destruction of the corpuses at the moment. The maintenance of such a condition would, however, be hazardous, as every ingestion of liquid from the alimentary canal would result in the destruction of many red blood-cells. As a matter of fact, the plasma always contains a greater percentage of salts than is necessary to prevent the extraction of the hemoglobin from the discoplasma; hence the origin of the term "*hyperisotonia*" of the plasma or serum.

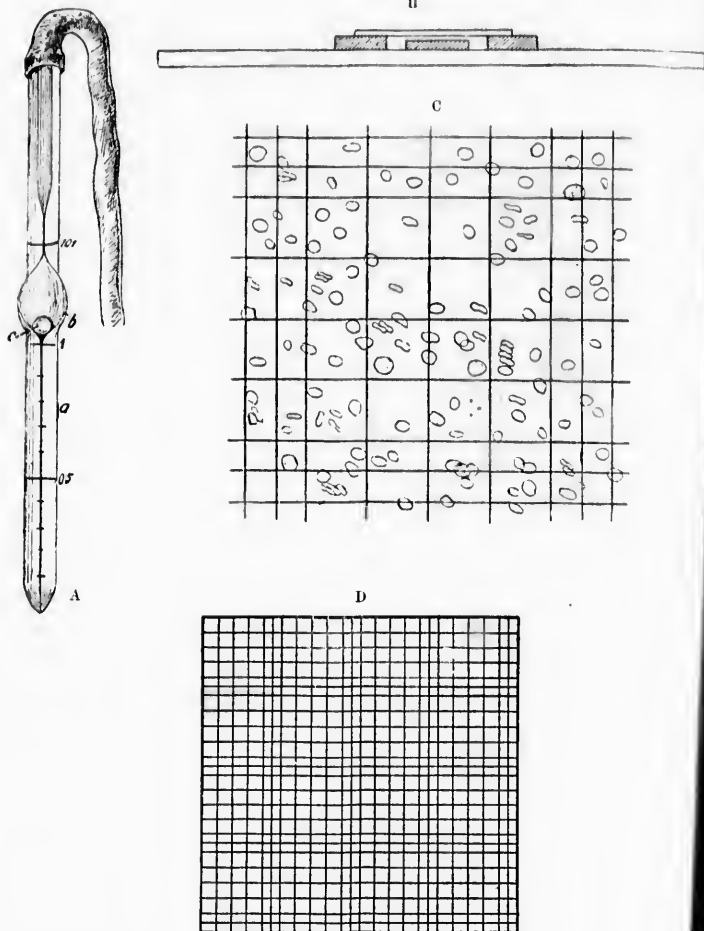
Certain other pathological alterations of the blood-plasma, such as cholemia, uremia, lithaemia, melithaemia, and lipaemia, will be considered in full in connection with the diseases in which they occur.

Before speaking of the diseases of the blood we shall discuss briefly the methods of examination to be employed, for a full appreciation of which, however, a rigid study of the text-books which contain the technical details and practical work in the laboratory under a competent instructor are indispensable.

Examination of Fresh Blood.—A microscopic slide and thin glass cover-slip (the former being less sensitive) having been washed off with alcohol or ether and thoroughly dried, a slight puncture is made with a sterile lancet or needle, and the first drop or two of blood which exudes wiped away. The cover-slip, being held with a pair of forceps, is then applied lightly to the summit of the projecting drop, care being taken not to allow the glass to come in contact with the patient's skin. Little or no pressure should be used in expelling the blood-droplet. The cover-glass is then placed at once upon the slide, and the technique has been perfect the drop will be spread out into a thin layer. The specimen may be examined immediately with a one-twelfth inch oil-immersion lens. The form and color of the red blood-corpuses should be noted, the relative number of whites and reds, the activity of the amoeboid movement of the leucocytes, the presence or absence of parasites (the plasmodia of malaria, spirilla of relapsing fever). One can make out sometimes the predominance of certain leucocytic forms, and if there be a large number of nucleated red blood-corpuses, they may be seen in the fresh specimen. Some care must be exercised not to allow the oil-drop to reach the edge of the cover-glass or the specimen will be destroyed.

Enumeration of the Corpuscles.—In a healthy man there should be from five to five and a half millions of red corpuscles in a cubic millimetre of blood, the number in women being normally a little under this. The white blood-corpuscles vary in number at different times of the day; thus, they are more numerous after a meal than during the digestive process. Speaking generally,

FIG. 3.



Thoma-Zeiss Blood-counting Apparatus (Limbbeck).

- A. Melangeur: *a*, Capillary tube in which the blood is taken; *b*, Chamber for mixing the blood with the diluting solution; *c*, Glass ball to aid in mixing the blood with the diluting solution.
 B. Cross-section of the chamber in which the blood is counted.
 C. Section of the field on which the blood is counted, showing thirty-six squares.
 D. Diagram of the whole field.

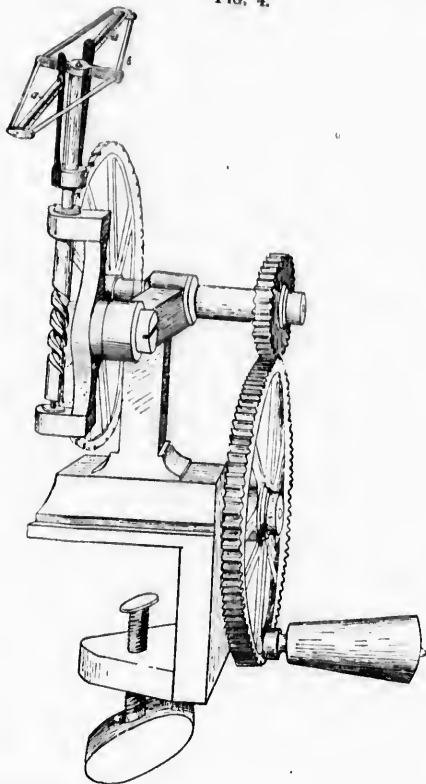
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the average number of white corpuscles to the cubic millimetre is from 5000 to 7000. The best apparatus for counting these formed elements is the now well-known instrument of Thoma-Zeiss. (See Fig. 3.) The blood is diluted in the "mixer" (A) one hundred or two hundred times with a saline fluid of specific gravity corresponding to that of the blood. In my clinic the solution recommended by Toison is used, since it contains a little methyl violet, by which the white blood-cells are tinged and are as easy to count as the red. The drop of the mixture placed in the blood-counting cell (B) should be free

FIG. 4.



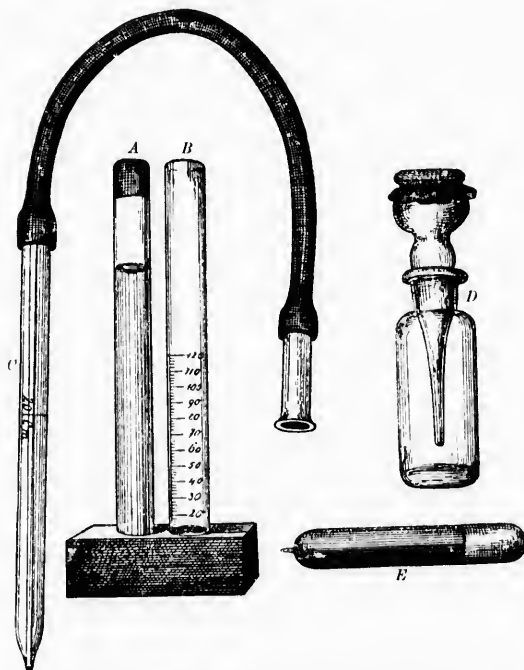
The Blitz-Medin Haematokrit: a, Capillary tube for blood mixture; b, Frame for holding tubes (Linbeck).

from air-bubbles, and when the cover-glass has been adjusted one should be able to see Newton's rings at the margin of the drop. It is necessary to wait until the corpuscles have all settled to the bottom of the cell before beginning the count. Two whole fields (see Fig. 3, c and d), 16 large squares or 400 small squares in each) should be counted for the reds, and at least four

whole fields for the whites. Although the process of counting and calculating is not a complicated one, yet careful and conscientious work is required in order that the results attained may be reliable. With the Thoma-Zeiss counter an experienced hæmatologist should not make an error of more than 2 or 3 per cent.

The centrifugal machine has been applied to blood-counting in the form of the hæmatokrit (Fig. 4) of Blitz-Hedin, and is said to give as accurate results as the hæmocytometer. Its clinical value has been definitely settled by Judson Daland,¹ working under the direction of von Jaksch in Prague. The blood is mixed with an equal volume of a 2½ per cent. solution of bichromate of potassium, or, as some prefer, of Müller's fluid, and placed in a capillary tube in

Fig. 5.



Gowers' Hemogloblometer: A, Closed tube containing the standard mixture; B, Tube in which blood and water are mixed; C, Pipette for collecting the blood; D, Bottle and pipette for distilled water; E, Lancet for obtaining the blood (Limbeck).

the hæmatokrit. The wheel is then turned, and, the tube revolving at the rate of 9000 revolutions per minute, the red blood-corpuscles, being relatively of higher specific gravity than the white, go to the periphery, and the volume read off on the graduated capillary tube. A long series of experiments has

¹ Fortschritte der Medicin, 1891, Nos. 20 and 21.

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been made which show that in healthy young men the red blood-corpuscles occupy 44 to 66 parts in 100 volumes of blood, the average in 55 cases being 51.618. The average of the control blood-counts made with a Thoma-Zeiss counter in the same series of cases was 5,130,248 to the cubic millimetre, so that a volume on the scale of the hæmatokrit corresponds to 99,390 red blood-cells. Where the volume of the reds was 45 to 65, the whites occupied about one volume; in a case of leukemia the whites occupied thirteen volumes. Of course one volume of whites corresponds to many fewer cells than a volume of reds. The examination takes only about ten minutes, and thus there is a saving of much time and labor. There are several objections which may be raised to the use of the instrument, particularly in the study of the grave anemias, in which the volume of macrocytes varies materially from the volume of the ordinary blood-corpuscles; but there seems little doubt that when certain improvements already suggested have been made the instrument will be generally adopted.

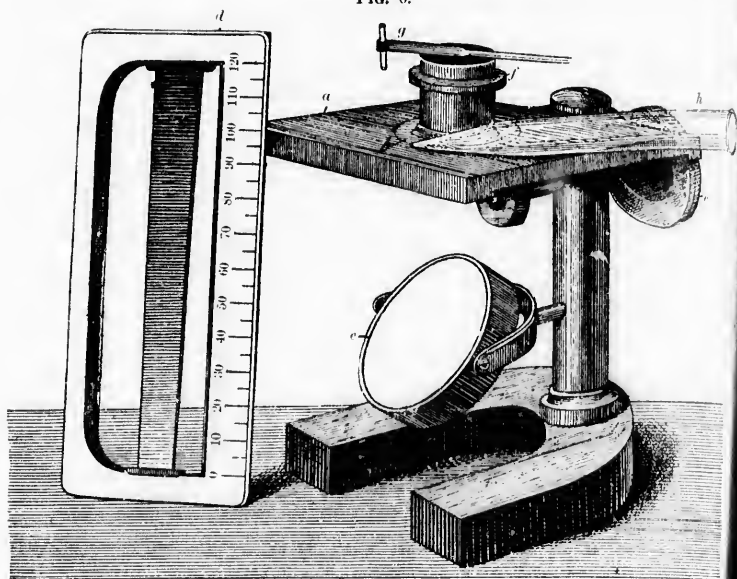
The enumeration of the blood-plaques has so far served no distinct practical purpose. Normally there are present from 200,000 to 500,000 in the cubic millimetre.

Examination of the Coloring Matter.—The instruments of Gowers (Fig. 5), Malassez, and Hayem are being entirely replaced by the convenient hemometer devised by von Fleischl. (See Fig. 6.) Like the blood-counter of Zeiss, there go with it many little technical points inattention to which will lead to very erroneous results. The color of the blood, diluted in definite proportions with distilled water, in one compartment is to be compared with that of water in a second adjacent compartment, beneath which, by means of a micromicroscrew, a wedge of red glass (Cassius's Goldpurpur) is moved until the color of the two chambers exactly correspond. The scale showing the percentage of hæmoglobin may then be read off. The examination must be made with the aid of artificial light and in a dark room. The blood normally contains a little less than 14 per cent. of hæmoglobin, the number 100 on the scale of von Fleischl corresponding to 13.44 per cent. Having counted the corpuscles and determined the percentage of hæmoglobin, it is easy to calculate the individual corpuscular richness in coloring matter (colour globulaire)—a point of much practical value in the differential diagnosis of certain forms of anemia.

There are times, however, when it is desirable to add to a quantitative the results of a qualitative estimation of the coloring matter of the blood. This may be best done by means of the spectroscope, of which certain inexpensive forms have been invented which are suitable for clinical purposes. Thus, carbon dioxide poisoning leaves traces in the blood which can be recognized by the spectroscope for weeks after the intoxication.

The Study of Dried and Stained Specimens.—In the diagnosis of blood diseases it is to Ehrlich of Berlin that we owe the increased precision obtained by a color-analysis of the formed elements of the blood. He makes use of his method of preparing cover-glass specimens. A drop of blood is allowed

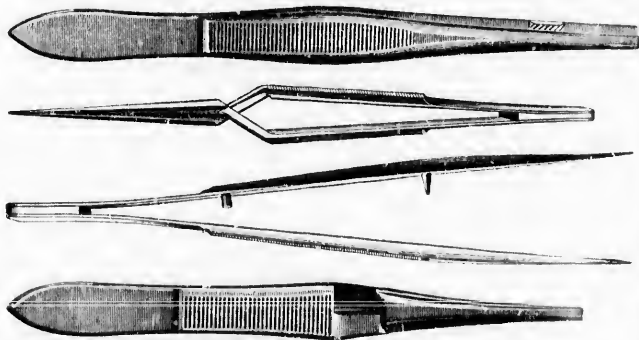
FIG. 6.



a, Stand; *b*, Opening into which the double chamber fits; *c*, White plate *f*, *e* which light is reflected through the chamber; *d*, Frame with the wedge of colored glass which passes under the chamber; *e*, Screw by which the glass is moved; *f*, Double chamber which holds the blood and water; *g*, Capillary tube to collect the blood; *h*, Pipette for adding the water (Limbeck).

to spread out into a thin layer between two cover-slips, which are then quickly separated and allowed to dry in the air. Forceps (see Fig. 7) are used for holding the cover-glasses, since the moisture of the fingers alters the shape of the pus-cells. Specimens so prepared may be set aside in labelled boxes and examined

FIG. 7.



Forms of Forceps for holding Cover glasses.

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at leisure. Before staining the specimens must be heated (according to Ehrlich, on a copper bar) for from one to two hours at a temperature of 120° C., in order to fix the hæmoglobin of the red disks, otherwise it would be extracted by the staining fluid. In the granulated cells of the body Ehrlich finds several varieties of "specific granulations," the classification depending upon their specific behavior toward certain groups of dyes, their form, size, and conditions of solubility. He divides the aniline dyes into two groups, acid and basic—a nomenclature at first misleading, since most of the dyes are used in the form of neutral salts. By an acid dye is meant one in which the staining agent is the acid part of the salt, while in a basic coloring matter it is the base that has the staining power. A combination of a staining base with a staining acid forms the so-called neutral dye. Of these three classes, ammonium picrate might be given as an example of the first, rosamilin acetate of the second, and rosamilin picrate of the third. Altogether, Ehrlich has been able to demonstrate in the cells of different animals seven definite and distinct granulations: one cell species contains more than a single variety of granules. Only three of these are found in human blood, and only two have as yet been shown to be of practical diagnostic value:

(1) The eosinophilic, or α -granulation. (Plate I, Fig. 1 (*f*)). This is found in cells with fairly large nuclei which contain relatively large ovoid or round, highly refractive, fat-like granules, which stain by all the members of the acid group of dyes, and by no others. Ehrlich has proved that these granules are made up of neither fat nor hæmoglobin, but believes them to be of an albuminous nature, a product of the secretory action of the cell-protoplasm. The granules are called eosinophilic, on account of their great affinity for eosin (tetrabrom-fluorescein).

(2) Basophilic, or β -granulation. Only rarely does one see cells in the blood whose granules stain only with color bases, though this granulation is common enough in the "mastzellen" of the tissues.

(3) The neutrophilic, or ϵ -granulation. This is the most important of all the granulations, and is found in the majority of leucocytes. The granules are very fine, and resolvable only with high powers of the microscope. They stain in the neutral dyes—*e. g.* in a mixture of acid fuchsin and methyl green.

Virchow in 1845 pointed out two forms of leucocytes—a large and a small. More than twenty years later Max Schultze established the fact of the absence of a morphological unity in the leucocytes, and suggested their division into groups. In normal blood we now distinguish the following varieties of white blood-corpuscles:

(*a*) *Lymphocytes*.—Small cells about the size of red blood-corpuscles, containing large, roundish, deeply-staining nuclei, the non-granular protoplasm appearing only as a little rim round the nucleus. (Plate I, Fig. 1 (*b*, *b*)). These are derived from the lymphoid tissues of the body, and make up 20 or 30 per cent. of the whole number of leucocytes in the blood.

(*b*) *Large Mononuclear Forms*.—Cells with a large oval or ovoid feebly-

staining nucleus, and a relatively well-developed protoplasm which does not contain granules. (Plate I, Fig. 1 (c).) Ehrlich believes that they are gradually transformed in the circulating blood into the smaller polymuclear forms.

(c) *Leucocytes with Polymorphous Nuclei* (the so-called "polymuclear" leucocytes).—This is the most common form, since they represent two-thirds of the whole number of white blood-corpuscles. (Plate I, Fig. 1 (c, c').) They are smaller than the large mononuclear elements, and are characterized by the irregular forms of their nuclei, which take all sorts of shapes—S, V, Y, Z, or E. Their protoplasm is thickly studded with fine neutrophilic granules, so that they are often called "polymuclear neutrophiles."

(d) *Transition Forms*.—These cells are similar to the large mononuclear corpuscles, but differ in having indentations in their nuclei. (Plate I, Fig. 1 (d, d').) Ehrlich regards them as intermediate forms between *b* and *c*. The mononuclear cells, together with these transition forms, represent about 6 per cent. of the whole number of leucocytes in normal blood.

(e) *Eosinophiles*.—These are cells of about the size of the polymuclear leucocytes with variable nuclear forms, and a protoplasm containing large refractile eosinophilic granules. (Plate I, Fig. 1 (f).) They make up from 2 to 4 per cent. of the white blood-corpuscles, and have their origin probably in the bone-marrow. Forms *b*, *c*, and *d* are said to come from both spleen and bone-marrow.

The proportions of the different forms above given are fairly constant in health, but may vary widely under different pathological conditions. Hence a "differential count" of the leucocytes may be of very great value, as I shall show later, in the clearing up of the diagnosis of a difficult case.

In some diseases cells not normally present in the blood at all may be found in dried specimens, and the presence of these, together with certain degenerative and regenerative forms of red blood-corpuscles, to be spoken of later on, are signs hitherto insufficiently appreciated.

It would be going beyond the limits of a general text-book to refer to all the various staining methods which may be advantageously used. The coloring mixture of greatest practical value is perhaps that known as the "triple stain" (Ehrlich-Biondi). It contains methyl green, acid fuchsin, and orange G. With this fluid the nuclei of the white blood-corpuscles are stained green, those of the nucleated red blood-corpuscles nearly black, the red corpuscles themselves orange, the eosinophilic granules red, the neutrophilic granules a deep violet.

The plasmodia malarie may be studied in dried specimens stained with Giemsa's solution of eosin and methylene blue, but these bodies can be examined much more satisfactorily in the fresh blood. The staining of microorganisms in other blood infections (*e. g.* the tubercle bacillus in acute milk tuberculosis) gives results too inconstant to be of much practical clinical value.

ACCESSORY METHODS OF EXAMINATION

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vary between 1045 and 1075. It is, as a rule, higher in men than in women, and in youth than in adult life. The procedure of von Schunaltz of weighing a known volume in a capillary tube is an accurate method of determination, but takes up too much time. More convenient is the method of Hammerling, who places a drop of blood in a mixture of chloroform and benzol; he then adds either chloroform or benzol until the blood-drop floats lazily around in the mixture. The specific gravity of the latter is then taken in the ordinary way with an areometer. Another plan is given by Dr. Lloyd E. Jones of Cambridge.¹ The specific gravity of the blood is lowered in pulmonary phthisis, different forms of anæmia, and in certain cachexias.

The Alkalescence.—As is well known, the reaction of the blood is alkaline, but the amount of alkaline carbonates varies under different physiological and pathological conditions. The technique of the determination is complicated, and will scarcely be undertaken except for purely scientific purposes.

The Estimation of the Total Amount of Blood.—This can be at best only approximate, and need not be described here.

PLETHORA.

The older writers spoke of plethora as a definite pathological condition, depending either on an increase in the total amount of the blood in the body or on an increase of the red blood-corpuscles beyond the normal limit. They distinguished a true plethora (*plethora vera*) from a symptomatic plethora (*plethora apocoptica*, following amputation of a limb; *plethora hydropica*, after hemorrhages or in cachexias). By true plethora was meant that condition of full-bloodedness seen in men of strong constitution, where the face is generally red, the mucous membranes injected, the pulse large in volume and bounding, such patients, in consequence of their plethoric condition, suffering at times from attacks of palpitation and dyspnoea, epistaxis, and hemorrhages from different mucous membranes. Hereditary predisposition, over-feeding, and insufficient exercise are the most important of the various causes which have been suggested. The experimental investigations of Worm-Müller and Cohnheim on animals, although they show the possibility of a temporary plethoric condition, do not justify the belief in a persistent polyæmia. Large quantities of transfused blood were disposed of in dogs in a few days, and at most in two or three weeks, after injection. The appearance of full-bloodedness in men is due rather to changes in the vaso-motor system controlling the blood-distribution than to actual increase in the total volume of blood. The cases of blood-concentration following watery evacuations from the bowels, as in cholera, where at times there may be over six million red corpuscles to the cubic millimetre, would now scarcely be regarded as a state of plethora.

THE ANÆMIAS.

Anæmia may be a general or a local condition. The local anæmia, or *hypochæmia*, dependent upon some obstruction to the circulation, in an individual

¹ *Journal of Physiology*, vol. viii.

part, will not be considered here. In a general anæmia there may be a diminution in the total amount of the blood, of its contained corpuscles, or of certain other important constituents, such as albumin and hæmoglobin. Where there is a decrease in the number of red blood-corpuscles, we speak of an oligocythæmia; when the amount of hæmoglobin is low, the term oligochromæmia is used. Very often the oligochromæmia is about proportionate to the oligocythæmia, but in other cases the relation is by no means equal; this relation is generally quoted in terms of the amount of hæmoglobin in an individual corpuscle—*la valeur globulaire* of Lepine.

Not every pale person has a general anæmia. There are individuals whose persistent pallor of the face is due to hereditary influences or to local vasomotor disturbances, who may have their full complement of corpuscles and of hæmoglobin.

Patients who have any advanced degree of anæmia present a characteristic set of symptoms—viz. pallor, shortness of breath on exertion, palpitations of the heart, headaches, and in women menstrual disturbances, most often amenorrhœa—symptoms which always demand a most careful blood-examination. Even with the marked improvement in the hæmatological technique of to-day it is often difficult to pass judgment on certain obscure cases, and all classifications given are at best only provisional. It will be found convenient to separate the so-called primary or essential anæmias from the secondary or symptomatic forms, it being understood that what we now call primary anæmias are so only because we are as yet unacquainted with their exact etiology.

THE PRIMARY OR ESSENTIAL ANÆMIAS.

Of these we have two distinct forms—Chlorosis, and Progressive Pernicious Anæmia.

CHLOROSIS.

Definition.—An affection occurring chiefly in young females, which produces clinically the group of symptoms common to the anæmias, and is characterized by a marked diminution of the amount of hæmoglobin in the individual corpuscles.

Etiology.—The great majority of cases occur between the ages of fourteen and twenty-four—a fact which gives some support to the view that there is an intimate relation between the affection and the changes which the organism undergoes at puberty. In girls in whom the disease occurs early in their teens we are apt to find a certain precocity and an almost premature appearance of the menses, while cases occurring later are associated with a history of a late puberty. As a rule, the pallor begins a year or two after the menses are first seen, and scanty menstruation or total amenorrhœa is a concomitant symptom, the menorrhagic chlorosis of Trousseau, as far as our experience goes, being uncommon. Girls with light hair and fair complexion are more frequently attacked than brunettes. The affection is rare in males, though some cases occurring at puberty have been reported.

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cular system lies at the bottom of the condition, and that the disease is present from birth. The affection is extremely rare in young children. Hereditary influences seem, however, to play some part in the etiology: thus a mother who has been chlorotic not infrequently bears children who later on become chlorotic, and the physician frequently has to treat two or more sisters suffering from chlorosis at the same time. There are facts which indicate that the disease occurs more frequently in families contaminated with tuberculosis (Jolly).

A primary nervous origin is claimed by some who cite instances of chlorosis developing after sudden shock or violent emotion, homesickness, or disappointment in love. The "green and yellow melancholy" of Shakespeare was probably a poetic term for this disease. The influences of unsatisfied sexual desires and of masturbation have, it seems to me, been over-estimated. In dispensary practice a large proportion of the cases are found among hard-working sewing-girls or factory-operatives, who have long hours, eat in hastily-prepared food, work in close, ill-ventilated, and badly-lighted rooms, and have several flights of stairs to climb every day. Such a constant transgression of all hygienic laws in regard to air, food, and exercise cannot fail to exact its penalty from the constitutions of young girls, already severely taxed by the assumption of the functions of womanhood. The better classes are, however, not exempt, and the disease is frequently found in the most luxurious homes. Sir Andrew Clark found constipation so frequently in his cases that he regards the affection as the result of the absorption of toxic products from the colon—a true copremia.

Morbid Anatomy.—The pathology of chlorosis is imperfectly understood. Few cases die directly from the disease, and the pathological findings in those which have come to autopsy have been by no means constant. Rokitsansky in 1846 pointed out certain instances of incurable chlorosis due to anomalies of the blood-vessels and of the genital organs. Virchow described a congenital hypoplasia of the vascular system found in several autopsies on chlorotic patients. The aorta and all its branches were of small calibre and thinner than normal; the elasticity of the vessels, however, appeared to be increased. In some of his cases, but by no means in all, the genital organs also showed errors in development. The heart is at times dilated and the left ventricle hypertrophied.

Symptomatology.—The symptoms may appear with comparative suddenness—a young girl apparently in blooming health reaching an extreme degree of pallor in a few weeks—but this is not the rule, the onset in the majority of cases being gradual. Headache is common in the early stages, and dyspnea and palpitation are not often absent, the patient complaining of these rather than of the pallor when she consults the physician for the first time. More often still an anxious mother brings a daughter whose menses have ceased, and the physician is begged to direct his treatment toward a restoration of this function.

The general symptoms of chlorosis are those of an anemia of a moderate

grade. The patient is generally well nourished, and the panniculus adiposus rather increased than diminished. The skin in many cases has a characteristic greenish-yellow tinge, quite different from the blanched aspect produced by hæmorrhage or the muddy pallor of the graver forms of anemia. It is this curious tinge of the complexion which has given rise to the popular name of "green sickness;" it must be borne in mind, however, that in many patients undoubtedly chlorotic this sign may not be marked. Aside from the hæmometric examination, the degree of hæmoglobin-poverty may be judged best by examining the color of the palpebral conjunctivæ and that of the matrix of the finger-nails. The lips and cheeks may be of a rosy-red color on exertion, even when the *couleur globulaire* is considerably diminished (chlorosis rubra). The skin about the joints not infrequently shows areas of pigmentation. The breathlessness, palpitation, and tendency to fainting are evidences of the insufficient oxygenating power of the circulating blood.

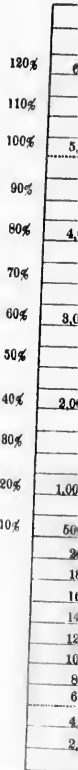
The symptoms referable to the digestive system are often interesting. In some cases the functional disturbances are so marked that many authors speak of a "dyspeptic type" of chlorosis. The appetite is poor in many patients—more often it is perverted, the girl refusing to eat ordinary articles of diet, but longing for unwholesome dishes like pickles or other highly-flavored foods. School-girls have been known to eat quantities of the most indigestible substances, such as bits of chalk, slate-pencil, or even earth. Vomiting, or rather regurgitation of food, in the mornings is not uncommon. More than once patients have come to me fearing that they were pregnant—a fear perhaps not unnatural in presence of the three conditions of exposure, amenorrhœa, and morning vomiting. Contourier has found a dilated stomach in many chlorotics, and believes that it is sometimes a cause, sometimes a result, of the disease. Pick of Prague goes so far as to attribute chlorosis to the absorption of toxic products from the stomach, and claims to have successfully treated many of his cases by systematic lavage.

We have already mentioned the frequency of constipation in chlorosis, as well as disturbances in the menstrual function, which are extremely common. The amenorrhœa, leucorrhœa, and dysmenorrhœa generally disappear rapidly under treatment directed toward the defective condition of the blood. Nervous symptoms are more prominent in some cases than in others. Headache, particularly the vertical variety, is especially often met with, while neuralgia and even hysterical manifestations sometimes occur. Fever is not common, but there are cases (febrile chlorosis) in which there is a daily rise of temperature.

The changes in the vascular system are more or less characteristic, and the palpitation of the heart is at times most troublesome. On physical examination the heart may be found slightly enlarged, and murmurs may nearly always be heard in the severer cases, the most common being the systolic souffle at the base, usually in the pulmonary region. More rarely a whiff with the first sound is to be heard at the apex. Duroziez affirms stoutly that these murmurs may always be distinguished from the murmurs of organic disease. He claims that while the latter are still plainly heard when the ear is

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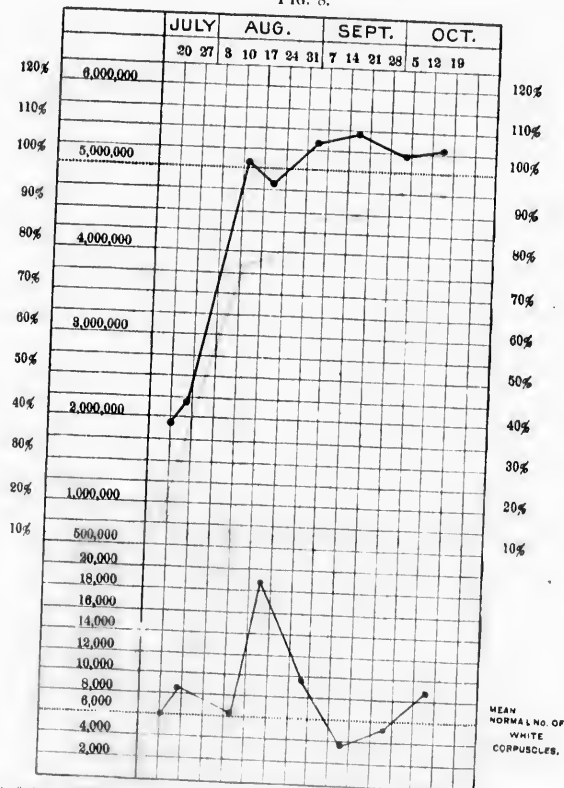
In Thayer's series of blood-corpuseles to normal, and the av

removed a little distance from the chest, the former under the same circumstances disappear. A loud hum, the so-called "bruit de diable," is often heard in the cervical veins. The importance of venous thrombosis in chlorotic patients has been emphasized by Brayton Ball. It may occur in the femoral or brachial veins, where it is not apt to be serious, but when the longitudinal sinus is thrombosed there may be a fatal result.

Edema of the ankles sometimes occurs, but it is not so common here as in the graver anemias.

THE BLOOD EXAMINATION.—The red globules may be present in normal numbers, although in all severe cases there is a considerable oligocythæmia.

Fig. 8.



Blood-chart of Case of Chlorosis: black, red corpuscles; red, hæmoglobin; blue, colorless corpuscles.

In Thayer's series of 63 cases, studied in my clinic, the average number of red blood-corpuscles to the cubic millimetre was 4,096,544, or 74 per cent. of the normal, and the average quantity of hæmoglobin was 42.3 per cent. This

relatively great oligochromæmia, first pointed out by Duncan, is the distinguishing characteristic of the blood in chlorosis, and serves to differentiate it sharply from diseases, like pernicious anemia, where the globular value in hæmoglobin is increased. In one case the oligocythæmia was severe, there being only 1,953,000 reds, with 17.5 per cent. of hæmoglobin. The white cells were only slightly increased in number, averaging in the above 63 cases 8467 to the cubic millimetre—*i. e.* 1 white to 408 red. One case with over 85 per cent. of red globules and only 35 per cent. of hæmoglobin presented accurately the clinical aspect of a profound anemia.

If a drop of fresh blood be examined, the pallor of the individual corpuscles is at once apparent. There may be many poikilocytes, by which we mean deformed red globules assuming the most curious flask-like, hammer-shaped, or pyriform appearances. In the dried and stained specimens a small nucleated red blood-corpuscle (the normoblast of Ehrlich) may now and then be seen. Græber's determinations, according to Landois's procedure, showed a diminution in the alkalinity of the blood, but investigations by more accurate methods have not confirmed this.

Diagnosis and Prognosis.—When a young girl comes to us with such an array of symptoms and complaints, one should never assume the responsibility of excluding a grave anemia before making a careful blood examination, although the diagnosis in the majority of cases is tolerably easy. There are cases of secondary anemia, however, with considerable diminution in the corpuscular hæmoglobin value: this is especially true of the anemia of the earliest stages of tuberclosis of the lungs. One should always satisfy himself that the lungs are clear before giving a positive diagnosis, and organic diseases of the heart and kidneys are to be excluded in the ordinary way.

The prognosis is always favorable, except in those cases associated with congenital anomalies of the vascular and genital systems. We must not, however, forget that relapses are common, and where they occur it is in most cases because the treatment has been too soon discontinued. It is not rare to see a recurrence during the third decade of life.

Treatment.—Chlorosis is one of the few diseases of which the physician is a therapeutic master. A few weeks' administration of iron, together with an improved hygienic condition, usually suffice to restore a ruddy glow to the most pallid cheek. At the outset the patient should be impressed with the desirability of persevering with the treatment until the hæmoglobin value, as shown by the hæmometric scale, is above 90 per cent. The distressing symptoms may disappear entirely at the end of two weeks—long before the percentage of the hæmoglobin is normal—and thus our patient may disappear for weeks, only to return in her former condition. In the severest case on Thayer's list, where the red blood-corpuscles were below two millions and the hæmoglobin below 20 per cent., at the end of four weeks the numbers of reds were found to have increased to 5,090,000, and the hæmoglobin to 70 per cent., and at the end of the eleventh week her hæmoglobin percentage was 95. All of the cases of the series were given iron in the form of Bland's pills, two pills

of five grains one or two times a day with milk between meals, if necessary, consistent with the

If one form may be taken, the theory of Bunge given in any form detected in the hydrogen sulphide and thus permitted of iron which exceeds as an instance of this hypothesis, but these are a nutrition.

As the girl are not uncommonly primary treatment, Fleisch's instillation treatment until the hæmoglobin

This disease "anemia" by Addison has become classic to the literature of its clinical aspect of the affection since then has been

Etiology.—Addison's anemia; and in his we find a brief account. "For a long period of general anemia of which there had been chlorosis, no purpura malignant disease." Albert of Zurich (1857) assigned by Biermer, affection.

Addison's anemia one time to be particularly to the fact that

of five grains each after every meal. The patient was encouraged to spend one or two hours in the open air daily, and to take three or four glasses of milk between her meals in the course of the twenty-four hours. Where necessary, constipation was treated by salines in the morning.

If one form of iron disagree, we shall often find that another preparation may be taken without trouble. How the iron acts is still unsettled, but the theory of Bunge is a very plausible one. He believes that inorganic iron is not itself absorbed, since an equal amount can always be detected in the feces, but supposes, on the other hand, that it unites with the hydrogen sulphide or other sulphur compounds in the gastro-intestinal tract, and thus permits the absorption of the highly complex organic combination of iron which exists in food-stuffs, and which would otherwise pass off in the feces as an insoluble sulphide. Certain ingenious pharmacists, influenced by this hypothesis, have put upon the market preparations of albuminate of iron, but these are all of doubtful advantage. The diet should be liberal and nutritious.

As the girl gradually regains her color, acneiform eruptions on the face are not uncommon, but these are of trifling importance and yield to the ordinary treatment. I have found the systematic examination of the blood with Fleisch's instrument a valuable aid in encouraging patients to continue treatment until cured, as they grow interested in watching the steady increase in the hemoglobin percentage.

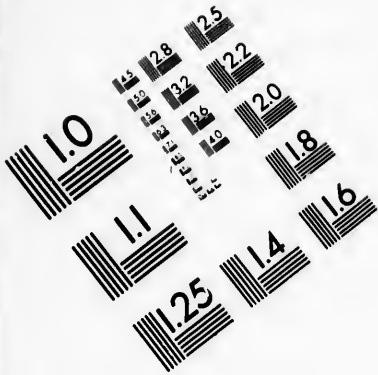
PROGRESSIVE PERNICIOUS ANEMIA.

This disease was first clearly described under the name of "idiopathic anemia" by Addison, whose account of the clinical history of the affection has become classical. Wilks, Lebert, Channing, and Gusserow all have added to the literature of the subject. Thus far, the disease had been studied chiefly in its clinical aspects, and it is to Biermer, who in 1868, discussed the pathology of the affection, that we owe the revival of interest in the affection, which since then has been studied by a host of observers.

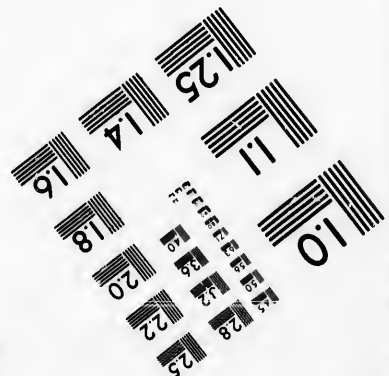
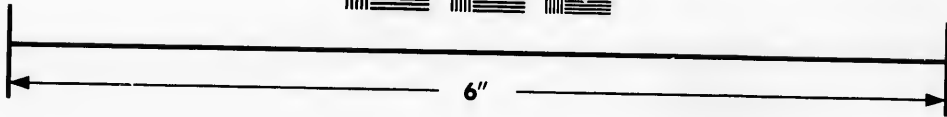
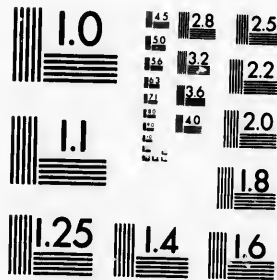
Etiology.—Addison as early as 1843 had spoken of the disease in his clinics; and in his monograph on the suprarenal capsules published in 1855, we find a brief account of this form of anemia, of which he speaks as follows: "For a long period I had from time to time met with a very remarkable form of general anemia occurring without any discoverable cause whatever—cases in which there had been no previous loss of blood, no exhausting diarrhoea, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous, or malignant disease." The name "essential anemia" had its origin with Lebert of Zurich (1858), while the term "progressive pernicious anemia" was coined by Biermer, who thought he was dealing with a previously unknown affection.

Addison's anemia is geographically widely distributed. It was thought at one time to be particularly common in the cantons of Switzerland, owing probably to the fact that it was confused with some of the many grave cases of





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secondary anaemia seen there. Many cases have been described in this country, and twenty-eight have come under my personal observation. Although the disease sometimes occurs in children, it is much more common in those of middle age. The youngest patient I have seen was a girl of twenty, but Griffith has collected some ten cases in patients under twelve years of age. Males are attacked more frequently than females.

There are, associated with certain known conditions, many instances of progressive and fatal anaemia which cannot be distinguished clinically from the idiopathic form of Addison. Severe anaemias accompanying pregnancy and parturition make up a large proportion of the reported cases of pernicious anaemia. Again, certain atrophic conditions of the gastric mucous membrane give rise to an anaemia at once progressive and pernicious, but by means of the improved technique for the investigation of the gastric contents it will sometimes be possible to exclude these *intra vitam*. Lastly, the grave secondary anaemias consequent upon the presence of intestinal parasites (*Anchylostoma duodenale*, *Bothriocephalus latus*) may be extremely difficult to recognize until after death.

In eighteen of my cases, however, there was absolutely no appreciable cause for the anaemia, and they therefore correspond to Addison's description. As yet we are unable to say definitely whether the cause of these obscure anaemias is to be looked for in a haemolytic process or in a defective haemogenesis. Stephen Maekenzie, F. P. Henry, and others believe that, owing to some fault in the process of blood-making, the corpuscles become abnormally vulnerable. The weight of opinion, however, on the whole, is in favor of an increased haemolysis. The experiments of Quincke and Peter with regard to the enormous increase of iron in the liver, and those of Hunter bearing on the excretion in the urine of quantities of pathological urobilin, are interesting in this connection.

Birch-Hirschfeld holds that the tissue-destruction and the retardation of blood-coagulation favor the idea of an infectious origin. Unfortunately, our knowledge of the etiology is as yet far too limited to enable us to construct any theory which is wholly adequate or satisfactory. Only by the most careful and minute examination after death of patients whose blood during life has been carefully studied according to modern methods can we hope to find the solution of the problem.

Morbid Anatomy.—The pallor of the whole body surface and of the organs is striking, and a characteristic lemon-yellow tint of the skin is present in many cases. As a rule, the body is not emaciated, and, as in most anaemias, the subcutaneous fat is not diminished. The muscles may be pale, but are often intensely red. Punctiform haemorrhages in the organs and on the serous membranes are quite common. The lungs are not particularly abnormal. The heart-muscle is very pale, light yellow in color, and shows in fresh teased preparations the most intense fatty degeneration. The walls of the ventricles are remarkably lax and flaccid, and the cavities contain light-colored blood. The intima of many of the smaller vessels may show patches of fatty degener-

ation. The fatty degeneration resulting from the disease is regarded as and fatty. Iron in the deposited in specimens a picture from the disease.

A. C. Scott's anaemia.

Naturally. The spleen sh increased. They were of has also been and is apparent Rindfleisch the and Rindfleisch was an inability normal non-n

Certain other. Such are the Wilks, and Bird noted by

Symptoms.—Healthy begins usually the onset is able to give the comes paler, and the capers are not aggravated, and characteristic less appetite is poor, oedematous, and The end is graph the patient can falls into a prostration to the very last, ness of the general striking contrast respect."

THE BLOOD

ation. The stomach in the purely idiopathic cases is normal, except for slight fatty degenerative changes in the cells of the secreting tubules. The anemia resulting from extreme atrophy of the mucosa must of course be no longer regarded as primary. The liver in most of my autopsies was normal in size and fatty. In some cases it was enlarged. The peculiar distribution of the iron in the liver seems to be characteristic of these cases, the pigment being deposited in the outer and middle zones of the lobules, and in two of my specimens appearing to outline the bile-capillaries. This is quite a different picture from that seen in secondary anemia, and may possibly be peculiar to the disease. The liver in forty-five consecutive autopsies examined for me by A. C. Scott showed this special lesion in no cases other than those of pernicious anemia.

Naturally, the hæmopoietic organs have been the objects of anxious study. The spleen shows no characteristic lesions; the amount of iron in it is usually increased. The lymph-glands may be unchanged, though in three of my cases they were of a rich deep-red color resembling spleen-tissue—a condition which has also been noted by Weigert. The amount of yellow marrow is diminished, and is apparently replaced by hæmoblastic red marrow. In a case reported by Rindfleisch the marrow appeared to be one huge mass of nucleated red cells, and Rindfleisch is inclined to think that the cause of the pernicious anemia was an inability of the organism to change the nucleated red cells into the normal non-nucleated red blood-corpuscles.

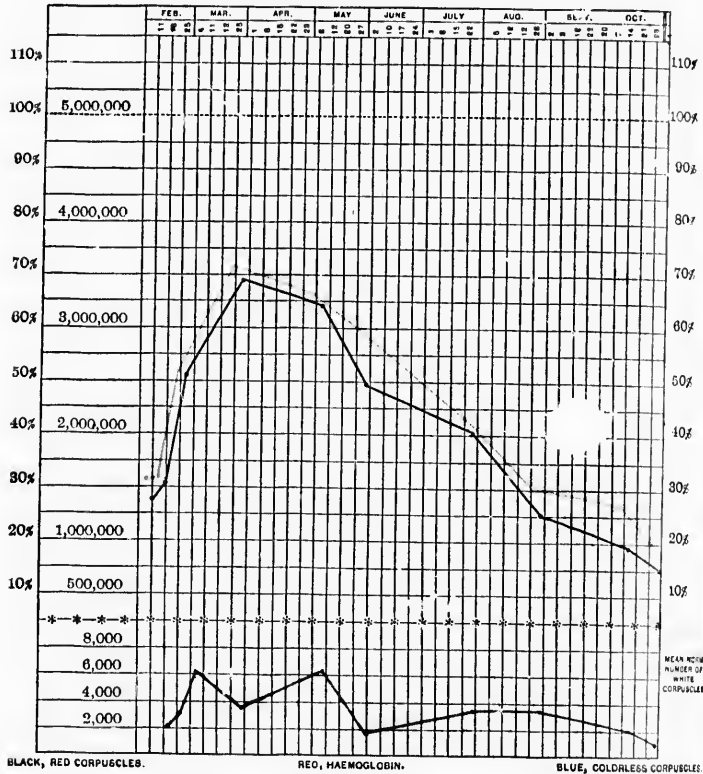
Certain other lesions have been described, but none of them are constant. Such are the changes in the sympathetic ganglia mentioned by Queckett, Wilks, and Brigidi, and the sclerosis in the posterior columns of the spinal cord noted by Lichtheim.

Symptomatology.—An individual who perhaps has before been perfectly healthy begins gradually to develop the symptoms of an anemia. Occasionally the onset is rapid, but as a rule it is so insidious that the patient is scarcely able to give the exact date of the beginning of his illness. He gradually becomes paler, and notices that he tires easily, gets out of breath, and has palpitation of the heart on the least exertion. Headache, vertigo, and ringing in the ears are not uncommon as early symptoms. All these may be gradually aggravated, and later on the pallor may be extreme, the skin assuming the characteristic lemon-yellow tint. The digestive organs become disturbed, the appetite is poor, and nausea and vomiting are frequent. The ankles become œdematous, and hæmorrhages may take place into the mucous membranes. The end is graphically described by Addison: "The debility becomes extreme, the patient can no longer rise from bed, the mind occasionally wanders; he falls into a prostrate and half-torpid state, and at length expires; nevertheless, to the very last, and after a sickness of several months' duration, the bulkiness of the general frame and the amount of obesity often present a most striking contrast to the failure and exhaustion observable in every other respect."

THE BLOOD EXAMINATION.—The oligocythemia is always marked, and

is generally extreme; in one case reported by Quinke there were only 143,000 red corpuscles to the cubic millimetre just before death. The oligochromæmia does not keep pace with the cell-reduction, the percentage of hemoglobin always being higher relatively than the percentage of red globules. In one of my cases the hemoglobin percentage was greater by 10 per cent. This relative increase in the individual globular richness is an important point in the differential diagnosis between this disease and chlorosis, as well as the secondary anemias. The value of this sign was first noted by Laache, and it has by many been considered pathognomonic of the disease.

Fig. 9.



Blood-chart of Case of Pernicious anemia.

While we acknowledge and appreciate its diagnostic importance, yet we must warn the student that even with the best clinical hemoglobinimeter (v. Fleischl's) which we possess the determination of the amount of coloring matter can only be approximate. Although in blood which is nearly normal

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the error may not amount to more than 2 per cent., Neubert and Letzius¹ have shown that when one examines a much-impooverished blood, such as is always found in pernicious anæmia, the error may be as great as 20 per cent., or one-fifth of the number read on the scale. Since the difference in relation between corpuscular and hæmoglobin percentages will never be very great, one would always be left more or less in doubt as to whether there were an actual increase in the *valeur globulaire* or not.

The fresh blood-slide reveals many megalocytes or macrocytes (Fig. 10 (2).)—large red globules measuring from ten to fifteen micro-millimetres across—which have been spoken of by Henry as indications of a “reversion to a lower type.” They are a constant feature in the disease, and it is supposed to be their large size which accounts for the relative hæmoglobin-increase. Furrbringer, basing his opinion on a study of seventy-five cases, claims that only those anæmias are to be regarded as pernicious where one-quarter of the red

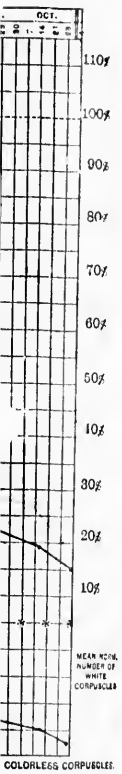


FIG. 10.



Red corpuscles from a case of profound anæmia. 1, 1. Normal corpuscles. 2. Large red corpuscle—megalocyte. 3, 3, 3. Very irregular forms—poikilocytes. 4. Very small, deep red corpuscles—

blood-corpuscles are macrocytes. Besides these, there are many dwarf forms known as microcytes, (Fig. 10 (4).) first described by Vanlair and Masius, which measure from 2 to 6 μ in diameter, as well as misshapen poikilocytic cells (Fig. 10 (3).) which are very frequent. There is no leucocytosis; indeed, the number of leucocytes would even appear to be diminished. The blood-plates are few in number or absent altogether.

One turns with interest to the results obtained from the study of dried and stained specimens. There is nothing remarkable about the leucocytes, except that the large mononuclear elements are relatively somewhat increased. Ehrlich, however, has pointed out the constant presence of two varieties of nucleated red blood-corpuscles in the disease: (1) the ordinary form or normoblast, which is about the size of an ordinary red globule, and contains a nucleus which stains intensely and is always placed excentrically in the cell; and (2) very large forms with large faintly-stained nuclei (megaloblasts or gigantoblasts of Ehrlich). (Plate I, Fig. 2 (h) and (i).) The former correspond to the nucleated globules occurring in the blood-forming organs in adult life, the latter to those of embryonic blood-development.

The megaloblasts are found only in very small numbers, and then much

¹ *Inaug. Diss.*, Dorpat, 1889.

degenerated, in the secondary anæmias; in pernicious anæmia and in the later stages of leucæmia they are numerous. Ehrlich's description of the different forms of degeneration of the red disks will be found of great interest. More particularly we would draw attention to the retrogressive changes revealed in specimens stained doubly with hæmatoxylin and eosin.

THE CIRCULATORY SYSTEM.—The important symptoms referable to the cardio-vascular system have been already mentioned, of which the distressing palpitation may give the patient most concern. On physical examination, besides the loud venous hum in the neck, murmurs may always be heard over the cardiac area. There may be visible pulsation and throbbing of the larger arteries, and in two of my cases venous pulsation was noted. A capillary pulse is frequently to be seen, and a sphygmographic tracing of the collapsing pulse may be quite suggestive of aortic insufficiency. Hæmorrhages into the skin and mucous membranes are by no means rare, and there may be retinal hæmorrhages, causing blindness or partial limitation of the visual field. An ophthalmoscopic examination should be made in all severe cases of anæmia. The tendency to fatal thrombosis spoken of in connection with chlorosis is never seen in pernicious anæmia.

THE RESPIRATORY SYSTEM.—In the earlier stages dyspnoea is commonly present—a symptom which later may be much aggravated, even to such an extent that the breathing becomes stertorous (anæmic dyspnoea). Toward the end œdema of the lungs and dropsical effusions may be looked for.

THE DIGESTIVE SYSTEM.—The lips and tongue are pale; the appetite is variable, but is generally poor. Dyspepsia, nausea, vomiting, and diarrhoea may be present throughout the whole course. The liver, as a rule, is of normal size, but the spleen is often slightly enlarged and its border at times palpable.

The urine gives evidence of decided changes in tissue-metamorphosis. The urea and uric acid are increased. A low specific gravity along with a dark-colored urine is more or less characteristic. Hunter and Mott, who have investigated the urine chemically, have proved this to be due to the presence of pathological urobilin, a substance differing in many ways from the urobilin found in normal urine. The addition to the urine of a few drops of an alcoholic solution of zinc chloride gives a marked green fluorescence, but the substance is best detected by spectroscopic examination. If pathological urobilin be present, a well-marked absorption-band will be visible lying close to the line *F* and fading off toward *b*, with a considerable absorption of the outer part of the blue spectrum. Peptonuria has little or no significance.

Fever may or may not be present. Thus, a normal temperature may be noted for weeks, and afterward be followed by an irregular pyrexia. The increased sensitiveness of certain bones (*e. g.* the sternum) to pressure has probably been exaggerated. With the "anæmic sclerosis" of the cord there are in some cases disturbances of sensation, and in one instance an extensive paralysis was observed by Lépine.

Diagnosis.—The essential points to be noted are—(1) the severe grade of oligocythæmia; (2) the increased *valeur globulaire*; (3) the presence of many

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macrocytes and giantoblasts; (4) the absence of any cause for secondary anemia; (5) occasional febrile disturbances; (6) the yellow tint of the skin; (7) hemorrhages, particularly retinal; (8) a progressive course and the inefficiency of treatment.

Pernicious anemia may be readily distinguished from chlorosis by the clinical examination of the blood, which will reveal in the former disease the increased globular richness in hemoglobin and the presence of Ehrlich's giantoblasts. Again, as we have said, the oligocythemia in chlorosis is never very marked. The differential diagnosis from some of the severe forms of secondary anemia may be extremely difficult. One can of course in most cases attain to a moderate amount of certainty from the study of the blood. The origin of the grave secondary anemias associated with gastric cancer or atrophy of the gastric mucosa may perhaps be cleared up by examining the stomach-juice according to modern methods. The skin, as a rule, too, in these cases has not the yellow tint, although the patient may present the signs of severe cachexia. Where intestinal parasites are suspected and the patient's condition will permit, a brisk purge may be given and the feces examined microscopically for the parasites or their eggs. Secondary anemia consequent on pulmonary tuberculosis or renal disease will scarcely be overlooked by a well-trained clinician, but even the shrewdest diagnostician will sometimes be able to discover at the autopsy some cause for a secondary anemia which he has regarded during life as an anemia of the true Addisonian type.

Prognosis.—The prognosis in a majority of cases is, as we might expect, very grave. Up to a short time ago the disease was supposed to be invariably fatal; indeed, some authors even now look upon reported cases of cure as examples of mistaken diagnosis. Since the introduction, however, by Byrom Bramwell in 1877 of the arsenic treatment, the results have been more favorable. Some cases appear to have been entirely cured, and in many the progress of the affection, at least for a time, has received a decided check. Of my own series of 28 cases, 2 have recovered under Fowler's solution; 16 are dead; several of the others remained in comparatively good health for a few years, and disappeared from observation. Relapses after marked improvement are extremely common, and such an occurrence is so characteristic that Stephen Mackenzie in his recent lectures makes a distinct class of what he calls cases of "relapsing pernicious anemia." I myself know of no instance in a male in which the improvement was maintained for more than five years, but one case reported recently by Hale White has enjoyed good health for eleven years after cure by arsenic.

Treatment.—In contradistinction to the beneficial effects of iron in chlorosis, in this disease the drug seems to do little or no good, and it is on arsenic that we must mainly rely. It may be given in the form of Fowler's solution in gradually increasing doses, but if the liquid preparation be not well borne, the patient will probably do well on pills of arsenious acid. My plan is to start with 3 minims of Fowler's solution after each meal, and increase to 5 at the end of the first week, to 10 at the end of the second week, and so on until

the patient is taking from 20 to 25 minims thrice daily. In one of my cases which remained well for three years I was able to push the drug up to 30 minims at a dose. The patients occasionally do surprisingly well, and toxic effects from the drug are unusual. Some persons, though, are more susceptible than others, and as soon as some oedema of the eyelids or digestive disturbances are noted, the administration of the drug should be discontinued until all such symptoms have disappeared, and then resumed at the dose at which we left off.

Rest in bed is essential at the beginning of the treatment. A light but nutritious diet is highly desirable, for the longer the digestive powers hold out the greater the hope. As a rule, the cases are best treated at home, removal to the seaside or mountain resorts being often disappointing. Birch-Hirschfeld¹ recommends, especially in the early stages, a residence in some immune place, citing Munich as an example. A systematic massage treatment is often of great benefit. The use of rectal injections of dried blood I can no longer advise. In the later stages the question of blood-transfusion arises: it is of doubtful advantage, and is certainly not free from danger. If anything be used, I would recommend the introduction of a warm physiological salt solution into the subcutaneous tissues, but even this can at best give only temporary relief.

THE SECONDARY ANÆMIAS.

This includes all those cases of anemia resulting from hæmorrhage and those coming on in the course of other affections. The blood-impoverishment is here due to a definite cause, and the consequent anemia is, as a rule, directly proportionate to the severity of the primary affection. But why under similar conditions, with apparently the same etiological factors at work, the anemia in one case may be slight and in another profound is difficult to explain.

The Blood.—No matter what the cause, the blood in the symptomatic anemias presents certain characteristics which are more or less constant. The degree of oligocythæmia may vary from a slight diminution in the number of corpuscles in a mild case to an enormous decrease, almost as great as would be seen in a case of pernicious anemia. The amount of hæmoglobin decreases *pari passu* with the number of red blood-corpuscles. At times the individual globular richness may be below par, but there is never an increase, such as occurs in pernicious anemia. The number of white blood-corpuscles is always relatively, and generally absolutely, increased.

The fresh blood-slide varies in its appearances according to the degree of anemia. In mild cases little or nothing abnormal may be noted, while in the severer grades one will find as marked alterations in the size and shape of the corpuscles as are ever seen in one of the essential anemias. Microcytes, macrocytes, and poikilocytes in such a case will be numerous. In stained specimens nucleated red blood-corpuscles can always be found, although the search may be a long one if the anemia be slight. It is the normoblast that pre-

¹ *Deut. med. Woch.*, 1892, Apr. 1, 28.

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dominates here, the megaloblasts being rarely seen. If there be a leucocytosis, the extra leucocytes are almost always polymuclear neutrophiles. This increase, which is generally present, is most marked in the anemia following a severe hæmorrhage.

CLASSIFICATION OF THE SECONDARY ANÆMIAS.

Any arrangement of the secondary anemias into groups has thus far been unsatisfactory, having been of necessity based on the etiology. Given a case of secondary anemia, it may often be difficult to decide which one of several possible causal agents present may have been responsible for the blood-improvement.

The most important groups are—

1. ANEMIA FROM HÆMORRHAGE.—The loss of blood may be the result of a lesion of a large vessel from injury or from rupture of an aneurism or from post-partum bleeding, or there may be severe hæmorrhage in cases of ulcer of the stomach or duodenum, or in cirrhosis of the liver from the œsophageal varices, and in various other conditions. By the so-called spontaneous hæmorrhages we mean those occurring in individuals suffering from a hæmorrhagic diathesis—*c. g.* in purpura, scurvy, and hæmophilia. Where the bleeding takes place quickly there is a diminution of all the blood-constituents, a true oligæmia. The total volume of blood may be so much diminished and the general arterial tension so lowered that death results in a few moments, and the more sudden and profuse the loss the greater the danger of fatal syncope. Thus, the rapid shedding of three or four pounds of blood would probably be fatal. In one case which I saw seven and a half pounds of blood, an unusually large amount, escaped into the pleura from rupture of an aneurism. On the other hand, where there are frequent hæmorrhages, provided always the blood-loss at any one time is small, an almost incredible amount may escape and yet the patient ultimately recover. Thus, I have known a man to lose over ten pounds of blood in one week from gastric hæmorrhage without succumbing. Sometimes we may be unable to obtain a history of hæmorrhage, as in cases of enterorrhagia from the *anchylostoma duodenale*, bothrioccephalus, or from cirrhosis of the liver, where the patient himself may be unaware of any such loss, and where for some reason or other the history is withheld, as may happen in the cases of female patients suffering from bleeding piles or metrorrhagia.

It is surprising to find how rapidly the regenerative processes go on, the normal amount being regained sometimes in a week or ten days after the hæmorrhage if it occur in a previously healthy individual. The lowering of the arterial pressure permits the absorption of lymph from the perivascular spaces in the tissues, even while the hæmorrhage is still going on. The albuminous, watery, and saline constituents are much more quickly renewed than the cellular elements, and it may be even weeks or months before there is a complete *restitutio ad integrum*. The restoration of the hæmoglobin does not keep pace during this regeneration with the corpuscular development.

2. **ANÆMIA FROM INANITION.**—Here the plasma, as a rule, suffers more than the corpuscles; the latter may be present in almost normal numbers to the cubic millimetre. The inanition may be due either to a deficiency in the food-supply or to disturbances of one or more of the various physiological processes by which digestion and absorption are carried on. Good examples of this form of anæmia are seen in cancer of the œsophagus or pyloric orifice, and in the chronic dyspepsias, especially in those due to atrophy of the gastric mucous membrane.

3. A prolonged drain on the albuminous materials of the blood, no matter what the cause, is accountable for a large group of cases of anæmia. The blood-impovertyment of Bright's disease, of chronic suppuration, of prolonged lactation, etc. may be explained in this way.

4. **TOXIC ANÆMIA.**—Under this heading may be tabulated the anæmias resulting from various poisons, organic as well as inorganic. The influence of lead, arsenic, mercury, and phosphorus as blood-globule destroyers is well known. Of the infectious diseases, tuberculosis, syphilis, and malaria are most frequently associated with anæmia. In malarial blood one may watch the corpuscles grow pale under the action of the plasmodial parasite. A post-typhoid anæmia is not uncommon, and in some cases the grade may be severe. In these toxanæmias the red blood-corpuscles may be directly destroyed as in malaria, or the ordinary rate of their consumption may be increased.

The anæmia accompanying pyrexia is due partly to the direct action of the poison producing the fever on the blood itself, partly, perhaps, to some interference with the working of the hæmopoietic organs.

Treatment.—Obviously, the first indication in the treatment will be for the removal of the cause. In the secondary anæmias, as in other secondary affections, this is unfortunately too often impossible. A careful physical examination of the organs and an examination of the gastric juice, sputum, urine, and feces by modern methods will often reveal the primary cause. It might seem unnecessary to speak of this were it not well known that the anæmia accompanying malaria has been treated with iron before any attempt was made to kill off the swarms of plasmodia which were the active cause of the blood-degeneration. In every case strict attention must be given to the dietetic and hygienic management, a part of the treatment fully as important as the administration of drugs. The blood in the anæmia following sudden hæmorrhage in individuals previously healthy may be restored with astonishing rapidity, and often without any medicine.

It is generally best to begin by confining the patient to bed. For the anæmia, apart from the treatment of the primary cause, iron is the best drug. The particular form chosen must depend in each case to a great extent on the idiosyncrasies of the patient and the condition of the alimentary tract. In by far the greater number of cases Bland's pills were found to be perfectly satisfactory, though some patients do better on the officinal tincture of the perchloride. Janeway prefers the tartrate of iron and potassium, but perhaps it may be necessary to search still further before the preparation appropriate

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THE LEUCOCYTOSES.

Besides the different forms of leukemia to be presently discussed, there are many conditions in which the number of leucocytes in the blood is increased. These non-leukemic processes since the time of Virchow have been spoken of as leucocytoses. In his *Cellular Pathology* he describes a "physiological" leucocytosis occurring after meals and in pregnancy, and a "pathological" leucocytosis belonging to acute inflammations, such as erysipelas and pneumonia. He explained the phenomenon by supposing that the substances carried to the lymphatic glands stimulated their cells and caused them to proliferate, and, as the leucocytes were thought to arise from a proliferation of these cells, it was readily conceived that they should immediately be found in greater numbers in the blood. Since then numerous observers have studied the blood in the most varied diseases, and found in many, particularly in the acute suppurative diseases, a pronounced leucocytosis.

Much light has been thrown on the subject since the discovery of the existence of chemotactic processes. When one considers the tremendous number of leucocytes which accumulate in a short time in the formation of a large abscess, he cannot help wondering whence they have all arisen. Inasmuch as in all acute suppurative processes there is an extensive increase in the number of the leucocytes in the blood, besides the aggregation of leucocytes at the seat of inflammation, it is obvious that the leucocyte-building organs are capable of being suddenly aroused into an enormously increased activity. The study of pus and of dried and stained specimens of the blood from these cases shows that the extra number of leucocytes is made up almost entirely of polymuclear neutrophiles.

Speaking generally, we are able to guess in any acute disease whether or not there will be a leucocytosis. If the disease be one in which there is a pronounced local reaction—*i. e.* a disease associated with inflammatory exudation in a certain part of the body—then there will almost certainly be an increase in the number of polymuclear neutrophiles also in the blood. On the other hand, where there is little or no local reaction, no matter how intense the general process, then we shall expect only a slight leucocytosis or none at all.

The local reaction is to be regarded as the result of a positive chemotaxis. There are, as we now know, certain substances which attract, and certain others which repel, the white blood-corpuscles. Such substances are spoken of respectively as being positively and negatively chemotactic. Of their nature we as yet know but little; it seems probable, however, that they are products closely allied to the alkali-albuminates which result from the necrosis of certain tissue-cells. Buchner and his pupils conclude from their investigations that the protein substances of the bodies of micro-organisms are posi-

tively chemotactic, and that the presence of dead bacteria suffices to become for the attraction of the leucocytes (Römer). This does not, however, explain the chemotaxis resulting from the injection of substances like turpentine, nor that which taken place about certain necrotic areas in the liver and lymph-glands which have been shown to bear no direct relation to micro-organisms. The subject, however, is too wide to admit of a full discussion here. We would emphasize the fact that leucocytosis occurs, as a rule, only in diseases which have a local reaction, and that its extent is proportionate to the latter, so that we are able to say *a priori* in a given infectious disease whether or not a leucocytosis will exist. Thus in a croupous pneumonia or in a suppurative pleurisy there will be a leucocytosis proportionate to the extent of the lung or pleura involved, while in typhoid fever or malaria, where there is no marked local reaction, there will be little or no leucocytosis. Indeed, in typhoid the number of leucocytes would appear to be diminished. This peculiar character of the blood in typhoid fever furnishes us with a ready method of discovering complications in that disease. I have often in my own wards seen a leucocytosis appear precisely at the onset of a complicating pleurisy or pneumonia in the course of typhoid fever.

The course of the leucocytosis in pneumonia is extremely interesting. Increasing with the lung-consolidation, it reaches its maximum just before the crisis, and then the decrease in the number of leucocytes is as marked as the fall in temperature. Thus, a leucocytosis of 20,000 to 30,000 may drop within a few hours to 6000 or 8000. There is some reason for believing that the greater the degree of local reaction (of which the leucocytosis may be regarded as an index) in a disease like acute lobar pneumonia, the less is the virulence of the general blood-poisoning. Thus Tschistowitch claims that in a pneumonia where the leucocytosis is slight or absent the termination is always fatal. The theory has received some support from von Jaksch; and if these results are confirmed, the blood-examination in pneumonia will be of great use for the prognosis. In one of my own cases, however, there was a leucocytosis of over 45,000 to the cubic millimetre just before death, the autopsy showing a croupous pneumonia of the right upper lobe, together with a fibrino-purulent pericarditis, with myriads of the lanceolate pneumococci in the exudate. In a recent fatal case there was a leucocytosis of 114,000 to the cubic millimetre. The disappearance of the leucocytosis in erysipelas is, as in pneumonia, also by crisis.

In addition to these inflammatory leucocytoses, a large, sometimes enormous increase of the leucocytes has been observed in the cachexias of malignant neoplasms. How far this leucocytosis is dependent on the local reaction in the neighborhood of the tumor (necrosis and wandering-in of leucocytes) is not as yet clear.

LEUKÆMIA.

Definition.—A peculiar disease, assuming various forms, characterized by a persistent increase in the number of the white blood-corpuscles, associated

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with alterations occurring either singly or together in the spleen, lymph-glands, and bone-marrow.

History of the Affection and its Different Forms.—Though the claim to priority has been much disputed, it is now generally agreed that Virchow was the first to recognize the increase in the white blood-corpuscles as an essential feature of the disease. He gave it the name leukaemia. Virchow's article appeared in November, 1845; in October of the same year Bennett and Craigie had described a case in the *Edinburgh Medical Journal*, but thought that the peculiar blood-condition was due to the presence of pus, and accordingly spoke of it as a suppuration of the blood. Other cases had been observed by Piörny and Rokitsansky, who also believed that they were dealing with a pyæmic condition. Vogel in 1849 was the first to diagnose the disease during life. In 1851, Bennett collected additional cases, and gave the name of leucocythæmia to the disease. In the following year the same authority published a monograph on the subject, claiming for himself priority in the discovery of the affection—a paper which aroused a lively controversy between the professors of Edinburgh and Berlin.

Virchow described two forms of the disease. In his *Cellular Pathology* he states that he was able to recognize one class of cases as characterized by the presence of a large number of the smaller forms of leucocytes in the blood, together with marked involvement of the lymph-glands; in another series of cases, where the spleen was much enlarged, it was the larger white blood-cell forms that were predominant. Many years later Neumann described a myelogenous form in which the bone-marrow showed marked changes. Although it has been customary to speak of lymphatic, splenic, and myelogenous leukaemias, it is rare to find a pure form of any one of these, more particularly of the two latter. So far, only one case of pure myelogenous leukaemia has been recorded (Leube and Fleischer), and whether a splenic leukaemia can occur independently of bone-marrow changes would seem doubtful. The lymphatic form is, however, sharply separated from the others both clinically and anatomically, and there would seem to be a tendency at present to group all leukaemias under two headings—(1) splenic-myelogenous and (2) lymphatic leukaemia.

Behier reported an intestinal type characterized by changes in the lymphatic apparatus of the bowel, and Kaposi in 1885 recorded a case in which the lymphatic elements of the skin were first involved—an affection to which he gave the name lymphoderma perniciosum. The cases in which the tonsillar and pharyngeal lymph-elements seem to be primarily affected are of peculiar interest, as we shall point out when we speak of the etiology of the disease.

A distinction between acute and chronic leukaemia is justifiable, but the former is much less common than the latter.

Etiology.—Notwithstanding most careful clinical study and thorough histological and bacteriological investigation, the secret of the causative factor in this disease is almost as profound now as it was half a century ago. The idea that leukaemia is a specific infectious disease (Klebs, Osterwald, Roux) has,

however, gained ground during the past decade. Histologically, there are many points of resemblance between leukaemia and the infectious granulomata; and this, taken with the fact that the acute cases running a fatal course in a few days or weeks with high temperature correspond throughout to the clinical picture seen in the acute infectious processes, goes far to make a micro-organismal origin probable.

An interesting case has been recorded recently by Obrastzow, in which the attendant of a patient suffering from acute leukaemia developed the same disease and died: this suggests not only infection, but also the possibility of direct contagion, but inoculations with leukaemic blood have so far been without result.

Since Hinterberger in Nothnagel's clinic pointed out that by far the larger number of the acute leukaemias are accompanied by a stomatitis or by intestinal ulceration, we are tempted to regard these not as complications, but rather as primary affections affording a gateway of entrance (infection-atrium) for the leukaemic virus. A patient with splenic-myelogenous leukaemia, who entered my clinic in August, 1892, gave a history of a dysenteric attack two years previously—*i. e.* in the summer of 1890—but dated his splenic enlargement only from February, 1892: while the splenic tumor must have existed longer than this, yet the cases in which a leukaemia has been preceded by intestinal lesions occur far too frequently to allow us to regard the circumstances as merely accidental. Troje has speculated further, and suggested that in the chronic leukaemias, where enlargement of the cervical lymph-glands occurs early, the virus may have entered by way of the swollen tonsils. At a recent medical meeting in Berlin,¹ Troje advanced the theory that the so-called pseudo-leukaemia represents a leukaemic condition, the forerunner of a true leukaemia. While cases which have been definitely diagnosed as pseudo-leukaemia have, under the eyes of thoroughly competent clinicians, been observed to pass on into true leukaemia, yet the statistics are too limited to permit us to hold that such a relation is constant. The peculiar disease occurring in children under two years of age first described by von Jaksch (who named it "anaemia infantilis pseudo-leukaemia"), and subsequently by Luzet, in which clinically one finds the spleen somewhat enlarged, the blood oligocythaemic with an increased number of white blood-corpuscles, would seem to stand in an intermediate position between the pseudo-leukaemia of Hodgkin and Troussseau and the true splenic-myelogenous leukaemia: where the affection is not terminated early by an associated gastro-enteritis, the blood may assume the characteristics of a true leukaemia, the so-called "hypertrophic" leucocytes being present.

So far, no micro-organism has been definitely proven to be the cause of the disease: the monads of Klebs, the cocci-like bodies described by Byron Bramwell, the bacilli of Majocchi and Biechimi have probably nothing to do with the affection. Kelsch and Vaillard report a case in which they found bacilli, and recently Pawlowsky of Kiew² describes a bacillus which he claims is peculiar to leukaemia and which he found in six successive cases. The organism

¹ *Dent. med. Woch.*, 1892, No. 16.

² *Dent. med. Woch.*, 1892, No. 28.

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What the true nature of the disease is, is a question which must still be left open; scarcely any one now-a-days looks upon it as a primary blood-disease; on the contrary, the blood-condition is generally regarded simply as an expression of the pathological changes going on in the hæmopoietic organs.

Leukaemia is not uncommon on this continent. Of the 18 cases of which I have notes, 11 occurred in Montreal, 2 in Philadelphia, and 5 within the last two years at the Johns Hopkins Hospital. It does not seem to be more frequent in the South.

It may occur at any age, though most common in the middle period of life. I have seen a case at eight months, and it has been known to occur as early as the eighth or tenth week and as late as the seventieth year. Eleven of my cases were males, and the disease is undoubtedly less frequent in females; thus of 200 cases collected by Birch-Hirschfeld, 135 were males and 65 females.

Although the majority of the patients come from the lower and middle classes, no definite influence can be attributed to social and sanitary conditions. Mental worry and depression have been mentioned as predisposing causes. A history of injury—a fact to which De Chappelle has drawn especial attention—is not infrequent: 3 of my patients laid great stress on this, 2 ascribing their disease to having strained themselves by over-lifting, and 1 to the effects of a kick from a horse. It seems quite improbable that traumatism by itself could set up a process of this kind.

That malaria and syphilis bear any etiological relation to leukaemia is scarcely probable, although in 150 cases analyzed by Gowers, 30 had a malarial history, and over one-third of my cases had previously suffered from malarial invasion.

In female patients the affection most often develops at the climacteric, though pregnancy would seem somewhat to predispose to it. A patient of Cameron's at Montreal passed through three pregnancies, bearing on each occasion a non-leukaemic child. That heredity, however, plays some part is shown by this same case, since the grandmother, mother, and one brother of the patient suffered from symptoms strongly suggestive of leukaemia, and two of her children died of the disease. A leukaemic child may, on the other hand, be born of a healthy mother (Sanger).

Dogs not infrequently have leukaemia, and it has been described in horses, oxen, cats, swine, and mice (Bollinger, Eberth).

Symptomatology.—The onset (in the splenic myelogenous leukaemia) may be so insidious that the splenic tumor may fill a large part of the abdomen before the patient suffers much inconvenience. As a rule, it is for this "lump in the side" that he first consults the physician, or perhaps he notices that he has been getting short of breath and has palpitation of the heart, pallor, and other symptoms common in anaemia. Epistaxis and gastro-intestinal symptoms often occur early; they may even precede the onset of the disease.

On the occurrence of a previous dysentery we have already remarked. There are instances in which a sudden or fatal hæmorrhage has been the first symptom. In one of the cases of my series a boy who died of hæmatemesis had been two days before apparently quite well, and had played in a game of lacrosse.

The symptoms referable to the stomach, such as a feeling of oppression after eating, nausea, and vomiting, are rarely absent. The vomiting, in fact, often appears early, and is at times a troublesome feature. The bowels are usually loose, diarrhoea frequently occurring early in the disease: this is said to be more frequent in those cases in which the lymph-follicles of the intestines are involved. The stools are thin and watery; in some cases there is a true dysenteric process in the colon, with tenesmus, and mucus and blood are seen in the feces.

The liver becomes enlarged at some stages of the disease; jaundice is not common, but may result from obstruction due to catarrhal inflammation of the duct or to pressure of the glands in the hilus of the liver. Ascites may be a prominent symptom, and is probably due either to the splenic tumor or to the pressure of enlarged glands on the portal vein. Willecocks has described a leukæmic peritonitis due to new growths in the membrane.

The Blood.—No matter what the form of the disease, it is the blood examination alone that offers distinctive features. We have already mentioned the different forms of leucocytes, and the relative proportion of those of each form to the whole number in health. In the lieno-myelogenic forms of leukaemia the most striking blood-change is the enormous increase in the number of the white cells. Instead of the normal proportion of 1 white to 500 or 1000 red cells, the proportion in leukaemia may be 1 to 10 or 1 to 5, or the two kinds may occur in equal numbers; indeed, there are cases recorded in which there were actually more colorless than colored elements. A drop of blood from the finger-tip in a well-marked case will be more or less turbid, reddish-brown in color, or in extreme cases possibly chocolate-colored. Very often a single glance through the microscope at the fresh blood-slide will settle the diagnosis. Much discussion had taken place before we were well acquainted with the affection as to how great an increase there must be in the number of white blood-cells, and what relation of whites to reds is necessary to constitute a leukaemia. After this, when Ehrlich had pointed out that as a rule the eosinophilous cells were increased in the disease, clinicians went astray in regarding an increase in those cells as pathogenic of leukaemia. While it is true that they are generally both relatively and absolutely increased, this is by no means always the case, and besides, we must not forget that their number may be as great or even greater in certain other affections, and even at times in health. The lymphocytes (Plate I, Fig. 1, *b, b, b*) are relatively diminished in number; instead of making up 20 or 30 per cent. of the whole number of white cells, these small mononuclear forms may be reduced to less than 1 per cent. The leucocytes with polymorphous nuclei and neutrophilic granules (Plate I, Fig. 1, *e, e*) may be present in normal proportions; usually, how-

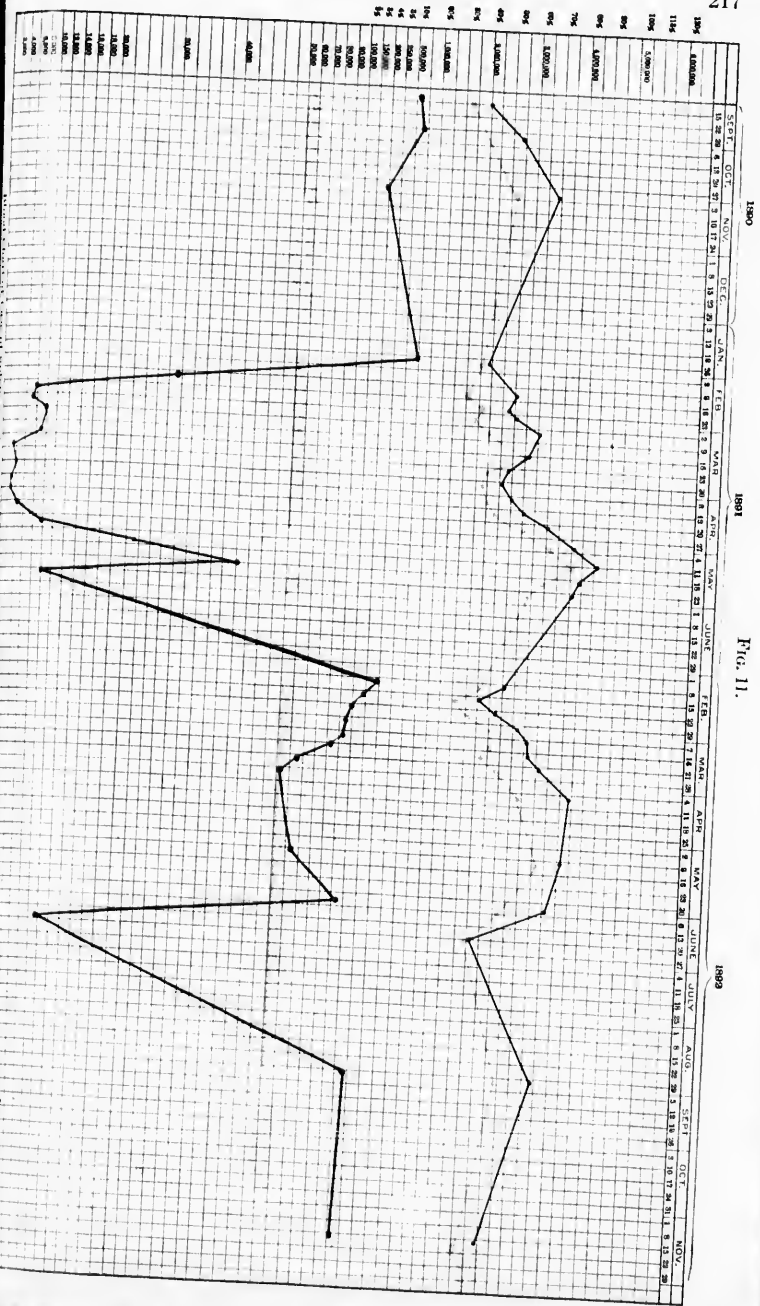


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ever, they are relatively diminished, and may, especially in the later stages, be very few in number. In the dry preparations the numerous brightly-stained eosinophiles (Plate I, Fig. 1, *f*) form a striking picture, but in this variety of leukaemia the most important characteristic of the blood is the presence of certain cells which may be said not to occur at all in normal blood. These cells closely resemble the large mononuclear leucocytes, but differ from them in several important particulars. Ehrlich has studied them with great care, and first described them as large mononuclear forms containing a fine thickly-set ϵ - or neutrophilic granulation. Believing that they originated in the bone-marrow, he has named them myelocytes. (Plate I, Fig. 2, *g*.) In one of my cases, in which the blood was examined by Thayer according to Ehrlich's method, these myelocytes at one time made up nearly 25 per cent. of the whole number of white corpuscles. H. F. Müller has described large white elements in the blood in this disease, varying in size, but being usually one-third to one-half larger than the ordinary white cells; the nucleus is large, plump, and oval, and usually lies excentrically, and its intranuclear network is more delicate than that of the ordinary leucocytes; the cell-body is often surrounded by a slightly thickened layer of cell-substance. Mitoses were numerous in these cells, and Müller has shown that precisely similar cells and karyokinetic figures occur in the bone-marrow. Similar cells had also been described earlier by Cornil and were named by him *cellules medullaires*.

My own study has convinced me of the importance of this peculiar cell-form for the diagnosis of a myelogenic leukaemia, and I have no doubt that Ehrlich, Cornil, and Müller have been describing under different names the same morphological element.

Occasionally there are leucocytes in the blood of leukæmic patients which contain basophilic granules; they are by no means always to be found. As a rule, there is no marked oligocythæmia, the red corpuscles rarely going lower than two millions per cubic millimetre; the amount of hæmoglobin corresponds to the decrease or is reduced in a somewhat greater proportion. Nucleated red blood-corpuscles are present, and, as a rule, in considerable numbers; they are chiefly normoblastic in type (Plate I, Fig. 2, *h*), but megaloblasts (Plate I, Fig. 2, *i*) occasionally occur. Cases with the blood of the type of a pernicious anæmia have subsequently developed a true leukemia.

In the pure lymphatic leukaemia the blood-condition is quite different. Here one never meets with the enormous increase in the number of white cells described as characteristic of the ordinary form, a proportion of 1 to 10 being rarely exceeded. The increase takes place solely in the small mononuclear elements (lymphocytes), the large mononuclear and polynuclear forms being relatively greatly diminished in number. The enormous disproportion is well shown in a case described by Uthemann, where 93 per cent. of all the white cells were lymphocytes. Eosinophilous cells and nucleated red corpuscles are rare; myelocytes are, as a rule, not present unless there be an associated disease of the bone-marrow.

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Just as there are mixed forms of leukaemia, however, so the blood-condition may deviate from the two types above given. In a case of acute leukaemia which came into my clinic at the Johns Hopkins Hospital, where the glands as well as the spleen and bone-marrow were affected, in the blood, besides a large proportion of lymphocytes and myelocytes, many large mononuclear leucocytes were present.

In leukaemic blood one not infrequently finds a number of polymuclear leucocytes devoid of the usual ϵ -granules—a phenomenon as yet not understood. The want of amoeboid movement in the white cells of the blood in leukaemia was first pointed out by Casafy; this is particularly noticeable when one compares leukaemic blood with normal specimens on the warm stage. The explanation is easy to find, since we know that of the leucocytes in health it is only the polymuclear forms which have active amoeboid movements. Other points to be mentioned are—(1) the abundance of blood-plates in many cases; (2) the unusually dense fibrin network between the corpuscles; and (3) the appearance of Charcot's octahedral crystals in blood-slides which have been kept for a short time.

The Circulatory System.—It is rare that there are symptoms referable to the heart, although the apex-beat may be displaced considerably upward by the enlarged spleen. The pulse, though large in volume, is usually frequent, soft, and of low tension. (Edema of the ankles, or even general anasarca, may occur toward the end of the disease. Hemorrhages are common in all stages, those from the nasal mucous membrane being the most frequent.

In two cases which I have seen fatal hæmatemesis occurred before there was any suspicion of an existing leukaemia. Hemoptysis and hæmaturia are rare; cerebral apoplexy was the cause of death in one case of my series. The "leukemic retinitis" is another manifestation of the hæmorrhagic tendency.

OTHER ORGANS.—The shortness of breath is due, as a rule, to deficient oxygenation owing to the oligocythæmia. The lungs are scarcely ever responsible for any symptoms until toward the end of the disease, when œdema or pneumonia may carry off the patient.

If we except the cerebral symptoms, such as headache, dizziness, and fainting spells, which are associated with anemia, the central nervous system does not seem to be much affected. We have already spoken of the occurrence of sudden coma following hemorrhage from one of the cerebral vessels. The peculiar retinitis, which is by no means rare, consists chiefly of hæmorrhagic patches, but there are also sometimes true leukemic new growths with aggregations of round-cells in the retina. A genuine optic neuritis is not common. The hearing is frequently affected, and deafness may come on early in the disease. As a rule, the temperature is more or less elevated, ranging at times as high as 102° or 103° F., but periods of pyrexia may alternate with prolonged intervals of normal temperature.

The urine may be albuminous, but it is by no means always so. There is an abnormal increase in the amount of uric acid excreted, which Salkowski believes may stand in direct relation to the splenic enlargement. The cause

of the persistent priapism which often occurs is unknown. In a case recorded by Edes it was the first symptom; it may persist for days or even weeks (Peabody).

The Spleen.—When a patient suffering from lieno-medullary leukaemia first consults the physician, the spleen is nearly always much enlarged, and, though usually somewhat tender, may give rise to very little inconvenience. Its border will be felt in the left side of the abdomen as a hard, smooth rounded lump which rolls over the finger-tips with each full inspiration. The organ when much enlarged may extend as far as the navel, and I have even seen it fill the whole left side of the abdomen and extend into the right iliac

FIG. 12.



Case of Lieno-medullary Leukaemia—showing enlargement of spleen.

fossa. (See Fig. 12.) One can sometimes feel a friction fremitus over the tumor, and on auscultation, besides the rub, a "splenic souffle," systolic in rhythm, may sometimes be heard. Gerhardt has described a pulsating spleen in one of his cases of leukaemia.

That the tumor is the spleen is, as a rule, easily decided from the position, form, and feel of the enlargement; moreover, not infrequently one is able to clearly make out a notch, or even several notches, in the anterior border. It varies much in size from time to time; after meals it is increased, after haemor-

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rbage or severe diarrhœa diminished. As might be expected, pressure-symptoms sometimes occur, such as distress after eating or obstruction of the bowels, from the latter of which death has been known to result.

The Lymph-glands and Bones.—In ordinary leukaemic patients it is rare for the lymph-glands to be much enlarged: after the spleen has become very large the lymphatic glands may increase in size, but even then it is the superficial ones which are generally affected. One never sees such huge bunches of them as are found in the pseudo-leukaemia of Hodgkin. In pure lymphatic leukaemia the lymph-glands are generally enlarged, and the spleen perhaps only slightly so, but the disease is a very rare one indeed, and needs further study.

There may be scarcely any tenderness over the bones during life, which at autopsy show the most advanced marrow-changes; the patients sometimes complain when the sternum is percussed in the course of the physical examination. Irregularity and deformity of the ribs, the sternum, and other flat bones occasionally result from the leukaemic bone-changes.

Morbid Anatomy.—The body is pale and may be much emaciated; œdema and dropsical effusions are common. When the heart or aorta is opened, the blood is usually found to be clotted, the clots having a peculiar greenish-yellow color, reminding one of the fat of a turtle. When the increase in the white elements has been extreme, the color of the clotted masses may be yellowish-white, and it has more than once happened (as in a case of Virchow's) that the observer on opening the right auricle has believed for a moment that he had before him an abscess. The large amount of blood in the heart and vessels is a noteworthy feature; in one of my cases the heart-chambers alone contained blood-clots weighing 620 grammes. All of the vessels were engorged in the same way, the portal vein just above the union of its branches measuring 11 cm. in circumference.

The blood has been examined chemically by various observers with results which do not altogether correspond. Seherer as early as 1852 found hypoxanthin, lactic acid, formic acid, acetic acid, leucin, and tyrosin present, and the diminution of the alkalescence of the blood (it is even acid at times) has been supposed to be due to organic acids. The presence of a notable quantity of peptones has been mentioned by Salkowski, and confirmed recently by Freund and Obermayer.

The octahedral crystals which are found in blood which has been allowed to stand for some time were first described by Charcot and Robin. Their nature is as yet imperfectly understood: some have thought them to be tyrosin, but Gamgee claims that they represent a phosphate of the same organic base discovered by Schreiner in semen and other animal fluids.

The specific gravity of the blood is lowered—varying from 1035 to 1050—and the watery constituents are increased. We possess as yet no satisfactory knowledge of the condition of the albuminous bodies and salts.

On examining the heart it will be found pushed up the distance of an intercostal space; the serous membranes (peri- and endocardial) not infre-

quently present ecchymoses, and leukiemic new growths may exist there as well as on the peritoneum. The cavities of the heart are, as a rule, dilated and the myocardium soft; if the papillary muscles be teased out, a moderate grade of fatty change is evident. Beyond an occasional fatty degeneration of the intima there is no recognizable histological alteration of the walls of the vessels.

As we have said, the spleen is nearly always enlarged. Externally there may be the sign of an old perisplenitis, with adhesions to the abdominal wall, diaphragm, or stomach, the capsule in these cases being often greatly thickened. The arteries and veins at the hilus are enlarged. The organ may vary in weight from two to eighteen and a half pounds, the latter weight being the heaviest on record. On section the spleen is firm and tough and the surface a reddish or purplish brown. There may be throughout the organ hæmorrhagic infarctions or areas of a rusty, reddish-brown color, the site of old extravasations. The Malpighian bodies are not prominent; indeed, they are, as a rule, not recognizable. On the other hand, grayish-white, well-defined lymphoid tumors may occur throughout the organ, contrasting strongly with the reddish-brown ground-substance. If the spleen be seen in an early stage and before the disease has progressed far, it will be found softer, and there will be swelling of the pulp and proliferation of the cellular elements; rupture of the spleen, it is said, has happened at this period from the excessive hyperæmia. Microscopical examination shows this proliferation to be general; karyomitotic figures and large myeloplques are seen here as well as in the lymph-glands and bone-marrow.

The lymph-glands may be enlarged in the chronic form of leukaemia, but the hyperplasia is not extensive. In the acute lymphatic leukaemia all the lymph-glands of the body may be involved, the cervical, axillary, mesenteric, and inguinal groups most frequently, less commonly the bronchial and mediastinal. The glands are soft and easily movable, scarcely ever being matted down by a periadenitis. As in other lymph-gland affections, the size varies from time to time, often diminishing notably before death. On section the grayish color of the healthy gland is not seen; instead, the surface usually has a grayish-red color, and there are evidences of hæmorrhages into the substance.

The pathological changes in the bone-marrow have been closely studied since the investigations of Neumann. That observer claimed that the medulla of bones was affected in every case of leukaemia; there are instances, however, where no such changes are recognizable. In the majority of examples of the lieno-medullary form described by the Germans one finds that the normal fatty marrow undergoes marked alterations. Examination of, say, one of the middle lumbar vertebrae or the extremities of the long bones reveals a dark reddish-brown substance quite different from that seen in health. Occasionally there are hæmorrhagic infarctions, as in Ponfick's case, and as a result of the proliferation there may be expansions here and there of the bony case, forming localized swellings. Smear cover-glass preparations, dried in the air,

heated and fixed, are frequently stained with methylene blue, the cellular elements of the blood. Many of the cells in their interior contain granules of leucocytes, and cell-inclusions are frequently abundant. The health or disease of the blood is determined by the changes; thus, in the intestine, the tissue may participate in the different stages.

The liver is enlarged, and weighed over 1000 grams due to a diffuse hæmorrhagic columnar liver, the blood-vessels are dilated.

The large leucocytes in 12 autopsies—described in the organs, the numerous cells and formations arise since the cell in the nuclear leucocyte is improbable.

Diagnosis.—The majority of instances of the white cell leucæmia in hospital practice, the blood-condition, the ordinary spleen present even when the course of a case is at p. 220. The patient had 2,000,000 with 30 per cent. in 1891, when he became twenty-three days cubic millimetre with hundredth part of

¹ Vide

heated and fixed with Flemming's solution or with picric acid, and subsequently stained with saframin or dilute hæmatoxylin, show most beautifully the cellular elements and their nuclei. Müller thus convinced himself of the identity of the medium-sized marrow-cells with the large multinuclear cells in the blood. Many mitoses were seen, and myeloplques containing leucocytes in their interior. The theory that these latter represent an endogenous formation of leucocytes cannot be supported,¹ for we are probably here dealing with cell-inclusions. Nucleated red blood-corpuscles and eosinophilous cells are abundant. The function of the huge giant-cells of the marrow, whether in health or disease, is still unknown.

Wherever there are lymphatic elements in the body there may be leukæmic changes; thus the thymus gland, the solitary and agminated follicles in the intestine, the tonsils, the lymph-follicles of the tongue, pharynx, and mouth, may participate in the process. Even the little collections of lymph-corpuscles in the different organs, in the lungs, liver, kidneys, etc., may undergo proliferation.

The liver is frequently enlarged. Welch has described a case in which it weighed over thirteen pounds. Histologically, the enlargement is seen to be due to a diffuse leukæmic infiltration; the capillary ectasis is extreme, and the columns of liver-cells are widely separated by the crowds of white elements in the blood-vessels.

The large leukæmic tumors, though rare—being seen only in 1 case in my 12 autopsies—deserve more than a passing mention. When they are present in the organs, they appear as grayish-white nodules, and show microscopically numerous cells undergoing karyomitosi. It has been supposed that these formations arise from cells which have emigrated from the blood-vessels, but since the cell in the leukæmic new growths does not at all resemble the polynuclear leucocyte, the only one supposed to leave the vessels, this view seems improbable.

Diagnosis.—This rests entirely upon the blood-examination, and in the majority of instances is easily made. In doubtful cases the differential count of the white elements by the methods of Ehrlich should not be neglected; in hospital practice a color-analysis should always be made. Aside from the blood-condition, the clinical features may be indistinguishable from those of an ordinary splenic anæmia or Hodgkin's disease. That the disease may be present even when the leucocytes are not increased in number is well illustrated by the course of a case the chart of which is given at p. 217, and the spleen outline at p. 220. The patient, a negro, was first seen in the fall of 1890, at which time he had 2,000,000 red and 500,000 white blood-corpuscles per cubic millimetre, with 30 per cent. of hæmoglobin. He neglected treatment until January 29, 1891, when he began to take arsenic regularly in increasing doses, and in twenty-three days—*i. e.* on February 21st—the number of white cells to the cubic millimetre was found to have fallen from 714,000 to 7500, or only one-hundredth part of what they were before. The red blood-corpuscles had risen

¹ Vide H. F. Müller, *Deut. Archiv. f. klin. Med.*, vol. xlvii. p. 47.

in number to 3,500,000, and the hæmoglobin had increased to 44 per cent. Could one under these circumstances, seeing the case for the first time, have made the diagnosis of leukaemia? It is here that the value of Ehrlich's methods is well demonstrated. A careful color-analysis was made by my assistant, W. S. Thayer, at different times, and the estimates given in the following table were based on differential counts of at least one thousand leucocytes at each examination :

	Normal Blood.	Nov. 9, 1890.	Jan. 29, 1891.	Feb. 7, 1891.	Feb. 14, 1891.	Feb. 21, 1891.	Feb. 28, 1891.
Lymphocytes	20-30%	2.1%	0.96%	1.5%	2.7%	6.9%	10%
Polynuclear	60-75	73.8	70	83.9	84.7	83.2	78.1
Mononuclear and Transition forms }	6.0	4.6	3.0	1.5	2.1	2.5	2.3
Eosinophiles	2.4	4.8	2.3	4.2	1.6	3.0	4.1
Myelocytes	0	14.7	23.5	8.6	8.5	4.0	4.7

Now, on Feb. 21st, while the enormous enlargement of the spleen would have made one think of leukaemia, yet the mere numerical estimate or the examination of the fresh blood would have given no hint that a leukaemic process had existed. As will be seen, however, by reference to the above table, the dried and stained specimens still showed 4 per cent. of typical myelocytes, and this would have hinted at a previous existence of, and the possibility of a return of, a leukaemia.

An enormous leucocytosis might be mistaken for a leukaemic condition, but may be easily excluded by the study of stained specimens; in all ordinary leucocytoses the increase affects solely the polynuclear neutrophiles. The enlargement of the spleen in chronic malarial cachexia or malignant disease may also be differentiated from leukaemia by the blood-examination. It certainly is not justifiable to make (as has been done in at least one case of leukaemia) an exploratory abdominal incision to examine the spleen before the blood has been carefully studied.

The pure lymphatic form of leukaemia has to be distinguished from general lymphadenoma or Hodgkin's disease; in the latter, however, the glands are found in much larger bunches; and, besides, the blood-condition is in lymphatic leukaemia quite characteristic (*vide supra*).

Course and Prognosis.—In the splenic-myelogenous form the progress is slowly progressive for months and years. Recovery occasionally occurs, but this is so rare that when the diagnosis is once established we can expect death almost certainly within five years, and, as a matter of fact, the majority of cases terminate fatally in two or three years. Certain symptoms, as hæmorrhage, high fever, severe diarrhoea, and œdema, will indicate a rapid course. The progress of the affection is very irregular, and there may be transient intervals of comparative health, which encourage the patient for a time, only to be followed sooner or later by a return of the symptoms. I have known a patient (Case VIII. of my series) with an enormous spleen to get about for months, attending to a light business, when his blood-count showed a ratio of 1 white to 6 red cells.

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The patient finally becomes weaker and weaker, the strength of the heart gradually fails, œdema develops, and death in most cases is the result of the general asthenia. Fatal hæmorrhage may occur at any stage of the disease. Cerebral apoplexy has been mentioned in the Symptomatology: it was the cause of death in 6 of 60 cases analysed by Gowers. Not infrequently death results from some intercurrent affection; in more than one case the autopsy has revealed an acute infection with cocci, probably an expression of the diminution of the resistance of the tissues to bacterial invasion.

The general lymphatic leukaemia appears to be more rapid in its course, and most of the acute cases of leukaemia terminating fatally in a few days or weeks belong to this class. It runs its course with hæmorrhages and pyrexia, and often resembles closely a severe scorbutus.

Treatment.—If the cases came under treatment early, we might hope for favorable results, but, as we have already said, the disease is usually well advanced before the physician is consulted. It is important to pay particular attention to the hygienic surroundings of the patient. He should have abundance of fresh air and a liberal diet, and must avoid worry and mental emotion of all kinds.

While we possess one or two remedial agents which have an influence on the disease, there is none which can be absolutely relied upon to have a good effect. The treatment by arsenic has given the best results in my hands, most cases improving, at least for a time. We must not be too hasty, however, in attributing the favorable results attained to the administration of the drug employed, since the curious remissions which often occur in the progress of the affection may thus lead to wrong conclusions. I remember one case in particular, a patient, who had been confined to bed for a long time with little hope of any improvement, without having received any special treatment became well enough after a time to get around, and even to attend to light duties. No better example of an apparently direct effect of arsenic could be advanced than the case of the colored man mentioned above. Having taken arsenic in 1891 until the relation of white to red cells became normal, he discontinued treatment and went to his home in Virginia; months later he returned, the blood-count showing marked leukaemic changes, which was again reduced under arsenical treatment. Having once decided to use arsenic, we should not be afraid to push the drug, under due precaution, till large doses are reached.

In those cases which have a decided malarial history quinine may be tried, although little is to be expected from its use. Iron and inhalations of oxygen have been recommended, and possibly may be of value in some cases. It does not seem probable that cold douches over the region of the spleen or the application of the galvanic or faradic current can do more than give the patient a certain amount of comfort and satisfaction. Still less promising is the operative treatment—the removal of the leukaemic spleen; splenectomy has been done twenty-four times for leukaemia with one recovery—namely, in the case of Franzolini. The transfusion of blood does no good, and is now scarcely

ever advised. Notwithstanding the fact that the disease is almost always progressive despite the most carefully directed treatment, yet the practitioner can do a great deal to relieve the distressing symptoms. The stomach troubles and the diarrhoea should be attended to. Hemorrhages are frequent and not rarely dangerous, and are to be checked by the usual methods. Little can be done to relieve the dragging feeling in the left side; the pain may sometimes be so severe as to call for sedatives, but their use should be delayed as long as possible. In the use of purgative medicines much caution should be observed.

HODGKIN'S DISEASE.

Definition.—An affection characterized by progressive hyperplasia of the lymphatic glands occurring with anæmia, and sometimes accompanied by the development of secondary lymphatic growths in various parts of the body.

History.—The disease which now bears his name was first described by Hodgkin of Guy's Hospital in 1832, in a paper entitled "On Some Morbid Appearances of the Absorbent Glands and Spleen."¹ Morgagni and other observers had before this mentioned cases with enlargement of the lymphatic glands terminating fatally, but the accompanying histories are too meagre to allow of any judgment as to the nature of the maladies with which they died. A number of the cases described by Hodgkin were undoubtedly examples of tuberculous adenitis, but at least four of them were genuine instances of what we now speak of as "Hodgkin's disease." The affection received its name from Wilks in 1865, when he reported a series of cases in which, together with anæmia, there was enlargement of the lymph-glands with growths in the spleen and other organs. Virchow described the histology of lymphosarcoma in 1845, and later Coluhn² discussed the pathology of the affection, giving it the name of pseudo-leukæmia, on account of its superficial resemblance to leukæmia. The studies of these investigators attracted general attention to the subject, and the literature is voluminous. Unfortunately, many cases described have to be weeded out, as the affection has been repeatedly confounded with tuberculosis, true leukæmia, syphilis, and neoplasms of the lymph-glands. Billroth³ endeavored to distinguish these growths, which he named malignant lymphomata, clinically from the local non-infective lymphosarcomata, stating that in the former there was no invasion of the periglandular tissue, while in the latter the new growth did not confine itself to the glands. The description of this disease given under the name of *adenic* by the great French clinician Trousseau is so accurate that the affection is now often referred to as the "pseudo-leukæmia of Hodgkin-Trousseau." Ranvier introduced the term *lymph-adenic*, and the number of other synonymous terms used is very great. Thus, Wilks has termed it anæmia lymphatica; Wagner and R. Schulz, "desmoid carcinoma;" Mursiek called it lymphatic cachexia

¹ *Transactions Med.-Chir. Soc.*, vol. xvii, 1832. ² *Virchow's Archiv*, Bd. xxxiii, p. 451.

³ *Beiträge zur Pathologischen Histologie*, Berlin, 1857.

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⁴ *Prager*

⁵ *Johns*

fauils, "cachexia sans leucemie;" while Southey preferred the name "adenoid disease."

The disease is not uncommon in America.

Etiology.—At present we must allow the term pseudo-leukemia to cover certain groups of pathological conditions which before long will be recognized as definite and distinct diseases. One has only to attempt to acquaint himself with the literature of Hodgkin's disease to appreciate the hopelessly confused condition in which the matter at present stands. There is a growing conviction, especially among the German clinicians, that in at least one class of cases, if the patients live long enough, there develops a true leukemia; and certainly there are several instances recorded in which under direct observation such a change has taken place.

Hodgkin's disease is more common in the young, over 60 per cent. of the cases occurring in persons under forty years of age. That it is an infectious process there would now seem little reason to doubt. Klebs¹ was the earliest to point out that the changes in the tissues resemble strongly those in the infectious granulomata; and Virchow and Cohnheim both looked upon the mode of formation of metastases as an evidence rather of an infectious than of a neoplastic process. Dreschfeld in a recent article lays special stress on the probable infectious nature of the disease, and calls attention to the pyrexia and hæmorrhages which occur in acute cases. The "chronic relapsing fever" described by Ebstein, and commented upon by Pel of Amsterdam, is probably to be looked upon as an acute form of pseudo-leukemia.

So closely do the histological changes resemble those seen in certain forms of tuberculosis that some writers have gone so far as to state their belief that pseudo-leukemia represented a modified form of lymph-gland tuberculosis. Weisshaupt studied a case in which even at the post-mortem the diagnosis in a doubtful case was settled only by the finding of tubercle bacilli in the stained sections. He studied twelve true cases of pseudo-leukemia and found tubercle bacilli in none.

What the infectious agent is we do not know. Those cases in which pyogenic cocci have been found are to be looked upon as pseudo-leukæmias with a complicating septic infection. Flexner,² in working up the tissues of a case from my wards, has made out certain bodies foreign to the tissues and occurring most commonly in the larger nodules. These, he thinks, may be animal parasites which possibly stand in a causal relation to the affection. Later he secured material from another case, and succeeded in finding the same bodies in the nodules in the intestines and liver. These bodies consisted of protoplasm, and contained minute particles within them varying much in shape, although the bodies themselves did not differ much in size. The bodies were easily stained with hæmatoxylin and eosin, and were readily distinguished from the tissue-cells present by their smaller size (one-third of the size of red blood-corpuscles), and from nuclear fragments by the fact that each stained particle

¹ *Prager Vierteljahrschrift für Heilkunde*, Bd. cxxvi. p. 113.

² *Johns Hopkins Hospital Reports*, 1892.

was surrounded by a zone of protoplasm, and the intensity of the staining was not so great as in fragments of nuclei.

Morbid Anatomy.—The pathological changes found at the autopsy will vary according to the portions of the lymphatic apparatus affected. As a rule, the lymph-glands are soft and elastic, though in some few cases they are tough and firm. In an advanced case the glands will be seen fused together into huge bunches as large as an orange or even larger. Should the patient die in the earlier stages, this matting together of the glands is not so evident, as at the onset, when the enlargement first begins, the individual glands are isolated. As a rule, there will be found to have been more or less connective-tissue proliferation about these glandular tumors, with thickening of the fibrous capsule. The cases in which the growth perforates the capsule of the gland and invades the neighboring parts, such as the muscles or skin, have been placed, as we have said, by Billroth in a separate class. On cutting into one of these new growths the surface will be found smooth and the substance of variable consistence; sometimes it is soft and juicy, while in other cases it may be firm and dry. The tumor is usually grayish-white in color, and those cases in which caseation has been reported were probably not cases of pseudo-leukæmia at all, but rather a tuberculosis of the lymph-glands. Pyogenic processes sometimes occur, especially if the growths invade the skin, the suppuration here being of course due to a complicating infection with cocci. Pus-formations in the deeper sets of glands are rare.

The glands of the body most frequently affected in this disease are the superficial chains, particularly those of the neck. Not infrequently, at the post-mortem examination one is able to trace the cervical glands as continuous chains running down along the trachea and large vessels to join the axillary and mediastinal glands. Next to the cervical groups the axillary glands are most frequently attacked, and then the tumor-masses may extend in under the pectoralis major and minor muscles and backward beneath the scapula. Less often such masses are formed from the glands in the groin. Those cases are particularly interesting in which the glands in the thorax are much enlarged and press on the vessels, or even occasionally perforate the sternum and appear externally as a tumor-like projection.

The retroperitoneal and mesenteric—in short, any of the lymph-glands of the body—may be involved. The diagnosis when the abdominal glands alone are implicated is of course extremely difficult. I remember when in Germany some years ago seeing a leading gynecologist perform a laparotomy for an abdominal tumor, presumably a myoma of the uterus; the incision revealed masses of enlarged lymph-glands adherent to the uterus and adnexa, the case proving to be one of Hodgkin's disease.

The histological changes in the glands seem to consist chiefly of a hyperplastic proliferation of the cells, the reticulum, as a rule, not being thickened. The normal relation of the lymph-paths are in the early stages maintained, and it is only when the growths have become large that these are disturbed. The bands of reticular tissue vary in thickness and density in different places.

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marked dyspnea

Besides the changes in the lymph-glands proper, the lymphatic tissues throughout the body may be affected. First among these come the follicles in the spleen: in 75 per cent. of the cases tabulated by Gowers there was some enlargement of this organ, and in 56 per cent. there were new lymphoid growths, grayish-white bodies varying in size, and consisting wholly of lymph-corpuseles supported by a delicate reticulum. The bone-marrow, the tonsils, the lymphoid follicles at the root of the tongue, the patches of Peyer, and the solitary follicles in the intestines, all may participate singly or together in the process. In an obscure case which came into my clinic in August, 1891, with abdominal pain, vomiting, and slight tympanites, the patient dying suddenly in collapse, the autopsy revealed three lympho-sarcomatous nodules in the small intestines, with similar new growths in the liver and kidneys. In this case, too, there was a diffuse atrophy of the mucous membrane of the stomach and small intestines.

The lungs are occasionally involved, either by direct ingrowth from the glands at the root or by secondary nodules similar to those seen in the spleen, liver, and kidneys. The skin is sometimes the seat of lymphomatous growths, and cases in which this occurred have been reported by Greenfield and Arnschepical examination. A case in which the heart-muscle contained a nodule has been described by Wiegandt. The central nervous system, the genitals, and adrenals are rarely invaded.

The distribution of the metastases necessitates the assumption of the conveyance of the exciting agent through the blood-current.

Symptomatology.—Since at present we are forced to include under the name of pseudo-leukæmia conditions varying so widely in a pathological sense, it will of course be impossible to lay down a typical and definite series of symptoms applicable to all cases. We shall therefore describe first the appearances presented in those cases in which there is an anæmia associated with enlargement of the superficial and deep glands, and which therefore correspond most closely to the affection described by Hodgkin.

The patient's attention may be first drawn to the granular tumors (see Fig. 13), or, less frequently, it is the anæmia and other constitutional symptoms which lead him to consult the physician. The cervical glands are generally the first attacked, and often on one side of the neck alone. When seen early it may be impossible immediately to exclude tuberculosis or syphilitic adenitis. I have seen a case in which the glands on one side of the neck were involved for three years before any other similar tumors appeared. Gowers speaks of a boy in whom Heath excised the glands from the axilla, which had been enlarged for six years; he was seen four years later, and by that time the disease had spread only as far as the cervical glands on the same side. When the deeper glands are first affected, symptoms resulting from the pressure of the new growths on the vessels or nerves may be the earliest evidences of disturbances; thus, enlargement of the bronchial and tracheal glands may cause marked dyspnoea and thoracic pain before anything definite can be made out

by physical examination. In a case observed by Ross of Montreal, (on which I made an autopsy) in which œdema of the feet and lancinating pains in the distribution of the nerves, occurring early, were followed by complete paraplegia, we found a gland-mass pressing on the spinal cord. If the axillary glands be much enlarged, there will be œdema of the hand and arm from venous obstruction. The inguinal glands sometimes form large tumors which occasionally become pedunculated.

Extraordinary symptoms from the pressure of intrathoracic glands are at times met with. In a man who still frequents my clinic the superior vena cava is completely obliterated. There is considerable congestion of the head and upper extremities, but a fairly good compensatory circulation has been established through the superficial veins. The chest-walls have been converted into a huge felt-like mass of dilated veins, the latter emptying into two large trunks, the dilated epigastric veins. Occasionally he has an attack of phlebitis in one of the smaller veins, and here and there small phleboliths have been formed. One day, while doing heavy lifting, he had an attack of hemoptysis, losing about a quart of blood—an accident which relieved the congestive symptoms for some little time.

The retroperitoneal glands are more frequently enlarged than the mesenteric, and in thin individuals the nodules in the abdomen can be made out. Along with the affection of the abdominal glands there may be well-marked bronzing of the skin, as in Case IV. of my series; Féréol described a similar case, and Crocq suggests, by way of explanation, pressure of enlarged glands on the suprarenal capsules.

The variation in the rate of growth and in the size of the glands at different times is astonishing. Where they have been large they may diminish in volume or even entirely disappear; a rapid diminution in the size of the glands shortly before death has been frequently observed.

The spleen is often sufficiently enlarged to be easily palpable in the left hypochondrium. The thyroid is occasionally affected, and in rare instances the thymus as well.

The patient may go on for a long time complaining of little else than the inconvenience resulting from the presence of tumors. Sooner or later, though, the anemia and the cachexia gradually appear. He begins to feel languid and disinclined for exertion, whether mental or physical; œdema of the legs, headache, palpitation, and dyspnoea succeed. The blood-count is, as a rule, not strikingly low; in only one instance have I seen the red blood-corpuscles sink lower than 2,000,000 per cubic millimetre and often there is no decrease at all in the number of red blood-corpuscles. There is no extreme poikilocytosis and the leucocytosis is inconsiderable. In the differential count the lymphocytes appear to be relatively increased. Where there is a marked leucocytosis with a preponderance of lymphocytes, we have to think, of course, of a lymphatic leukaemia. An occasional nucleated red cell (normoblast) may be found.

The palpitation of the heart may or may not be severe. On examination

murmurs are only functional or be due to œdema of the lungs. Fever will be much more remarkable and may persist for weeks by Pel, the new infection attacks of fever for ten or eleven days.

Usually there is which there is no fever is slight in the naso-pharynx. Unilateral dilatation of the vessels is seen. In the growths and occasionally an induration. Sometimes the phages into the blood. Our remarks on the disease.

Diagnosis.

History of character. In regard to necrosis. In a woman one should differentiate the chief points of difference. In the young those running a course whereas those of a chronic disease.

A long-standing process to obtain. But the most important suppurate—a few reached an enormous acute tuberculous instance of such a twenty-four was swelling of the

murmurs may usually be heard over the cardiac area, but these are probably only functional in character. The dyspnoea may be the result of the anaemia or be due to pressure on the trachea; occasionally there is hydrothorax or oedema of the lungs. If the temperature be carefully recorded, more or less fever will be found even in the earliest stages. It may be continuous, but it much more often has a recurrent type. In Case I. of my series there were remarkable ague-like paroxysms at varying intervals. These attacks, which may persist for weeks or even months, have been studied also by Ebstein and by Pol, the former observer believing in one case that he had discovered a new infectious disease, since during a period of nine months the patient had attacks of fever lasting from ten to fourteen days, alternating with apyrexia for ten or eleven days.

Usually the digestive symptoms are not marked, although in those cases in which there is extensive atrophy of the gastro-intestinal mucosa one would expect to find serious disturbances. There may be a little ascites, and the liver is slightly enlarged. Deafness may be consequent on adenoid growths in the naso-pharynx which have occluded the orifices of the Eustachian tubes. Unilateral disturbances from pressure on one cervical sympathetic, showing itself by dilatation of one pupil and flushing and sweating of one cheek, may be seen. In addition to an actual invasion of the skin by lymphomatous growths and the bronzing which we have already mentioned, there is occasionally an intense and troublesome pruritus with or without a papular rash. Sometimes there is albuminuria, and in the acute cases there may be hæmorrhages into the skin and mucous membranes. We have already spoken in our remarks on Leukæmia of the peculiar pseudo-leukæmic anaemia which has been described by von Jakseh and Luzet as occurring in children.

Diagnosis.—We have to carefully exclude syphilis. Even when no history of chancre can be obtained, the patient must be questioned with regard to ulceration of the throat, falling out of the hair, and if it be a woman one should ascertain whether or not she has had miscarriages. The differentiation from tuberculous adenitis may be even more difficult. The chief points of distinction are as follows: Tuberculous adenitis is more common in the young, and involves the submaxillary group of glands oftener than those running along the anterior and posterior border of the sterno-mastoid, whereas these latter are more frequently the first attacked in Hodgkin's disease.

A long-standing affection of one group of glands without an extension of the process to others is suggestive of tuberculosis rather than of lymphadenoma. But the most important point of all is, that the tuberculous glands tend to suppurate—a feature rarely seen in pseudo-leukæmic glands unless they have reached an enormous size. We must not forget that there is such a thing as an acute tuberculous adenitis involving the lymph-glands of the neck. As an instance of such a possible confusion we quote the following case: A man of twenty-four was admitted to the Montreal General Hospital with marked swelling of the cervical glands on both sides, tonsillitis, sloughing pharyngitis

with irregular fever and diarrhœa: a diagnosis of Hodgkin's disease was at first made, but was afterward given up. The occurrence of ague-like paroxysms and of recurrent attacks of fever is in favor of pseudo-leukæmia, but there certainly are cases in which it may be impossible for a time to make a certain diagnosis. Where the glandular enlargement is localized, it is not only justifiable, but also advisable, to remove them, when the diagnosis can be cleared up by microscopical examination.

The disease is to be distinguished from genuine leukæmia by the examination of the blood, which should be made carefully in all cases.

Prognosis.—Hodgkin's disease is in the long run almost invariably a fatal affection. There may be marked variations in the course, distinct exacerbations and remissions being characteristic, but the cases of complete and permanent cure are rare. Where the gland-involvement remains localized for a long time and does not extend to other groups, we may expect a long period of comparative health, but when the gland-tumors are multiple and are to be found in different regions of the body, and especially in those cases in which the cachexia develops early, a fatal termination may be soon expected. Death comes in different ways, but most frequently it is the result of the general asthenia: the patient grows weaker, and perhaps becomes emaciated; the dyspnoea and palpitation increase, the legs become swollen, and at the end perhaps there may be hydrothorax or œdema of the lungs, with heart failure. Of course death may occur from pressure upon important parts, as in those cases where the tracheo-bronchial groups of glands are much enlarged. The occurrence of high fever or of hæmorrhage is of grave import. The acute cases may die in a few days or weeks, the chronic lasting sometimes many years. Two of my cases died from general infection with the streptococcus pyogenes.

Treatment.—Besides hygienic measures, the internal administration of arsenic is certainly of value in some instances. As soon as the diagnosis has been established, the patient should be given Fowler's solution after meals, well diluted, the dose being gradually increased. If benefit is to be derived, the arsenic must be pushed until its physiological effects are noticeable; if these be troublesome, it may be necessary to discontinue the medicine for a time, returning to it later when they have passed off. The injection of arsenic into the affected glands by means of a hypodermic needle has been recommended, but we should be inclined to regard it as a wholly unnecessary procedure.

When the case is seen early and only a few glands are enlarged, without any evidence of increase in the size of the spleen, the question of excision of the nodules may arise, and, if there be also no cachexia, I consider it good practice. Not only does the diagnosis become entirely cleared up, but there may perhaps be a chance of limiting the progress of the disease in this way, and at any rate, with the improvements in technique possessed by modern surgeons, the operation is trifling and attended with very little danger. Surgical

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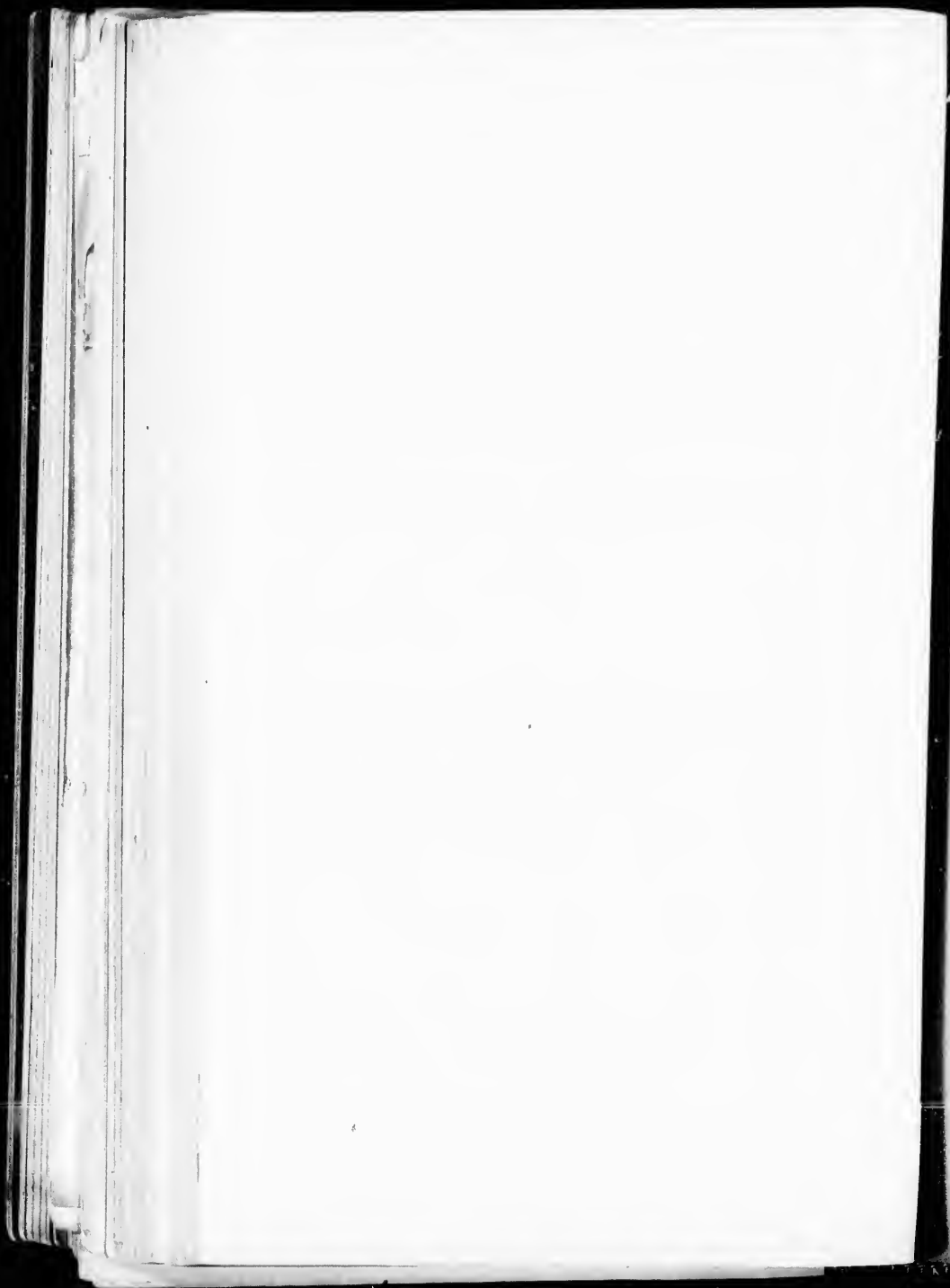
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treatment may be required where asphyxia is threatened from pressure on the trachea.

The external application of substances like the tincture of iodine or the ointment of the biniodide of mercury can have no permanent effect. The internal administration of iodine and of the iodide of potassium would not seem to be of any greater utility. Gowers and Broadbent think that they have seen good results following the use of phosphorus, and where for any reason the arsenic is not well borne this drug may be given a trial. Von Jaksch recommends inunctions of green soap and strong galvanism.

Everything possible should be done to support the strength of the patient: fresh air, nutritious food, an environment quiet and cheerful, will, with the aid of tonics such as quinine and iron, do much to add to the comfort and welfare to the individual affected. Change of air and scene, a course in a well-conducted establishment where hydrotherapy may be employed, by improving the general health may do something in holding the disease in check, but where the patient's means are limited he should not be encouraged to sacrifice too much on measures which at best can give but transient benefit.



PROFESSOR

THE

On Sporadic Cretinism in America.

BY

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PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY AND PHYSICIAN-IN-
CHIEF TO THE JOHNS HOPKINS HOSPITAL.

FROM

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NOVEMBER, 1893.

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Extracted from *The American Journal of the Medical Sciences*, November, 1893.

ON SPORADIC CRETINISM IN AMERICA.¹

BY WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY AND PHYSICIAN-IN-CHIEF
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The studies which have given to the thyroid gland the dignity of an organ with diseases of capital importance have come from practising physicians, experimental physiologists, and from surgeons: studies which, "fitly joined together," have not only made clear some dark problems in pathology, but also have raised a reasonable hope in the treatment of a group of hitherto hopeless disorders.

A relation between myxoedema proper and cretinism was hinted at by Gull in the title of his paper (1873) "On a Cretinoid State Super-vening in Adult Life in Women," and clearly appreciated by Ord, in 1877, in a fuller description of the disease, in which its connection with abnormal states of the thyroid gland was recognized. The remarkable cachexia found by the Swiss observers, Reverdin and Kocher, to follow certain cases of total extirpation of the thyroid, and the brilliant studies by which Horsley demonstrated the existence of an experimental myxoedema, threw a flood of light on the whole subject, and enabled the committee of the Clinical Society of London, in 1888, to reach the following conclusions: "That there is strong evidence that myxoedema, sporadic cretinism, endemic cretinism, cachexia strumipriva, and the operative myxoedema of animals are severally species of one genus; that such clinical differences as exist between them are due to causes already sufficiently set forth; and that the one pathological fact common to all these conditions is the occurrence of morbid processes or of operations involving the annihilation of the function of the thyroid body."²

Having had at my clinic within a comparatively short space of time three cases of cretinism, and knowing that the subject of myxoedema was to be presented at this meeting, I thought the matter of sufficient interest to inquire as to the prevalence of the disease in this country. The report here made is based upon a careful search of the literature so far

¹ Read before the Association of American Physicians, May, 1893.

² Report of a Committee of the Clinical Society of London, to investigate the subject of Myxoedema. *Clinical Society's Transactions*, Supplement to vol. xxi. p. 129. London, 1888.

as it relates to the United States and Canada, and upon inquiries made of the superintendents of the Asylums for the Insane and of Institutions for Feeble-minded Children throughout the country, as well as of many friends.

As much misunderstanding exists as to the exact definition of a cretin, illustrated by the fact that at least one-half of the photographs sent me from different institutions did not belong to this type of idiocy, it may be well to define somewhat carefully the precise conditions to which this term should be applied. In the first place, there is no essential difference between the cases occurring in large numbers in goitrous districts and the sporadic cases. The term should be limited accurately to a form of idiocy associated with changes in or absence of the thyroid gland. The following statements are based upon the recent article of Horsley.¹ The important factor is the loss of the function of the thyroid gland, whether this results from congenital defect, progressive atrophy, or coarse changes which gradually annul its function.

1. *Congenital cretinism* is rare, and is usually associated with absence of the thyroid gland. The child rarely lives, but the changes presented are sufficiently distinctive for diagnosis. The supra-clavicular fatty tumors are well marked and the skin generally is thick and in folds. The limbs are short, the epiphyses swollen, while the shafts are much ossified. The skull is broad and short, the sutures open, and the basi-sphenoid junction is prematurely ossified, a point upon which Virchow laid great stress. This congenital variety may be difficult to distinguish from rickets. Degenerative changes, slow over-growth of the fibrous tissue, and a myxœdematous condition have also been met with.

2. *Ante-natal and subsequent slow development of cretinism.* Here the changes appear to have been initiated during fetal life, but are slight and scarcely noticeable at birth. "The infant shows no, or very slight, signs of intelligence, but the physical signs are less obvious. According to some, the majority at birth have a goitre, usually of about an inch in diameter; the body is large, with disproportionate head and hands, and, what is more important still in connection with the similarity to myxœdema, in many cases the subcutaneous tissues appear œdematous; occasionally, according to the severity of the case, there is also non-development of the facial bones, a flattened nose, giving a stupid appearance, and a large thick tongue. The neck is short and thick. It is obvious that under these circumstances we have the same condition as that described above, only much less severe; the further history of these cases shows that the destruction of the thyroid gland continues, and the symptoms develop into the worst form of cretinism, about to be described." (Horsley.)

¹ Tuke's Dictionary of Psychological Medicine: art. "Cretinism."

3. *Development of cretinism in early childhood.* The infant may be perfectly normal at birth, develop naturally, and show no signs of disease until from the second to the fifth year. A majority of the instances of sporadic cretinism belong to this division. "The child from being bright and normal becomes gradually less and less intelligent, and at the same time the physical appearances which have been summed up in the conditions before mentioned begin to assert themselves. The child does not increase in height, the limbs similarly do not lengthen, but remain short and thick. The trunk is broad and thick, there being also well-marked lordosis, so that the abdomen is prominent. In like manner the neck is shortened, the skull broad, the nose *retroussé*, the lips thick, and the teeth very imperfectly developed. The speech, from being clear becomes thick, the voice is rough and at times stridulous, the physiognomy is placid to stupidity, the skin is coarse, the hair becomes scanty and thin. There is well-marked anaemia; the subcutaneous tissues have a peculiar kind of spongy or waxy feel, as if there were, so to speak, solid oedema occupying the connective fibres of the tissues.

"The condition thus produced reaches its height usually by the end of fourteen or fifteen years, so that by the twentieth or twenty-first year it has attained complete development, and thenceforward remains perfectly stationary until death. Hence, at the age of thirty the physical appearance presented is that of a young child, and the intellectual condition similarly does not advance beyond that of childhood." (Horsley.) A majority of the cases of which I shall speak and which are illustrated in this paper belong in this division.

The adult condition of cretinism as seen in cases which have developed slowly, and have reached the age between twenty or thirty and over, is very characteristic. This "pariah of Nature," as it has been called, is a being degenerate both physically and intellectually; short in stature and childish in appearance. The height usually does not exceed that of a child from five to seven years old. The skin is often rough, sometimes brown and stained, but in the sporadic cases more frequently of a chalky earthy hue. In certain instances the subcutaneous tissues are much infiltrated, so that the skin has a curiously waxy hue. Supra clavicular folds of a fatty and myxœdematous character are common. The hair may be thick, and is usually confined to the head, even in adults; but in some instances there are traces in the axilla and on the pubes. The face has an aspect of dulness and stupidity, though sometimes in the sporadic cases it is bright and smiling. The lips are broad and thick and prominent; the nose is broad at the base; the nostrils wide; the alæ very broad and pass without any special division into the naso-labial fold. The eyes are widely separated and sometimes present strabismus. The eyelids are often œdematous. In

advanced cases, though they see things, yet they see without any intelligence, and the expression of the eyes adds very much to the impassive, immobile aspect. The tongue is often thick, large, and may constantly protrude from the mouth. The skull is large in proportion to the body and to the face. It is broad, brachycephalic, the transverse diameter approaching that of the antero-posterior. It is flattened in the forehead and frequently depressed and sloping backward. The two halves of the head are often asymmetrical. The sutures are often occupied by Wormian bones. The neck is large and short, and the thyroid gland may be enlarged or may be completely absent. The thorax is usually deformed in association with lateral or antero-posterior curvature of the spine. The abdomen is prominent and full. The limbs are extremely short, sometimes emaciated, occasionally deformed by rickets. The muscles are feeble, the hands and feet are large, the fingers thick and broad, and the nails often coarse and large, and may be rudimentary.

There are varying grades of cretinism, and just as we recognize complete idiocy, imbecility, and feeble-mindedness, so there have been described three degrees of this affection: cretins, which present in a most advanced degree the physical characteristics above mentioned, and are in addition deaf-mutes with the vegetative functions alone active; semi-cretins, with mental dulness, harsh guttural voice, expressionless countenance, and the physical condition similar to but less pronounced than that of the true cretin; and lastly, the cretinoid condition in which there is some degree of enfeeblement of the intelligence, speech somewhat impaired, and the physiognomy and physical conformation is that of the cretin.

The recognition of the condition of cretinism, though easy in advanced and typical cases, is often, I find, not clearly made: I judge this from the number of descriptive cases sent to me as instances of this condition, but which in reality have been cases of various forms of idiocy. The important criteria are the physiognomy, the shape of the head, the stunted growth, and the condition of the connective tissues. The mental deficiency is less characteristic, presenting nothing not seen in instances of ordinary idiocy. The condition of the thyroid is uncertain. There are cretins with and cretins without goitre, while in others the gland seems entirely absent. The most satisfactory diagnostic feature is the condition of the skin and connective tissues, which, as Horsley suggests in the following words, should form really the basis of the classification. "By excluding all cases in which the appearance of idiocy is not accompanied by any noteworthy changes in the skin or connective tissues we obtain a considerable delimitation of the condition which we ought to call cretinism, for by adopting such a plan of differentiation we necessarily leave out all cases due to direct injury or disease of the

central nervous system, and which are included in the conditions classed by various writers under different headings, such as congenital idiocy, idiocy following encephalitis, idiocy coupled with porencephaly, etc., all being cases where we have destructive lesions or non-development of the central nervous system, especially of the cerebral hemispheres, and in which, therefore, we have a simple and direct destruction of the intellectual mechanism. Although such conditions may be naturally accompanied by want of development in the parts of the body which may happen to be paralyzed, etc., still there is no direct or certainly no general change in the connective tissues throughout the whole system, and secondarily in the nervous system, such as furnishes the basis of the present classification."

The pathology of the disease requires to be studied in the light of the more recent researches. In endemic cretinism the thyroid gland is very commonly enlarged, but in all probability functionless, and the intimate relation of the condition to goitre, particularly the marked influence of heredity as shown in the fact that goitrous parents are more likely to have cretinous children, shows the close interdependence of cretinism upon conditions of the thyroid. In the sporadic cases the thyroid is usually absent, and in all probability the progressive changes in the connective tissues, including the bones, are associated in some way with the absence of the function of this gland.

HISTORICAL.—References to the existence of cretinism in America are found in Hirsch,¹ the *Dictionnaire Encyclopédique des Sciences Médicales*, the *Nouveau Dictionnaire*, in the *Index-Catalogue of the Surgeon-General's Library*, and in the *Index Medicus*. Hirsch states that "Cretinism does not appear to be at all common except at a few points in all this region; at any rate it is stated by Barton that cases of it are rarely met with in the United States. Brown speaks of its occurrence in the valleys of Vermont; in Kneeland's account of the health of Massachusetts (for which State I have been able to learn nothing of the occurrence of goitre), it is stated that there are at least twelve hundred idiots and somewhat frequent cases of cretinism among a tribe of Indians living near Cape Mendocino, in California, as well as among the Spaniards in the mountainous parts of Southern California." These statements of Hirsch pass current in various works; thus Bury, one of the latest writers on the subject, in the *Cyclopaedia of the Diseases of Children*,² says: "In North America cretinism is not common except at a few points, namely, in the valleys of Vermont, in Massachusetts, and in

¹ Handbook of Geographical and Histological Pathology, vol. ii. (New Sydenham Society's translation).

² Art. "Cretinism," by Baillanger and Kreishaber.

³ Vol. ii., art. "Cretinism."

California." When we turn to the original sources for these statements, nearly all of which antedate 1850, we find, for example, the authority for the occurrence of the affection in Massachusetts the general statement of Kneeland,¹ that there are twelve hundred idiots and cretins in a population of one million. I can find no detailed observation in this article, and the term "eretin" was probably used in a loose way to indicate some variety of imbecility. So far as I can ascertain, the statements as to the existence of the disease in Vermont and New Hampshire rest on a paragraph in Buckminster Brown's article on cretins in Switzerland:² "Simpletons or idiots are to be met with in the valleys of Vermont, New Hampshire, or Scotland." There is no reference to cretinism in Dorr's³ account of the prevalence of goitre in the valleys of the Green Mountains. Trask, of Windsor, Vermont, speaking of the prevalence of goitre among the early settlers in the valley, says: "In most countries goitre is connected with a species of mental imbecility called cretinism; but in the United States, thanks to God, it is a mere corporeal affection."

Praslow's account of the occurrence of cretins in California I have not seen, but I have letters from several correspondents in that State who know nothing of its existence at present, while in the State Insane Asylum, at Stockton, Dr. Hoisholt tells me, there are only two cases.

Barton,⁴ whose essay on goitre, published in the year 1800, is one of the few systematic attempts to study the distribution of this disease in America, states: "I have heard of some cases of cretinism among the Indians inhabiting the neighborhood of Sandusky. But such cases are undoubtedly very rare in North America. This circumstance, as I have remarked, is well calculated to show that goitre and idiotism are not necessarily connected with each other."

Here and there one meets with the assertion that cretinism occurs in Lower Canada among the French, but I have not been able to trace the allusion to its source or to verify the fact of its existence. Some years ago I looked through two of the large institutions for children in Montreal, and the Longue Pointe Asylum, without finding any, and two cases supposed to be cretins, at Cacouna, proved to be remarkable rhaehitic dwarfs.

The more recent literature descriptive of cases is very scanty. Jacobi, in the *Hospital Gazette*, N. Y., 1879, vol. v., described briefly a case, the first on record in this country—a child of eight years. Johnson's paper, in the *Detroit Review of Medicine*, January, 1873, contains no statements about cretinism in America.

¹ AMERICAN JOURNAL OF THE MEDICAL SCIENCES, April, 1851.

² *Ibid.*, 1817, ix. p. 111.

³ New York Medical Depository, x.

⁴ Benj. Smith Barton, Professor of Materia Medica in the University of Pennsylvania. "A Memoir Concerning the Goitre as it Prevails in Different Parts of North America." 1793, Philadelphia, 1800.

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Last year two cases were reported; one by Lloyd,¹ from the Philadelphia Hospital; the other by C. W. Townsend,² of Boston. Huber, in the discussion on Townsend's case, stated that the disease was not very uncommon among the children "in the tenement districts of New York, owing to the influx of immigrants," but no definite data are available as to the facts of its prevalence.

ENDEMIC GOITRE.—Endemic cretinism occurs only in localities in which goitre prevails extensively, and the above observations, which have led in Europe to statements as to the prevalence of it here in endemic form, have been based in reality upon incidental references to, and studies upon, goitre, made for the most part in the early part of the century. So far as I can learn, the disease has not and does not occur endemically in this country. It may be interesting to note certain facts about goitre which I have gleaned in my inquiries, but which, however, refer to this malady only so far as it might be related to the existence of cretinism in a locality. Hirsch³ is again our chief authority as to its prevalence; and, as he remarks: "Our information on the endemic occurrence of goitre in North America belongs for the most part to the early years of this century and is very fragmentary." Barton's memoir already referred to, and the articles of W. Gibson⁴ and of Mease⁵ contain the most authentic information as to its prevalence, from which subsequent writers have drawn their information. Without entering into details which are available in Hirsch's work, it may be stated that goitre has been described as prevailing among the French Canadians along the Detroit River, and along the Richelieu River between St. John and Montreal; in the valleys of Vermont and New Hampshire; in the central parts of New York about the smaller lakes; in Central Pennsylvania; in the mountainous districts of Maryland, Virginia, and the Carolinas; and in Alabama. From a majority of these localities we have no recent observations. I have written to a number of physicians in the towns of New England mentioned by Dorr⁶ as very much affected, and so far have had only negative answers. Thus Dr. R. Clark, writing from Windsor, Vermont, one of the towns mentioned by the early writers, says that in the past fifty years he has not heard of its being very prevalent; and Dr. Emerson, who formerly practised at Chester, Vermont (a town one-half of the inhabitants of which were stated by Dorr [1806] to be subjects of goitre), writes that "During seven years' residence in Vermont I do not recall seeing more than three or four cases of goitre, and I do not think that it prevails to any

¹ International Clinics, vol. II., series 2, 2d ed., p. 119.

² Archives of Pediatrics, Nov., 1892.

³ The Philadelphia Journal of the Medical and Physical Sciences, vol. 1., 1820.

⁴ American Medical Recorder, Philadelphia, 1818.

⁵ New York Medical Repository, 1806.

special extent." Dr. R. J. Preston, of the Southwestern Lunatic Asylum, Marion, Virginia, has very kindly made inquiries as to the existence of the disease in some of the southwestern counties of that State, in which, as stated in Gibbon's *Surgery*, the disease formerly prevailed, and here, too, it seems to have almost disappeared. Dr. W. Taylor, of Talladega, Alabama, who is the authority quoted by Hirsch in support of the statement that there is a "good deal of it" in the northern counties of that State, writes (1893): "Since that time [1854] my views on the subject have been greatly modified. With a much larger population there are now really fewer cases of goitre to be found in Talladega and adjacent counties than in the earlier period of their history. . . . The fact remains that there has been a great decrease in the prevalence of goitre during the past thirty years, and the percentage of cases will not surpass the average in other States and communities."

In the Province of Quebec cases of goitre are by no means rare, and in Montreal the disease is certainly more frequent in hospital practice than in Philadelphia or Baltimore. I have no information of any localities in which it could be said to be endemic, attacking a very large number of persons.

In the neighboring Province of Ontario, in the limestone regions at the end of Lake Ontario, the disease is very prevalent. In response to my inquiry about cretins, Dr. C. K. Clark, of the Kingston Asylum, mentions the extraordinary prevalence of the disease. Thus in an asylum population of about 600 there are 288 cases of goitre. He writes:

"The goitres are generally developed when the patients are admitted to the asylum, and it is rarely indeed that we see recent cases unless among the employés. After studying the subject carefully I have come to the conclusion that Eastern Ontario is a distinctly goitrous district, and I do not believe that outside practitioners have given the matter any attention. It is difficult to get accurate statistics even from asylums, and for this reason I have never published the returns sent from nearly every hospital for the insane in America. A superintendent would answer my circular and state that his institution was without goitrous patients. I would go to his institution myself and probably find twenty or thirty goitres. The inference was plain, and when institutions side by side gave returns showing marked differences the inference was plainer still.

"Outside practitioners about Kingston have written nothing of interest in connection with the subject, but I find goitre prevalent even among the lower animals; most of the curs about the asylum have goitres, some of them so large that anyone can notice them. The tendency to this disease seems to run in certain strains, and the young of some families of dogs and horses are invariably goitrous. In two cases of human beings

goitres have proved fatal through pressure. At one time I was inclined to believe that mental disease might be the factor determining the presence of goitre in so many of our people, but am now convinced that this alone will not account for the condition of affairs at the Kingston Asylum. The goitres met with in the insane are almost invariably incurable, probably because of long standing. Those occurring in employés are easily cured by ordinary methods of treatment. With some there seems to be a hazy idea that people coming from about Loughboro Lake have goitre more frequently than others in this district. There is nothing to show that such is the case, and the disease seems to be common and widespread throughout Eastern Ontario.

There are no cases of cretinism in the Kingston Asylum.

Altogether, the evidence at command favors the view that in the regions of Virginia, Alabama, and Vermont in which goitre was formerly endemic, it is now very rare.

Endemic cretinism does not exist, we may say, in the United States or Canada, nor is it at all probable, from what we can learn, that it has ever existed. My inquiries have not extended to Mexico, nor, indeed to New Mexico, in which it is stated that both goitre and cretinism occur.

SPORADIC CRETINISM.—Independently altogether of the occurrence of endemic goitre, cases of cretinism are known to occur here and there in all civilized countries, and the inquiries which I have made in this country relate particularly to the existence of this form of the malady. Its rarity may be gathered from the fact that up to date, so far as I can ascertain, there have been but three cases put on record. My attention having been called to the subject by the appearance in rapid succession of three cases at the Johns Hopkins Hospital, I thought it would be of interest to the members of the Association, particularly in connection with the discussion upon myxœdema, to ascertain somewhat more accurately the prevalence of the disorder. Accordingly I sent out letters to all the asylum superintendents in the United States and Canada, and to the various institutions for feeble-minded and idiotic children, asking information as to the existence of the disease. I wrote also to physicians practising in various localities in which it had been stated that goitre prevailed endemically. Among the replies which I received were descriptions of many cases of idiotic children which were evidently not cretins; but, in addition to the hospital cases I have referred to, there were eight well-characterized examples, the description of which will be given. In addition, from various superintendents there were statements as to the existence or occurrence of five or six other cases. The interest in the subject is at present a very practical one, inasmuch as the observations on the beneficial effects of thyroid feeding have been shown in several cases, particularly in those seen within the first three

or four years of life. I have at present two cases under treatment, but both for such a short time that it is impossible to say as to the changes in the condition.

CASE I.—M., aged (now) two years and three months, was brought to me first from the Eastern Shore of Maryland, January 10, 1892. The parents (first cousins) are healthy and strong. No hereditary ailments on either side; no members of the family have had goitre. The patient was the second child; the labor was easy, and she thrived well. Nothing special was noticed about the child until the end of the first year, when it was suspected something might be wrong, as she had not cut her teeth, and did not attempt to walk or to talk. Throughout her second year she grew fairly well, but had several attacks of slight fever, and did not develop as other children, making no attempts to crawl or to walk, and seemed unnaturally quiet and dull. She did not cut the incisor teeth until she was nearly two years old. Within the past six months she has changed remarkably in color, has become very pale and waxy, and the face and limbs seem puffy and swollen. She has taken milk well, and has developed a little mentally; smiles, and attempts to repeat her own name when it is said, and has learned to say "mamma" and "papa."

Present condition. Under-sized child for her age. Aspect is very striking; color pale; face, very broad across; the mouth is open; tongue protrudes, and is evidently enlarged; the lips are full and heavy; the cheeks very large, almost pendulous; the hair is long and straight; the eyes are blue; the sclerotics very pale; the eyelids glossy and infiltrated. The forehead is large, not badly shaped; the head well formed, rather prominent behind; the anterior fontanelle is not quite closed. She looks good-tempered, but takes very little notice, and smiles in a feeble way. The facial aspect is that of a cretinoid idiot.

The muscles of the arms are feebly developed; the subcutaneous tissues are much infiltrated; the hands are swollen and glossy—not tense, and look cedematous, but the infiltration is firm, and only yields on prolonged pressure. The legs look large; the thighs present several folds; the skin looks glossy, and the subcutaneous tissues are much infiltrated. The skin over the dorsal portion of the feet is very glossy and tense, and on firm pressure pits with distinctness. The abdomen is distended and the superficial veins prominent. Palpation is negative; the edge of the liver is palpable about six cm. below the costal margin. The edge of the spleen is not palpable, nor does the organ appear to be enlarged. The thorax is well formed; no trace of rickety enlargement of the ends of the ribs; no evidences of rickets in the long bones. The apex-beat of the heart is just within the nipple line. There is a systolic murmur with the first sound, which is loud and intense at the pulmonary cartilage; the breath sounds are clear. There is no enlargement of the superficial lymphatic glands; the thyroid gland is not enlarged; the cricoid cartilage can be well felt, as can also the entire trachea as low as the sternum, and it can be taken between the two fingers quite plainly. Dr. Halsted thought he could feel the thyroid beneath the sternomastoid muscle. The percussion note on the first bone of the sternum is

clear. The examination of the blood showed a moderate increase of leucocytes and some irregularity in the size of the red blood-corpuscles.

The condition was diagnosed as sporadic cretinism. As it was evident that the blood condition of the child was very much below par, she was ordered the syrup of the iodide of iron.

March 1, 1893. Patient brought again to-day. In the year and two months which have elapsed since I saw the child she has improved remarkably. She is now three-and-a-half years old. Her height is 75 cm. She looks more intelligent, takes more notice, and the facial expression is decidedly brighter. She tries to say a few words, and has begun to walk with a little assistance. The most striking changes are the disappearance in great part of the anemia and lessening of the firm subcutaneous edema which was so marked a feature. She still has a little infiltration about the eyelids and cheeks. The limbs also look full, and they are firm. The skin is a little glossy over the hands and feet. The tongue does not protrude so often from the mouth, though when the face is in repose it is frequently seen protruding slightly. The face looks broad and full, and the expression and aspect are still cretinoid; Head is 51.5 cm. in circumference, the abdomen 54.5 cm. The neck is thick and short, and presents a large transverse fold of fat. The thyroid gland is not palpable, and below the thyroid cartilage the trachea can be felt with the greatest distinctness and grasped between the fingers down to the sternum.

The favorable reports from cases of sporadic cretinism treated with the thyroid extract encouraged us to try it in this case, and the child has been taking the glycerin extract of the sheep's thyroid in an amount corresponding to about a quarter of a gland in the twenty-four hours. No special change is as yet noticed after nearly a month's treatment.

CASE II.—Emma—, aged nineteen years; brought to the Johns Hopkins Hospital by her mother, March 3, 1893. The family history is good; parents are not blood relations; no thyroid enlargement; no history of mental troubles. Patient is the second child; delivery was not instrumental; she was healthy when born; fat and well; nursed for nearly a year, and it was not until the end of this time that it was noticed that she was backward in development. She did not seem to grow and thrive as other children, though she took her food well, and was in other respects quite healthy. For several years it was thought that she was completely idiotic, as, though she took notice and seemed to know what was said to her, she did not walk or talk, but had to be held in the lap, and the tongue was constantly protruded from the mouth. She did not begin to cut her teeth until the third or fourth year. They decayed early and rapidly, and her second dentition did not begin until she was past her twelfth year. The anterior fontanelle did not close until after her eighth year. She did not begin to walk until her twelfth year. She has never learned to read or to write.

Present condition. Her height is three feet nine inches. She walks readily; the feet are turned out a little, and there is a somewhat waddling, uncertain gait, with the hands spread. The face has the characteristics of a cretin. The expression is pleasant; she smiles brightly, and looks good natured, but has a childish, somewhat silly expression. She sits quietly, as a rule, with

her mouth shut, but sometimes the tongue protrudes between the lips. The face is broad, and all the features thick and coarse. The nose is *retrousé*, the nasal orifices very apparent, and the alæ thick, and measure across the margins fully 5 mm. in thickness. The lips are thick and full; the cheeks prominent, large, and broad. In the upper jaw the lateral incisors are absent; the central incisors are of fair size, the enamel much eroded; the canines are small, also with defective enamel. The premolars and molars are small and much decayed. In the lower jaw the teeth are all present, but they are irregular and show the same character of defect. The root of the mouth is much vaulted, the palate is not defective. The forehead is full, a little prominent in front; the head is long; the occiput projects, and it is broad immediately behind the parietal eminences. The occipital arches are much developed, and there are thick ridge-like projections at the line of the squamoparietal sutures. The circumference of the head is 54½ cm.; from the tip of one ear to the tip of the other, 27 cm.; from the occipital protuberance to the glabella, 38 cm. The ears are well formed.

The neck is 36 cm. in circumference. The thyroid gland is distinctly enlarged; the left lobe more than the right. The hands and arms are well formed; there is no enlargement of the epiphyses. She uses her fingers well, and can feed herself and pick up small objects, but the movements are somewhat clumsy, and she is unable to dress or undress herself. The legs are firm and strong; not bowed. The gait is as above mentioned; she falls easily, and, as her mother expressed it, has no elasticity. She is flat-footed. The knee-jerk seems slightly increased. The body looks squat and full; the thorax is capacious; the back shows a moderate antero-posterior curvature. The abdomen is large. Examination of the thoracic and abdominal organs negative.

She is well nourished, and the subcutaneous tissues are firm but do not pit, and there is no appearance like that of myxœdema; it is only in the thickness of the features that the condition is suggested.

She talks a great deal; the voice is high-pitched, very difficult to understand. Some words she speaks clearly, and she talks and behaves very much as a child of two or three years. She is easily amused; showed with great pleasure and childish joy a little new ring, and is very fond of pretty things. She has a very good musical ear; can sing several little songs. She is very good-hearted and generous, and always very anxious, if she has anything nice, that the servants, who are devoted to her, should share it. She is, however, self-willed, and does not like to be thwarted. She began to menstruate eighteen months ago.

CASE III. (Dr. Booker).—Minnie R., white, aged three and one-half years, came to Johns Hopkins Hospital Dispensary November 25, 1892. She was born in Lebanon, Pa., and lived there until one year ago, when she was moved to Steelton, Md. Born in natural labor; mother had only three hard pains; was a fat, healthy child up to second summer; when one year old, had summer diarrhoea, about sixteen stools daily for a month; after that the bowels became regular, and the child improved for a short while, then began to waste again without anything to account for it. She had no cough, no fever. There appears to have been no growth and no improvement since the attack of diarrhoea at one year of age, excepting the slight improvement

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which came on soon after the diarrhoea had been relieved, and lasted a short time. Parents are healthy, and no hereditary tendency. Mother has a younger child living and healthy; she never had a miscarriage. The child was brought to the dispensary on account of an almost constant crying, which had existed for three months. Appetite good; bowels regular; no fever; sleeps well.

Present condition. Child is thin, but not emaciated; is pale, with yellow tinge. Skin is dry, scaly, inelastic, in great folds, and appears much too large for the body. Numerous small lumps can be felt under the skin over the abdomen. Face has an idiotic or stupid expression; lips thick and coarse; tongue broad and thick, and protrudes a little between the open lips; child has only the four central incisor teeth, which are already decaying and nearly black. (The two lower incisors were cut in August, when one year of age, and just before the diarrhoea commenced. The following October was the time of slight improvement in the general nutrition of the child, and at this time the two upper incisors were cut; since then she has had no other teeth.) The nose is flat and broad; forehead low, and the head covered by thick, coarse, chestnut-colored hair. Strabismus in both eyes; fissures of the eyes very small. There is some enlargement in the neck in the region of the thyroid gland, but it is not certain that it is the thyroid. Also a thickening behind the sterno-cleido-mastoid over the clavicle. The limbs appear relatively short; they are thin, and the skin is very loose and in great folds over the limbs. Hands are large, spade-like, and the skin rough and in folds over the hands. Right wrist has been slightly œdematous for several days. Abdominal organs do not appear to be enlarged; spleen not felt. Lymphatic glands of body enlarged. Weight, twenty-seven pounds; length, 69 cm. Temperature, 98.4° in rectum. Child cannot walk nor talk; mother said it could say "mamma" and "papa," but the child does not look intelligent enough for that. Blood examination; normal amount of white elements, some of which contain pigment; crescents and cellular bodies found.

The child was under observation until February, 1892. She was treated with quinine and arsenic, and for a while appeared to improve; she was able to sit up, which was more than she could do when brought to the dispensary. When last seen at the dispensary, February 10, 1892, she had about lost what had been gained, and was pretty much as when we first saw her.

The mother said the child had got all its growth in the first year, up to the time it had the diarrhoea; that since then there appeared to have been absolutely no growth.

CASE IV. (Dr. Rotch and Dr. Bullard).—G. S., female; aged six years. American, parents not blood relations, not the subject of goitre. Does not speak; mental condition is much enfeebled. Circumference of the head is 46.5 cm.; measurement from occiput to roof of nose, 34.4 cm.; across the head from external meatus to external meatus, 29.3 cm. There is the general condition of infiltration like myxœdema of the skin. The thyroid gland is not to be felt. Circumference of thorax is 40 cm. The bones are somewhat enlarged about the epiphyses. The front teeth are good. (This case will be published in full by Dr. Rotch.)

CASE V. (New York Custodial Asylum for Feeble-minded Women; Dr. Brownell).—Sarah McG., aged nineteen years, American, parents temperate.

She is 86.5 cm. in height; weight, 41 pounds. The complexion is sallow, voice discordant, harsh. She sleeps well; is good-natured, and is seldom ailing; is a great favorite in the household. Largest girth of head, 52 cm.; from nose to occiput, 35.5 cm.; from ear to ear over vertex, 26.7 cm.; girth of neck, 29.3 cm.; girth of chest, 54.5 cm.; girth of abdomen at umbilicus,

FIG. 1.



FIG. 2.



Case V. Sarah McG., aged nineteen.

62.5 cm. The abdomen is protuberant and the chest is narrow; the legs are perfect, but the knees incline inward. The flesh of the hands and feet looks old and wrinkled; the teeth are a good deal decayed and notched. There seems to be complete atrophy of the thyroid gland; there is fulness in the supra-clavicular fossæ; there is marked curvature of the spine, both lateral and antero-posterior.

CASE VI. (Indian School for Feeble-minded Children; Dr. Van Sweringen).—Louisa S., aged fourteen years, born in America, parents not related, no goitre in the family; nationality German. Height, 110.5 cm.; circumference of head, 56 cm.; from occiput to root of nose, 33 cm.; from external meatus to external meatus, 26.7 cm.; circumference of neck, 28 cm. The skin is loose and flabby, elastic and soft, very abundant. She is a deaf-mute, but appears quite intelligent. There is no curvature. The throat is 57.3 cm., abdomen, 68.6 cm. The limbs seem a little enlarged about the

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epiphyses. There is no goitre, and there is no trace to be felt of the thyroid gland.

CASE VII. (Syracuse State Institution for Feeble-minded Children: Dr. Carson.)—Martha L. Y., aged sixteen years; parents Americans, not related. Height, 103 cm.; circumference of head, 54.7 cm.; measurement from occiput to root of nose, 32.5 cm.; across head from external meatus to external meatus, 34.4 cm.; circumference of neck, 34.4 cm. The subcutaneous tissues appear infiltrated and myxœdematous, and there are tumor masses behind the sterno-mastoid muscle. The thyroid gland is apparently absent. The circumference of the thorax is 67.5 cm.; of the abdomen, 71.2 cm. The bones of the limbs are a little enlarged at the epiphyses. The teeth are defective. She is feeble-minded, but appears to understand what is said; can only say a few words; answers "yes" and "no." Is cleanly in habits; knows the names of objects, and can match colors.

Dr. Carson writes: "The child presents almost the characteristic features described in cretins by Dr. Down, namely: absence of the thyroid gland, puffy swellings in the supra-clavicular space; skin of an earthy color, loose, and flabby, as if too large for its body; the nose flattened; the distance between the eyes exaggerated; tongue large; lips thick; cranium brachycephalic. She speaks only a few words in monosyllables, and though occasionally stubborn, is usually of a placid disposition, laughs easily and heartily; is orderly and cleanly in her habits.

CASE VIII. (State Insane Asylum, Stockton, Cal.: Dr. Hoisholt.)—Willie V., aged forty-two years; father was Irish, mother German; no note as to the presence of goitre. Height, 135 cm., circumference of head, 55.3 cm.; from occiput to root of nose, 35 cm.; from external meatus to external meatus, 33 cm.; circumference of neck, 38.4 cm. The skin is very loose, and in places hangs in large folds. The head is brachycephalic. The skin of the face in smiling is wrinkled. He is imbecile. The thyroid is not enlarged. There are no definite tumor masses above the clavicle; the spine is not curved. He is said to have been much brighter some years ago. The last three years he has had occasional epileptic fits.

CASE IX. Johnny V., brother of the preceding case, aged forty years. Height 127 cm.; circumference of head, 58.5 cm.; from occiput to root of nose over the head, 29.5 cm.; from external meatus to external meatus, 38.3 cm. The skin is extremely loose; hangs in folds. On the scalp one may make a fold of four inches of superfluous skin; same on the neck, face, and back. The intelligence is very defective; speech scarcely intelligible; he is not at all bright, except that he has, under the circumstances, a remarkable memory for names, remembering those of from thirty to forty patients in the ward. The thyroid gland is not enlarged.

The photographs of these two patients show marked brachycephalic heads, wide nostrils, the eyes wide apart, and the condition of the skin described by Dr. Hoisholt appears to be fairly characteristic.

CASE X. (Randall's Island Hospital, New York: Dr. Furness.)—Nellie R., aged fifteen years, born in New York State. Height, 76.3 cm.; circumference of head, 48.4 cm.; from occiput to root of nose, 30.5 cm.; from external meatus to external meatus, 31.2 cm. The skin is coarse and thick, and there are tumor masses above the clavicles. The thyroid is not enlarged. Circum-

ference of the thorax, 54.7 cm.; of abdomen, 51 cm.; it is distinctly pendulous. She can only stand with assistance. The epiphyses of the limbs seem somewhat enlarged. Intelligence is extremely slight, and she never talks, but can call the name of the nurse. She is affectionate in disposition, and on recognizing the Doctor utters a peculiar shrill cry.

The Doctor writes that the child looks about the age of three years; is unable to walk or to stand erect without support. The photograph illustrates a typical cretin.

CASE XI. (Inmate of the California Home for Feeble-minded Children, Dr. A. E. Osborne.)—I. N., female, aged probably thirty-five years; nationality unknown, supposed to be Irish; no data about the parents. Height, 108 cm.; circumference of the head 56 cm.; measurement from occiput to root of nose, 35 cm.; circumference of neck, 38.3 cm.; circumference of thorax, 81.3 cm.; of abdomen, 84 cm. The face is broad and flattened; the skin rough, and hangs in folds over the body; the complexion is sallow; the hair very scanty and coarse; the teeth are defective, only half a dozen in the upper and lower jaws; the thyroid gland is palpable; the spine is slightly curved. The intelligence is of a low order, but her memory is good. The disposition is docile. She is tractable and affectionate, and forms strong attachments. She is quick to appreciate a favor, and has a fair sense of humor. The speech is slow and measured; the voice rather low and rasping. Respiration is slow, and the body temperature is below normal.

OPERATIVE MYXŒDEMA.

In connection with the subject of myxœdema, I am indebted to Dr. McGraw, of Detroit, for photographs illustrating the following case, which, so far as I know, is as yet happily unique in American surgery—namely, one of operative myxœdema:

CASE XII.—The patient, George M., is now about thirty years old, and was operated on March 7, 1881. Complete extirpation of the thyroid. The photograph [exhibited] was taken March 30, 1893. A full description of the case will be published by Dr. McGraw. Suffice it to say here that there has been a gradual but progressive change in this young man since the date of the operation. The hair is scanty and coarse; the skin thick and rough; the subcutaneous tissues very thick; the integument and underlying tissues make great ridges on the back and on the hands and feet. The intelligence is good, but the action of the intellect is slow, and he is unable to do any continuous work or to study. He complains of fulness in the head and ringing in the ears when he stoops. Even in standing he is not steady on his feet, and has a tendency to fall. Temperature is normal; pulse, 70; respirations, 20. Heart's action is normal. Voice is harsh and squeaky.

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NOTES ON TUBERCULOSIS
IN CHILDREN.

By WILLIAM OSLER, M.D.,
Professor of Medicine
at the Johns Hopkins University, Baltimore.

Read by title before the
AMERICAN PEDIATRIC SOCIETY,
West Point, N. Y., May, 1893.

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December, 1893.

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NOTES ON TUBERCULOSIS IN CHILDREN.*

BY WILLIAM OSLER, M.D.,

Professor of Medicine at the Johns Hopkins University, Baltimore.

I. WHAT IS THE INCIDENCE OF TUBERCULOSIS IN THE FOUNDLING ASYLUMS AND CHILDREN'S HOSPITALS OF THIS COUNTRY?

In preparing the article on tuberculosis for Starr's Handbook of Children's Diseases, I was surprised to find how few observations had been made on the prevalence of tuberculosis among the inmates of asylums and children's hospitals in this country. Northrup's studies in the New York Foundling Hospital show, as is well known, a startling prevalence of the disease. We miss, however, detailed statistics, the result of systematic clinical and anatomical observations, such as have been published during the past few years by our French and German colleges. The most reliable figures, of course, are those obtained in the post-mortem room. The manifestations are so protean that unless in fatal cases the clinical be supplemented by an anatomical examination, very many tuberculous lesions are overlooked.

The study would not only be interesting in itself, but directly beneficial in improving the sanitary surround-

*Read by title before the American Pediatric Society, West Point, N. Y., May, 1893.

ings of the institutions, promoting that scrupulous cleanliness, that aseptic environment, quite as important (though we are apt to forget it) to the physician as to the surgeon. Whatever stand we may take on the question of heredity, the fact is indisputable that in the tuberculosis of children the enemy in a large proportion of cases enters through the ever open portals of the respiratory and alimentary systems. As the surgeon with a case of streptococcus infection in his ward knows that there has been some focus of infection, so in these instances, when we find the bronchial nodes or the mesenteric glands the seat of advanced disease, we should recognize definitely air or food contamination.

Attached to every foundling asylum or children's hospital there should be a paid pathologist, who should report yearly to the Board of Managers and to the Medical Board on the prevalence of tuberculosis in the Institution. He, better than anyone, would be in a position to furnish data upon which important sanitary changes might be based. In every institution so equipped four or five years' work would not only throw important light on the prevalence of this scourge, but would also give indications as to the best means for its prevention.

II. THE FEVER OF TUBERCULOSIS.

The second point requiring study relates to the fever of tuberculosis. Usually, whether more or less continuous or definitely remittent, the fever is associated with active development of tubercles, their caseation, softening and suppuration, or with a peri-tuberculous pneumonia. The more definite hectic or intermittent type of fever in tuberculosis, with intermissions sometimes lasting for many hours of the twenty-four, is seen in children as in adults only in advanced cases of tuberculosis. In all these instances some definite relationship exists between the severity of the fever and the extent of the disease.

Our French colleagues have recently called attention to two other types of fever in tuberculosis which require

study. Several years ago Landouzy described a fever in the tuberculosis of infants which sometimes was of such severity as to kill before any extensive lesions had developed. The children presented all the features of a profound infection, but at the autopsy comparatively trivial changes were found, either in the lungs or in the glands. This *febris tuberculosis peracuta* (fièvre infectueuse tuberculeuse suraiguë) has been recently referred to in the monograph of Aviragnet. The symptoms presented are those of a general infection rather than any local disorder, and in the child it is described as coming on insidiously, sometimes with vomiting; the tongue is red, sometimes dry; the fever range is usually high; the mental symptoms are marked, often a condition of profound depression; the abdomen is distended, sometimes painful; the liver and spleen are somewhat swollen. The symptoms are, in fact, those of a profound infection without definite local signs, and cases are described in which the disease has run its course in children in a very few days. The autopsy may show quite slight tuberculous lesion, perhaps only in the bronchial glands or a small area of tuberculous broncho-pneumonia, or the disease may be connected with a group of enlarged glands in the mesentery or the neck. The symptoms are believed to be caused by the toxins developed in unusual amounts under certain favorable conditions at the site of the local disease. I have never met with an instance of the kind in children, but there was a case admitted to my wards on the 13th of March last, which I believe to belong to this type. The patient, a man aged forty-seven, had a swelling on the left side of the neck, high fever and delirium. He had had an illness of four or five weeks' duration, and when admitted, the symptoms were those of a most profound infection without any local disease to be discovered other than that of the glands of the neck. Though his symptoms were highly suggestive of typhoid fever, the swelling in the glands of the neck seemed to be definitely tuberculous. He died on the fifth day after admission. The autopsy

showed numerous punctiform hæmorrhages. There was a chain of tuberculous glands, yellow and caseous, on the left side of the neck, evidently of some age. The lungs were crepitant, and there was an area of commencing pneumonia with fresh pleurisy over it in the right lower lobe. There were scattered miliary tubercles throughout the liver and the spleen.

To another form of fever attention has also been called by our French colleagues, the *typho-tuberculose*, or continuous tuberculous fever, acute fever developing in connection with a tuberculous infection, but which, unlike the acute miliary tuberculosis, runs a favorable course. Apparently it may be one of the first manifestations of the invasion of the organism by the bacilli, but it may be the expression of what may be called an aborted acute tuberculosis, consecutive to some local disease, and Landouzy refers to it as a bacillary toxæmia. The general symptoms are those really of typhoid fever, from which the diagnosis may be extremely difficult. It runs a course of from four to five weeks, and from the description and the temperature chart given by Aviragnet there must be extreme difficulty in its recognition from typhoid fever. In fact, as he remarks, whenever we find a child with a *cortège* of symptoms sufficiently marked to make one think of typhoid fever, but not sufficiently characteristic to make a clear diagnosis, the question should always be raised as to the existence of tuberculosis. Shall we then recognize an acutely developing fever continuous in character, associated with tuberculosis and differing from acute miliary tuberculosis in running a favorable course?

III. GENERAL ANASARCA IN TUBERCULOSIS.

The following cases are of special interest from the fact that they were both admitted with general anasarca, the dropsy being due apparently to the blood condition rather than to any secondary nephritis associated with the tuberculosis.

CASE I.—*General anasarca; albumin with hyaline and granular casts in the urine; cough; diffuse bronchitis; moderate fever; death on the fourth day. Tuberculous adenitis of the bronchial glands; tuberculous bronchopneumonia; scattered miliary tubercles.*

Edith J., aged three, colored, admitted November 29, 1889. She was brought to the dispensary, November 14, with a history of an illness from about the first week in September.

The nature of this was doubtful, as it was said to be malaria with pneumonia at one time, and at another diphtheria or scarlet fever. At the dispensary, when first seen, the child was wasted and looked very ill. The abdomen and legs were swollen; temperature, 101° . The percussion note over lungs was clear; numerous râles heard everywhere.

Dr. Booker, who first saw the child, diagnosed tuberculosis and sent the case to the ward. On admission the child was in a miserable condition with general anasarca; closed eyes from œdema of the lids, ulceration at the angle of mouth, and numerous erosions on the legs. The child coughed frequently, and there was a bloody discharge from the mouth.

The physical examination was not very satisfactory on account of great œdema of the chest walls, but râles were heard everywhere. The urine was scanty, acid in reaction, and contained albumin and numerous leucocytes with hyaline and granular casts. The temperature did not range above 101° . Although the case was admitted with the diagnosis of tuberculosis I must say we leaned rather to the opinion that it was acute nephritis (following either diphtheria or scarlet fever) with anasarca and extensive pulmonary œdema. The child lingered and died on the fourth day after admission.

Post-mortem by Dr. Welch. Body 75 cm. long; general anasarca. On the inner surface of thighs, numerous, irregular, more or less serpiginous erosions of the skin, from many of which a watery fluid escaped; similar erosions on the surface of the buttocks and one of these on the left, evidently of older date. On the left hand the two last digits of fourth finger and the last digit of the third were gangrenous.

Peritoneum contained 300 cm. of clear fluid; the membrane smooth and pale; pleural cavities contained small amount of slightly bloody serum. The heart was distended with fluid, blood and fresh clots; valves normal;

muscle substance pale, and fibres showed on microscopic examination extensive, diffuse, fatty degenerations.

Lungs.—Left; in the middle of lower lobe was an area of collapse and a few spots of ecchymosis. The upper lobe, dark-red in color and solid; and at the inferior margin and extending to the middle of the lobe is an area of solidification, which on section presented caseous areas surrounded by miliary nodules. The bronchial glands were large and caseous. The right lung presented a few pleural adhesions. On section the entire middle lobe filled with areas of grey tuberculous consolidations, in the centre of which was a small cavity containing pus. This was situated between the upper and middle lobes, and penetrated the tissues of each. Immediately below this cavity and adherent to it was a caseous bronchial gland.

Liver.—Large, pale and mottled with areas of intense congestion; the lymph glands of the hilus large and caseous. The kidneys were large, pale; capsules readily stripped off; cortices wide; striæ clear; microscopical examination showed intense fatty change of the tubules, particularly in those of the pyramids; slight degeneration in the vessels of the glomeruli and granular, fatty cells within Bowman's capsules.

The Intestines.—Tuberculous ulcer in the ileum just at the orifice of the valve.

In Douglass' fossa there was a caseous mass below the peritoneum.

CASE II.—*Primary tuberculosis of the intestines; diffuse tuberculosis; general anasarca.*

William L., colored, aged nine, admitted October 17, with general anasarca. The father, one brother and one sister living; two died when quite young. The mother is dead; cause unknown.

The patient had whooping-cough some years ago; never has been ill since that time.

Six months ago the present illness began with pains in and gradual swelling of the abdomen; the appetite, however, remained good; bowels regular and he had no cough. He has gradually grown weaker and has lost in weight. It is not easy to get a satisfactory account of his illness from the friends. The condition of general œdema has, they say, existed for several months.

Present Condition.—Child is emaciated; eye-lids œdematous; face puffed; mucous membranes pale. The hands and wrists are swollen; the legs and feet are

oedematous, and the abdomen is much swollen. Pulse is regular, the tension not increased.

Thorax.—The resonance is good in front and behind, except at the right base, where there is some flatness and slight movable dullness. The respiratory sounds are harsh and puerile, with occasional sonorous and sibilant rales. On the right side the breath sounds are distant, and become very feeble in the lower part of the chest. Cardiac impulse is in the third, fourth and fifth left spaces; the nipple line in the fifth interspace. The sounds are clear at the apex, with a soft systolic murmur in the pulmonary area, and the second sound is here accentuated.

The abdomen is much distended, soft and humid; no definite fluctuation, though there is slight movable dullness in the flanks. The border of the liver cannot be felt; nor is the spleen palpable.

The urine was 300 cc. in amount; sp. gr. 1013; acid; faint trace of albumin; no casts were found.

On the day after admission the child seemed bright in the morning; then suddenly became unconscious; the pulse was extremely feeble and could scarcely be counted, though the heart beats were loud and clear. About 11.30 the respirations became very slow, only seven to the minute, and extremely jerky, and he died about 12 A.M.

Autopsy.—(By Dr. Flexner.—Abstract.) *Anatomical diagnosis.*—Primary tuberculosis of intestines secondary of mesenteric and retro-peritoneal lymph glands; miliary tuberculosis of peritoneum, liver, pleura and lungs. Tuberculosis of bronchial glands; general anasarca.

Peritoneum contained several thousand cc. of chylous fluid. The left lung was firmly adherent. In the right pleural cavity there was a considerable quantity of clear fluid. The pericardium smooth.

Lungs.—Left costal pleura thickened and inherent. The lung is crepitant throughout, and in the upper lobe close to apex were two or three fresh-looking, wedge-shaped, hemorrhagic areas surrounding minute tuberculous broncho-pneumatic cavities. In the right lung there were one or two small tuberculous areas at the apex. The bronchial glands were pigmented, and contained cheesy masses. There were one or two small superficial ulcers in the larynx.

The heart was normal. The liver contained numerous miliary tubercles. The kidneys were swollen, capsules

stripped off easily; substance firm, pale; the striae almost invisible; no tubercles.

Intestines.—“Fifty cm. below duodenum was an extensive and circling ulcer, the edges of which were undermined, the base irregular, worm-eaten, and contained necrotic grey and yellow material. It extended to the muscular coat, and the peritoneum over it was thick and opaque. At the mesenteric detachment there was considerable thickening and infiltration of the tissues. These girdle ulcers occurred at varying intervals throughout the small intestine, separated from each other by a few cm. There were in addition circular or oval smaller ulcers. On the peritoneal coat, corresponding to the ulcers, were numerous nodules of an opaque white and yellowish color. In the cæcum corresponding with the mesenteric detachment was a closely adherent tumor mass composed of caseous glands united by infiltrated fibrous tissues. The omentum was adherent over this mass, and when torn away the underlying tissue contained large and small tubercles. The cæcum itself presented an extensive deep ulcer, occupying almost the entire mucous membrane. The rest of the large intestine was healthy except the rectum, which presents a small ulcer.”

Peritonæum.—In addition to the nodules corresponding to the ulcers the peritoneum generally was sprinkled with tubercles varying in size from a pin's head to a hemp seed. Between the liver and the diaphragm were masses of caseous tubercles and tuberculous granulation tissue, and tubercles were seen on corresponding points of the pleural surface of the diaphragm. The mesenteric glands were enormously enlarged and converted into caseous masses. The retro-peritoneal glands are also swollen and caseous.

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TOXÆMIA IN TUBERCULOSIS.

BY WILLIAM OSLER, M.D.,

Professor of Medicine, Johns Hopkins University, Baltimore.

The symptoms of a profound intoxication in tuberculosis are met with under three conditions: first, in those rare cases, described most commonly in children, in which death may occur with symptoms of a profound toxæmia before there are any extensive localised foci of disease. "The children have presented in the course of the disease all the signs of a profound intoxication, and as the tuberculous lesions of the lungs and all other organs are altogether insufficient to produce death, it is quite reasonable to attribute the fatal results to the bacillary intoxication."¹ These are the instances of the *fièvre infectieuse tuberculeuse suraiguë*. Second, acute miliary tuberculosis is often accompanied with toxic features, giving to many of the cases clinical pictures of severe typhoid fever. *Post mortem*, miliary tubercles are found extensively throughout the viscera and on the serous surfaces. Third in chronic pulmonary tuberculosis there may develop, with or without fever, a profound toxæmia, with dry tongue, delirium, rapid pulse, and signs of intense intoxication. The patient may be admitted to hospital unconscious, with a normal or subnormal temperature, and, as in a case which was under my care at the Philadelphia Hospital, the autopsy alone reveals the true nature of the disease.

The following case² may perhaps be regarded as an instance of the *febris tuberculosa peracuta*. The striking features were

¹ Aviragnet: De la Tuberculose chez les Enfants. Paris, 1892.

² Reported in the Philadelphia *Medical News*, December 2, 1892.

the existence of a local tuberculous adenitis in the group of left cervical lymph-glands; a miliary tuberculosis of very moderate intensity in the liver and spleen; and a clinical picture of the most profound toxæmia.

Joseph S., aged forty-seven, a shoemaker, was admitted to Johns Hopkins Hospital, March 13, 1893, with a swelling in the left side of the neck, cough, loss of appetite, and delirium.

Nothing very definite could be learned about the family history. The patient was married and had six living children. His wife stated that he had had a cough the summer previously for about two weeks, and that he had not been very strong all winter, and had complained at times of pain in the abdomen. He had occasionally had chills and fever and had sweated very much. The existing illness had begun five or six weeks before, with chilly feelings and loss of appetite. About a week later it was noticed that the glands on the left side of the neck were swollen. The man continued at work, however, until three weeks before presenting himself. He had neither nausea nor vomiting, but there was loss of appetite and progressive weakness and fever. For fully two weeks he had been irrational, and at night quite delirious. The chief complaint had been the feeling of profound weakness, and for more than ten days he had been confined to bed, too feeble to walk.

On admission the patient looked very ill; the temperature was 102.7° , and rose by 6 p.m. to 105° . Throughout the day before the temperature had ranged from 103° to 105° , and the man had been delirious. The patient was a fairly well nourished man, and did not look as if he had been ill for any great length of time. The complexion was pale, but the lips and mucous membranes were of fairly good colour. The pupils were of medium size, and reacted to light; there was no strabismus. The tongue had a thick yellow coating. The pulse was rapid, 124, regular but soft, and the radials compressible. The respirations were a little hurried, thirty-six to the minute, but the man did not show any marked respiratory distress, and lay comfortably with his head low.

On the left side of the neck behind the angle of the jaw, and in the lower triangle, the lymph-glands were moderately enlarged, hard and not painful. The largest was about the

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size of a horse-chestnut. There were no other lymphatic enlargements.

The chest was symmetrical, the expansion equal, and there was no change on percussion; the respiration was everywhere clear, with the exception of a few sibilant rales at the bases. The expectoration was muco-purulent, small in amount, slightly blood-stained, and repeated examination failed to discover the presence of tubercle-bacilli. The heart-sounds were normal and there was no increase in the cardiac dulness.

The abdomen was symmetrical, full, and generally tympanitic. The patient had five movements of the bowels in the first thirty-six hours after admission. They were soft, but not in any way distinctive. The edge of the spleen could be easily felt and extended three fingers' breadth below the costal margin. The urine was dark reddish-brown in colour; 660 ccm. were voided in the twenty-four hours, containing a small quantity of albumen and a few granular and hyaline casts. There was a decided diazo-reaction. The patient was irrational and frequently spoke in an irrelevant manner.

On the 15th, two days after admission, the patient was shown at the clinic, and I extract the following remarks from the report of my stenographer: "As to the nature of this interesting case, from the appearance of the man and the history you would think at once of typhoid fever, though the temperature-chart is unlike this disease in the fourth or fifth week. Still the general features, the enlarged spleen, the diazo-reaction, and the negative condition of the examination render this diagnosis highly suggestive. Against this, however, there are several important objections. The temperature-range, as I have mentioned, is more continuous than is usual in typhoid fever at this stage. The abdominal symptoms are slight, and there are no rose-spots, though it is true the spleen shows marked enlargement. Bronchitis is not an infrequent complication of typhoid, and at the bases it is of course common to have diffuse rales. A feature that suggests another diagnosis is the enlargement of the lymph-glands on the left side of the neck, which has increased during the patient's illness. There can be no question that the enlargement here has nothing whatever to do with the ordinary swelling of the salivary

glands seen in typhoid fever. Here the affection is evidently in the lymphatic glands, and this important fact, with the protracted fever, the delirium, and the enlargement of the spleen, suggests rather that the patient has acute tuberculosis. Two other points of interest may be mentioned. The blood-count shows a marked diminution in the number of leucocytes, only 2,000 per cmm. being present, which is, however, rather against tuberculosis. There is no optic neuritis and there are no tubercles in the choroid."

The critical condition of this patient continued throughout the 16th and 17th. The temperature ranged from 103° to 105°, rarely falling below 103.5°. The pulse became more rapid, from 140 to 160; the abdomen became distended; the respirations very shallow and rapid; and the patient died early on the morning of the 18th.

Report of the Autopsy (by Dr. Flexner).—Punctiform hæmorrhages were found on the skin of the shoulders and neck, and subcutaneous hæmorrhage at the back of the neck on the right side, as also hæmorrhages in the subcutaneous fat in several situations. The muscles were of a deep-red colour. The peritoneum was smooth; the diaphragm on the right side was at the fifth rib, on the left side at the upper margin of the sixth rib.

Both layers of the pleura were united by old adhesions, some of which were pigmented. The lungs themselves were crepitant and deeply pigmented; the lower lobes were congested, and, on section, serum and blood escaped. The bronchi contained frothy mucus. Along the posterior edge of the right lung the pleura was greatly thickened, measuring 3 mm. in thickness. Beneath it the lung was pigmented. The lower lobe of the right lung presented areas of fresh consolidation, and the pleura was covered with fresh granular fibrin. On section the lung was deep grayish-red in colour, and portions excised sank in water. The heart weighed 270 grammes. The pericardium was smooth, the valves normal. The heart-muscle was soft and somewhat friable. The liver weighed 2,550 grammes; the surface was smooth, and there were whitish and whitish-yellow miliary tubercles beneath the capsule, irregularly scattered and not in great numbers. The

spleen weighed 500 grammes; the section was dark-red in colour; the brown pulp was abundant, and there were numerous large tubercles in its substance. The kidneys presented a few atrophic patches in the cortex; the striæ were coarse and pale; the consistence a little firm. There was nothing of special note in the pharynx, stomach, or œsophagus. Peyer's patches were a little swollen; the mucous membrane of the intestines was somewhat congested. The *appendix vermiformis* was obliterated.

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PAROTITIS IN PNEUMONIA.

This complication is of excessive rarity. I remember no case at the Montreal General Hospital, which has an unusually large service in this disease, nor was there an instance in the 105 post-mortems in the disease which I performed at that institution. It is very much less frequent than endocarditis or meningitis, with which, however, it has in one or two instances been associated. Traube mentions a case¹ in which, in the course of an abscess following pneumonia, double parotitis developed on the forty-fifth day; the patient recovered.

The following is the only instance which has come under my personal observation. The cardiac physical signs were also of very great interest, inasmuch as there was a very well marked pleuro-pericardial friction.

PNEUMONIA OF THE UPPER THIRD OF THE LOWER LOBE OF THE LEFT LUNG; PLEURISY; PAROTITIS; DEATH.

M. R., aged 33, admitted to the Philadelphia Hospital, October 29, 1888. The patient was an Italian without friends, and as he was delirious no history could be obtained. The temperature on admission, at 4.30 P.M., was 103°; pulse, 120; respiration, 52. He was very restless all night and refused medicine. Feces and urine were passed involuntarily.

October 30, 1 P.M., the condition was as follows: Patient is delirious; tongue dry; hands tremulous and constantly picking at the bedclothes; pulse 120, feeble; respiration 50; temperature 103°. Expansion on the left side is defective, and there is a well marked tympanitic note from clavicle to sixth rib; posteriorly there is dullness extending from near the spine of the scapula almost to the base and into the posterior half of the axilla. Over the dull region the breath sounds are tubular, with rales at the end of inspiration. Blowing breathing is intense at the angle of scapula. There is no expectoration. The heart sounds at the apex are clear.

October 31. Pulse ranged from 110 to 120; respiration 48 to 52; temperature from 101° to 103°. Still delirious and has had very little

¹ Gesammelte Beiträge, Bd. II, Article 29.

sleep. Takes medicine and nourishment well. Has been taking carbonate of ammonia, aromatic spirits of ammonia, whisky and strychnia. The patient is decidedly worse. The pulse is more feeble and the skin looks now a little bile-tinged. He is still delirious; it was noticed this evening that the left parotid gland was swollen. The bowels have been freely moved. The physical examination gave the following: Left lung clear to lower border of fourth rib, below which there is dulness. There is a loud friction murmur and many rales in left axilla. Below the third rib and to the left of the sternum there is a well-marked pericardial, to-and-fro, friction murmur. It is not heard at the base and is loudest in the fifth interspace below the nipple. It was concluded that it was pleuro-pericardial friction. The condition at the back of the chest remains the same.

November 2. Temperature through the day has ranged from 102° to 103°; pulse from 126 to 130, regular and small; respiration 44 to 52. Examination showed blowing breathing outside the nipple line and in the scapular regions rales were numerous.

At the apex both sounds were heard, a soft systolic murmur with the first. Sounds are clear at the aortic cartilage. The to-and-fro friction in the fourth and fifth spaces is scarcely audible.

November 3. The patient passed a fair night, slept better. The parotid gland not much swollen. Temperature 102.9°. The apex systolic murmur, which is much more distinct, is not heard in the axilla, but is much intensified towards the sternum. The sounds are clear at the aortic cartilage. The murmur is loud in the third and fourth left interspaces. The pleuro-pericardial friction sound has entirely disappeared. The percussion note is clear to the upper border of the fifth rib; it is dull from this into the axilla.

November 4. The patient is weaker; pulse 130 to 140; tremor is constant; respiration 44 to 56. Passes urine and feces involuntarily. The apex systolic murmur is distinctly louder and rougher than two days ago. Sounds at the aortic cartilage are clear. There are no cutaneous ecchymoses; no sputum has been obtained.

Respiration 65; pulse 160; temperature 103.6°. Death took place at 12.15 P.M.

Autopsy, twenty-four hours after death. Body that of a small, moderately muscular man; skin slightly icteric; left parotid swollen.

Thorax: A pint and a half of sero-purulent fluid in the left pleura. The upper lobe of the left lung is glued to the pericardium by thick fibrinous exudation. The entire pleura, visceral and parietal, is covered with a very thick creamy material. The right pleura is smooth.

Heart: The pericardium is smooth; no exudation. The right

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chambers are dilated and full of dark, firm clots, which can be withdrawn from the vessels. No endocarditis. Muscular substance somewhat relaxed and turbid. The mitral orifice admits three fingers to the middle of the second joint.

Left lung: The lower two-thirds of the lower lobe are collapsed, airless and dark in color. The upper third stands out very prominently, is very firm and in a condition of typical red hepatization. The bronchi of this part are filled with tenacious exudation. The upper lobe is crepitant throughout and a little congested at its base, but did not contain much blood or serum. The right lung is congested at the base. The bronchial glands are enlarged and tumefied. The spleen is enlarged and soft and contains two large wedge-shaped infarcts with yellow-brown soft centres. The kidneys are swollen and turbid; no infarcts. The liver presents the condition of cloudy swelling. The stomach is small; the intestines normal; the large bowel presents patches of deep congestion. The left parotid gland is deeply congested; the interlobular septa infiltrated with blood and here and there are distinct foci of pus. The brain presents no special changes.

CASE OF PERICARDITIS TREATED BY INCISION
AND DRAINAGE.

The points of interest about this case are: (1) A septic pericarditis following acute necrosis of the bones of the nose; (2) the peculiar delirium occasionally seen with pericardial effusion; (3) the onset, two weeks after operation, when the patient had been doing well, of excessive cardiac debility, probably due to myocarditis.

January 15, 1890, I saw, with Dr. Donaldson, Mr. H., aged 36, who had come on from Louisville to spend Christmas at his home. A few days before the New Year he began to have trouble with his nose, which became acutely inflamed and swollen, and though there was no fetor in the secretion Dr. Donaldson thought that necrosis of the bones was present. A week or so before I saw him he began to get a little short of breath, the fever, which had been moderate, became high, and there were signs of congestion at the base of the right lung. The pulse became much more rapid and feeble, and the heart sounds indistinct. When I saw him the condition was as follows: He sits propped up in bed. Respiration is noisy, about thirty-five a minute. Face looks dull, perhaps a little suffused, not cyanotic. Part of the difficulty in

breathing comes from the fact that both nostrils are obstructed. The pulse is 110, irregular in volume and in force. Heart; inspection; nothing noticeable, as a heavy layer of panniculus covers the mammary regions, no impulse. No thrill. Dulness extends to upper border of the third rib in parasternal line and to a level of the second rib on the sternum; to the right it reaches two fingers' breadth beyond the sternum; to the left at least two inches beyond the nipple line. On auscultation no heart sounds audible over body of heart or towards apex. At the base feeble, distant, only just distinguishable sounds can be heard.

Resonance is impaired at the right base, and there are here rales, but no special blowing breathing. In the left lower axillary region there is a flat tympany, a modified Skoda's resonance.

It was thought from these signs that pericardial effusion existed. There was albumin in the urine, but no tube casts. A remarkable form of delirium was present; he would talk quite rationally for a time and then wander off on subjects connected with his business, and never seemed exactly to know where he was, though he always recognized his father and his wife. I saw him again on the 17th and on the 21st. The condition remained practically the same. Pulse was extremely irregular, feeble, 112 to 120. Temperature rarely above 101°. Respirations from 35 to 45. He could not lie down and the color of his face was certainly worse. Physical signs persisted unchanged. There was an entire absence of heart sounds. The dullness had certainly extended more to the left. On the 22d Dr. Halsted cut down into the fourth interspace, midway between nipple and sternum, and after aspirating somewhat over a quart of a sero-purulent fluid, incised the pericardium and inserted a gauze drainage plug. The patient stood the operation very well. The area of dullness diminished remarkably; the heart sounds were better heard; but there persisted in the fifth, sixth, seventh and eighth interspaces outside the left nipple marked dullness as far as the mid-axilla. The improvement after the operation was rapid. The pulse the following day was steadier, with only an occasional intermission. The heart sounds were more clearly heard and the area of dullness still further diminished. The drainage was very free, soaking the thick layers of gauze. On the third day the dullness was less marked in the axilla. The note was here somewhat tympanic. The peculiar delirium persisted. Temperature fell to normal. He took his food well and gained rapidly in strength. On the eighth day the discharge had become very much less. The opening was still free. Dullness had diminished very much. On the tenth day after the operation the following note was made:

February 1. Patient is very comfortable, sleeps now with his head low, breathes without difficulty. Respirations are about 30. Pulse 112, regular, of fair volume. There is still moderate purulent discharge soaking the inner dressing. Cardiac impulse is not visible or palpable. Dullness begins at the lower border of third rib and at right margin of sternum; to the left it shades gradually from the nipple. Auscultation: First and second sounds heard everywhere in cardiac regions, still a little distant; no murmurs. No pericardial friction to be heard.

There is still a defective resonance at the right base with rales, clear at the left base, and in the lower left axilla the note is more normal than it has been. Delirium has not been present for some days.

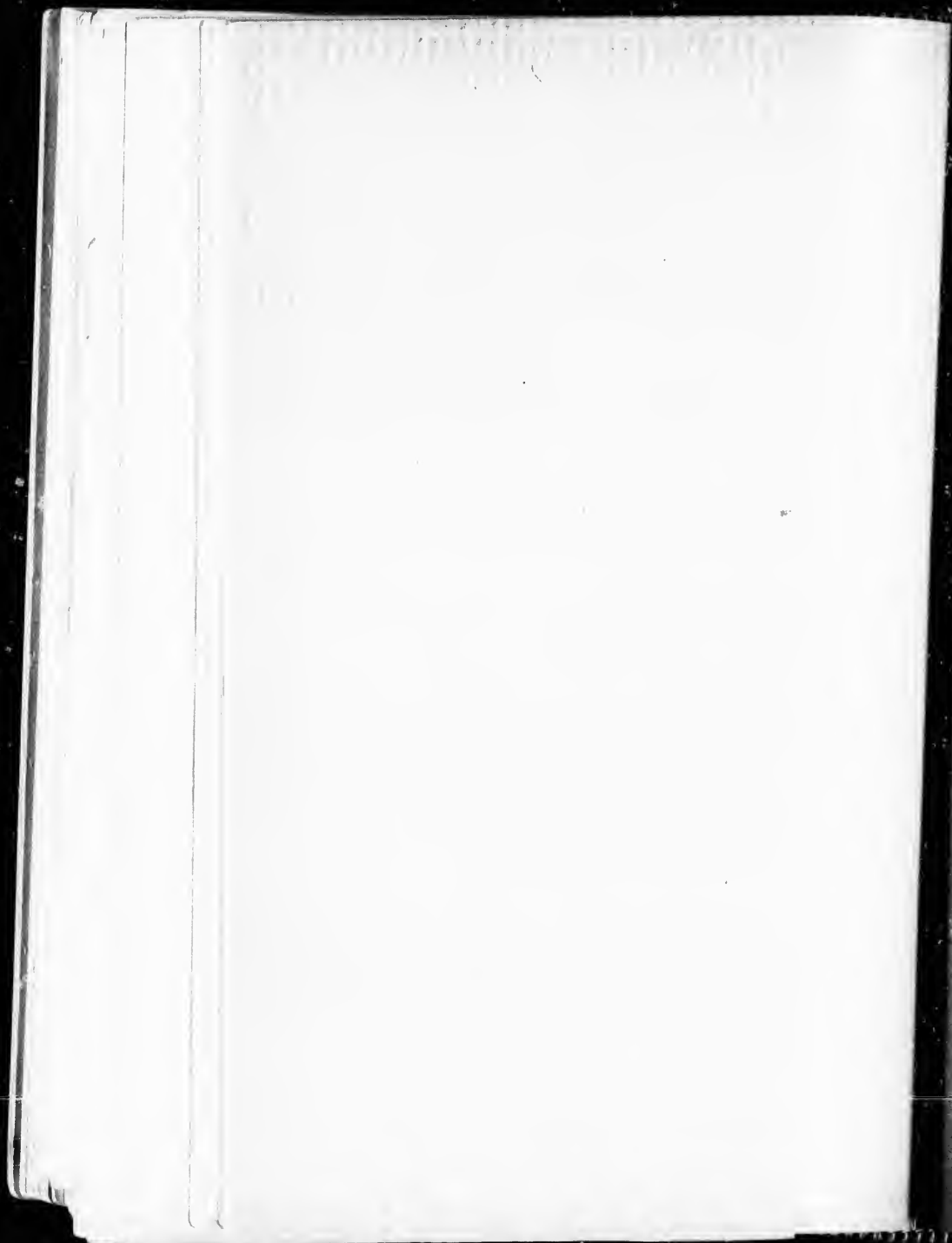
February 6. Patient has not been so well. The drainage is free. There is no fever, but the pulse continues very rapid and has become more irregular. He is also very restless at night and requires morphia hypodermically. There was apparently a slight extension of the dullness to the left, but Dr. Halsted could pass his finger well within the pericardium and there seemed to be no reason to fear a reaccumulation. The heart sounds were clear, but not very strong; no murmur.

February 7. Patient has failed rapidly. Pulse extremely irregular and feeble. Great restlessness. Color not so good. Respirations more hurried. February 8. He sank and died this morning. No autopsy.

WILLIAM OSLER, M.D.,
*Professor of the Theory and Practice
of Medicine in the Johns Hopkins
Medical School.*



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I.—GENERAL ANALYSIS AND SUMMARY OF 229
CASES OF TYPHOID FEVER.

II.—THE TREATMENT OF TYPHOID FEVER.

III.—A STUDY OF THE FATAL CASES.

IV.—SPECIAL SYMPTOMS, COMPLICATIONS AND
SEQUELAE.

By WILLIAM OSLER, M. D.

From the Johns Hopkins Hospital Reports, Vol. IV, No. 1, Baltimore, Md.

Typical malformations - Disturbances of ossification

1. Usually, even a acute in the tongue etc. etc. on fine
2. The malformation of the mandible are less frequent. (Pneumatosis)
3. It is not necessary to be very early & to look at the
field but it is not. It is often felt that the malformation
is not standard in the mandible system.
4. Cases of atrophy of the mandible are not infrequent.
5. - almost total absence as to the character of the skull
6. The total malformation even in the severe cases not always
adequate
7. Malformations very badly related - skull & mandible and
referred to in several.
8. - more when there are cases of malformation of the
mandible

I.—GENERAL ANALYSIS AND SUMMARY OF THE CASES.

By WILLIAM OSLER, M. D.

To May 15th, 1893, 229 cases of typhoid fever were treated in the medical wards.

The patients are isolated in Ward I only when violently delirious or for some special reason.

The following statistical details relate to age, sex, race, etc.

Sex.—187 cases were males and 42 females.

Race.—21 cases were Africans and 208 white.

Of the 208 whites the nationality was as follows: Native Americans 77, Germans 70, Irish 18, English 10, Scotch 2, Russians 4, Scandinavians 8, Poles 4, Bohemians 9, Italians 1, Syrian 1, Finn 1.

The very large proportion of foreigners is in part explained by the situation of the Hospital in a district with a large foreign population, particularly of Germans; and in part is owing to the fact that a large majority of the native Americans have their own homes, and prefer, even in cases of protracted illness, to look after their sick. The ratio of colored to white was 1 to 11.4. The average for 18 years in the city was 1 to 4.2.* The ratio of colored to white in the hospital is about 1 to 7.

Ages.—5 to 15, 23; 15 to 20, 51; 20 to 30, 109; 30 to 40, 29; 40 to 50, 10; 50 to 60, 4; 60 to 70, 3.

Thus it will be seen that nearly 50 per cent of all the cases occurred in the third decade.

Mortality.—Of the 229 patients, 22 died, 9.6 per cent, which is an average rate of mortality, perhaps a little lower than is common in general hospitals. Since the introduction of the cold-bath treatment the mortality has been 7.1 per cent. The various circumstances and conditions influencing the mortality will be dealt with in the consideration of the fatal cases.

* Annual Report of the Health Department, 1892.

Season.—Typhoid is essentially an autumnal fever, and more than one-half of the admissions were in August, September and October. The admissions in each month were as follows:

January 9, February 5, March 3, April 5, May 3, June 9, July 22, August 40, September 38, October 40, November 34, December 16.

The average duration of stay in hospital for the 229 cases was 28.1 days. The majority of the patients are persons without regular homes, and their stay is sometimes unusually protracted; a convalescent from typhoid fever is allowed to remain until he feels well enough to go out and work.

The distribution of the cases in the city will be dealt with in a special section (VIII). Only one case originated in the hospital. A nurse, Miss R. (Hos. No. 3729), had been on night duty from August 1st in ward F, in which was a large number of cases of typhoid fever, and she superintended the giving of from seven to eight baths every night. Prior to August 23rd, when she went off duty, she had been for two weeks "out of sorts" with occasional headache and felt very tired and weak. There was nothing whatever in the history to indicate that she had taken the disease outside, and so far as we knew she had not been exposed except in her duty.

Another nurse had typhoid fever, but just previous to the attack she had been outside nursing a brother with the disease.

A doubtful case was that of Sallie R. (Hos. No. 4716), who was admitted February 16th, 1892, with a choreic affection and spasms. From February 16th to March 1st, 13 days, she had a normal temperature; then from March 1st to 7th there was a gradual rise each day (with the exception of the 5th), the temperature registering a little higher than the last. She gradually developed a typical attack of typhoid fever. She was a resident of Hopkins, Accomack County, Va., but a week before her admission had been staying at Barre Street, in a house, however, in which there was no typhoid fever. In the next bed to her was a patient with typhoid fever, but it is quite possible, and indeed probable, that she received the infection outside, as the fever developed within the limits of the period of incubation.

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II.—TREATMENT OF TYPHOID FEVER.

By WILLIAM OSLER, M. D.

(a) *Nursing and Diet.*—Since typhoid fever, like a majority of the specific infections, runs a course uninfluenced by any known medicines, the duty of the physician is to see that the patient is properly nursed and fed, and that dangerous symptoms, should they arise, are combated by appropriate remedies. In hygienic and dietetic measures his activity is incessant; so far as drugs are concerned his attitude is best expressed in the term "armed expectancy," giving no medicine simply because the patient has a fever, but in emergencies using suitable remedies with promptness and decision. He advocates, as Sydenham said of Hippocrates, "the support of enfeebled and the coercion of outraged nature."

A large proportion of all cases—75 per cent at least—recover under any and all forms of treatment, and even without the good nursing and regulated diet upon which we lay so much stress. By judicious care, by careful feeding, and by the withholding of drugs of uncertain value, fifteen additional patients in each hundred are saved, and if any reliance can be placed upon figures, an extra three or four per cent are saved by hydrotherapy. Nursing and diet are the supports in which we trust, the essentials under all circumstances, to which is added the cold bath, when possible, or cold sponging, for the antipyretic action and stimulating effect. Medicines are not, as a rule, indicated. No known drug shortens by a day the course of the fever; no method of specific treatment or of antiseptics of the bowel has yet passed beyond the stage of primary laudation.

Good nursing not only means comfort—in all implied in that word—to the patient in innumerable little ways, but it also lessens materially the chances of those complications and accidents which claim so large a percentage of the fatal cases. The mortality has, I believe, been materially influenced by the introduction into hospitals of trained nurses, and would probably be found lowest in those institutions in which the percentage of nurses to patients is found the highest.

8.30 "	105°	160	24	180 cc.	strychnia $\frac{c}{60}$	Sherry 3 iv	Wine whey 3 ii Beef juice 3 vi	Vomited a little bile. Retained.
9.15 "						Brandy 3 ii	No nausea. Pulse extremely feeble.	
9.30 "						Brandy 2 ii Sherry 2 ii	Asleep quietly.	
10.10 "						Brandy 2 ii	No milk ^a .	
10.25 "						Albumen 2 ii Albumen 2 ii		
10.45 "								
11.40 "	101.5°	160	24		Sponge bath	After sponge strychnia $\frac{c}{60}$		
12.00 "								
12.40 "								

Milk is the staple article of diet, of which from three to four pints are given in the twenty-four hours. As a rule, it meets all the requirements of an ideal fever food. If not well borne by the stomach it is diluted with lime-water or soda-water, and then the diet is supplemented with egg-albumen or with meat-broths, which are also given when inspection of the stools shows that the milk is not thoroughly digested. Water is given freely and the patient is encouraged to drink as much of it as he can. Alcohol is given after each bath, and in full doses when the fever is high and the pulse feeble. An idea of the dietetic and medicinal measures used to support strength in a serious case may be obtained from the annexed facsimile of the diet and treatment sheet for 24 hours in a case in the middle of a relapse.

(b) *The Cold-bath Treatment.*—For years hydrotherapy has been in vogue as a means of combating the more serious symptoms of typhoid fever. Advocated toward the end of the last century by Currie, it has come into general use by the strong advocacy of Brand in Germany and of the physicians of the Lyons school. It is worth quoting here the admirable remarks of the late Professor Nathan Smith, of Yale, who practised hydrotherapy in typhoid fever as early apparently as 1798*: "But the most effectual method of reducing the temperature of the body is by the use of cold water, which may be taken internally or applied externally. When persons, sick of this disease, desire cold water to drink, it should never be denied them—they should be allowed to drink *ad libitum*. The quantity of heat abstracted from the body by the water which they will drink, however, is but small, and except in cases where, by its influence on the stomach, it produces perspiration, its effects are very trifling.

The only effectual method of cooling the body in these cases is by the use of cold water applied externally; by this means we can lessen the heat to any degree we please. Different physicians have adopted different modes of making this application. Some advise to take a patient out of bed, pour buckets of water upon him and then replace him again; while others prefer sponging him with cold water. We have cases where cold water would be of service, in which our patients are too much reduced to be taken out of bed and placed in a sitting posture without injury. In these cases a different management

* A Practical Essay on Typhous Fever. By Nathan Smith, M. D., Professor of the Theory and Practice of Physic and Surgery in Yale College. New York, 1824.

will be necessary. The method which I have adopted is to turn down the bedclothes and to dash from a pint to a gallon of cold water on the patient's head, face and body, so as to wet both the bed and body linen thoroughly. It is better that he should lie on a straw bed when this is done; it is not, however, essential. If his body should be very hot, he may be turned upon his side and the water dashed upon his back.

As soon as his linen and the bedclothes begin to dry, and the heat in the head and breast begins to return to the surface, the water should be again applied, and in this way the heat may be kept down to the natural standard, or rather below, on the surface, so that the skin may feel rather cool to the hand of a healthy person.

It is not very material what the temperature of the water is, if it is below blood-heat, excepting the shock given by its first contact, which in cases where there is much stupor or coma is of some importance; in general the effect is produced chiefly by the evaporation."

During the first year of the hospital work the cases were treated symptomatically, but the remarkable results published by Brand and by the physicians of the Lyons school seemed to make imperative the adoption of hydrotherapy, so that we determined to give it a full and fair trial. Accordingly, Dr. Lafleur, the former first assistant, now of Montreal, after a visit to the wards of Dr. J. C. Wilson at the German Hospital, Philadelphia, began the practice, which for more than a year subsequently received his personal supervision.

1. *Details of the method.*—The patient receives a bath of from 65° to 70° every third hour when the temperature, taken in the rectum, registers 102.5° or over. The temperature of the bath varies somewhat with its antipyretic influence; thus when the fever is very slightly reduced by the bath at 70° , a lower temperature is employed. The temperature is taken every two hours in the rectum, and if it rises above the point mentioned the bath is given. The length of time the patient remains in it varies somewhat, but unless otherwise directed the bath is of twenty minutes duration. The bath tub, of which there are several light portable forms, is wheeled to the side of the bed, around which a ward-screen is placed. In all instances the patient is lifted from the bed into the bath. There is an arrangement for the support of the back of the patient, either a comfortable padded sloping platform or a properly adapted water-cushion. The

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water is deep enough to cover entirely the chest. If thought necessary, the patient receives a small quantity of whiskey or a hot drink of some kind. He is lifted into the bath, covered with a sheet or with a folded napkin around the loins. A cloth wrung out of ice-water is placed upon the head, and with a sponge the head and face are kept bathed in the same water. These cold effusions to the head are very important, particularly in cases with marked nervous symptoms. The limbs and trunk are systematically rubbed, either with the hand of the nurse or, what is more convenient, with a cloth or with one of the forms of bath-rubbers now in common use. While the patient is in the bath the bed is prepared for his reception with a rubber sheet, a blanket, and over this an old linen sheet. The patient is lifted out, and in a protracted case with feeble heart is dried at once and wrapped in a blanket. In other instances the patient is tucked carefully in the sheet for from five to ten minutes and covered with the blanket before he is thoroughly dried. The patient is given a hot drink, usually whiskey and water. Half an hour after the bath the temperature is taken and recorded. If at the end of three hours the temperature is again above 102.5° the bath is repeated. During the bath the condition of the patient is carefully watched. Though at first the sensation may be rather agreeable, within five or six minutes the patient usually complains of feeling cold and becomes restless. In a majority of instances shivering begins and the patient's teeth chatter and the extremities and face become a little blue. Systematic frictions do much to counteract shivering and the tendency to cyanosis. Feeble patients are carefully watched, and the duration of the bath is reduced when there are signs of increasing weakness.

The procedure upon which Brand lays, perhaps, the greatest stress, namely, the carrying out of the cold-bath treatment from the very beginning of the disease, by which means alone perfect results can be secured, is of course impossible in hospital practice. Only in most exceptional cases can the treatment be begun before the end of the first week; thus only 95 of the admissions were in, and usually at the end of, the first week.

We have, however, in this matter always given the patient the benefit of the doubt and have frequently begun the baths before the diagnosis was established, and this way have bathed cases which proved subsequently to be malaria, pneumonia, or pleurisy.

The frequency of the baths depends upon the severity of the case. Four is an average number for the 24 hours, but the maximum number possible, eight, have often to be given. The arrangements are such that they are given in the night as well as in the day. The largest number of baths given an individual case was 147; five cases received more than 100 baths. Though followed as a matter of routine, there have been since we began the treatment five cases in which the patient was admitted in such a state that it was not thought advisable to bathe him; while in eight cases the extreme debility of the patient made us abandon, sometimes for a time only, the treatment.

Brand urges that all cases should be bathed, that every case of typhoid fever, whether grave or moderate, should be treated by the cold bath. This we have not considered necessary, and of the 196 cases admitted since the beginning of the treatment there were 22 which did not receive any baths,—nearly all, except those above mentioned, mild cases in which they did not seem indicated. In but one instance in the entire series did a patient who entered with low temperature subsequently develop serious symptoms with high fever and great prostration. The case is of no little interest, and an abstract of it will be found among the fatal cases, No. 22. We did not really appreciate that he had typhoid fever during the first week in hospital. The temperature chart was very deceptive, and we thought that it might be an anomalous form of malaria, but repeated examinations of the blood were negative. After the enlargement of the spleen and the appearance of a few rose-spots rendered certain the diagnosis of typhoid fever, the temperature did not rise above 102° until the thirteenth day in hospital. The baths were then begun, but the case proved to be one of unusual severity. He took in all 114 baths. Death occurred from perforation on the fifty-first day. One could not but regret that the baths had not been started at the outset.

2. *General results of the treatment.*—Without entering upon a discussion of the theory of the action of the cold bath, the most important effects may be said to be in the reduction of the temperature and in the general stimulating effect upon the patient, particularly upon the nervous system.

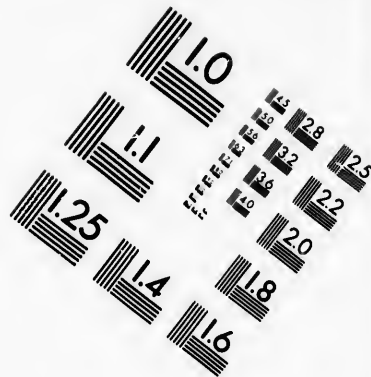
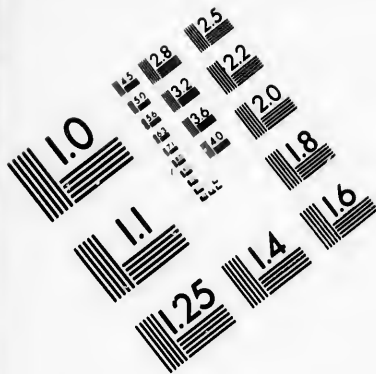
Brand's statement that by the cold bath it is possible to keep the patient in an afebrile condition is not borne out by our experience. In a majority of cases the action of the bath is prompt, and within

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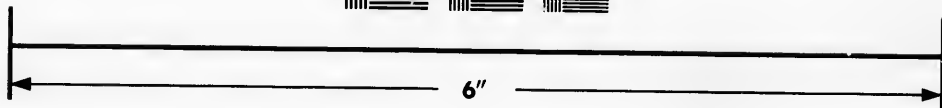
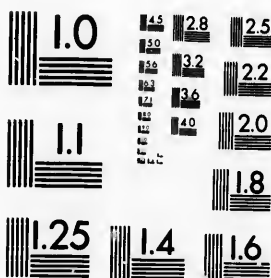
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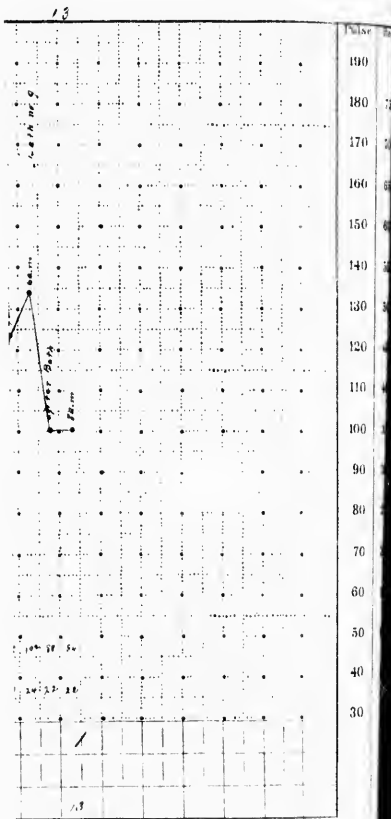
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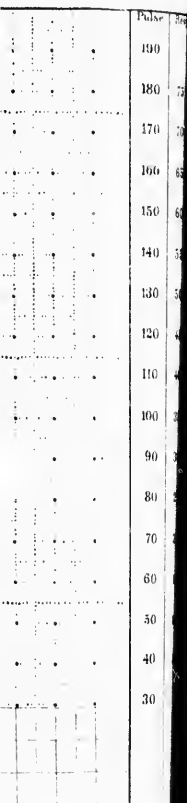
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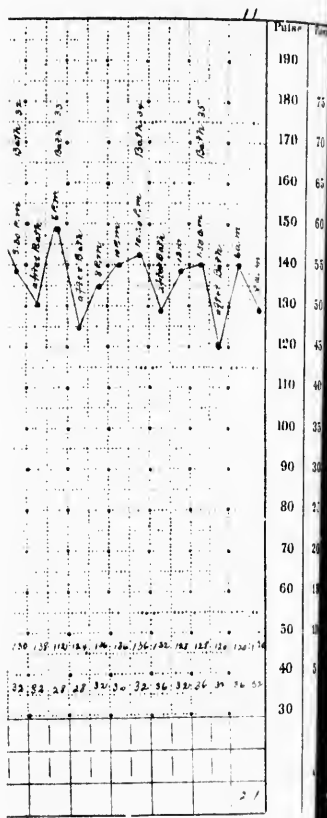
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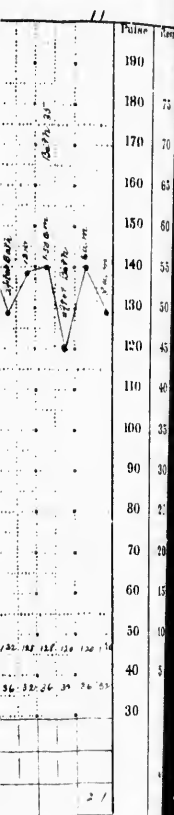
half an hour after the patient comes out of the bath the rectal temperature is lowered from one to three degrees. Then our charts show as a rule a gradual rise, and by the time the two-hourly temperature is again taken the temperature usually has reached its former height. At the height of the disease it is quite exceptional to see the fever kept down for more than a couple of hours. On the other hand there are not a few cases in which the bath at 65° has very little influence in reducing the fever. There were many cases in which at the end of the first or the beginning of the second week, or even later, the baths did not materially influence the fever, that is to say, did not reduce it for more than from a half to one degree. The accompanying chart illustrates this point (Chart I).

On the other hand there are cases in which the bath at 70° acts very powerfully, and on every occasion reduces the temperature to normal or even to 95° or 96°. In children, particularly, this extreme action was seen from the very outset. More frequently it is met with in the later periods, as in the third week. The accompanying temperature chart illustrates the prompt and decisive antipyretic action of the bath in the second week (Chart II).

The cold bath acts in a majority of instances as a tonic to the circulatory system. Within five or ten minutes the pulse of a patient in the bath becomes smaller and the tension is increased. It may indeed become extremely small and hard, a change which is particularly noticeable in cases which present the relaxed, dirotic pulse. After the patient is put to bed and is shivering and blue from the effects of the bath, the pulse may be even difficult to feel. The frequency may be at this time very considerably reduced. The stimulating tonic effect is particularly seen in the early stage, and it seems to be as much upon the peripheral arterial system as upon the heart itself. In the later stages of the disease, with feeble heart's action and pulse above 120, a tonic action is not so often observed, and the reaction from the bath frequently very slow. Collapse symptoms were present in five of our cases and necessitated the abandonment of the baths, usually only for a time.

On the nervous system the most striking effects are witnessed. The headache is relieved; delirium, stupor and coma are rarely seen; the patient sleeps well and naturally, and tremor is a rare occurrence. Of course there is not a complete absence of all the grave nervous phenomena even when the cases are bathed from the

Ward C.



earliest period. Thirteen patients presented marked nervous features, but this is a very small number in the whole series. Certainly the symptoms to which the term "typhoid" is applied are not nearly so frequent under the cold-bath treatment. Thus, at the time of writing (October 20th) there are twenty-eight cases of typhoid fever in the medical wards, not one of which has or has had delirium or tremor.

On the respiratory system the baths exercise no special influence. They certainly do not aggravate the preliminary bronchitis, and the idea that they are liable to induce pneumonia or pleurisy is entirely groundless.

Patients treated with the cold bath appear less often to have the dry, brown tongue. Gastric irritation is not so frequent. Diarrhoea and tympanites are so variable symptoms in different epidemics that it is difficult to say whether they are specially influenced by the baths, but comparing the series treated with and without the baths, they certainly appear to have a good effect. There were seven cases of hemorrhage in the bathed cases; only one in the thirty-three cases treated symptomatically. The proportionately large number of cases of perforation among the fatal cases was probably accidental and had nothing to do with the treatment.

The number of relapses in our bath series, 9.2 per cent, contrasts strikingly with the entire absence in the small number treated symptomatically. The incidence of relapse ranges in different places from 2 or 3 per cent to 9 or 10 per cent, and it does not seem right to attribute any prejudicial influence to the baths. Complications with the bath treatment are rare, and the only unpleasant one was the skin-boils, which certainly occurred in a greater number of cases than in any series treated by me in other hospitals.

The cold-bath method carried out in all its details is exceedingly onerous, particularly if there is a large number of cases in the hospital at the same time. It is, moreover, to a very considerable majority of all the patients excessively disagreeable, and at least nine out of ten of our patients have complained bitterly of it. So harsh does it often seem that I would not suffer it in my wards for a day did I not feel sure that under its systematic employment the death-rate in the disease was definitely lowered. Results such as published by Brand, in cases treated in garrisons and in private practice, cannot be expected and are not obtained in ordinary hospital work. The mortality in the Red Cross Hospital at Lyons, as given by Tripier

and Bouveret, gives a percentage of 7.3, results not only good in themselves, but brilliant in comparison with the statistics of previous periods, in which the mortality ranged from 16 per cent in one period of nine years, and prior to that a mortality of 25 per cent.

The 33 cases treated symptomatically during the first year of the hospital work had a mortality of 24.2 per cent. The cases, however, were of unusual severity; one was admitted with acute hemorrhagic nephritis, one was admitted at the beginning of the third week and had double pneumonia; two cases died of perforation, and one of hemorrhage from the bowels. The mortality since the introduction of the cold-bath treatment has been only 7.1 per cent.

Of course the number treated is small from which to draw any conclusions, but the total mortality of the bathed cases is certainly very low for general hospital work in this country, the average mortality in typhoid fever ranging from 10 to 15 per cent. Series of 30 or 40 cases may be treated consecutively without a death; thus on one occasion there were 33 cases treated without a death, and on another occasion 37; and 51 were treated consecutively with only one death. Of the 14 fatal cases since the introduction of the bath treatment, one came in during a relapse of unusual intensity and died on the twenty-third day, having in all 67 baths. Three were admitted in the third week, one was admitted on the sixth day, two on the seventh, one on the eighth, two on the ninth, one on the tenth day, one on the twelfth, one on the sixteenth, and in one it was impossible to say how long he had been ill. In one of the fatal cases the condition was thought to be pneumonia in a cachectic old man, but the post-mortem showed it to be typhoid fever.

III.—A STUDY OF THE FATAL CASES.

By WILLIAM OSLER, M. D.

Many circumstances influence the death-rate in typhoid fever, of which the most important are the inherited disposition, the amount and character of the poison, the time at which the patient comes under skilled care, and the mode of treatment.

The variation in symptoms, so striking in the infectious diseases, no one case resembling another in all respects—what is it but the expression of the individual disposition, the personal equation? All are not equally susceptible; some are immune, others seem to have an absence of what have been termed the protective *alexins*. Almost the only definite fact, the only certain point, illustrating individual disposition is the varying incidence of typhoid fever with age. The conditions favoring infection increase with each quinquennial period from the third to the sixth. Not the tender blade, not the bud, but the full flower of early womanhood and manhood falls victim to this scourge. The cases are not only more frequent between the 15th and 25th years, but the death-rate at this period is the highest. Of the 22 fatal cases in our series, 11 were under twenty-five years of age.

Experimental evidence has abundantly demonstrated that the symptoms vary with the dose of a poison, and while analogy would lead us to infer the same in the spontaneous infections, we know nothing of the circumstances influencing the dosage in typhoid fever; not even if the variations depend on the amount of infective material or on differences, at different times and in different places, in the intensity of the virus. The severity and duration of the symptoms, and the termination, whether in death or recovery, are influenced primarily, in a large majority of all cases, by these two factors, viz., disposition, constitution, soil, or whatever we may term it; and the virus, possibly by its relative virulence, possibly by its dosage. Fortunately, spontaneous recovery follows in a majority of the cases in the self-limited infections, such as typhoid, typhus, smallpox, etc. The term *self-limited* implies that the duration is fixed—fixed, we

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formerly thought, by an exhaustion of the soil, an absence of the conditions suitable to the further development of the germs; now, as it seems more likely, by the gradual production of substances which inhibit, control and limit their growth—the gradual induction of a tissue-state analogous to that enjoyed by the blood with its germicidal serum.

The mortality is influenced greatly by the time at which the patient comes under treatment. The earlier he takes to bed and is at rest and surrounded by all those accessories of nursing which have come to mean so much in fever cases, the better the chance in the prolonged fight of the *vis medicatrix nature* against progressive toxæmia. Ambulatory cases, which take to bed in the second or third week, usually succumb with facility, often becoming rapidly poisoned and showing no rallying powers; as if the energies had been expended in a preliminary aggressive fight, when the victory lay in a defensive, waiting battle. Of the 22 fatal cases 10 were admitted during the first week, 5 during the second week, 3 in the third, and 2 in the fourth. Of the total admissions, 95 were in the first week, 80 in the second, 25 in the third, 8 in the fourth, 2 in the fifth, 1 in the sixth, and in 16 it was impossible to get accurate details as to the duration of the illness before entering the hospital. This gives a percentage of 9.5 deaths in patients in the first week, 6.2 for patients admitted in the second week, 12 per cent for the third, and 25 per cent of those admitted in the fourth week. Of the 16 cases in which it was impossible to speak definitely as to the onset, 2 died.

The greater the care which a typhoid-fever patient receives, the more watchful is the attention to details, the lower should be, *ceteris paribus*, the death-rate. In a medical ward of a general hospital the number of nurses and assistants should bear some ratio to the number of fever cases, particularly to those of typhoid. In the men's medical ward the average staff of nurses and assistants is four with one orderly; in the months of October and November it has risen to seven with two orderlies. Incessant care in carrying out every direction, regularity and system in feeding, bathing and cleansing, and an intelligent appreciation of the significance of symptoms are all-important factors in influencing the death-rate.

Death in typhoid fever is due: (1) To asthenia, a result either of the rapid or slow action of the poisonous toxins, or a sequence of the severe diarrhoea;

(2) To intercurrent affections, usually caused by an invasion of the weakened organism by other parasites, pneumococci, streptococci, etc.; and,

(3) To accidents of the lesion—erosion of a large blood-vessel, or perforation of an ulcer.

Analyzing the 22 deaths according to this division, there came in the first 8 cases, in the second 4 cases, and in the third 10 cases.

I.—DEATH BY PROGRESSIVE ASTHENTIA.

No case in the list died, so far as one can judge, directly from the effects of the fever, that is, from hyperpyrexia. The highest temperature recorded among the fatal cases was 107°. Nor was there an instance of death from early toxæmia, by which is meant the rapid overpowering of the system, and a fatal result within the first week. Such cases are extremely rare. More commonly the toxæmia is slow and progressive, causing a gradual failure and exhaustion of the strength of the patient, usually but not always with coma and delirium. Of the 8 instances here given 6 died of the progressive toxæmia due to the disease itself. One of these was a case of relapse, and of the others, 1 was admitted on the sixth day, 3 in the second week, and 1 after three and a-half weeks' illness. As a rule there is marked involvement of the nervous system with delirium, coma and tremor. In only one instance, Case III, did the patient retain consciousness to the end. The temperature is usually high, the range from 103°–105°. Sometimes, as in Case III, which was very protracted, the temperature may towards the end sink and be normal or even subnormal. The pulse is always rapid and feeble; thus the range in the six cases was usually above 120, and in every instance rose above 140. The average duration in hospital of these cases was a little more than 12 days. Four of these six patients were bathed. Huxham's* description of this mode of death is particularly graphic: "Now Nature sinks apace, the extremities grow cold, the nails pale or livid, the pulse may be said to tremble and flutter rather than to beat, the vibrations being so exceeding weak and quick that they can scarce be distinguished, though sometimes they creep on surprisingly slow, and very frequently intermit. The sick become quite insensible and stupid, scarce affected with the loudest

*An Essay on Fevers. Second edition, 1750, page 78.

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 ceptive of the impressions of either. The delirium now ends in a
 profound coma, and that soon in eternal sleep. The stools, urine
 and tears run off involuntarily, and announce a speedy dissolution,
 as the vast tremblings and twitching of the nerves and tendons are
 preludes to a general convulsion, which at once snaps off the thread
 of life. In one or other of these ways are the sick carried off, after
 having languished on for fourteen, eighteen or twenty days, nay,
 sometimes for much longer."

The cases with progressive asthenia are as follows:

CASE III. *Admission at end of third week. Great prostration, tem-
 perature irregular and low, death from exhaustion.*

Annie K., aged 23 (Hos. No. 175), admitted August 3rd, 1889. Mar-
 ried and had four healthy children. Present illness began three weeks
 ago with pains and fever. On the fourth day of her illness diarrhœa
 began and she had at first six or seven movements a day. When
 admitted she was in a very prostrated condition; temperature 102°,
 pulse 140, dirotic, and she was delirious. There was herpes about
 the mouth and nose, the tongue was very dry. The spleen was
 enlarged, there were no spots seen. Throughout the first week in
 hospital the temperature showed pretty wide daily variations, as
 much sometimes as 3° or 4° between the morning and evening tem-
 perature. On August 8th and 9th the temperature was extremely
 irregular and once dropped to normal. She was very apathetic,
 but conscious. On the 10th, 11th and 12th the fever kept between
 103° and 104°, and on the 13th and 14th was normal for 24 hours;
 thus on the morning of the 13th the temperature gradually fell, and
 at 6 a. m. was normal. It remained between 98° and 99.5° for 36
 hours, then gradually rose, and on the 15th, the day of her death,
 rose to 103.5°.

The irregular and low temperature in this case towards the close
 was associated with the most profound asthenia, rapid, feeble pulse,
 and diarrhœa.

There was no autopsy.

CASE VIII. *Admission in second week. Diarrhœa, delirium and
 tremor, progressive asthenia, death, autopsy.*

Louis S., aged 28 (Hos. No. 1215), admitted May 5th, 1890. The
 patient gave a history of illness of about ten days' duration; pains

in the head and back and severe diarrhœa, ten and fifteen stools in twenty-four hours. On admission the temperature was 103° ; pulse 108. Throughout the first and second weeks in hospital the case was regarded as one of ordinary severity; the pulse was never very high, not above 98, the temperature between 102° and 104° . On several occasions he had very profuse perspirations. The mind was clear. The diarrhœa, which had been troublesome at first, was checked. About the beginning of the fourth week of the illness the symptoms became aggravated; the pulse became more rapid and feeble, the delirium was marked, and he had very pronounced muscular tremor. It was not until the third day before death, however, that the pulse rose above 100. The heart sounds were clear and there were no complications. On the 15th the tongue became dry and brown, the pulse feebler, and the heart sounds were muffled and very feeble at the apex. Throughout the 16th, 17th and 18th the temperature was between 103° and 104° ; he was delirious, and he sank and died on the evening of the 18th.

Autopsy. Anatomical diagnosis: *Typhoid ulcers in every stage of development in the ileum.*

The ileum showed extensive ulceration, most marked near the valve. Higher in the bowel the patches were covered with brownish necrotic sloughs. The mucous membrane of the large intestine was extensively congested. The spleen was much enlarged. The heart muscle was pale and soft, but on microscopical examination did not show fatty degeneration.

In this case the patient had been doing well, had had only moderate fever, the pulse was not high, and of fair volume, and it was not until within four or five days of the fatal issue that the symptoms became in any way alarming. There was nothing in the anatomical condition to account for the sudden development of these more serious symptoms.

CASE X. *Admission late, probably in third week. High fever, meteorism, diarrhœa, gradual exhaustion, death, autopsy.*

Joseph D., aged 43, admitted August 21st, 1890 (Hos. No. 1687). He is a German, has been in this country eight years, and states that with the exception of "abdominal typhus" (which expression he used himself) six years ago, when he was ill for five weeks, has always enjoyed good health. In July he had what he called a sun-

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stroke. Four weeks ago he had headache and pain in the abdomen; no chill; no diarrhoea. The headache has persisted and he has had occasional cough. He was seen in the dispensary August 11th, when his temperature was 101.4°, and he was then urged to come into the hospital. On admission mind was clear; temperature 104.5°, pulse 120, dicrotic; first sound of the heart a little feeble and muffled at the apex; abdomen full and a little tender in the median zone; well defined rose spots; spleen not palpable; tongue presents a heavy fur, somewhat dry. Patient was ordered baths and stimulants. For the first two days he seemed pretty comfortable; the temperature tended constantly to rise to 105°, but he took the baths well. On the 26th he had a good deal of tremor; the sensorium remained clear. The abdomen was distended; the tympany on percussion extended as high as the seventh rib in nipple line. Slight tenderness in left iliac and hypochondriac regions. There were 5 cm. of liver dulness in the nipple line. The splenic dulness could not be made out; the edge was not palpable. He was ordered warm enemata with turpentine, and given turpentine internally. On the 27th the abdomen was softer, not distended, not tender on pressure. Rash not so marked, general condition altogether better, though the tongue was dry and the pulse was still 120. On the 28th he was very much worse; pulse 132, and he has had for the past two days more diarrhoea. Throughout the evening he failed rapidly, became very feeble and weak on the 29th and died in the evening.

The urine, on admission, was clear and contained no albumin, but there were hyaline and granular casts. Subsequently the urine contained albumin in a small amount and the granular casts persisted. The albumin was never of such amount as to excite special attention or uneasiness.

This patient had in all twenty-five baths, which he seemed to stand very well and did not make any special complaint.

Autopsy (Dr. Councilman). Anatomical diagnosis: *Typhoid ulceration of ileum, pulmonary collapse with œdema, incipient broncho-pneumonia.*

Peritoneum smooth. At the beginning of the ileum, situated in the centre of a Peyer's patch was a circular ulcer 1 cm. in diameter. 300 cm. above the ileo-cæcal valve was the first of a series of ulcers affecting the Peyer's patches and solitary follicles. The first large and deep ulcer was situated 80 cm. above the valve. The patch in

which it was situated was raised above the surrounding parts, and the ulcer was irregular with eroded edges. In only three of the ulcers had the process reached the muscular coat. There were three superficial erosions in the sigmoid flexure.

There were marked œdema and congestion of the lungs at the bases, and throughout the substance were several patches of beginning broncho-pneumonia. The spleen weighed 137 grammes; the kidneys were enlarged; the cortices swollen. In both there were small nodules about 2 mm. in diameter, not raised above the surface, of a yellowish color, and surrounded by a zone of hyperemia. The heart muscle was of a brownish-red color; the striæ were well marked; no wide-spread fatty change. The valves were normal.

CASE XII. *Admission in relapse. Delirium, high fever, slight hemorrhages, dyspœna, progressive cardiac weakness, death, autopsy.*

John S., aged 34 (Hos. No. 2983), admitted April 26th, 1891. Patient was a bartender, had always enjoyed good health since childhood. No acute illness until last autumn, when he was ill for three weeks with fever, cough, and pains in the right side and the back. He got better and remained well until eight weeks ago, when he was taken ill suddenly with a chill and fever. He felt very badly and was in bed for six weeks and a half. Was delirious at times. He had no pain, not even headache. About five weeks after the onset he began to sit up. He had been at work for some time (he says three weeks, but that is inconsistent with the former statement), when on the 24th, that is two days ago, he began to feel badly again and had chilly feelings. On the 25th and 26th he had vomiting, with fever and a little nose-bleeding.

The patient is a stout, plethoric, healthy-looking man, and it is difficult to credit the statement which he makes that within the past three months he has spent at least six and a half weeks in bed with a prolonged fever in which he was delirious. He looks now a very ill man. His pulse is 120, tension low, but not dirotic. The temperature rose in the evening to 104°. Abdomen was large, panniculus thick, skin covered with a very copious and typical rose-red rash. Edge of the spleen distinctly palpable. The heart sounds were clear, the first approaches the second in character. The patient was rational, but at night was delirious. For the first week in hospital the temperature was remarkably continuous, even the two-hourly

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temperature showing very little variation between 103° and 105°. It was not until he had had the baths for three or four days that there was much variation in the temperature. The pulse towards the end of the first week became rapid and irregular. The note by Dr. Lafleur states that the baths have had less influence than in any case previously treated. After many of the baths there was no reduction whatever. The delirium persisted; the spots came out in crops. The pulse was rapid, 120 to 140, with very low tension. The note of May 4th is as follows: "He is conscious; there is a little tremor of the hands; tongue is dry; color of face fairly good; respirations labored, 48; there is diarrhœa; the rash is very copious." The dyspnœa was marked; there were wheezing sounds over the lungs in front, and there was slight dulness at both bases, with enfeebled breathing and numerous fine râles. There was no leucocytosis. The red corpuscles were above five millions per cm., the white between five and six thousand per cm., and the hæmoglobin at about 80 per cent. On the 8th he had a small hemorrhage from the bowels, not followed by any fall in temperature. The delirium persisted; heart sounds very feeble and of fetal rhythm. During the next four or five days he had between six and seven slight hemorrhages, none of large amount. The pulse was extremely feeble and rapid, 140 to 160. He was fed and nursed with the greatest care. On the 14th, which was about the 18th day of his stay in hospital, the note is—"Rash is fading; abdomen is considerably distended; bowel tympany extends about 2 cm. above costal margin; pulse 144; respirations 44. The dyspnœa is not now laryngeal or tracheal. He moves the head constantly from side to side." He sank gradually and died on the 15th.

During the nineteen days this patient was in hospital the temperature is noted as below 102°, in the two-hourly record, only 17 times, this in spite of the most persistent and systematic bathing and sponging. He had in all 67 baths. The temperature was above 104° in the great majority of the records, and it once reached nearly 107°.

The special interest in this case was the definite statement which he made as to a previous attack, and of this, from the accounts of his relatives, there apparently can be no doubt, so that we regarded this case during life as an instance of unusually severe relapse.

Autopsy. Anatomical diagnosis: *Typhoid fever; ulcers with clean bases, and glands in a stage of medullary infiltration; lesions of relapse; catarrhal pneumonia of lower lobes of both lungs; acute enlargement of the spleen; swelling of the mesenteric glands; old tuberculosis of the lungs.*

The body was that of a large, strongly built, well-nourished man; ecchymoses on the arms. Peritoneum smooth. Small intestine presented in the upper part of the jejunum, 100 cm. from the stomach, many points of extreme congestion in the valvulae conniventes. The upper Peyer's patches in the jejunum were hyperæmic and swollen, without any ulceration. Lower down the solitary follicles were affected as well; some of the Peyer's patches were greatly elevated above the surface and had very sharp edges. The first distinct ulcer was 20 cm. from the valve. It had clean edges, and a base on the muscular coat. Close to the valve was a series of ulcers with perfectly clean bases. In the upper portion of the ileum every stage of change in the glands up to necrosis was present. There were no distinct sloughs in any portion of the intestine; the only lesions were medullary infiltration and the clean-cut ulcers. The mucous membrane of the vermiform appendix was swollen, but not ulcerated. The mucous membrane of the descending colon presented patches of old pigmentation. The spleen was much enlarged, weighing 750 grammes. Mesenteric glands were all greatly enlarged and soft. The liver was enlarged and substance soft. The heart muscle was pale, soft, flabby, no mottling visible; but there was extensive fatty degeneration in the form of very fine molecules. The lung presented at both bases scattered areas of broncho-pneumonia and a few old caseous and tuberculous nodules. A point of very great interest in this case was, whether we could judge from the anatomical lesions the truth of the statements of the friends, and of the man himself, that he had only been a short time convalescent from a protracted fever before the onset of the attack in which he died. At the meeting of the Hospital Medical Society at which the specimens were shown, Dr. Councilman, who performed the autopsy, regarded the condition of the lymphatic elements of the intestine as rather bearing out this view. Extensive clean-cut ulceration in the lower part represented, he thought, the old unhealed ulcers, whereas above they were in a condition of unusually marked fresh hyperplasia. I took the view that the lesions present might have been produced during this attack, which had lasted for exactly three weeks.

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CASE XIV. *Admission in third week. Great debility, meteorism, delirium, death, autopsy.*

Sophia H., age 17 (Hos. No. 3967), admitted September 29th, 1891. Patient had been in this country a little over a year. She cannot give a very satisfactory account of herself. A friend stated that she had been ill four weeks. She was complaining for one week, and for three weeks she has been in bed. She had pain in the back and side, fever, no chills, a good deal of diarrhœa and some vomiting.

The patient was well formed, well nourished, had a heavy, dull expression; temperature 102.5°; pulse 102.

Tongue clean at the base. Abdomen was moderately full, tympanitic, everywhere tender on palpation. The spleen was not palpable. One or two small rose spots on the back. Temperature in the evening rose to nearly 105°. The urine, drawn off by a catheter (as she had retention), contained albumin and hyaline casts. During the first week in hospital the temperature constantly tended to the neighborhood of 105°. The pulse was rapid and feeble, reaching 140. She refused nourishment, but took the baths well. She was very restless and even attempted to get out of bed, and was at times quite violent. The abdomen was very tympanitic. On the afternoon of the 6th she was so feeble that the baths were omitted, after she had had in all thirty-three. On the 7th and 8th the temperature kept constantly between 102° and 104°. She was sponged. The abdomen was distended, tense, tympanitic, and on the 7th the liver dulness in the middle and upper sternal lines was obliterated. On the 8th she seemed more rational and put out her tongue when asked, and seemed to understand what was said. There was marked tenderness on slight pressure on the abdomen. The pulse was 140, very compressible. On the 9th the note is: "Patient had a very good day yesterday; she was very quiet; pulse better; face brighter. The tympanites has almost disappeared. On the middle finger of the right hand, just beside the last metacarpo-pharangeal joint, was a reddened, somewhat indurated and very tender spot, and extending along the inside of the finger and the back of the hand is a red streak. This morning the general condition of the patient is worse; the face is more drawn; the pulse is feebler; the abdomen is more tympanitic, though not so distended as it was yesterday, but it is still very tender. On the right outer malleolus is a red, elevated, indurated area 2 cm. in diameter; the centre is hemorrhagic, the skin not raised." Patient sank and died shortly after noon.

Autopsy. Anatomical diagnosis: *Typhoid fever, swelling and necrosis of the follicles in both small and large intestines, catarrhal pneumonia.*

The areas of local inflammation noted in the history were evident post-mortem, and the axillary glands on the right side were somewhat enlarged. The peritoneum was smooth. The diaphragm on the right side was at the third space. The large intestine was greatly distended. In the ileum the solitary follicles were very much swollen and elevated. About a metre from the valve there were some small points of ulceration and superficial necrosis at the apices of the swellings. The uppermost Peyer's patches were swollen; near the valve they were necrotic and stained yellow, and presented large yellow fissured sloughs. The vermiform appendix was swollen and showed superficial necrosis. The large intestine was dilated, and throughout its entire course were numerous small ulcerations. The follicles were swollen and the ulcers evidently proceed from them. The mesenteric glands were enlarged. The spleen weighed 234 grammes. The kidneys were large, somewhat swollen, and microscopically showed fatty degeneration. The heart was small and flaccid, and the muscle showed slight, very diffuse fatty degeneration. The lungs were congested at the bases, and along the posterior borders of the lower lobes showed a few scattered areas of lobular pneumonia.

CASE XVII. *Admission in second week. High fever, extreme cardiac debility, delirium, progressive asthenia, death, autopsy.*

Charles W. S., aged 22, colored (Hos. No. 5540), admitted July 8th, 1892. Patient had been healthy and strong until the present illness, which began, he thinks, about four weeks ago with pains in the legs, weakness and diarrhoea. He did not give up work until six days ago, and went to bed the next day. He had been slightly delirious and had some vomiting. Blood was negative, no leucocytosis. The day before his admission the patient was visited at his home by one of the house-physicians, and found in bed, unconscious, with a temperature of 104.8°. On the 10th, the day after his admission, the abstract of the note was as follows: "Patient is a well nourished man; tongue is covered with a thick, yellowish fur; temperature rose to 105.7° through the night and this morning was 104°. The pulse is 136, low tension. The abdomen is a little full, tympanitic,

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nitic, nowhere tender. The spleen cannot be felt; the heart sounds are clear, but feeble." The patient took his baths well; the temperature was very high during the first week of his admission, often reaching 105° and usually 104° at the time of the baths. On July 12th his condition was such that the baths had to be stopped; the pulse became quite uncountable at the wrist and he became extremely feeble. He was ordered carbonate of ammonia and given alcohol freely and strychnia. He was very dull and drowsy. During the second week in hospital, about the 16th of July, the temperature became lower, and from the 16th to the 20th it did not rise above 102°. The abdomen was not distended. The pulse, however, was very feeble. There were apparently no complications. On the evening of the 20th the temperature rose to 103.5°; the pulse became extremely feeble, and he died on the 21st, the 12th day in hospital.

Autopsy. Anatomical diagnosis: *Typhoid fever; acute splenic tumor; enlargement of the mesenteric lymph glands.*

The lower portion of the jejunum and the ileum presented typical typhoid ulcers, chiefly in the long axis of the intestine. There were twelve of these oblong ulcers, most of them with clean bases extending to the muscular coat. There were two sloughs still adherent. There were no ulcers in the large intestine, but the follicles were enlarged. Mesenteric glands were very greatly swollen. The spleen was only slightly enlarged. The kidneys showed cloudy swelling. The heart muscle was pale and flabby.

In the following instances the fatal event was connected with the intensity of the gastro-intestinal symptoms; in Case II, a young girl aged 15, who was admitted about the 8th day, had moderately high fever, which seemed readily controlled by sponging, and which by the end of the second week had fallen to between 101° and 102°. In the fourth week, when the temperature had reached normal on several occasions, she had very severe vomiting, rejecting everything. The temperature was often subnormal, and she died of the exhaustion consequent upon the persistent vomiting. The other, Case XVIII, is of special interest, from the fact that he had been in hospital a year before with intense entero-colitis, and on readmission the attack was thought to be a recurrence, as the temperature was not very high, and fell almost to normal. The fatal result seemed due directly to the severe diarrhoea.

CASE II. Admission on 7th day. Delirium, high fever, irregular temperature in third week, persistent vomiting, diarrhoea, parotitis, death, autopsy.

Barbara L., aged 15 (Hos. No. 150), admitted July 26th, 1889, about the seventh day of her illness, with a temperature of 105.3°. She was a well nourished, healthy-looking girl. The illness began with headaches and cough, and on the 22nd she had a chill. On admission the temperature was 105.3°. She was delirious from the outset, very restless, and had marked nervous symptoms. The temperature was high, and during the first week the daily variations were never more than 2 or 2½ degrees. Towards the end of the second week of the illness the morning and evening temperature was about 102°, and the daily range of the two-hourly temperature not more than 2.5°. Throughout the third week she was delirious; the pulse between 110 and 129, the tongue dry, and on August 6th parotitis began on the left side. She also began to have frequent attacks of vomiting. The fever during the third week was extremely irregular; thus on the 16th day there was a drop in the afternoon to 96.5° without any chill and not following the sponging. It rose in the evening to 103.4°, the highest temperature which she had had for more than a week. Throughout the 17th, 18th and 19th days of the illness the temperature on several occasions was normal, and on the 20th day it was subnormal for the greater part of the twenty-four hours. She had had for several days a good deal of vomiting and was extremely feeble and weak; pulse 142. Throughout the greater part of the fourth week this remarkable condition in the temperature persisted, and throughout the 21st, 22nd and 23rd days the temperature was subnormal for a large part of the time. Thus on August 10th the temperature at 8 p. m. was 99°, at 4 a. m. was 99.6°, at 8 a. m. it had fallen to 95°, at 10 a. m. to 94°; it gradually rose throughout the day, and between 2 p. m. and 8 a. m. the next morning was constantly between 98° and 99°. The next day there was a drop again to 95°. The pulse was during this period not so rapid, but extremely feeble. The vomiting was persistent and followed immediately the taking of food. She was given stimulants constantly, and hypodermics of ether and brandy. On August 15th, the 26th day of the disease, the temperature began to rise, and on the 27th and 28th was between 103° and 104°. Then throughout August 18th, 19th and 20th it remained between 100° and 102°, and on the

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latter date she died in a condition of exhaustion. Diarrhoea had been present throughout the illness, the number of stools ranging from two to four daily. It was more marked early than late in the illness. There was never very great abdominal distension and never tenderness. The rash was profuse.

The special features of the case were the great irritability of the stomach during the second and third week, the low temperatures during the fourth week, with which the severity of the symptoms did not in any way abate. The parotitis which developed subsided without suppuration.

Autopsy (Dr. Welch). Anatomical diagnosis: Typhoid lesions; clean and smooth ulcers and a fresh medullary infiltration; extensive typhoid lesions in large intestine; swollen spleen; hemorrhage into right ovary; cloudy swelling of kidneys.

No peritonitis. The distribution of the intestinal disease was as follows: The first lesion occurred in a Peyer's patch 197 cm. from the ileo-cæcal valve, and consisted in medullary infiltration with a little slough in the upper part. From this point to the valve the Peyer's patches and follicles were swollen and ulcerated. Near the valve were large ulcers with swollen edges and clean floors, in which the circular muscular coat was evident. The edges of the ulcers were moderately swollen and a little undermined. All of the large ulcers had this clean appearance, without any slough attached; but in one or a little outside the edge of the ulcers there were fine, swollen, whitish follicles, looking like a fresh medullary infiltration. The ulcers sometimes had the long axis parallel to that of the coat and sometimes ran transversely. The large intestine was very extensively involved; the mucous membrane from the cæcum to the rectum was thickly studded with whitish, rather firm elevations, apparently solitary follicles the size of a pea or smaller. Many of these had a small central loss of substance, forming crater-like ulcers, or a small yellowish central slough, partly or wholly detached. In the cæcum there were more extensive ulcers, with smooth floors resembling those in the ileum. The mucosa of the vermiform appendix was swollen and presented numerous swollen follicles, but no ulcers or sloughs. The swollen follicles were less numerous in the rectum than in the colon, but they were present, and in some instances ulcerated.

The condition of the heart was interesting in connection with the fact that she had a persistently feeble, though never excessively

rapid pulse. The organ weighed 180 grammes; the valves were normal, and the note by Dr. Welch on the heart muscle is, "microscopically entirely normal; stripe distinct, no trace of granular or fatty degeneration." An interesting accessory condition was the hemorrhage into the stroma of the right ovary.

CASE XVIII. *Doubtful duration before admission. Diagnosis of entero-colitis; severe diarrhoea, death, autopsy, medullary infiltration of Peyer's glands.*

John L., colored, aged 25 (Hos. No. 5556), admitted July 12th, 1892. This patient was in hospital just a year before and was treated for entero-colitis and recovered. He states, however, that he has since had several attacks, for which he has had repeatedly to take landanum. He sought relief at the dispensary a few days ago for diarrhoea, which, he says, lasted some time, but it was impossible to fix the date of onset. He has had some nausea and occasional vomiting. The patient was emaciated and had a dull, stupid expression. The tongue was covered with thick white fur. Temperature on admission was 102° and rose to 103.5° . The abdomen was flat. The condition of the heart and lungs was negative. The blood examination showed no malarial parasites. The stools were examined repeatedly; no amœbæ were found. They were thin, of an amber color, and contained gelatinous threads with fecal masses. Nothing special was seen on microscopical examination. The colon was irrigated and he was given bismuth. During the first three days in hospital he had a great many stools, from nine to ten in the twenty-four hours. Typhoid fever was not suspected, as it was thought he had entero-colitis, such as that for which he was treated a year ago. Moreover, the temperature morning and evening on the day after admission was 99.5° , and only rose once in the day to 101° . Throughout the 14th, 15th and 16th the temperature did not rise above 100° . The only suggestive point was the diazo reaction in his urine. On the 17th the temperature rose to 104° and he became very much prostrated. The diarrhoea was not so severe, but the movements were involuntary, and he gradually sank and died on the 19th.

Autopsy, 29. Anatomical diagnosis: *Typhoid fever, stage of medullary infiltration, acute splenic tumor, parenchymatous degeneration of kidneys and liver.*

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Peritoneum smooth. The large intestine was dilated and the walls thickened. From the anus to the cæcum the mucous membrane was covered with small prominences the size of shot. They were all about the same size, most of them firm. Some of the largest had a small depression in the centre. The mucous membrane between these nodules was intensely hyperæmic. In the entire ileum both the follicles in the Peyer's patches were intensely swollen, reddened, or in a stage of medullary infiltration. No sloughs in the intestines anywhere. In the largest of the patches there was a marked reticular appearance, in the smaller a homogeneous swelling; the mucous membrane between them everywhere hyperæmic. The hyperæmia and the relative degree of swelling of the follicles extended half-way up the jejunum. The spleen was large, weighing 235 grammes. The mesenteric glands were very much enlarged. The kidneys were much swollen and pale. The heart muscle was pale, but not fatty. Typhoid bacilli were found in the spleen and mesenteric glands.

A point of special interest in this case is the occurrence of death before the formation either of sloughs or ulcers in the Peyer's glands. This is extremely rare; in every one of 64 autopsies in typhoid fever (Montreal and Philadelphia cases) sloughs or ulcers were present; and in one instance at least, extensive necrosis existed by the end of the first week. In the case under consideration it is impossible to estimate accurately the duration of the illness, but it was probably at least ten days. There was intense colitis, and many of the enlarged solitary follicles showed central losses of substance, and the reticulated appearance was present in the Peyer's patches, so that superficial necrosis had occurred. But a patient may have a prolonged and typical attack with delirium and diarrhœa, and present at the time of death, on the 36th day, only medullary infiltration without sloughs or ulcers. (See Sidney Phillips, Clin. Society Transactions, 18 . .)

II.—DEATH FROM INTERCURRENT AFFECTIONS.

In this class are four cases: one an instance of acute hemorrhagic nephritis, which is referred to in the section on renal complications; two of pneumonia; and one of œdema of the glottis. Of the two cases of pneumonia, one was of particular interest inasmuch as it

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was regarded as the primary lesion, and the diagnosis was only established post-mortem. The œdema of the glottis occurred in an unusually protracted case in a pregnant woman. The attack came on somewhat suddenly when she was apparently doing very well and when the temperature was gradually falling.

CASE I. Onset with rigor, persistent high fever, hæmoglobinuria, delirium, symptoms of perforation, death, autopsy.

John T., aged 26, colored (Hos. No. 54). Onset with rigor, persistent high fever. Hæmoglobinuria with albumin and tube casts. Delirium, symptoms of perforation; death on 14th day of illness. Extensive lesions in ileum; perforation; acute hemorrhagic nephritis.

This case is fully reported in Vol. II of the Hospital Reports, page 120, and will be referred to in this report in Dr. Hewetson's paper on the kidney complications.

CASE V. Admission at end of second week. Marked cardiac arrhythmia, pneumonia, death, autopsy.

Johann R., aged 32 (Hos. No. 469), admitted November 2nd, 1889, from one of the ships of the Hamburg-American S. S. Co. There was a history of an illness of two weeks' duration, with fever and diarrhœa and slight cough. He persisted in keeping about and trying to do his work.

On admission he was rational; temperature 102°, pulse 78, very irregular and intermittent. The color was good, he had no dyspnoea and no cardiac distress. There were some petechiæ on the skin of the abdomen and a few rose spots. The heart condition was unusual, and for the first twenty-four hours alarming; the impulse was not forcible, but the shock was felt widely, the beats followed each other rapidly, sometimes in pairs or in series of three, four, or five. Many of the beats did not reach the radial. The second aortic sound was clear. So feeble, intermittent and irregular was the heart's action that he was given several times hypodermics of ether, and was at once ordered digitalis and whiskey. The first days in hospital the patient was very restless and delirious. The heart for the first twenty-four hours, as stated, was extremely irregular and the action rapid. The rash became very abundant, the petechiæ gradually faded, the spleen was enlarged; he had troublesome

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diarrhoea, five or six stools in a day. The temperature was not high, ranging only from 101° to 103°. After the 6th the digitalis was stopped, as the pulse became regular but more rapid. The patient seemed to be doing well, though he had had diarrhoea and was delirious, until the 7th of November, when signs of pleurisy and pneumonia developed. The temperature rose to 104° on the 7th, and after that did not rise above 103°, though the pneumonia extended rapidly. The reddish-brown sputa contained numerous pneumococci. The pulse became extremely feeble and rapid, the respirations were between 50 and 60, and in spite of ether, ammonia and brandy he sank and died on the morning of the 9th.

Autopsy. Anatomical diagnosis: *Typhoid ulceration in small and large intestines, lobar pneumonia, pleurisy.*

There was extensive ulceration of the large intestine, extending even to the rectum. The ulcers were round and irregular, with, as a rule, clean bases; they involved the entire length of the large bowel. The ileum presented extensive ulceration, particularly near the valve. The upper and posterior portion of the lower lobe of the left lung was consolidated, and in a state of red hepatization. The pleura over it was covered with a thin pellicle of fibrin. The posterior part of the lower lobe of the right lung was also solid, and the pleura presented a similar fibrinous exudate. The spleen weighed 630 grammes. The heart muscle was dark and flaccid. The fibres presented no fatty degeneration.

CASE XI. Admission in state of extreme debility. Diagnosis of pneumonia; death, autopsy, lesions of typhoid fever.

Geo. W. K., aged 70 (Hos. No. 1814), admitted September 22nd, 1890, complaining of extreme debility. Patient states that he has been a healthy man, but cannot give a satisfactory account of himself. States that he has not had cough, and that the bowels have been regular; no chills, no vomiting. On admission he was much emaciated, looking in a condition of senile debility. The temperature was 97.5° at 8 p. m., and did not rise above 97° throughout the night. Pulse 72, regular, compressible, radials sclerotic. Tongue very heavily coated, dry and almost black. There were numerous cutaneous hemorrhages about the wrists and legs, and large superficial ones on the skin over the manubrium and scattered over the trunk. The chest is somewhat barrel-shaped, and the lower part of

the sternum is much depressed—a modified “trichter-brust.” On the first day nothing was noticed on the examination of the lungs. The heart sounds were clear; second aortic accentuated and ringing.

Note on the abdomen reads: “Soft, irregularly distended, the intestinal peristalsis can be seen through the thin walls; no tenderness; no growth felt. Percussion limits of the spleen and liver are normal.” The patient was thought to have a senile cachexia, and was ordered stimulants, with iron and nourishing food. The urine contained a moderate amount of albumin with granular and hyaline casts. During the 23rd, 24th and 25th there was fever, the temperature rising to 101°. It was usually normal, sometimes subnormal, in the morning. There was no diarrhoea. Had no cough, no expectoration. The physical examination was negative. On the 27th he began to have diarrhoea. He was unconscious; tongue very dry; he passed the urine and faeces involuntarily. The ecchymoses on the chest were more extensive. To-day it was found that the percussion note at the left base was dull as high as the angle of the scapula. Respiration was tubular, expiration prolonged, and there were a few râles. It was then thought that it was a case of pneumonia in an old debilitated individual. He became progressively weaker on the 28th and died on the morning of the 29th. The diagnosis was pneumonia in an old man.

Autopsy (Dr. Welch). Anatomical diagnosis: *Typhoid fever. Recent croupous pneumonia of the left lower lobe, enlarged spleen, gall stones.*

Peritoneum smooth; the peritoneal surface of the ileum near the valve was covered with streaks of dark-red hemorrhagic infiltration. The small intestine presented a number of ulcers, the largest were in the lower part of the ileum. They were irregular, nearly always as deep as the transverse muscular coat, and with little or no thickening, and without adherent sloughs. Many had dark-red hemorrhagic floors. One occupied the margin of the ileo-caecal valve. They extended upwards for a distance of 50 cm. There were also many small follicular ulcers. The edges of the ulcers were but little undermined. In the caecum and beginning of the colon were several small ulcers; glands moderately swollen, soft. There was no trace of tubercles over the ulcers, which were undoubtedly typhoid in character.

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Spleen was soft and weighing 260 grammes. The heart was small; valves presented calcareous plates.

The lobe of left lung was in a condition of recent hepatization, the remainder of the lung emphysematous. There was much œdema. Kidneys were anæmic and were in a state of cloudy swelling.

This interesting case of typhoid in an aged man presented no clinical features in any way characteristic. He was admitted in a cachectic condition with dry, furred tongue, and when the consolidation in the left lower lobe was detected, Dr. Lafleur, under whose care he came, thought very naturally that it was an instance of slowly developing pneumonia in an old man, that the "typhoid state," so well marked, was secondary. With this opinion, I, seeing him two days before death, concurred. Unfortunately, no details could be obtained as to the length of time the patient had been ill. It is interesting to note the low temperatures. On four or five occasions within the first three days he was in hospital the temperature was below 98°, and once was 97.5°. In the week he was under observation only once did the temperature rise above 102°. The extensive cutaneous hemorrhages were such as are seen frequently in the protracted cachexia of elderly people.

CASE XVI. *Admission in second week. Pregnancy, high fever, delirium in third week, with increase of fever; diarrhœa; œdema of glottis, tracheotomy; death, autopsy.*

Annie M., aged 23 (Hos. No. 4559), admitted January 1, 1892. Patient was transferred to the medical side from the gynecological ward, to which she had been admitted the day before, complaining of fever and malaise. She had been a healthy woman; married at 18, had had one child. Present illness began five days ago. She had previously felt well. Her husband had recently had an attack of typhoid fever, with relapse. She has been feverish for nearly a week. Healthy looking, well nourished woman. Signs of old interstitial keratitis, and the central incisor teeth are notched. Temperature 105°, pulse 120. Tongue dry and brown. The abdomen is evenly distended. The uterus can be felt in the position of about the fifth month of pregnancy. There are typical rose spots on the abdomen and thorax. The spleen is just palpable, heart sounds are fairly loud, the first is accompanied by a soft, blowing murmur.

The urine contained no albumin. For the first week in hospital she had no special features except the persistent high fever, which was not much controlled by the baths. She was rational. The pulse ranged from 104 to 112; she had no diarrhœa. After the 19th she did not take the baths well, and considering her condition, it was thought well to substitute the sponging for them. During the second week in hospital the temperature was lower, only occasionally reaching 104°. The pulse, however, was feeble and she had emaciated very much. She took stimulants and food freely.

On January 30th the temperature sank to and remained at 100° for 16 hours, and on the 31st it fell to 98°. She was quite rational and took her food better. During the third week in hospital she became worse; the temperature kept persistently high, between 104° and 104.5°. She had no diarrhœa. In the fourth week the fever persisted and she began to have for the first time delirium. There had been no distension of the abdomen, no diarrhœa. The rose spots, of which there had been several crops, had almost disappeared. The fetal movements were distinctly felt. On February 16th there was a fresh crop of rose spots noted. The temperature kept persistently high, constantly reaching 104.5° and rarely sinking to 101°. The pulse ranged from 130 to 140. On February 22nd she seemed to be somewhat better and temperature had been falling. For a few days she had been much troubled with hoarseness, and with diarrhœa. On the 22nd, 23rd and 24th the temperature was between 100° and 100.5°. On the morning of the 24th the patient became very hoarse and could scarcely speak above a whisper. By noon there was very marked difficulty in breathing. It was very difficult to make a thorough examination of the larynx, but there seemed to be a considerable degree of œdema about the epiglottis. At 8 o'clock that evening Dr. Halsted performed tracheotomy, with temporary relief, but during the night she sank rapidly, and died on the 50th day of her illness.

Throughout the attack the urine contained a trace of albumin with hyaline and granular casts.

Autopsy. Anatomical diagnosis: *Typhoid fever. Ulcers healing and others in progress, broncho-pneumonia, pregnancy at sixth month (cerebral hemorrhage of fœtus, general œdema of fœtus).*

Extensive ulceration in the ileum. The larger ulcers had circular outlines, but with low, not very well-defined edges. There was a

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very large ulcerated surface near the valve. Higher up in the intestine there were ulcers which had almost healed, and in places there were completely healed ulcers and fresh ulceration in close contact. The mesenteric glands were greatly enlarged. Spleen enlarged, weighed 250 grammes. The kidneys were pale; there were numerous small areas on the surface, made up of small reddish bodies surrounded by areas of hyperæmia, which were found to be abscesses containing the typhoid bacilli. The heart was pale, the muscle fibre very flaccid and showed diffuse and fine fatty degeneration.

Marked œdema and congestion at the bases of both lungs, with small areas of broncho-pneumonia.

This unusually protracted case presented two periods; from the 28th to the 31st day there was a break and the temperature was not so high, and she seemed to be improving; subsequently the fever rose again, and on the 8th and 9th there was a fresh crop of rose spots.

(Edema of the glottis is a rare complication of typhoid fever. In the exhaustive article by Lünig,* of 115 autopsies in which there were serious laryngeal complications, in 9 œdema was present. In only 6 cases the condition was uncomplicated.

III.—ACCIDENTS OF THE LESION.

HEMORRHAGE.—Of the 229 cases, eight had hemorrhage from the bowels, three of which proved fatal. In the first instance, an elderly man, admitted on the 10th day of his illness, had a sharp attack, with severe diarrhoea and high fever in the fourth week; death followed shortly after a very profuse hemorrhage from the bowels. In the second case, a young man who had been ill for at least two or three weeks before admission to hospital, had a large hemorrhage the day after his admission, and died within twelve hours. In the third case (Hos. No. 6410), there was perforation, and it is given in that section.

CASE VIII. *Admission on 10th day, with diarrhoea, occasional vomiting, persistence of fever in 4th week, profuse hemorrhage from the bowels, death, no autopsy.*

*Die Laryngo- und Tracheostenosen im Verlaufe des Abdominaltyphus, *Archiv für klin. Chirurgie*, Band XXXI.

Charles B. L., aged 51 (Hos. No. 1450), admitted July 7, 1890, about the 10th day of an illness, in which he had had diarrhœa, fever, cough, and several chills. He had also had at the onset very obstinate vomiting. During the second and third weeks the temperature ranged from 100° to 103°. The tongue was not dry, the pulse was of fair volume, and the general condition was good. He had no bad symptoms except that the stomach remained a little irritable and he had an occasional attack of vomiting. No rash was noted. In the fourth week the fever did not abate, the pulse became more rapid and feeble, and he had diarrhœa, from five to eight stools daily; on the 15th the tongue became dry and coated, and nervous symptoms were marked. On the 16th he had a graduated tepid bath. On the 16th his temperature rose to 104° and he had another bath at 80° F. On the morning of the 17th, following a profuse hemorrhage from the bowels, he became collapsed, and in spite of stimulation and hypodermics of ether, he did not rally, and died the same evening.

There was no autopsy.

CASE XV. *Admission in third week. High fever, rapid pulse, meteorism. On second day severe hemorrhage, recurrence on third day, death, autopsy.*

Patrick W., colored, aged 23, laborer (Hos. No. 4192), admitted November 7th, 1892, complaining of diarrhœa. Had been a very healthy man. The present illness began three weeks ago, with diarrhœa, six or seven stools a day. He had had chilly feelings and pain in the back. He had not been able to work for the past twenty-five days. He was told that he had a high fever and two weeks ago he was delirious. He has had also a slight cough. When admitted the pulse was extremely weak and rapid. The temperature was 103.5°; tongue was heavily coated. The abdomen was distended and tender; the spleen was enlarged, readily palpable; the blood examination was negative, and there was no leucocytosis. He was bathed, and the baths acted very promptly, reducing the temperature from three to four degrees. On the 8th the temperature was between 104° and 105°; the pulse extremely rapid, between 130 and 150. The heart sounds were feeble, but clear. Abdomen was tense and tender on pressure; slight trace of albumin in the urine. At 9 p. m. he had a large hemorrhage from the bowels, passing

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many clots, and all night there was more or less oozing. On the morning of the 9th he looked a little blanched, but was sleeping quietly. The pulse was 142, very weak and irregular. In spite of the large hemorrhage the temperature was not at all reduced; thus at 8 p. m. it was 103.2°, at 10 p. m. the same, and throughout the night it ranged between 101.5° and 102.5°. The patient sank rapidly through the day, and died at nine on the evening of the 9th, about 48 hours after admission, and on or about the 28th day of the disease.

Autopsy. Anatomical diagnosis: *Typhoid ulceration of the ileum, acute broncho-pneumonia.*

Peritoneum smooth. There was no special distension of the intestines. In the ileum there were well-defined ulcers with sharp edges and numerous swollen solitary and agminate glands. Some of the latter had greatly elevated edges with well-marked reticular appearance. The solitary glands were in all stages of swelling, and they showed superficial necrosis at the apices. The large intestine showed the most extensive ulceration. There were well-marked typical ulcers with clean bases. There were other elevations over the surface with areas of necrosis. The ulcerations in the large bowel looked old and there was some slaty discoloration in the mucous membrane about them. The source of the bleeding was not discovered. The glands of the mesentery were greatly enlarged. The heart was pale, the valves normal. The muscle showed slight fatty degeneration. The lungs showed at the bases a few areas of broncho-pneumonia. The brain and cord showed no changes.

PERFORATION.—Peritonitis from perforation of the bowel was responsible for eight deaths, a percentage of 36.4 of the fatal cases, and of 3.5 of the total number admitted, a high percentage in comparison with that of Munich, in which of 2000 fatal cases there were 114 deaths from this cause, 5.7 per cent. Of the 64 post-mortems of which I have notes, there were 15 deaths from this cause, 23.4 per cent. Of the eight cases, the ileum was perforated in four, the appendix vermiformis in two, and the colon in two. The high percentage of perforation is rather remarkable. The averages as given in the large statistics from the Hamburg hospital and the statistics of Liebermeister were only about 1.2 and 1.3 per cent. The percentage given by Murchison in his collected cases was, however, as high as eleven.

The time of the occurrence of the perforation in these eight cases was as follows: in the 8th week, 1; in the 7th week, 2; in the 5th week, 1; in the 4th week, 2; at end of second week, 2.

In every one of the cases, as may be gathered from the notes, the attack was severe, and in more than one-half of them protracted. In six cases the symptoms of perforation were present—pain, increasing abdominal distension, and collapse. In one case (XXI) the abdomen was retracted. In two cases the condition was unsuspected, though in one (case IX), in which the appendix was perforated, there was great pain in the right iliac fossa.

Perforation of the appendix in typhoid fever is not very common, 3 per cent in the 167 cases of perforated Fowel collected by Fitz, who remarks:* “Clinical evidence, on the contrary, though perhaps misunderstood, is abundant as to the probable frequency of perforative appendicitis in typhoid fever. The probability of its occurrence furnishes the best solution as to the prognosis of intestinal perforation in the latter disease. Most of the cases of recovery from symptoms of perforation of the bowel in typhoid fever are those in which an attack of appendicitis is closely simulated, while the fatal cases of perforation of the bowel in typhoid fever are, in a great majority of instances, those in which other parts of the bowel than the appendix are the seat of the perforation; hence the prognosis of apparent perforation of the bowel in typhoid fever is to be regarded as the more favorable the more closely the symptoms and course resemble those of an appendicitis.”

CASE IV. *Admission in third week. Hemorrhage from bowels, progressive asthenia, perforation, death, autopsy.*

Zachariah L., aged 40 (Hosp. No. 319), admitted September 27, 1889. The patient applied at the surgical dispensary, and while waiting became very weak, and had a large bloody stool. When taken to the ward he was extremely feeble, and stated that he was a sailor by occupation, and had not worked for three weeks on account of fever and diarrhoea. No further history could be obtained. Temperature on admission was 101°; pulse 92, dicrotic; tongue was furred, not dry; the abdomen soft, with a few suspicious-looking spots. The heart sounds were very feeble, the first particularly weak, and there was a systolic murmur at left border of sternum. He had no further

* Transactions of the Association of American Physicians, vol. vi., p. 209.

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bleeding through the day, and was given stimulants, and for two days a mixture of ergot, turpentine and laudanum. During the next four days he became progressively weaker; there was continuous delirium; the temperature range was not high, but he was persistently drowsy. On the 30th the temperature fell to 98°. Throughout the first two weeks in October he was very feeble, with persistent delirium and rapid pulse. He had no diarrhœa. The tongue was extremely dry. On the 17th the pulse became much more rapid, and he had marked tremor of the extremities. The temperature range was irregular, between 100° and 103°. During the last week he was extremely feeble, the temperature showed very slight variations; thus from the 15th to the 18th it was between 102° and 103.5°, occasionally rising to 104°. On the 19th, 20th and 21st it was between 100° and 102°, and fell quite gradually and on the 22d, when he died, it was 98°. Towards the close there was no diarrhœa and no special abdominal symptoms. The heart sounds were extremely feeble, and the pulse rapid, 140.

Autopsy (Dr. Councilman). Anatomical diagnosis: *Typhoid ulcers in ileum and colon, perforation of ileum 150 cm. above valve, peritonitis, bronchitis, œdema of the lungs, broncho-pneumonia, pleuritis.*

About 75 cc. of yellow, turbid fluid in the peritoneum. The coils of the intestines agglutinated by fresh exudate; no gas escaped on opening the peritoneum. In lower part of ileum there were extensive irregular ulcers with smooth clean floors, showing the muscular layers. The edges were thickened and showed medullary infiltration. Many of the ulcers were placed transversely. The highest ulcer, 150 cm. from the valve, measured 2 cm. in transverse diameter and 3 cm. in length. In its centre was a yellowish slough 4 mm. in diameter, extending through the wall of the gut. At the edge of the slough there was a pin-hole perforation.

There were several oval ulcers in the œcum and colon. The lungs showed intense general œdema; a patch of consolidation in the right lower lobe, with an acute fibrinous pleurisy. The heart muscle was brownish-red in color and distinctly flabby. The spleen weighed 295 grammes.

CASE VI. *Admission in beginning of second week. Perforation, collapse symptoms, peritonitis, death, autopsy.*

Eliza M., aged 18, Swiss (Hosp. No. 926), admitted March 5, 1890. She had only recently come to this country; had been ill for

a week with pain in the head and back, cough and fever. It is difficult to say exactly how long she has been ill, but she says for not more than a week. She had complained of a good deal of abdominal pain, and as there was disturbance of menstruation she was admitted to the gynecological ward. When transferred to us, the temperature was 103.5° ; the abdomen was full, tense, and tender on pressure; pulse 120. The abdominal distension was so great, with a tympany extending to the fifth space on the right side and obliterating the liver dulness, that Dr. Lafleur thought that possibly perforation had occurred. On the 6th at 10.30 a. m. she had a chill lasting a half hour; complained of very severe abdominal pain. The temperature was 101.5° , and only rose by 1 o'clock to 103.5° . The note by Dr. Lafleur on the 6th was as follows: "Complains of severe abdominal pain; respirations 48, shallow; expiration groaning; pulse 168, compressible; skin hot and dry; face slightly flushed, not anxious-looking; tongue moist, with a brownish fur; pupils equal. Lungs present a few moist râles at the base. The heart sounds are fetal in character, very rapid, possibly a soft systolic murmur at the apex. The abdomen is uniformly distended, rigid, very sensitive in right iliac and lumbar regions; bowel tympany extends to fifth interspace, and in the nipple line the liver dulness occupies only three-fourths of an inch. The spleen is not palpable. Rose spots present on back." The evening temperature on the 6th rose to 103.5° . Throughout the morning of the 7th the temperature fell and was 98° at 12.30 a. m., then gradually rose through the morning. At the visit the patient was sweating profusely, looked collapsed; face pale, hands bluish; pulse 170, thready and very compressible; respiration shallow, rapid; mind perfectly clear. The liver dulness was practically obliterated. The temperature between 10 a. m. and 7.30 p. m. ranged from 104° to 105° . Throughout the early morning of the 8th it fell and at 2.45 a. m. was 96.5° . It rose at 5 a. m. to 103° and fell again at 6 a. m. to 96° . At 8 a. m. it rose to 104° . The patient on the 8th was somewhat cyanotic, with cold extremities. The temperature, however, kept up and was between 104° and 105° . The heart sounds were fetal in character and extremely rapid. On the morning of the 9th the temperature rose to 106° and she died at 12.45.

Autopsy. Anatomical diagnosis: *Typhoid ulcers in the ileum and cæcum, perforation of ileum in three of the ulcers. General purulent peritonitis. Sacculated peritonitis between the liver and diaphragm.*

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in the ileum and general purulent diaphragm.

Escape of gas on opening the peritoneum; membrane covered with thick, whitish-yellow granular material. The edge of the right lobe of the liver united to abdominal wall. There was a cavity between the right lobe and the diaphragm lined with soft white membrane, tolerably tough and easily removed. This cavity contained air, and the same yellowish matter as in the abdominal cavity. The coils of intestines were matted together. On separating them perforations were seen. The diaphragm on the right side corresponded to the lower margin of the third rib; on the left side to the lower border of the fourth rib.

The ileum presented numerous ulcers with sharp, clear-cut edges. Many of them were deep. Three of the ulcers presented perforations; the first, 60 cm. above the ileo-cæcal valve; the second, 20 cm. above this, and another about the same distance higher. The mesenteric glands were very large and soft. The spleen weighed 156 grammes. The heart was normal; no fatty degeneration of the muscle fibres.

CASE IX. *Admission in third week. Diarrhœa, high fever, pain in right iliac fossa, peritonitis, death, autopsy.*

Caroline M., aged 40 (Hos. No. 1540), admitted July 24th, 1890. Patient is a Swede; has been in this country six years; has been usually very healthy and strong. Her present illness began on July 8th, with diarrhœa and vomiting. The stools were very frequent and she vomited two or three times a day. She had headache, pain in the abdomen and slight cough. The expectoration, she said, was, several times, blood-tinged. All these symptoms have persisted until the present, except the vomiting, which stopped three days ago. She has from six to eight stools a day, watery, and without any pain. On admission the temperature was 101°, rose to 105° at 10 p. m. The pulse was 108, irregular in volume and intermittent. Tongue thickly coated. The baths which the patient had systematically every three hours when the temperature rose above 102.5°, were taken pretty well, though followed by a good deal of chattering of the teeth and cyanosis. On the 28th there were a few doubtful rose spots. The diarrhœa persisted. The temperature range throughout the first week in hospital tended constantly towards 104°. Pulse was from 116 to 132. August 3d, pulse 144, very dicrotic, fairly good volume, cheeks flushed, hands

and feet slightly cold, tongue dry and hard. Sensorium very slightly clouded. At the base of the right lung there is modified dullness; breathing is slightly tubular. Abdomen distended, not painful. Heart sounds are clear and rapid. Patient passed stools involuntarily in the night. To-day she was so feeble that the baths were not given. They were resumed on the 4th. On the 5th she was extremely restless; pulse small and rapid; mind clear. Respiration 30; tongue dry and brown; abdomen soft, not distended, but is tender on pressure in the right iliac fossa; the spleen is not palpable. Temperature in the evening rose rapidly to 106°, and she died at midnight.

The patient had 29 baths.

Autopsy. Anatomical diagnosis: *Typhoid ulceration of ileum; perforation of vermiform appendix; acute peritonitis.*

On opening the abdominal cavity there was an escape of gas. Large intestines much dilated; peritoneum covered with purulent exudate; 200 cc. of cloudy purulent fluid. Diaphragm on the right side at lower margin of third rib.

The ileum presented numerous ulcers in the Peyer's patches; the bases were clean. Some of the upper ones had small bile-stained sloughs adherent; swelling of the solitary follicles. The ulceration was very extensive about the valve. The vermiform appendix was dilated, and presented numerous ulcers with necrotic sloughs. Two of these ulcers had perforated, making openings, one 5 mm., the other 4 mm. in diameter. The large intestine presented many ulcers with smooth bases.

The spleen weighed 230 grammes. Heart muscle soft and pale, easily torn, showed very slight fatty degeneration. Lungs intensely congested at bases; in the superior division of the left pulmonary artery was a soft thrombus. The kidneys were enlarged and soft, and showed fatty degeneration.

CASE XIII. *Admission at beginning of second week. Moderate fever, delirium, meteorism, collapse symptoms, peritonitis, death, autopsy.*

Matthias G., aged 26, German (Hos. No. 3732), admitted August 28th, 1891. Patient had been in this country only nine months. Had always been well until the present illness, which began eight days ago with loss of appetite, vomiting, fever and chilly sensations. On August 24th he took medicine to move the bowels.

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Patient is a large, well-built man; temperature 102°; pulse 88, dicrotic. There is a diffuse erythematous rash over the chest and abdomen. The fauces are red and œdematous. For the first week in hospital the patient did very well. He took the baths nicely, and they had a marked influence in reducing the temperature, often four or five degrees. During the second week in hospital he was not so well; pulse became more rapid, above 108. On September 5th the note was: "Rash very distinct on abdomen; spleen palpable, below ribs; tongue is dry and brown; mind is quite clear. Range of temperature is now between 99° and 103°." About Sept. 9th the patient for the first time became delirious and very restless. The temperature, however, was not high, and on the 9th he only had three baths in the 24 hours. They had a very pronounced influence; thus a bath of 20 minutes at 70° at 4 a. m. on the morning of the 9th reduced the temperature to 96°, and at about 6 a. m. it had only risen to 97° and at 8 a. m. to 98°. The pulse became more rapid. It was noticed this morning for the first time that the abdomen was uniformly distended, rather firm, tympanitic, but not sensitive. The patient lay, however, with the knees somewhat drawn up. The pulse did not show any marked change, and throughout the 9th the temperature rose and in the evening was 104°. Early on the morning of the 10th the patient was in profound collapse, the temperature at 97°. He had not had a bath. He had passed a restless night and had been very delirious. Abdomen was distended, tense, tympanitic, and tender on pressure. It was suspected that perforation had taken place. The temperature rose through the day and by 8 p. m. had reached nearly 104°. He died on the night of the 10th. The urine in this case very shortly after the onset contained albumin, with a few hyaline casts, and latterly the amount of albumin had distinctly increased.

Autopsy. Anatomical diagnosis: *Typhoid fever, perforation, peritonitis, ulceration of epiglottis.*

Peritoneum contained gas; the membrane was injected, cloudy and covered with fibrinous exudate. There were 200 cc. of turbid yellowish fluid in the cavity. There were many ulcers, the largest and most advanced just at the valve. Mucous membrane swollen; the edges of the ulcers were undermined, the bases formed by the muscular coat. On a few of the ulcers necrotic tissue was still adherent. Twenty-two centimetres from the valve was a deep ulcer 2 cm.

in diameter, in the centre of which was a round perforation 2 mm. No ulcers in the large intestine. The spleen was enlarged and weighed 510 grammes.

Intense congestion of lower lobes of both lungs. The entire upper edge of the epiglottis was ulcerated and covered with a dark brown, easily separated fibrinous mass. There was slight necrosis in areas on the posterior wall of the pharynx. The heart was pale and soft, the muscle not fatty.

CASE XIX. *Admission in second week. In fifth week of illness great abdominal pain, vomiting, no pain or meteorism, emaciation; and in seventh week pain in abdomen, no swelling, vomiting, diarrhoea, death, autopsy.*

Benthine L., aged 21, domestic (Hos. No. 5597), admitted July 22nd, 1892. Patient had been a healthy girl. Present illness began about a week ago with loss of appetite and chilly feelings and fever. On admission the temperature was 104.5°; pulse 118. Abdomen was not distended, but tense. There was a slight erythematous blush over the lower thoracic and upper abdominal regions. The spleen could not be felt. Examination of the heart and lungs negative. Urine contained a trace of albumin, and there was distinct diazo reaction. During the first week the temperature range was between 100° (after a bath) and 105.8°. The baths reduced the temperature an average of three degrees. There had been a characteristic rose rash and the spleen could be distinctly felt. During the second week in hospital the fever kept high; the baths had a very marked influence, often reducing the temperature five and on one occasion six degrees. The pulse was feeble and rapid, from 116 to 120. The tongue was dry and coated. There had been no abdominal distension or tenderness, and only lately a little tendency to diarrhoea. In the third week the temperature was on the whole somewhat lower, though it often rose to 104° and once to 105°. She took the baths well and they still had a very marked influence on the fever. The rose spots disappeared. The pulse had been somewhat better. She had had troublesome boils on the back. There was no delirium. During the fourth week in hospital the temperature was not so high, and between August 13th and 17th it was usually between 101° and 102°, and she seemed to be doing well. On August 18th, after a bath the temperature fell from 105.8° to 99.2°. The pulse rose above 140, and

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the patient complained of great abdominal pain, and was in an extremely weak condition, so that hypodermics of ether had to be given. The temperature, notwithstanding the sponging, rose and between 2 and 10 p. m. remained above 104°, and from that time until 2 a. m. it fell and reached 101°. For the first time on the 17th she vomited greenish fluid. Since then she has vomited a number of times and complains of abdominal pain on any movement. On the 19th the patient was better; the pulse was only 104, and of better quality. The abdomen was not tender. During the next week, the fifth, the vomiting was a troublesome symptom, and she was somewhat nervous and excited. The temperature on August 21st rose to 105.5°, but after sponging sunk and the next morning was 98°. The abdomen had been retracted, tense, and very tender to the touch. Patient was now markedly emaciated, the features drawn, the pupils dilated. From this time until the 30th the temperature was extremely irregular, each day rising to between 103° and 104°, and then falling, sometimes to normal or even becoming subnormal. On the 30th the special tenderness and pain in the abdomen was noticed, but there was no distension. She was, however, extremely feeble, and the vomiting had been severe. On the 31st, note stated that the general condition had not improved; emaciation had increased. There was less vomiting; the pulse was extremely small and rapid, and could scarcely be counted at the wrist. Patient had five involuntary movements during the night. On the 31st the temperature did not rise above 100.5°; she became feebler and died on September 1st.

Autopsy. Anatomical diagnosis: *Late stage of typhoid fever, ulcers in small intestine, perforating ulcer in sigmoid flexure, general peritonitis.*

Peritoneum covered with flakes of lymph; little or no fluid present. On the sigmoid flexure there was a more circumscribed peritonitis, with a distinctly purulent exudate; corresponding to this there is a perforation of the bowel 2 mm. in diameter.

Peyer's patches were more prominent than normal, presenting small losses of substance. Occupying sometimes the middle of the patch could be seen two or more ulcers, which reached no deeper than the muscle. The edges were smooth. In the lower part of the ileum the patches were more prominent. The ulcers here sometimes were at right angles to the gut, and some of them had undermined

edges with clean bases, exposing the transverse muscle fibres. In the large intestine there were no ulcers, nor were the follicles at all swollen until the descending colon was reached. Here the solitary follicles were prominent and showed superficial losses of substance. At one of these points perforation had occurred. The ulcer had clean-cut edges and the perforation was 2 mm. in diameter. Another ulcer occurred in the sigmoid flexure. In the rectum there was a large irregular ulceration just above the anus, 3x3.5 cm. in size.

The mesenteric glands were swollen and enlarged; the spleen was not much enlarged.

CASE XX. Admission about end of first week. Moderate fever, rapid and feeble pulse. End of second week, abdominal distension and pain; death, autopsy.

Henry A., aged 35 (Hos. No. 6231), admitted November 1st, 1892. Present illness began about a week ago with pain in the back of the neck, general stiffness and soreness. Worked until five days ago. Four days ago felt very dizzy and had pains all over, and has felt hot. Has been in bed for five days. When admitted the temperature was 104°, the pulse 120, respirations 32. The tongue was dry and coated; there was a well-marked rash on the skin of the abdomen, and the spleen was palpable. The fever persisted, not much influenced by the baths, only occasionally there was a drop of more than two degrees. The patient seemed to do well, took his food satisfactorily; the pulse was sometimes rapid and feeble, 120 to 126. He was perfectly rational. The abdomen was tender and not specially distended. On the 8th the note was, "temperature from 4th to 8th has ranged from 100.6° to 104.2°. The temperature of the baths was reduced to 65°. The drops in fever after bathing have not been at all marked. The pulse has been feeble and rapid, and the patient has been given stimulants freely and strychnia." It was noted to-day that there is some tenderness over the abdomen. In the evening the abdomen was found considerably distended, particularly in the epigastric region just below the ensiform cartilage. The bowel-tympany reached high and completely obliterated the liver dulness. The patient sank and died at 11 p. m. on the 8th.

I noted as follows: "When I saw this man at 12 noon there were no marked collapse symptoms; the pulse was rapid, but not small; face not pinched or anxious-looking, and he answered ques-

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tions readily. There was pain in the lower abdomen; the tympany was higher in the thorax than I have ever found it."

Autopsy. Anatomical diagnosis: *Typhoid (early and late) ulcers, perforation of ileum with diffuse peritonitis.*

1000 cc. of turbid fluid in peritoneal cavity; fibrinous exudate over the coils of intestine. In the ileum, Peyer's patches were prominent. At a distance of 8 cm. above the valve was an ulceration 5 by 12 mm., which passed through all the coats, perforating the serous layer. The mucosa was undermined. From this point downwards the solitary follicles were swollen throughout, and some presented small ulcerations. In the large intestine the follicles were not swollen. The spleen weighed 750 grammes. The kidneys were a little pale, but of good consistency. The heart muscle was brownished in color and looked healthy. The lungs showed no special changes.

CASE XXI. *Admission in fourth week. Mass in right iliac fossa, great debility, signs of perforation, peritonitis, death.*

Ferdinand W., aged 18 (Hos. No. 6333), admitted Nov. 15th, 1892. Patient had been a healthy man. Present illness began five weeks ago with headache, which has been a prominent symptom. He has been in bed three weeks with fever and loss of appetite. Within the past few days he has had diarrhoea. During the first two weeks he had epistaxis five or six times. On admission the temperature was 105°, rose in the evening to 106°. The patient looked well and was not emaciated; temperature at the morning examination was 101°. Pulse 120, small in volume, not dirotic. Tongue swollen, a little furred. There was no delirium. A few suspicious-looking spots on the abdomen. In the right iliac fossa, midway between the navel and the anterior superior spine, there was a definite rounded mass about the size of a walnut, soft and elastic, and not sensitive on pressure. There was resonance over it. The spleen was not palpable; heart sounds were clear. During the first week the fever was persistently high, but was influenced rapidly by the baths, the reduction being from 4 to 5 degrees. Towards the end of the first week in hospital he became very much feebler. A crop of well-defined spots came out. He had involuntary movements; there were no changes in the mass in the right iliac fossa; the tongue was somewhat dry and fissured. On the 24th the note is as follows: "Patient

is lying on his left side with his hand on the abdomen, groaning continually. The abdomen is retracted and very tense, and is painful on pressure, but after examination considerable pressure is borne without much increase in the pain. Pulse is 120, full, but of low tension; tongue is dry, brown, glazed. Yesterday he had six stools, fluid, yellowish, and contained no blood. There is no leucocytosis. On the evening of the 24th the temperature rose to nearly 107°. On the 26th the note is, "temperature remains elevated; the diarrhoea, which was better, has recurred. The abdomen is retracted and tender; the pulse is small and soft; face is pinched. The temperature rose to 106° at noon." He gradually sank and died in the afternoon of the 26th.

Autopsy. Anatomical diagnosis: *Typhoid fever, perforation of appendix vermiformis, fibrino-purulent peritonitis, chronic diffuse nephritis, gas bacillus in the blood.*

In the lower half of the peritoneum there was an extensive fibrino-purulent exudate. In the right iliac fossa there was some brownish-yellow fluid with distinctly fecal odor. The vermiform appendix was 6 cm. long and buried in a mass of lymph. On examination a pin-hole perforation was found near its attachment to the caecum, from which gas and fluid escaped on pressure.

Small intestine was apparently normal until the middle of the ileum is reached, at which point there was a single enlarged follicle. Peyer's patches were not swollen until 35 cm. above the valve. The swelling was slight in amount, the edges a little elevated. The first ulcer was 20 cm. above the valve, in a patch. Other ulcers with sloughing contents occurred just above the valve. The caecum presented many ulcers varying in size, some with sloughs attached, others with clean bases. Many ulcers existed throughout the ascending and transverse colon. In the rectum there was an ulcer 3 mm. in extent. The appendix vermiformis presented two ulcers corresponding to the perforations mentioned. The mesenteric glands were enlarged; the spleen weighed 210 grammes.

The kidneys weighed 260 grammes together; the capsules adherent, and microscopically the organ showed a chronic diffuse nephritis. The heart muscle was pale. The lungs were congested and oedematous at the bases.

CASE XXII. *Admission in end of first week Mild attack at first, in third week high fever and delirium, in sixth week much delirium and*

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Mild attack at first,
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great debility, pain in right iliac fossa, hiccough, abdomen not distended, death, autopsy.

Ferdinand B., aged 44 (Hos. No. 6410), admitted December 12, 1892. Patient is a German; had been in America one year. Had always been healthy and strong. Present illness began six weeks ago with cough and pain in the chest. He kept at work, however, until four days ago, when he gave up on account of weakness and headache. On admission the temperature was 99°, rose in the evening to 103.5°.

Large framed, well-nourished man; pulse 96, regular in force and rhythm; respirations wheezing in character, and there are sibilant râles heard everywhere. The heart sounds are clear. The abdomen is full, but not tender. The spleen is not palpable. Patient has a good deal of cough. The temperature for the first week in hospital was not high, usually reaching every day 102° and sinking to 98° or 99°; thus on the 14th, 15th and 16th of December the temperature range was between 99° and 101°. His cough was better and the râles disappeared. The pulse was not above 100; he had no diarrhoea. About the ninth day there were well-marked rose spots, and it was regarded as a case of moderate intensity. During the second week in hospital the temperature rose; thus, on the 17th it reached 103°, and the baths were begun. Throughout the third week the temperature kept up and was constantly in the neighborhood of 104°. He took the baths well, but he now had the appearance of a patient severely ill. He was delirious, and the pulse was rapid, 116, and of low tension. On the 26th he became so feeble that the baths were omitted. He had constant delirium and a good deal of tremor. He had on this day a slight hemorrhage. The abdomen was not specially tense. The fever persisted and he improved somewhat, so that the baths were resumed on the 28th. The temperature throughout the fourth week was lower, ranging from 101° to 103.5°. He remained in very much the same condition throughout the fifth week. He had moderate diarrhoea, which was generally controlled with a pill of lead and opium. In the sixth week the temperature became more irregular, and frequently there were drops nearly to normal. The patient still had a wandering delirium and there was some subsultus. On January 30 the note is: "The diarrhoea has continued without much change, and patient has been very excited, nervous and delirious, and has struggled vio-

lently against the baths and the enemata. Last night he complained much of pain and referred it to the right iliac fossa. The pulse, which had before ranged from 100 to 128, rose at 7 a. m. to 160, and at 8 o'clock to 168. At the visit he was in a soporose condition, the mouth open; pulse 164, small in volume and low in tension. The hands and the mucous membranes were cyanotic. The patient was evidently very much weaker. The abdomen was full, but not distended. Patient complained of tenderness in the right iliac fossa. The hepatic flatness reached from the sixth rib to the costal margin. The pain came on suddenly during the night, and ever since the patient has lain with the legs drawn up. He has also had hiccough this morning." Patient became much worse in the afternoon; pulse rapid; no increase in the distension of the abdomen. The liver dullness remained as noted above, and he died at 1 p. m. The temperature throughout the 11th, 12th, 13th and 14th was intermittent, the evening ranging generally from 102.5° to 103° , and the morning almost to normal. Throughout the 15th the temperature was between 99° and 100° for 24 hours, and on the 16th, 17th and 18th there was very slight elevation.

Autopsy (Dr. Barker). Anatomical diagnosis: Extensive typhoid ulceration in small and large intestines, healing ulcers in small bowel, advancing ulcers in colon, ulceration extending on to skin at anus and into vesico-rectal tissue, perforation of ulcer in colon, general purulent peritonitis, ulceration of pharynx.

On opening the peritoneal cavity a foul-smelling gas escaped. The membrane was covered by a thick yellow exudate. There were 300 cc. of purulent fluid in pelvis. There were many hemorrhages in the subperitoneal tissue.

No ulceration in the jejunum; the first ulcer occurred 120 cm. above the valve and was in process of cicatrization. 17 cm. below this there was a second ulcer with more advanced healing; 12 cm. lower down there was a large ulcer with a clean base and undermined edges. Beginning 145 cm. above the valve there were very large losses of substance, consisting of irregular circular areas of ulceration with perfectly clean bases. Just above the valve there was a large irregular ulcer 5 by 12 cm. The appendix was normal. The caecum showed superficial losses of substance, and the solitary follicles were swollen. The largest and most numerous ulcers were in the sigmoid flexure and rectum. The first, 12 by 5 cm., was in the lower part of

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the colon and extended into the rectum, its lower end being 8 cm. from the anus. The base of this was quite clean, and the muscular coat everywhere exposed. In three or four places the erosion extended nearly to the serosa, and in the central part there was a perforation 1 mm. in diameter. Just before the lower end of this ulcer was reached there was an irregular excavation leading into the cellular tissue between the rectum and the base of the bladder. The tissue here had a dark sloughy appearance, but there was no pus. At the anus and extending on the skin for a distance of 1.5 cm. in the case of one, and just impinging in the case of the other, were two ulcers with pigmented edges.

There was an irregular ulceration in the posterior wall of the pharynx, 2 cm. by 5 cm., which led directly into the submucous tissue. The spleen weighed 210 grammes and was soft. The kidneys were swollen, the substance coarse, and the striæ very marked.

The heart substance was moderately firm, brownish in color. The intima of the aorta was fatty. The lungs were voluminous, congested and œdematous at the bases.

IV.—NOTES ON SPECIAL FEATURES, SYMPTOMS AND COMPLICATIONS.

BY WILLIAM OSLER, M. D.

1.—ANALYSIS OF THE GENERAL SYMPTOMS.

a. The Rash.—Rose spots were noted in 199 cases, 86.9 per cent. In nine cases they were very abundant, occurring not only on the trunk, but on the arms and thighs. In one instance, a lad of 14, they were present on the face.

In two instances there were small petechial spots. In one of the cases (Hos. No. 469) the attack was very severe, and the patient died. In one of the fatal cases there were extensive ecchymoses.

A diffuse erythema, usually punctiform, and in most instances about the thorax and abdomen, was noted in seven cases. It was present usually at the time or shortly after admission, and disappeared in all instances within two or three days. In one case it was also on the arms and about the joints (168).

In one case, a boy of eight, there was an urticarial rash on the face.

Pelionata—*taches bleuâtres* or *maculæ ceruleæ*—were noted in several instances, always in association with *pediculi*.

b. The Fever.—The temperature was taken every two hours in the rectum, unless there was special reason against it.

In hospital practice there are but few opportunities of studying the fever of onset. There were two instances in which, contrary to the general rule, the temperature reached the fastigium on the second day. One is the interesting case, to be given under the section of "typhoid fever and malaria," in which within 24 hours, from 4 p. m. on the 22nd of October to 4 p. m. on the 23rd, the temperature rose eight degrees, and then remained high. The other instance illustrates how abruptly the temperature may rise at the starting-point of a relapse. In No. 3684, after seven days' apyrexia, the temperature rose more than seven degrees in 36 hours. This was the starting-point of a relapse, and the temperature did not reach normal again for fifteen days. An instance in which a gradual step-like ascent

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of the temperature occurred day by day was in Sallie R. (Hos. No. 4716), a case admitted for chorea, and which developed typhoid fever after thirteen days' stay in hospital.

There were 152 cases, 66.3 per cent., in which at some time during the disease the thermometer registered 104° and over. Eight cases only had temperature above 106°; in one the register was 107°. Fifty-nine cases had a temperature between 105° and 106°, and eighty-five cases had a temperature between 104° and 105°. Of the 85 cases with a temperature between 104° and 105° there were 7 deaths, 8.2 per cent. In the 59 cases with a temperature between 105° and 106° there were 10 deaths, 16.9 per cent, and of the 8 cases with a temperature above 106° there were 4 deaths, 50 per cent. There was only one fatal case with a temperature below 104°, a man aged 70, who was admitted in a state of extreme debility, with consolidation of the left lower lobe, and the case was regarded as one of pneumonia.

c. Pulse.—There were 97 cases with a pulse rate of 120 and over. The following is the ratio of mortality to pulse rate: above 160, 10 cases, of which 7 died; 150–160, 5 cases, of which 4 died; 140–150, 15 cases, of which 5 died; 130–140, 15 cases, of which none died; 120–130, 52 cases, of which 5 died. There was one fatal case with the pulse rate below 120. Two cases presented during convalescence very slow pulse, one at 46 (case 126), and another at 56 (case 112) per minute.

d. Diarrhoea.—The bowels were loose in only 76 cases, 33.2 per cent. Of these, in 28 the discharges were frequent; in 48, moderate or slight. In 153 cases there was no diarrhoea. The condition of the bowels in the fatal cases was as follows: in 7 cases the diarrhoea was slight, in 10 it was profuse, and in 5 there was no diarrhoea.

d. Spleen.—The organ was enlarged sufficiently to be felt beneath the costal margin in 147 cases.

2.—RELAPSE.

In the 229 cases there were 18 cases of relapse, 7.8 per cent. Only those cases were regarded as such in which, after a period of apyrexia, the fever recurred and persisted for more than a week, and in which two or more prominent symptoms of the disease were present, as the rash, enlarged spleen, or gastro-intestinal symptoms.

The nature of the relapse in typhoid fever remains obscure. We speak of a fresh invasion of the bacilli, a fresh formation of the toxins, but why the disease should start afresh after a week's convalescence, and perhaps pursue a more severe course than in the original attack, or why in some cases there should be a second or even a third repetition, we remain completely ignorant. We do not even know whether the incidence depends on endemic influences (as would appear from the great variation in the frequency of relapse in different places), on influences which affect the *seed*; or on peculiarities in the individual organism, influences which affect the *soil*, exhausted quickly by the first crop, but renewed as quickly, and again rendered susceptible. The first attack gives, as a rule, that intimate and remarkable modification of the tissues, fluid and solid, which we call immunity; but, failing this, however produced (weakness of the army of phagocytes? failure of the development of the antitoxins?) the organism is again liable to infection. On any view it is difficult to understand why indiscretions in diet should sometimes precipitate a relapse.

There were no relapses in the first 33 cases treated on the symptomatic plan. In the 196 cases treated since the introduction of the cold-bath treatment there were 18 definite relapses, 9.2 per cent. The days of apyrexia were as follows: 12, 3, 5, 10, 4, 7, 6.

All of the cases of relapse were bathed. Four cases died.

We cannot follow accurately the rule of calling nothing a relapse without a definite period of apyrexia. In rectal temperatures the normal limit must be placed at about 99° ; and after the decline in the original attack, a period of some days with a temperature between 98° and 99.5° should be regarded, particularly in a young person, as an interval sufficiently definite. Thus Ada B. (Nos. No. 5430) was admitted about the 10th day with a severe attack. By the 20th day the temperature had fallen to 99° , then on the 21st, 22nd, 23rd and 24th days the temperature was between 99° and 100° , occasionally falling to 98° , and twice in these four days rising above 100° . Then on the 24th, 25th, 26th, 27th and 28th days there was a gradual ascent and the temperature reached 102.5° . On the 28th it reached 104.5° . The spleen enlarged and there was a crop of rose spots, and it was not until the 35th day that the temperature reached normal.

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Strictly adhered to, this rule would exclude a group of cases of great interest in which the fever subsides, the symptoms improve, but the temperature does not reach normal, and then in a day or two there is a marked recurrence of all the features; thus, in Hos. No. 6487, a young girl, aged 13, was admitted December 24th, towards the end of the second week of the primary attack, in a condition of severe delirium. About the beginning of the fourth week, that is, January 2nd, the temperature for the first time reached normal, and throughout the day remained between 98° and 99° . Then on January 3rd she had a chill, in which the temperature rose to 105° ; in the evening it fell to 99° . Then throughout the 4th the temperature was between 104° and 105° for the greater part of the day. On the 5th it fell again to 102° , and on the 6th it was normal for the greater part of the day. On the 7th, 8th and 9th the temperature was irregular, rising each day above 103° ; then on the 10th it was between 99° and 100° , so that altogether there was a period between January 2nd and the 11th of nine days of irregular fever. Her general condition was good and we thought convalescence was beginning. Then, on the afternoon of the 11th the temperature rose to 104° , and by midnight to 106° , and for six days she was desperately ill, the temperature constantly in the neighborhood of 104° and 106° , and she was so feeble that she could not be bathed. Then on January 18th the temperature fell to normal, and she made a very satisfactory convalescence. In this second attack of severe fever she had a rose rash, and the spleen again enlarged. It was certainly a relighting of the disease, but from January 2nd to the 11th, though the temperature dropped to normal on several occasions, she could not be termed a convalescent. There are in all four cases of this kind, inclusive of the one just mentioned.

Albert S. (Hos. No. 1830) had a moderate fever, which by the 14th day had fallen to normal, and on the 14th, 15th and 16th days the temperature was between 98° and 100° . Then it rose, and by the 18th had reached 104° , a higher point than at any time in the original attack, and the spleen again enlarged and he had a fresh crop of rose spots. The temperature did not reach normal again until the beginning of the fifth week.

Henry L. (Hos. No. 400), aged 16, entered in the second week of a well-marked mild attack. The temperature on the 12th, 13th, 14th and 15th days touched normal, but always rose through the day to

101°. All the symptoms improved and he looked as if he was entering upon his convalescence. Then on the 16th, 17th and 18th the temperature was between 99° and 100°, and on the 19th day rose to 103°. The spleen enlarged and there were rose spots. The second attack lasted for only eight days, the fever gradually subsiding.

It is impossible to draw a hard-and-fast line between these cases and the genuine relapse. This is well illustrated by the following cases:

Amie M., aged 23 (Hos. No. 4556), admitted about the eighth day of a very severe primary attack. On the morning of the 24th day the temperature touched 98°, then on the 25th, 26th and 27th it ranged from 100° to 104°, on the 28th day it again reached nearly 98°, but on the 29th, 30th and 31st there were no marked drops and the temperature was between 101° and 103°. About the 31st day the temperature began to rise, and she entered upon a period in which the evening rise was up to and above 104°. There were rose spots which came out in crops, and this recurrence formed a very severe attack. Even with the sponging, between the 31st and 43rd day, the temperature did not sink below 101°. From the 45th day the temperature was lower. She gradually sank and died on the 49th day. Here was a case in which it was impossible to say there had been any interruption in the pyrexia for more than an hour or so at a time, but taking the symptoms as a whole, there can be no question that she had a very definite and positive relapse.

Mary McG., aged 13 (Hos. No. 6405), admitted with fever which began two weeks ago with severe headaches. For the first 10 days in hospital there was scarcely a day in which the temperature did not rise to 105°, and once rose to nearly 106°. The baths and spongings had very little influence. On December 16th and 17th the temperature became a little more irregular, and from the 17th to the 30th, nearly two weeks, there was a remittent type of fever, the temperature falling each day to the neighborhood of 100° and then rising in the evening to 103° or 104°. These remissions were very marked on December 24th, 25th, 26th and 27th, when the evening temperature sank on each day to 99°. Then on the 28th, 29th, 30th and 31st the morning remissions were not so marked, and the evening exacerbations were a little higher, reaching 104°. On the 42nd and 43rd days of her illness the fever became more continuous, and from January 1st to the 9th she had fever from 103° to 105°, with very slight remissions. The

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spleen became distinctly palpable and the tongue was furred. She had no definite rose spots. On the 10th and 11th of January the temperature fell, and on the 12th, the 53rd day of her illness and the 40th of her stay in hospital, it reached normal and remained there. Here an interval of marked remittency in the temperature separated two periods of continued fever.

A protracted fever may develop in consequence of a post-typhoid anemia and must not be taken for a relapse. In the case of Carlo C. (No. 2132), the patient had a severe attack with high fever, the temperature ranging between 105° and 106° . On the 22nd day convalescence began, and for four days the evening temperature was at 98° ; then, between December 5th and the 21st the temperature was constantly between 99.5° and 101° . He had, however, a profound anemia (the case is referred to under the section on post-typhoid anemia); and though the spleen was enlarged, his general condition was good, and it was, I think very correctly, not regarded as an instance of relapse. From January 6th to the 10th the fever was still high, once rising to 104° , but he looked well and there was no evidence of local trouble. There were no spots.

3.—POST-TYPHOID ELEVATIONS OF TEMPERATURE.

During convalescence there may be a return of the fever for short intervals. There were eighteen instances in which, after a period of normal temperature, the fever recurred. Various temperature anomalies of convalescence must be carefully distinguished from these so-called recurrences or post-typhoid elevations. It is important to recognize the fact that in young children, and in very nervous subjects, the afternoon temperature may be persistently above 99° . With a clean tongue and gaining strength this may be neglected, and when strong enough the patient may be allowed to get up. Though really of no moment, the condition may be the cause of no little anxiety to the physician and to the friends. Then again, a well recognized cause of persistence of the fever in convalescence has already been referred to in connection with the anemia. Boils, too, may keep up a slight fever. Apart from these, and independent of complications and sequelae, there are curious and not altogether well understood elevations of temperature. They are really of very great interest, inasmuch as their onset is apt to be regarded as a

relapse. The following are brief notes of the eighteen cases in which, after the establishment of normal evening temperature, irregular elevations occurred :

Case I.—Henry H. (Hos. No. 392); mild case, afebrile on the 23rd day. Ten days subsequently the temperature rose to 101° , and remained between 99° and nearly 101° for 36 hours. He had had solid food on the 7th. He had been constipated for five days. With the return of the fever there were no special symptoms.

Case II.—Charles S., admitted June 7, 1891 (Hos. No. 3244). A very protracted and severe attack. The decline in the fever was very slow, and it really was not until the 50th day that the temperature was normal; then, every day or two he had an evening rise to 100° or 101° . From the 61st to the 67th day the temperature was normal; then from the 67th to the 75th day the temperature rose every afternoon, and on the 71st, 72nd and 73rd reached nearly 103° . There was nothing apparently in his condition to account for this rise in temperature. He was at times constipated, but it was never very clear upon what fever depended. He ultimately made a satisfactory convalescence and was discharged from the hospital on the 79th day.

Case III.—A. G. (Hos. No. 3260), admitted on the 12th day of a mild attack. The temperature was normal on the 21st day. Then from the 23rd to the 29th day the temperature range was from 97° to 99.5° . On the 30th, 31st and 32nd the temperature rose to between 101° and 102.5° . On the 37th day the temperature rose to 102° and remained elevated for 12 hours, then became normal and remained so. There was nothing in the condition to account for this subsequent rise.

Case IV.—Wm. S., aged 24 (Hos. No. 3552), admitted on the 7th day of a moderately severe attack; temperature range from 103° to 104.5° . On the 21st day the temperature was normal and did not rise above 98.5° until the evening of the 26th day, when it began to rise and on the 27th day was 103.3° . The edge of the spleen could be felt, and as there were a couple of doubtful rose spots, we began the baths again. A relapse seemed probable, but on the 28th day the temperature fell and was 99.5° in the morning. From the 28th to the 43rd day he seemed perfectly well and he gained in weight. Then on the 43rd day, 18 days from the previous elevation, the temperature rose rapidly in the morning to 105.5° . There were

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no chills, the spleen was not palpable, the abdomen looked natural. The patient was sponged; the temperature remained on the 44th day between 101° and 102°. On the 45th day it fell gradually, and was normal from the 46th to his discharge on the 67th day. Here, too, it was impossible to attribute this rise to any error in diet or to special constipation.

Case V.—Eva S., admitted August 23rd, 1891 (Hos. No. 3708), on the 14th day of a moderately severe attack. The temperature was normal on the 27th and 28th days. On the 29th it rose to 103°, on the 30th it rose to 105°, and on the 31st to 103.5°. From the 32nd to her discharge it remained normal. This patient was excitable and nervous, and very constipated. Here the sudden elevation to 105° after the temperature had been gradually falling for more than a week and had been normal for two days made us suspect some complication, but nothing was found to account for it.

Case VI.—Richard B., aged 19 (Hos. No. 4083), admitted October 21st, on the 8th day of a very severe attack. The temperature reached normal on the 24th day and remained so until the 27th day, when it rose to 103° and remained between 102° and 103° until the following morning. Looking for the probable cause of this, two small abscesses were found on the back. His convalescence was very protracted; he did not gain strength rapidly, and on January 1st, 2nd and 3rd, the 81st to 83rd days from the onset of his symptoms, the temperature rose to 101° without any cause.

Case VII.—Charles R., aged 19 (Hos. No. 4116), admitted October 26th, on the 8th day of a mild but protracted attack; temperature fell to normal on the 25th day. On the evening of the 29th the temperature rose to 102°, and kept up the next day without any obvious cause. He had not had solid food. The convalescence was slow, and on the 47th, 48th and 49th days he had a second attack of fever, the temperature reaching 103°, after which the convalescence was established.

Case VIII.—Gustave W., aged 22 (Hos. No. 4452), admitted December 27th, and had a very severe and protracted attack, the temperature not falling to normal until the 35th day. He recovered very slowly and had hysterical attacks. From March 11th to the 15th the temperature ranged from 99.5° to 102°. The tongue was a little coated and he complained of headache. The spleen was still palpable, and on the back and abdomen there were a few suggestive

spots. On the night of the 14th he was also delirious. We thought that it was possibly a very late relapse, but the temperature fell and on the 18th day was normal. He had not been constipated, and at the time of the fever he had been having solid food for between two and three weeks.

Case IX.—Louis M., aged 17 (Hos. No. 4458), admitted on the 10th day of an attack of moderate severity. The temperature on the 20th day was normal. From the 20th to the 30th day the temperature range was from 97° to 99° . From the 17th of January, the 30th day, to the 2nd of February there was mild fever, the temperature rising every day to 100° – 101° , without complications or unfavorable symptoms, and it seemed an instance of protracted post-typhoid fever rather than a definite relapse. He was not constipated; he sat up February 7th and made a good convalescence.

Case X.—George P., aged 21 (Hos. No. 5737), admitted on the 8th day of a severe attack. The temperature fell gradually, and was normal from the 31st to the 50th day, when without any obvious cause it rose on the 51st, 52nd and 53rd days to 100° and 102° . The tongue was slightly furred; the spleen not enlarged. There was no constipation.

Case XI.—David Martin (Hos. No. 5900), a very protracted case, in which the temperature did not fall to normal until the 33rd day. The patient was febrile from the 45th to the 52nd day, due apparently to a phlebitis of the left femoral.

Case XII.—Wm. W., aged 23 (Hos. No. 5937); case of moderate severity. Temperature normal on the 15th day. From the 25th to the 28th day the temperature ranged from 99° to 101° . This occurred when he was up and about the ward, and did not disturb the convalescence.

Case XIII.—Minnie —, aged 22 (Hos. No. 5995), admitted September 29, 1892, apparently late in the disease. The temperature was irregular and fell to normal October 9th. From October 19th to 27th the temperature rose once to 104° and every day to nearly 103° . She had one or two sweats; the abdomen was flat, not sensitive, no spots, tongue perfectly clean; bowels regular. Convalescence undisturbed.

In very protracted cases the convalescence is often slowly established, and the temperature may be normal for a day or two and then slight elevations will occur for four or five days without any special significance, thus:

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Case XIV.—Chris. Meyer, aged 52 (Hos. No. 6095), had an attack of great severity, and from the 43rd day to the 53rd day the temperature had been falling gradually and ranging from 98° to 101°. Then from the 53rd to the 59th day it was normal. From the 58th to the 70th there was every day a rise of from 2° to 2.5°, without any aggravation of the general symptoms. Possibly this slight fever was associated with a crop of boils.

Case XV.—Lillian R., aged 28 (Hos. No. 6214), admitted October 30th, 1892, with an attack of moderate severity, and the temperature was normal by November 9th, in spite of a moderate parotitis. On November 25th, 26th and 27th the temperature gradually rose, reaching 103°, and fell through the 28th and 29th. No abdominal symptoms.

Case XVI.—Charles H., aged 16 (Hos. No. 6270), admitted November 10th, 1892, on the 8th day. The temperature was normal by the 20th day. On the 21st there was a rise to 102°, and then it fell to normal. Then on the 27th to the 30th the temperature range was between 99° and 101° without any obvious cause. No enlargement of the spleen or furring of the tongue.

Case XVII.—Edward H., aged 23 (Hos. No. 5792), admitted on the 7th day. Temperature reached normal about the 22nd day, and on the 28th temperature rose to 103°, then to 105°, and throughout the 29th kept above 101°. It fell gradually on the 30th, but remained between 99° and 100° for several days. It was at first thought to be a relapse, but no spots were seen, and the spleen was not palpable. The patient had a very marked dirotic pulse.

Case XVIII.—John F., aged 20 (Hos. No. 1918), admitted October 10, 1892, on the 15th day of a protracted attack, with moderately high fever. On the 36th, 37th and 38th day the temperature was normal; then on the 39th, 40th and 41st the highest range was from 101° to 103°, and it was not until the 48th day that the temperature was again normal. There were no abdominal symptoms; the spleen was not palpable, and there were no rose spots. He was not constipated.

4.—TYPHOID FEVER AND MALARIA.

The belief in a specific typho-malarial fever—a hybrid of definite etiological and clinical features—has been generally abandoned, though the name persists in Health Reports; thus, in the mortality

returns from the city of Baltimore for 1892 there were 33 cases under the heading typho-malarial fever. We have had very good opportunity of studying the relations of the two diseases, as there have been under treatment in the medical department about 500 cases of malarial fever during the time in which the 229 cases of typhoid fever were admitted.

We do not profess always to be able to distinguish in their early stages cases of malarial fever from cases of typhoid fever. So much alike are they that frequently patients have been sent to the wards from the dispensary and have had their heads shaved and the bath treatment ordered. The routine order in all fever cases is to have careful and repeated examinations of the blood during the first two days. If Laveran's organisms are absent, malaria is definitely excluded. To mistake typhoid fever for malaria is much less rare than to regard a case of remittent as one of typhoid. There was no case with the characters of the two diseases so blended that it seemed a compound or hybrid malady, nor was there an instance in which the manifestations of the two diseases were *concurrent*. Very many patients with typhoid and malarial fever were admitted from the same low-lying sections of the city and the suburbs, districts in which both diseases prevail extensively in the autumn, so that it would have been strange not to have met with some cases of the combined infection.

In three cases there was a definite history of malaria within a few months of the onset of the typhoid fever. Martin M. (Hos. No. 4027), admitted October 12th, 1891, had had, three weeks before his admission, chills every other day for a week; then the next week on every day, followed in each instance by fever and sweating. Subsequently the bowels became loose, and on admission he had a continuous pyrexia between 104° and 106° . The blood was negative. It was noted the second day after admission: "This case is of interest, coming from Sparrow's Point. He had been exposed to malaria, and probably had three weeks ago genuine intermittent fever; he has had no sweats and no chills since admission."

The disease ran an ordinary course, the fever presented nothing uncommon, the temperature gradually declined, and he made a satisfactory convalescence.

A second case, Richard B. (Hos. No. 4083), admitted October 1st, 1891. A month before admission had had for a week tertian



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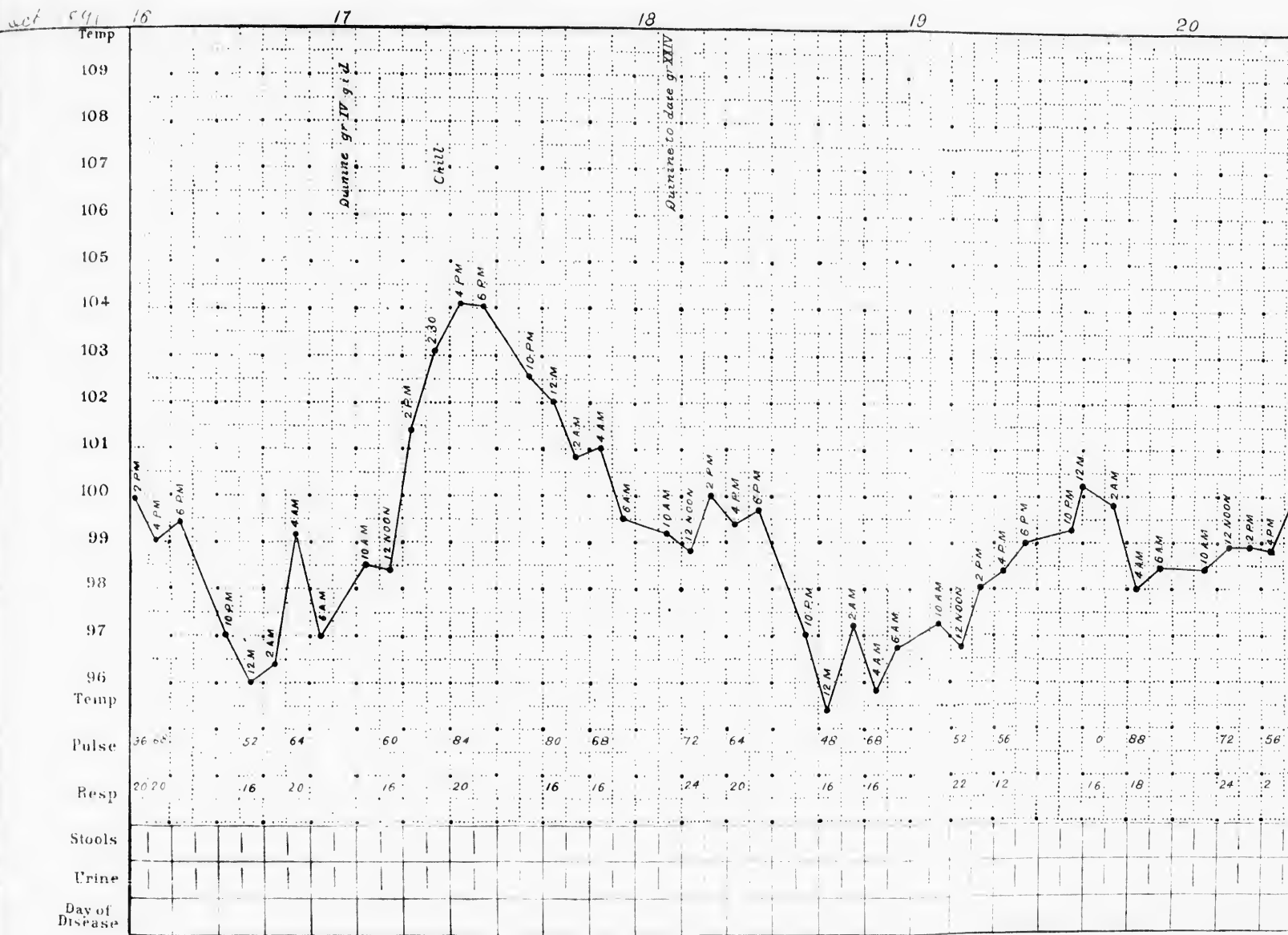
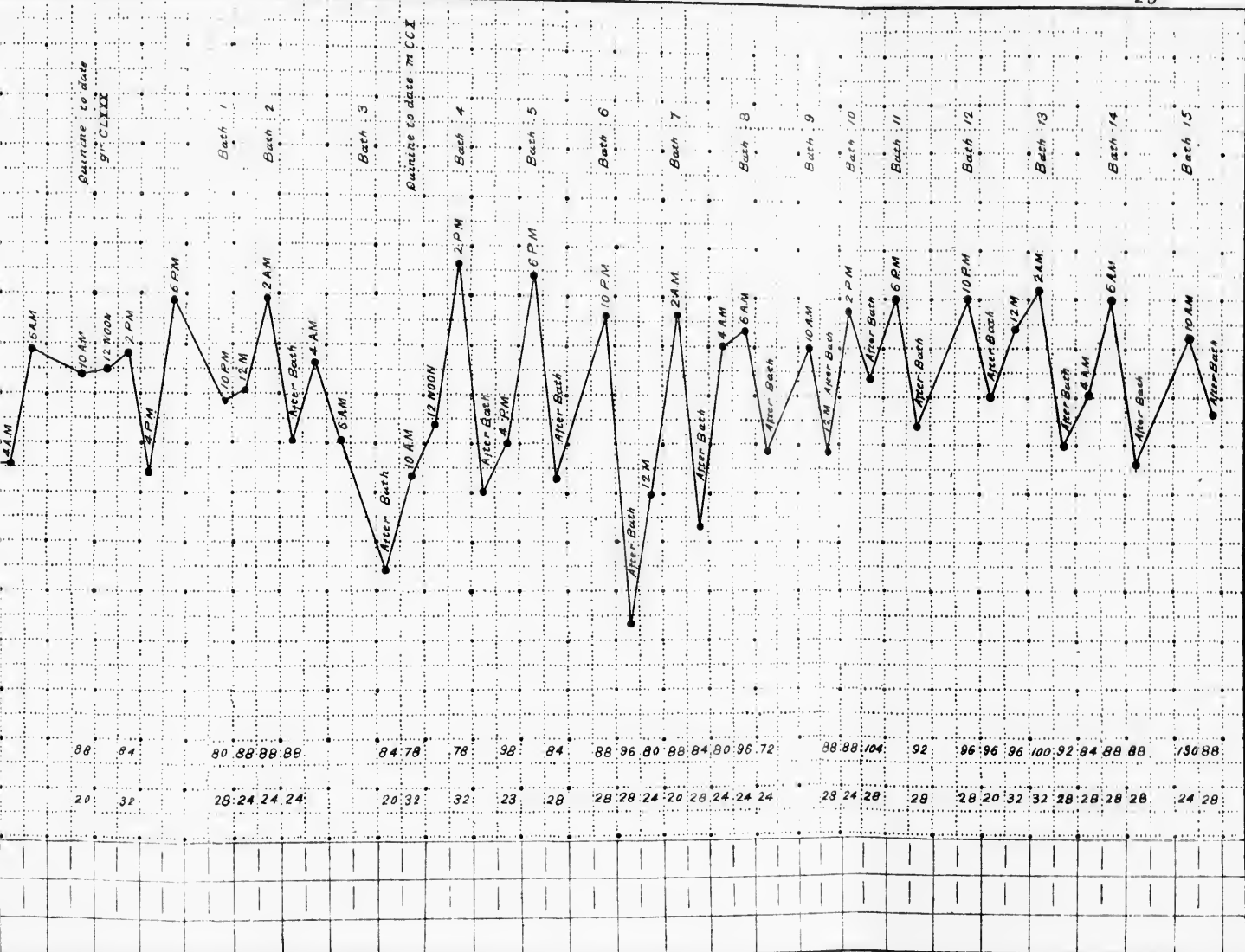


Chart III Case of combined Malarial and Typhoid infection.



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A third case, John C., aged 19 (Hos. No. 4172), was admitted November 4th, 1891, from Sparrow's Point. In the spring of the year he had severe malaria, for which he took a great deal of medicine. He had it on and off through the summer. He was ill for a month before admission; no distinct chills, but creepy sensations and irregular fever. This patient had a very mild attack, well-marked rose spots, no special enlargement of spleen. No features in the case in any way suggested a malarial taint.

The following case is the only one in which the patient, admitted with malaria, definitely shown to be so by the examination of his blood, subsequently developed typhoid fever. The patient, a man aged 20, had, during sixteen days prior to admission, headache and cough, occasional nose-bleeding and three chills. On admission, October 16th, the temperature was 100° , but fell in the early morning of the 17th to 96° . The malarial parasites were found to be present in the blood. He was ordered quinine, four grains three times a day. On the 17th the temperature began to rise a little after 12 a. m., and at 3.30 p. m. he had a chill, after which the temperature rose to nearly 105° , then fell throughout the next night, and was normal at 8 a. m. The case was one of ordinary tertian intermittent, and the quinine was continued. On the 18th, 19th, 20th, 21st and 22nd the temperature was normal or subnormal. A two-hourly temperature had been taken. Up to 8 a. m. of the 22nd he had taken 80 grains of quinine. He had no more fever and the malarial parasites had disappeared from the blood. At 8 a. m. on the 22nd the temperature was 97.5° . At 4 p. m. it was 98° . It gradually rose through the evening, and at 12 midnight it was 102.5° . The next morning it was 102.2° , rose throughout the day, and from 4 to 8 p. m. was at 105° ; so that within the 24 hours from 4 p. m. on the 22nd to 4 p. m. on the 23rd the temperature had risen 7° . Naturally we thought this was a recurrence of the malaria, in spite of the administration

of the quinine, of which he had had 96 grains up to 10 a. m. on the 23rd. From 8 p. m. on the 23rd throughout the 24th and 25th the temperature remained practically between 103° and 105°, uninfluenced by the quinine (which was continued), and only influenced slightly by sponging. The quinine was continued until noon on the 26th. The whole appearance of the man was suggestive of typhoid fever, and subsequently spots appeared, the spleen enlarged, and the disease ran a perfectly normal course, typical, but of great severity, the temperature not falling to normal until between the fifth and sixth weeks. The temperature chart annexed gives a fine-simile of the ward temperature chart, and shows the single malarial paroxysm and the abrupt onset of the typhoid fever and its persistence. The patient had in all 68 baths, and made a good recovery.

5.—COMPLICATIONS.

DIGESTIVE SYSTEM.

(a) *Parotitis*.—This occurred in five cases, of which one died. It occurred in the left parotid in two; in the right, in two; on both sides, in one. In three cases it was opened; in two the swelling subsided.

(b) *Melena* occurred in eight cases, of which three proved fatal. Notes of the fatal cases have been given. Hos. No. 6086, Patrick S., aged 27, had a very protracted attack of typhoid fever; was in hospital 67 days, had 87 baths, a long-continued high fever very little influenced by baths or sponging. He had at intervals ten hemorrhages, none of them very large.

Hos. No. 6198, Wm. P., aged 32, also a protracted case, had repeated hemorrhages, but none very severe.

Hos. No. 6235, Jos. R., aged 29, had one hemorrhage, not more than two ounces.

Hos. No. 6329, Wm. McM., aged 32, had a single small hemorrhage from the bowels following prolonged constipation.

Hos. No. 7318, Wm. E., aged 38, had moderately severe attack with relapse; small hemorrhage during relapse.

With the onset of the hemorrhage the baths were omitted. The pill of acetate of lead and opium was given, and cold applications applied to the abdomen.

(c) *Hematemesis*.—John M., aged 40 (Hos. No. 1683), admitted August 21st, 1890, with a history of illness of some weeks' duration,

the chief symptoms negative, and temperature had vomiting, and a brownish material. II

NERVOUS SYSTEM.

(a) *Typhoid* appearance of the face (4716), admitted with twitching, which becomes unconscious. The irregularity persisted. The patient was in an unsound mind.

On admission with sears, a large and one on the nose gave an intelligent examination of the muscles of the legs. The rhythmical. There was no hemorrhage, a dark-colored spot on the finger of the right hand. During the first week worse; thus on the 1st "Patient is worse than to feed herself. The muscles of the face a little distance off the chorea except ter." From Mare

the chief symptoms headache and fever. The blood examination was negative, and there was a very definite rose-colored eruption. The temperature was never high, not rising above 103°. On the 27th he had vomiting, and in one of the attacks he brought up a dark, greenish-brown fluid containing red blood corpuscles in a condition of disintegration, and a clot of blood about 3×2 cm. in diameter. On the 29th, 30th and 31st the stools were very dark in color and evidently contained blood, and several times he vomited very dark material. He became very anæmic, but made a good recovery.

NERVOUS SYSTEM.

(a) *Typhoid fever in a case of chronic chorea and epilepsy; disappearance of the choreic movements.*—Sallie F., aged 21 (Hos. No. 4716), admitted February 16th, 1892, complaining of spasms and twitching, which had lasted for about six months. She falls and becomes unconscious and bites her tongue. A year ago she began to have irregular involuntary movements of the muscles which have persisted. There is a marked neurotic history; the mother has been of unsound mind.

On admission she was well nourished, face a little thin and marked with scars, a large one on the forehead, one on the bridge of the nose, and one on the right side of the face. She was perfectly rational and gave an intelligent account of her symptoms. Occasionally during the examination she had involuntary jerking movements of the arms and of the muscles of the trunk. They occurred also occasionally in the legs. The movements were quick, sharp and sudden, not rhythmical. The reflexes were somewhat increased, sensation good, there was no hemianæsthesia, no heart murmur. There were several dark-colored spots on the legs and a suspicious onychia on the ring-finger of the right hand, so that she was ordered iodide of potassium. During the first week in hospital the choreiform movements became worse; thus on the 26th of February I made the following note: "Patient is worse; movements are now so extreme that she is unable to feed herself. There are many sudden electric-like jerkings of the muscles of the face, hands and trunk. Sometimes she jerked herself a little distance off the bed. The movements are like those of ordinary chorea except that they are rather more electric-like in character." From March 2nd to the 7th she was feverish, with gradually

ascending temperature, until it reached 104°. She complained of aching in the back and legs. The tongue became much furred. The fever persisted, and on the 11th several very suspicious-looking spots were seen. She developed a very well characterized attack of typhoid fever of moderate severity. As the fever developed the choreic movements became much less and gradually disappeared, though at the height of the fever she had some slight tremor and subsultus. The fever persisted until April 3, and then she made a very satisfactory convalescence. With the decline of the fever early in April the choreiform twitchings gradually reappeared and became almost as severe as at the time of her admission.

This patient was in hospital exactly thirteen days before the initial rise in the fever. There were several patients with typhoid fever in the ward, and one in the next bed to her, so that it is possible that it may have been an instance of ward infection, though the fever started within the limits of incubation of an outside contagion.

(b) *Melancholia*.—In three instances the patients during convalescence became profoundly depressed and melancholic.

George W. (Hos. No. 3922) was admitted September 24th, 1891, in the third week of typhoid fever, with a temperature of 103° and with a marked splenic tumor. The patient had only three baths, and the temperature was normal within a week after his admission. He entered upon a very satisfactory convalescence. On October 16th after he had been up for three days, it was noted that he had a peculiar mental condition, having an idea that he was going to die. Within a week this became much more manifest. He thought that he was going to be executed and was very much frightened about it. He saw and heard, as he insists, the headsman read his condemnation to death. After a few days of this delusion he said that he was ashamed of himself; then he became again very apprehensive, and about the second week of his convalescence sank into a state of profound melancholia. He did not speak to anybody, would scarcely answer a question, ate little, slept badly, and looked very much depressed. His physical condition improved after the middle of October, and on October 26th he was taken to his home by his friends, still very melancholic.

Pauline L., aged 28 (Hos. No. 5685), admitted August 4, 1892. This patient had a very severe attack with a well-marked relapse. She, however, took the baths well and had no special delirium, but

once or twice to normal a days of apyrexia and could sleep nearly three hours. She was a distressed about going to get upon convalescence more cheerful.

Henry N., 1892. He was moderate but He was always upon the convalescence would not talk. In January he had rapidly in weight very much in his mental condition.

(c) *Hysteria*.—In one (Hos. No. 2) the baths. The deal about them tenderness and of the body. T

The second pronounced hysterical throughout the year, at 5 p. m., restless, the eyes to his throat and at a time. He he upon it. The expression which he did not body to and from morning he had behaved queerly announced hysterical ceased.

once or twice was very restless and nervous. The temperature fell to normal about the 28th of August, and during the seven or eight days of apyrexia she was profoundly melancholy and would not speak and could scarcely be induced to eat. In the relapse, which lasted nearly three weeks, she was very nervous, complained a great deal of distress about the heart, and she had constant fears that she was not going to get well. As the fever declined, however, and she entered upon convalescence, she got brighter mentally and looked very much more cheerful, and ultimately made a satisfactory recovery.

Henry N., aged 32 (Hos. No. 6304), admitted November 15th, 1892. He was admitted in the first week of the disease and had a moderate but somewhat protracted attack. He had no delirium. He was always very depressed and looked dejected. As he entered upon the convalescence this depression became very marked and he would not talk, and was with difficulty induced to eat. Early in January he had a slight recurrence of the fever; then he gained rapidly in weight throughout the middle of January and improved very much in spirits, and when he was discharged on January 25th his mental condition was very good.

(c) *Hysteria*.—There were four cases with hysterical manifestations.

In one (Hos. No. 4113), they seemed to develop in consequence of the baths. The man became very nervous and complained a great deal about them and had crying spells. He had also marked general tenderness and complained of pains in the throat and different parts of the body. The convalescence was, however, satisfactory.

The second case (Hos. No. 3721), male, aged 18, had most pronounced hysteria. He had a pretty severe attack of fever, lasting throughout the greater part of September. On the 10th of September, at 5 p. m., he complained of difficulty in swallowing, was very restless, the eyes were closed, and he did not speak. He made signs to his throat and nodded his head repeatedly for a minute or two at a time. He held his tongue between the teeth and shut the teeth upon it. The expression of his face indicated that he was biting it, which he did not do. He rolled from side to side and swayed his body to and fro. He was at this time having baths. The following morning he had the same demonstrations and was very noisy. He behaved queerly all through his illness and had several very pronounced hysterical attacks. With the subsidence of the fever they ceased.

Gustave G., aged 22, admitted December 27th, 1891, with a severe attack, the temperature not reaching normal until January 23rd. At times, when the fever was high, he was delirious. On the evening of the 27th of February he had a pronounced hysterical attack, throwing himself on the bed, breathing in a hurried manner, and presenting very peculiar twitchings of the eyelids. He was spoken to sharply and the gas turned down, and he went to sleep quietly. On the 6th of March he had a second attack, while sitting in a chair, when he suddenly complained of a pain in the head, fell on the floor and behaved in a distinctly hysterical manner.

Perhaps the most interesting case was that of a young girl aged 13 (Hos. No. 6497), who was admitted December 24th, 1892. She had been ill for at least two weeks with very odd nervous symptoms, and which, though she had fever at the time, were regarded as hysterical. She behaved in a very odd and peculiar manner, had crying spells, was very restless, and sometimes quite delirious at night. So definitely hysterical were these initial symptoms that until a day or two before admission the case was regarded as one of pure hysteria. During her stay in hospital she had an unusually severe attack with a definite relapse and had delirium, but no subsequent hysterical symptoms.

(d) *Neuritis*.—C. W., aged 25, admitted October 8, 1890. Patient had a moderately severe attack, and the temperature did not reach normal until the 27th day. On October 18th, that is, on the 14th day of the fever and while the temperature ranged between 102° and 103°, she began to complain of pains in the arms. She had not had a cold bath since the 10th day, October 14th. The pains were neuralgic in character. On the 19th the note reads, "This morning pain is very much worse, she can scarcely lift the arms. There is no swelling of the joints or any tenderness about them on the firmest pressure. The soreness is particularly in the muscles. She winces at once when they are grasped. The biceps is particularly tender. There is no swelling of the ulnar nerves, no soreness in the brachial plexuses in the axillæ or above the clavicles. The pain to-day is not shooting in character, but it extends down to the fingers. There is no numbness. The pain is so severe that the arms are kept on a pillow and she is quite unable to move them." On the 20th the note reads, "Soreness persists. Cannot lift the arms; fingers can be moved. The pain is continuous. There is no disturbance of sensation, no pins and needles, no swelling of the joints; the

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legs are not painful." On the 22nd the note reads, "The hot applications have relieved the pain somewhat. Yesterday the hands were quite numb. She says the hands ache like toothache. Joints not swollen; arms and forearms still very sore to touch." From the 18th to the 30th this condition persisted with very little change. She had lead and opium applications and antipyrin internally. The temperature meanwhile gradually fell and her general condition improved. On November 2nd the note is, "Arms very much better; pains still in the left arm and she can move the arms well; no wasting of the muscles." Within the next two weeks she improved very rapidly; the pains in the arms gradually disappeared, and she recovered completely without any wasting of the muscles. The pain in this case was of a most aggravated character, causing the patient sometimes to cry out.

John M., aged 27 (Hos. No. 4171), admitted November 4, 1891, on the 10th day of a mild attack. On the 25th of November, when he had been already convalescent more than 10 days, he complained of very severe pain in the front and back of the left leg, which came on suddenly. There was distinct sensitiveness over the nerve trunks, the posterior tibial, and the peroneal, and particularly along the fibialis anticus muscle. The toes were also sensitive and there was a dulling of sensation in them. Throughout the 26th this condition persisted and it seemed probable the patient was going to have a severe post-typhoid neuritis, but on the 27th he was very much better. There was no tenderness, and the sensitiveness in the anterior tibial muscles had disappeared.

Mary McG., aged 13 (Hos. No. 6405), admitted December 4, 1892, about the end of the second week of what proved to be a very severe attack of typhoid fever. The temperature kept up for an unusually long time, and she became so feeble that after the 44th bath they were discontinued. It was not until the end of the 5th and throughout the 6th week that the temperature fell to normal. On December 14th, while the temperature was still high, having been constantly for several days in the vicinity of 105° , and after she had been sponged with ice-water for two days, she began to complain of very great pain in the right arm and in the right leg, of such severity that she cried out constantly and she had to have morphia. These attacks continued between the 14th and the 20th with great severity. In the right arm the pain soon subsided; there was no involvement of the joints; no pain along the nerve trunks. She screamed out if

any attempt was made to move the right leg. There was no tenderness about the hip, no swelling of the knees, and repeated examinations seemed definitely to exclude any articular trouble. Grasping the leg at any place seemed to cause extreme pain. On the 18th, three patches, like erythema nodosum, appeared on the right foot, one at the metatarsal joint of the small toe, one midway between the heel and toes, and one on the outer and back part of the heel. They looked like large chilblains, and around one there was a distinct bluish discoloration. The two smaller ones disappeared within a day or two. The larger one on the heel remained red for some days. There was no superficial necrosis. She never seemed able to localize the pain accurately. It was never definitely in the situation of the sciatic nerve. It was quite uncontrollable by anything but morphia. After causing great anxiety to us, and distress to the patient, for nearly ten days, the pain subsided and had disappeared by the 25th or 26th, two weeks at least before the temperature became normal.

Wm. McM., aged 32 (Hos. No. 6329), admitted Nov. 19th, 1892, at about the second week. The attack was of moderate severity, the temperature ranging between 103° and 104.5° , and not falling to normal until the fifth week. Just about the time the temperature became normal, that is on the 12th of December, the patient complained of general soreness and pains in the limbs, particularly in the arms, and he winced on pressure upon the forearms and arms. He had been in very good condition and convalescence seemed well established. The grasp of both hands seemed weak, but particularly the left, and he complained of a sensation of pins and needles in the left foot. There was no tenderness along the nerve trunks; no pain on pressure on the muscles of the calves; he winced a little when the muscles on the right thigh were pressed. On the 17th of December the note reads, "Left arm looks somewhat swollen and feels tense. It is not red; the temperature is not elevated. He moves the muscles with difficulty and says the arm is very sore. On the inner part of the upper arm there is very great tenderness along the course of the brachial artery and of the nerve trunks. The ulnar nerve is also somewhat tender at the elbow. There is tenderness of the muscles, particularly of the biceps and of the extensors of the upper arm. There is no anesthesia; no sensation of pins and needles. All movements in the limb cause him pain. There are flying pains in the legs, but no swelling; no tenderness; knee jerks were increased; no

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ankle clonus." The swelling and tenderness in the right arm gradually disappeared within ten days and there was no wasting of the muscles.

(e) *Local Vaso-motor Neurosis.*—John B., aged 21 (Hos. No. 6946), admitted March 4, 1893. He had, shortly after admission, a very peculiar condition of the soles of his feet in the neighborhood of the heel. The note reads, "The soles of the feet, particularly in the region of the heel, are swollen and red; the line of redness extends along the lateral aspect of the foot. The color is a bluish red; there is marked swelling, not much pain; the toes are not affected." Within a week the swelling had almost disappeared from the region of the heel, but on the dorsum of the foot there were two spots of redness and œdema, and two spots on the inner side of the right ankle and one on the outer side of the leg. These were reddish, raised and swollen. On the 21st this patient had slight pain in the right wrist without any swelling. The patient had a mild attack, and by March 30th the temperature was normal. He had during convalescence some pain in the right forearm and wrist without any redness.

(f) *Tender Toes.*—A very distressing and peculiar form of acroparæsthesia—as these digital and dactylic disturbances of sensation have been termed by Fr. Schultze—present in a number of the bathed cases, viz., exquisite sensitiveness of the toes, sometimes of the soles and dorsal surfaces of the feet. An appearance similar to chilblains has frequently been noted after the cold bath, but no special connection has been observed between it and the tender toes. The condition develops about a week or ten days after the baths have been given, and the first complaint is usually of the pressure of the bedclothes on the feet. No redness or swelling has been noted, nor any change in the appearance of the skin, except the yellow tinge which is not uncommon in the palms of the hands and soles of the feet in typhoid and, I think, other protracted fevers. The slightest touch on the toes caused severe pain. In passing from bed to bed in the ward, I have long had a trick of grasping the feet of a patient through the bedclothes as an emphasis to the morning greeting, a salutation which has been followed in some of the cases under consideration by a burst of tears. I thought at first that the pain might be due to a drying and hardening of the outer layers of the cuticle macerated by the repeated baths, and pressure of it on the sensitive layers beneath, but the skin has always looked natural, and though

there has never been any impairment of muscular power, we have gradually been led to regard the condition as a local neuritis. All the cases recovered without leaving any ill effects. The treatment was not very satisfactory; strong cocaine solutions on cotton-wool proved perhaps the most efficacious remedy.

RESPIRATORY SYSTEM.

Oedema of the Glottis.—The case has been given among the fatal cases and need not be here again considered. There were seven cases of *pneumonia*, two of which died, and the details are given in the section dealing with the fatal cases. One of these was specially interesting from the fact that the diagnosis was made of pneumonia, and the typhoid fever was not detected until the post-mortem. Of the five cases which recovered, in not one was the pneumonia extensive, and the diagnosis rested upon definite dulness, with distinct tubular breathing.

Pleurisy.—There were only two cases of this complication.

Wm. E., aged 38 (Hos. No. 7218), admitted with a well-marked friction and crepitant râles in right axilla. There was no effusion.

Frederick S., aged 20 (Hos. No. 192), admitted August 10, 1889, with perfectly well-marked signs of effusion at the left base, with dulness, absence of tactile fremitus and of breath sounds. The effusion gradually disappeared during convalescence.

CIRCULATORY SYSTEM.

Apart from the gradual failure of the heart power with the bodily strength, generally indicated by a shortening of the long pause (the foetal rhythm), there were few cases presenting cardiac complications. A heart murmur was present in many instances. This, of course, was not regarded as in any way indicative of endocarditis, but due simply sometimes to weakness of the cardiac muscles, sometimes to the condition of the blood.

Among the fatal cases there has already been referred to one in which there was pronounced arrhythmia cordis. There was no instance of endocarditis, and among the fatal cases, as will have been noted, there were few even of those with signs of progressive heart failure which had marked fatty degeneration of the muscle substance. There were no complications on the part of the arteries. In a case of aortic insufficiency with typhoid fever, the murmur increased

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Phlebitis.—John C., aged 21 (Hos. No. 5827), admitted August 31, 1892, about the beginning of the second week. The case was a slow, protracted one, and the temperature did not reach normal until about the end of the fifth week. When convalescence had been well established, though he was extremely weak, about the 24th or 25th of October, the left leg became swollen and oedematous, and this gradually extended to the thigh. The calf of the leg felt very firm, and was hard in the popliteal space, and very tender along the upper and inner aspect of the thigh. With this there was no increase in the fever, and his general condition had improved.

Wm. S. W., aged 24 (Hos. No. 2195), admitted November 26, 1890, on the sixth day of his illness. The case was mild, and the temperature was normal by December 25th. On December 19th he had tenderness along the inner side of the left thigh, in the situation of the internal saphenous vein. Within a few days there was much pain and the leg became swollen. There was a well-marked thrombus in femoral and saphenous veins. The leg was bandaged carefully, and the complication did not seriously retard his convalescence. He was discharged on the 15th of January.

CUTANEOUS SYSTEM.

Profuse drenching sweat occurred in four cases. *Boils* in large numbers occurred in twelve cases. They were particularly numerous and distressing in the cases treated during the autumn of 1892. In addition there developed in four cases definite skin-abscesses which could not be classified as furuncles.

OSSEOUS SYSTEM.

Periostitis occurred in the right tibia in case 4683. It developed when convalescence was well established, and did not cause any fever, but was a tender swelling with redness just above the middle of the right tibia. It disappeared without suppuration.

Otitis.—There were three instances of acute otitis media.

(g) *Errors in Diagnosis.*—By far the most common mistake was to send a patient from the dispensary to the wards with a diagnosis

of typhoid fever when the condition was in reality malaria. On more than one occasion a patient has had his head shaved and has had baths for twenty-four hours before the error was corrected. Such mistakes have not been so common since a thorough examination of the blood in every case of fever has been made a matter of routine, but we have been occasionally caught napping, as when a patient has had malaria for some time and has been taking quinine, so that the organisms are scanty or absent for a time from the blood.

In two very interesting instances the mental condition at the onset of the disease led to a mistake. In Hos. No. 6497 the error was not on our part. The patient, a young girl of thirteen, had been treated outside for a week or ten days for hysteria, and certainly, according to the mother's account, the symptoms which she presented were quite typical of that disease (the performance of odd and anomalous acts, with laughing and crying spells), yet the fever, which was high when she was admitted, should possibly have given a clue to the condition, about which there was no question when she came under our observation. The second case was a young woman, aged 28, whom I saw on a Sunday afternoon in the admitting room. She was completely "off her head," and the account given by the friends was so unsatisfactory as to the duration and mode of onset of the trouble that I told Dr. Hoch that I did not think the case a suitable one for admission, regarding it as an instance really of mental disease. The temperature was very slightly elevated, the tongue was clean, and the whole behavior was so much suggestive of mental aberration that I was completely led astray. Fortunately Dr. Hurd saw her subsequently, and it was decided to admit her. She had a mild attack; the delirium disappeared and she had no serious symptoms.

In only two cases did the anatomical correct the clinical diagnosis. Both of these are given fully in the history of the fatal cases; one (Case 11) was the old man, aged 70 (Hos. No. 1814) who was admitted in a condition of cachexia, with pneumonia of the right lower lobe. In the other, Case 18 (Hos. No. 5556), the patient had been in the hospital a year before with severe entero-colitis, and when admitted had diarrhoea and an irregular temperature, and not unnaturally he was thought to have a recurrence of his former severe trouble. The only suggestive feature in his case was the presence of the diazo reaction in the urine. He died on the seventh day after admission, and the autopsy showed the lesions of typhoid fever.

V.—ON THE NEUROSIS FOLLOWING ENTERIC FEVER,
KNOWN AS "THE TYPHOID SPINE."

By WILLIAM OSLER, M. D.

In 1889 Dr. Gibney, of New York, described at the American Orthopedic Association a sequel of enteric fever which he called "the typhoid spine," and which he regarded as a perispondylitis, "meaning an acute inflammation of the periosteum and the fibrous structures which hold the spinal column together." He stated that his reason for the use of the term "was the production of acute pain on the slightest movement, whether lateral or forward, and the absence of any marked febrile disturbance or neuralgia." He described four cases; in the first, a lad of 15, towards the end of convalescence, complained of severe pain in the back, particularly in the lumbar region, and especially after any movement. There was no disease of the bone, no pain in the distribution of the sciatic or anterior crural nerve. He was seen in the autumn of 1882, with Dr. Beverly Robinson. A spinal brace afforded relief, and in the course of two or three weeks he was practically well, but the brace was worn for more than a year.

The second case, a young man aged 24, had an attack of typhoid fever which ran a normal course. After convalescence was well established he complained of pain in the back, but he was able to lie up and about, and played tennis. After a fall in tennis the pain became very severe, and he suffered so exherciously that he could only rest in a recumbent posture. Deep pressure over the iliac region on the left side, and lateral or antero-posterior motion of the spine, caused excessive pain. He had some fever. The symptoms persisted from the latter part of November until the beginning of January, but it was not until March that he was able to get about.

The third case, a lad of 18, had typhoid fever in November, was convalescent by December 27th, and went to New York. On January 10th he fell while skating and struck his left hip. A week after this he had pain in the region of the lumbar spine. The stiffness became more marked and the pains increased in severity. On the 10th of

February he went to bed and was seen by a surgeon in Albany, who regarded the case as one of psoas abscess. There was no fever, no evidence of disease of the spine, but the patient could not move without exquisite pain. He did not recover until May.

The fourth case seems to me to belong to an entirely different category, as it was an instance in which, during typhoid fever, the boy had kept both limbs flexed on the abdomen, and during convalescence was unable to straighten them, an event met with in many protracted illnesses in which the patient lies curled up in bed with the legs flexed.

In 1890, in a discussion at the Association of American Physicians following the reading of a paper on some points in the natural history of enteric or typhoid fever, by Dr. James E. Reeves,* Dr. Loomis, Sr., referred to Dr. Gibney's observations, and to one of the cases he had asked Dr. Gibney to see. Dr. Loomis knew of no reference in literature to a similar condition. Dr. Jacobi, at the same meeting, besides protesting against the introduction of a new name, such as "typhoid spine," suggested that, in the absence of temperature, it might be one of two things, either a neurosis or a spondylitis, remarking that mild forms of spondylitis are not so uncommon as they are believed to be.

In the American Text-book of Medicine (page 90) Dr. Pepper remarks in his article on typhoid fever that he has observed in a series of cases "obstinate peri-osteitis of the sternum or of the crests of the ilia, or in two instances, judging from the location of the pain and from the effect of movement of the trunk, of the front of the spinal column." Eskridge also described a case last year.

I have not been able to find any other references in text-books or monographs on typhoid fever, either in English, French or German. My attention has not been called to the condition until recently, unless perhaps a case which I saw several years ago with Dr. Grasset, of Toronto, was an illustration; a young officer, invalided from India after a prolonged fever, had for many months, on the slightest movement, attacks of the most severe pain in the back, which incapacitated him completely, though when seen by me he looked strong and robust and had a good appetite. He subsequently got quite well.

* Transactions of the Association of American Physicians, vol. v., 1890.

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The two following cases are, I think, illustrative of the condition which Dr. Gibney has described :

Case I.—O. T., aged 25 (Hos. No. 8201), admitted complaining of pains in the back, hips and stomach. The family history is good. His father and mother are living and well. One brother died of typhoid fever.

Patient was strong and well until July, 1892, when he had a very severe attack of typhoid fever with relapse. He was in bed for nearly three months; very slow convalescence. He remained well for three weeks, when the present illness began with pains in the back and hips, usually of a shooting character, and paroxysms of pain in the abdomen, of which he would sometimes have several in the day. He had to take again to his bed and was there for seven weeks, having much pain in the lower part of the back and down the front of the legs. He never apparently, from his account, had any paralysis. About June of this year he was well enough to go out and do light work about the farm. In the latter part of June he had another attack of severe pain in the back and abdomen. He had not to go to bed. There was much aching pain and shooting in the right leg from the hip down to the knee. In the latter part of July and in August he had severe attacks of diarrhoea. Since August he has been up and about, but not working, and has been able to go out shooting. At present he has slight pains at times in the back and in the legs, and yesterday there was an aching pain from the left knee to the ankle. The appetite is good. He never vomits, though he often has eructations. Bowels are costive. He sometimes has dyspnoea on exertion.

Present Condition.—Healthy looking, well-nourished man, with fairly well-developed musculature. He gives one the impression of a neurasthenic patient. Lips and mucous membranes of good color; tongue clean and moist; pupils equal; pulse 70° to 80°; no increase in tension. Practically the examination of the thoracic and abdominal organs was negative. The abdomen was soft and nowhere tender. The chief complaint is of weakness in the back, and it hurts him to turn in bed. He describes the pain which he had last year as beginning in the small of the back, passing around the hip bones and then up the back. Judging from the scarring, the chief trouble was thought to be in the lower part of the spine. There is still a little tenderness on pressure just above the left sacro-iliac

synchondrosis. There is no tenderness over the sacrum itself, or along the iliac crests. Patient gets out of bed readily and stands well; walks with a natural gait; does not sway with the eyes shut. After prolonged standing or walking he complains of great increase of pains in the back. The knee-jerks are present, a little exaggerated; there is no ankle clonus. The most careful examination of the spine fails to reveal any signs of organic disease. The urine is normal.

The patient remained in hospital for a little more than a week; took large doses of nux vomica, and was encouraged to believe that he had no serious organic disease. Subsequent examinations gave no additional information, but the patient evidently was highly neurasthenic.

Case II.—A. A., aged 21, architect's assistant, seen with Dr. King, May 10th, 1893. Patient has always been a healthy man and has never had any very serious illness. He is not of a robust constitution, and though bright, not of a very strong mental fibre. There are no special nervous troubles in the family.

In November and December last, patient had typhoid fever, an attack of moderate severity. On New Year's day he sat up for the first time, and convalescence was gradually established. There were no sequelæ, no complications, and early in February he went to his work. He gained in weight and looked very well. He remained at work about three weeks, complaining only at times of pain in the back and of being very tired after sitting for a long time. One day he was very much jarred in the back during a sudden jerking of a cable car in which he was riding. Early in March, after complaining very much of his back and of the pain on moving, and of tired feelings, he took to his bed, where he has remained ever since. Dr. King tells me that the chief symptom has been pain on movement. His general health has been excellent. The appetite has been good, he has gained in weight, and he has slept well. He has been nervous and at times almost hysterical. When quiet and at rest and not attempting any movement he does not complain of pain, but on turning or on attempting to get out of bed, or even the thought of the attempt to move the legs, is enough to cause him to cry out. The pains have been in the lower part of the back, extending sometimes up the spine and down the back and sides, more

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rarely the front of the leg as far as the knee. He has had no fever, no chills, but has sweated a good deal. He has had no swelling of the joints.

Present Condition.—Patient is a well-grown young man, well nourished, musculature of moderate development. The palms of the hands are moist and sweating; he was somewhat excited, and at our entrance flushed over the cheeks and neck and upper part of the chest. Face does not indicate any special strength of character, rather the reverse. Pupils of medium size, equal, active; tongue clean. Patient in the dorsal decubitus, his usual attitude. On pulling down the bedclothes he implored us not to touch him, as he was sure it would hurt him very much. The abdomen was full, natural looking. On palpation he complained of a good deal of pain in the left iliac region, but on withdrawing his attention and pressing forcibly with the left hand in the region of the heart and asking whether he had pain here, the right hand at the same time could be pressed deeply into the iliac fossa without causing any disturbance. The deepest pressure in the lumbar and iliac regions failed to reveal any glandular enlargements or thickening. The inguinal glands not enlarged; no special sensitiveness along the anterior crural nerves. On asking him to lift the leg he said it was impossible, as it hurt him so much, but in a few moments, placing the hand beneath it, he lifted it apparently without pain. When lifted in a semi-flexed position he said it was impossible for him to straighten it, but in a few moments it could be readily extended and he straightened it easily on the bed. There was no special wasting of the legs. He could move all the muscles freely and was able to get up and stand on his legs if he took time. The sensation was perfect; the knee-jerks present, perhaps a little exaggerated; no ankle clonus. The feet and ankles were perspiring freely. No swelling of the articulations, and no pain on pressure of the muscles or in the popliteal spaces. On asking him to turn over on his left side he demurred very much, but gradually, and apparently with a great deal of difficulty, he got himself over. The legs could then be moved easily and freely; no pain about the hip joint, and the legs could be flexed and extended readily. The spine was straight; the lower dorsal vertebrae a little prominent. No tenderness at any point along the spinal column. On both sides in the lower lumbar and sacral regions he was sensitive at a distance of an

inch and a half or two inches from the middle line, and particularly towards the right sacro-iliac synchondrosis, and along the posterior third of the crest of the ileum. He stated that this was really the point of greatest pain. Any attempt at twisting the spinal column was very sensitive and we could not induce him to sit up. In the attempts to make this movement he seemed to suffer a great deal of pain and began to cry.

There were no sensory changes, no hemianesthesia, no hemianopsia. The patient said that his chief trouble was more the dread of moving, lest it should cause pain, than any pain itself. Four days ago he sat up for a couple of hours, got out of bed himself and sat on the chair, but felt very tired, and the back was painful. Practically the examination in this case revealed neither Potts' disease nor neuritis.

He was ordered massage and electricity, and the Paquelin cantery to the back, given strychnia internally, and urged to sit up a certain definite time each day.

June 10th. A few days after I saw him he was able to sit up and did very well. Went out on the 30th of May and has been doing remarkably well ever since. Called to-day, looks in very good condition. No pain in the back; feels a little stiff; knee jerks are normal; condition good.

Cases II and III in Dr. Gibney's paper are very much like the one here mentioned, particularly in the fact that the symptoms developed after convalescence, and in both instances there was a slight trauma; in one a fall while playing tennis, and in another a slight fall on the left hip while skating. In the case reported here the patient also lays a great deal of stress on the jar which he received by the sudden jerking of the cable car. In both of these cases the prominent symptom was pain on movement, and there was an absence of all signs of organic disease.

An explanation of the symptoms in these cases is by no means easy. As already mentioned, Dr. Gibney regarded the lesion as a periostomyelitis, an acute inflammation of the periosteum and fibrous structures holding the spinal column together; and with this view, judging from the quotation given, Dr. Pepper seems to agree.

Joint and periosteal troubles are by no means rare sequences of typhoid fever, but the symptoms do not usually develop (as in three

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or four of the cases here described) at so long a time after convalescence has been well established. The periostitis, seen oftenest about the sternum and the ribs, proceeds as a rule, but not necessarily, to suppuration. I have in several instances seen a periosteal swelling disappear without suppuration. We do not have, so far as I know, protracted periosteal thickening, lasting for weeks or months, *without suppuration*; and it is difficult to conceive of the attacks of pain, such as are described in the second and third cases of Dr. Gibney's, and in the second case which I here report, lasting for months, due to a simple perispondylitis which in none of the cases passed on to suppuration. In both of my cases the general impression given by the patients was that they were neurasthenic; and while of course it would be very illogical to assume that all of the instances are due to the same cause, yet I cannot help feeling that many of them are examples simply of the painful neurosis formerly known as "spinal irritation," and analogous to the painful condition met with in the "hysterical spine" and the "railway spine," in both of which the patient may have pains on the slightest movement of the back or of the legs. In the second case reported, the whole behavior during the examination was that of a hysterical patient; thus, he could not think of lifting a leg—even the idea was enough to give him agonizing pain, and yet in a few minutes he lifted it himself and got out of bed. So also the slightest pressure in the lumbar or iliac regions would cause him to scream out, but while his attention was directed elsewhere, pressure could be made with the greatest facility. The rapid recovery in a few days, with disappearance of all the symptoms, is quite inconsistent with a chronic perispondylitis.

I have recently seen a case presenting somewhat different features, but which I think may also be reasonably classed as a post-typhoid neurosis.

Case III.—A. B., aged about 30, New York City, consulted me Nov. 2nd, 1893, stating that he had had trouble with his spinal cord. Family history was good; parents living; one sister, however, is insane.

He was nervous as a boy; used to tremble very much when excited, and had "nervous fits." He had gonorrhœa three or four times; never had lues; acknowledges excesses *in venere*. Takes alcohol, but is not a hard drinker.

September 23rd, 1891, he had an attack of typhoid fever of unusual

severity, with prolonged delirium, extensive bed-sores, and very great prostration. Convalescence was not established until January 10th, 1892. During and after convalescence he was very nervous, and had uneasy pains in the legs, his feet were tender, and he tired very easily. He had no pain in the back, no soreness, but the tenderness in the feet and nervous feelings persisted for six or eight months after convalescence, and he does not think that they have ever entirely disappeared. He attended, however, to his business, gained in weight, and felt pretty well, though never entirely free from uneasy sensations in the feet and legs. In the spring of this year these symptoms increased, particularly after some spruces. He had neuralgic pains in the legs, and he felt weak and unstrung, and evidently got into a very nervous condition. He had a dread of walking, and could scarcely force himself to go as far as the corner of the street. He slept badly and got into a state of extreme neurasthenia. There were twitchings of the muscles, and the feet and hands felt numb, and he complained that when his shoes and stockings were off there was a smooth feeling as if something was between the feet and the floor. At this time a doctor in New York suggested there was oncoming spinal trouble, and stated that in testing the sensation over the spine with hot and cold water he could not distinguish between them. He ordered him electricity and massage and general tonics; for the past seven or eight weeks he has not been at work and has improved a good deal.

Present Condition.—Tall, able-bodied man; looks a little pale; gait is normal; not spastic; station good; no Romberg symptom; no atrophy of the muscles; legs scarcely in proportion, however, to the rest of the muscular development. The spine is straight, nowhere painful on pressure, no special prominence of any vertebra. Sensation is everywhere good, no retardation, distinguishes easily between heat and cold. He thinks that about the feet and ankles the sensation is a little blurred and unnatural. He feels, however, a sharp point, and distinguishes readily different objects, and the thermic and painful sensations are unaffected. He has no abnormal sensations about the back and abdomen, and has not any sense of constriction or girdle pain. There is no vaso-motor disturbance. He sweats, however, easily and the hands are clammy, and he has had at times, he states, marked blueness and congestion of the feet, and they are often cold in the morning.

The reflexes on the left side, and are normal. The pupils are normal; the examination. Here, after delirium, so the patient had the symptoms diminished, disappeared, and was irritated by pronounced, the sensation of weakness, (2) no lesion; (2) no evidence that it would see the date of the fever, nor does the man insist that present during subsequently. muscular weakness, attack of typhoid. In the paper he refers to the after typhoid enfeebled condition, and sometimes walking long distances studied, but it head of defect nervous centres general appearance typhoid fever. uncommon symptoms reflexes are not

The reflexes are increased; knee-jerks active, particularly on the left side, and a slight ankle clonus can be obtained. The skin reflexes are normal. There is no disturbance of the special senses. The pupils are a little large, equal, react to light. The optic disks are normal; there is no restriction of the visual fields.

The examination of the thoracic and abdominal organs is negative.

Here, after a protracted and severe attack of typhoid fever with delirium, severe nervous symptoms and tardy convalescence, the patient had disturbed sensations in the feet and legs. The symptoms diminished somewhat within five or six months, never entirely disappeared, and recurred with intensity during a period characterized by pronounced neurotic manifestations. Unlike the cases before described, there were no pains in the back or abdomen, only a sensation of weakness. The symptoms suggest: (1) central (spinal) lesion; (2) neuritis; or (3) a neurosis. From his statements it was evident that the doctor in attendance feared a central affection, but it would seem that the patient's condition now, two years from the date of the fever, would speak very strongly against any such view; nor does the case conform in its clinical history to a neuritis. The man insists that the same feelings which he has now in the feet were present during the convalescence from the attack and some months subsequently. There did not appear to have been any very special muscular weakness such as sometimes develops after a protracted attack of typhoid fever without any evidence of peripheral neuritis. In the paper by Dr. George Ross on Paralysis after Typhoid Fever* he refers to these cases in the following words: "It is not unusual after typhoid fever of considerable severity to find a definitely enfeebled condition of the lower extremities persisting for some time, and sometimes a person never entirely recovers his capacity for walking long distances. Such paretic cases have never been specially studied, but it is probable they would, if any should fall under the head of defective innervation from prolonged exhaustion of the nervous centres." In the case under discussion, the history and the general appearance of the patient suggest rather a neurosis following typhoid fever. The parasthesias such as he described are not uncommon symptoms of neurasthenia, in which also exaggerated reflexes are not at all infrequent.

*Transactions of the Association of American Physicians, Vol. III, 1888.

It is not unlikely that under the designation of "typhoid spine" Dr. Gibney has described several distinct affections, and I would not be understood as holding that there may not be a perispondylitis. Nor indeed are all the painful backs in typhoid fever neurotic; thus, a patient recently under my care (Hos. No. 8049) was admitted in an attack of moderate severity about the end of the third week, the temperature falling to normal by the 26th day; then after a period of apyrexia of seven or eight days he had a well-marked relapse of about two weeks' duration. During convalescence he began to complain of severe pain in the back of the neck, and at the attachment of the muscles of the occipital bone. There was no actual tenderness in the vertebræ, and movements to and fro and laterally were not associated with any very great pain. An application of the Paquelin cautery relieved it for a few days, and then it recurred. The examination from the pharynx was negative. The condition persisted for at least two weeks, and while at first confined to the neck, subsequently he had soreness and stiffness of the back; he walked stiffly and held himself very erect. He says that it is better when moving about than when lying down. No special tenderness in the spine, and no sharp pain; no increase in the reflexes; no indication of neuritis. He gradually improved, and when discharged he was very much better, having gained $11\frac{1}{2}$ pounds in weight.

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TYPHOID FEVER IN BALTIMORE.

By WILLIAM OSLER, M. D.

From the Johns Hopkins Hospital Reports, Vol. IV, No. 1, Baltimore, Md.

VIII.—TYPHOID FEVER IN BALTIMORE.

BY WILLIAM OSLER, M. D.

Among the cities which still pay an unnecessary Delian tribute of young lives to the Minotaur of infectious diseases, Baltimore holds a high rank. The pity of it is, too, that this annual sacrifice of thousands of lives (2281 for 1892, not including consumption), is not due to ignorance. For more than fifty years this gospel of preventive medicine has been preached—whether they would hear or whether they would forbear—in the ears of councils and corporations: that *three measures, efficiently designed and effectually carried out, reduce to a minimum the incidence of infectious diseases; viz., pure water, good drainage, and a proper isolation of the sick.* Of sanitary essentials in a modern town, Baltimore has a well-arranged water supply; still, however, with unprotected sources and constant liability to contamination. It has nothing else—no sewage system, no system of isolation of the sick, no hospital for infectious diseases, no compulsory notification of such a disease as typhoid fever, no disinfecting station, no system of street-watering, no inspection of dairies, no inspection of meat. The streets are cleaned, but so carelessly that for a large part of the year the citizens breathe a mixture of air with horse-dung and filth of all sorts.

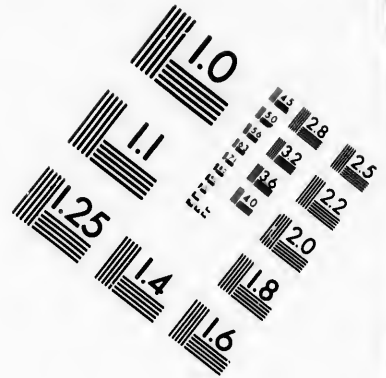
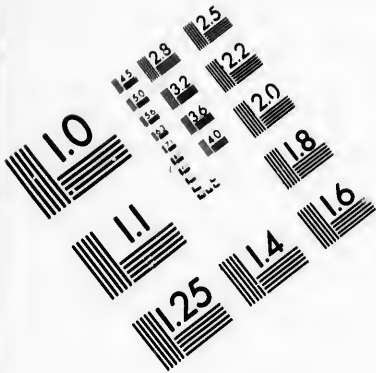
Perhaps the best gauge of the sanitary condition of a city is to be found in the mortality returns from typhoid fever.

THE INCIDENCE OF TYPHOID FEVER DURING THE FIVE YEARS 1888-92.

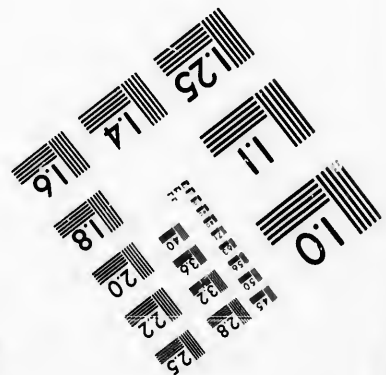
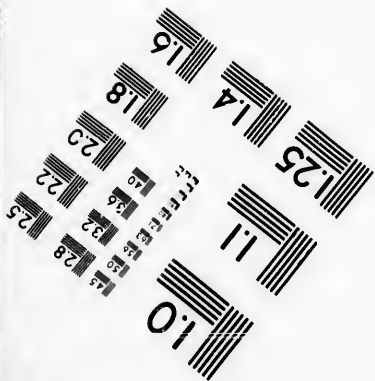
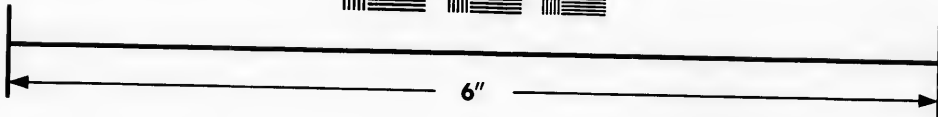
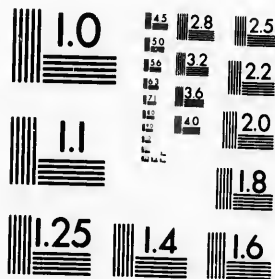
To the deaths from typhoid fever have been added the cases returned as typho-malarial fever, since no reason now remains for separate classification. We may speak for this latitude with some confidence upon this point, after a study of some 300 cases of typhoid fever, in not one of which the symptoms coexisted with those of malarial intoxication.*

* Baltimore is very favorably situated for the study of both malaria and typhoid fever, as the two diseases prevail during the same period of the year. To October 1, 1893, there had applied for treatment at the Johns Hopkins Hospital about 500 cases of malarial fever. The so-called typho-malarial fever is grouped with typhoid fever in the Boston, New York, and Philadelphia returns.





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According to the health reports there were in 1888, 202; in 1889, 224; in 1890, 301; in 1891, 189; and in 1892, 226 deaths from typhoid fever, a total mortality of 1146 cases, a yearly average of 229 cases. The morbidity, *i. e.* the total number of persons who have had the disease, cannot be determined, since the cases are not reported to the health office; and unless the system of registration is exceptionally good, a more reliable, though probably low estimate may be made by putting the average death-rate at from 12 to 15 per cent., which are very moderate figures. Taking the death-rate of, say, 12 per cent., this would give at least 13,752 cases of typhoid fever during the five years. Approximately for the five years, the average of fatal cases would be, estimating the census at 450,000, a little over 5 per 10,000 of population, or an average annually of—on the above statement of morbidity—one case of typhoid fever to every 163.6 inhabitants. Compared with the three other large cities on the Atlantic seaboard, we find the following for a corresponding period of five years:

Boston, * 802 deaths, a yearly average of 160.4. Estimating the population at about 442,000 (average of the five years) gives a ratio of 3.6 per 10,000 living; and estimating the morbidity as above, an annual average of 1924 cases, 1 to about every 229 of the inhabitants.

New York, † 1897 deaths, a yearly average of 379.4. Estimating the population at about 1,700,000 (average of the five years), this would give a ratio of 2.2 per 10,000 living, and estimating the morbidity as above, an annual average of 4552.8 cases, 1 to about every 373 of the inhabitants.

Philadelphia, ‡ 3309 deaths, yearly average 661.8. Estimating the population at about 1,000,000 (average for the five years), this would give a ratio of 6.61 per 10,000 living, and estimating the morbidity as above, an annual average of 7941.6, 1 to about every 125.09 of the inhabitants.

The ward map published in the City Health Report for 1892 gives the greatest number of fatal cases, and one may suppose the greatest prevalence of the disease, in the outlying wards of the city, more particularly in ward I, which has the highest figure; ward

* Report of Health Department, page 8, 1892.

† From figures kindly furnished by Emmons Clarke, Secretary of the Board of Health.

‡ Report of Health Department, 1892.

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XVII comes next, and then the outlying wards, XXI and XXII of the annexed district. A suspicious circumstance here is the number of dairies in these sections, and of wells still in use. Of the 229 patients treated at the Johns Hopkins Hospital during four years, there were 23 who, owing to having given their street directions or addresses imperfectly, could not be accurately referred to the wards from which they came. From the city there were 172 cases; from Baltimore County 35 cases; from Maryland, outside Baltimore County, 12 cases; from outside Maryland, 8 cases; from steamers, 2 cases. Of the cases in the city which could be located, the distribution according to the wards was as follows: First ward, 11; second ward, 26; third ward, 8; fourth ward, 6; fifth ward, 9; sixth ward, 19; seventh ward, 8; eighth ward, 10; ninth ward, 11; tenth ward, 3; eleventh ward, 5; twelfth ward, 5; thirteenth ward, 1; fourteenth ward, 3; fifteenth ward, 2; sixteenth ward, 1; seventeenth ward, 9; eighteenth ward, 3; nineteenth ward, 3; twentieth ward, 0; twenty-first ward, 1; twenty-second ward, 5. Of the 35 cases from Baltimore County, 22 came from Sparrow's Point and 6 from Canton.

While much remains to learn about the conditions favoring the vitality and growth of the typhoid organism outside the body, certain general facts relating to the disease are well established: viz., its frequent transmission by drinking water, the intimate connection with defective drainage, and the transmission by foods, such as milk, accidentally contaminated by the poison; and we may inquire how far these factors are at work in maintaining in Baltimore the high incidence of one of the most preventable of the infectious diseases.

(a) *The Water Supply.*—For the greater part of the year the water furnished from Lake Roland and Loch Raven is of exceptionally good quality. In the autumn, when the lakes and reservoirs are low, as during the present year, both supplies were reported to be dangerously contaminated with organic matter. No systematic biological analysis can be made, as the Health Board is not furnished with a skilled bacteriologist.

The distribution of the disease indifferently in all quarters, though prevailing more in the area supplied by the Gunpowder and in the low-lying districts of wards I and XVII, the occurrence here and there in foci, not in large contemporaneous crops, and the comparative freedom of the higher, less crowded, parts of the town, suggest that other factors than the water must be taken into account. Were

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the annexed chart from Dr. Smith's article, already referred to, contrasting sewered and unsewered towns. Typhoid fever is essentially a filth disease, and in the words of Liebermeister, "the disposition of any locality to an epidemic depends largely on the extent to which the inhabitants breathe or drink the contents of their privies; the greater the chances of this are, so much the greater are the probabilities that the introduction of an imported case of typhoid fever will produce an epidemic." In Buda-Pesth, von Fodor has shown that the deaths from typhoid fever per 100 houses are more than double in the very dirty houses than in the very clean, and in the same way nearly double per 100 houses when the yard was very dirty.

Admirably situated for natural drainage, Baltimore has practically only surface sewerage, from which the rain-water and kitchen outflow are collected in sewers. The excreta (urine and feces) pass for the most part into privy pits, of which it has been estimated there are from 70,000 to 80,000, occupying one-twentieth of the entire surface of the city, exclusive of streets and parks. Many of these when water-tight are not a source of special danger; but unquestionably leakage occurs in a very large number, with saturation of the ground in the vicinity. In addition, the arrangements for removal of the surface sewage and kitchen waste are such that in the shallow brick grooves, passing usually in the little passage-way between adjacent houses, constant soakage takes place into the earth beneath, which is polluted to a very considerable depth, varying very greatly with different localities. No single fact has been more clearly brought out than the intimate association between sewage-polluted soil and typhoid fever. As already stated, wholesome, healthy water is not alone sufficient to abolish the disease; but healing of the sickness in the soil, purifying it by proper drainage, is at once followed by a remarkable fall in the death-rate from typhoid fever. This has been strikingly shown in many cities; thus in Stockholm the mortality fell step by step with the increase in the number of metres of sewers, falling from 1877, with a mortality of 5.1 per 10,000 inhabitants and 8937 metres of sewers, to 3.7 per 10,000 inhabitants in 1883, with 40,435 metres of sewers, and to 1.7 deaths per 10,000 in 1887, with 65,709 metres of sewers. In Munich and Vienna typhoid fever has been almost abolished, and three years ago, when in the former city, Prof. von Ziemssen stated to me that the reduction in the cases in the hospital had almost changed the character of the service, and

they had scarcely patients enough to illustrate the disease in the clinical courses. The figures for Munich and Vienna have so often been quoted that it is not necessary to refer to them further than to state that the deaths per 10,000 living have fallen from 12.5 to between 1 and 2.

The local conditions permitting the disease to be endemic throughout the year relate unquestionably to the persistent pollution of the soil. While cases of typhoid fever occur in every month, it is essentially an autumnal disease, and there is a factor as yet unknown which at this season renders the poison more potent, or, what is more likely, favors in some way its growth and distribution. No satisfactory explanation has yet been given of this autumnal prevalence, certainly one of the most striking facts in the natural history of the disease. After the heat of summer, particularly a hot, dry season, when the streams and ponds are low, the drainage area is extended, and with it a proportionately increased liability to contamination. The amount of organic matter is also then much increased, rendering the water a more suitable medium for the growth of all kinds of bacteria. The heated soil, too, after the summer weather may favor their development; but the factor on which the greatest stress is laid, particularly by v. Pettenkofer, is the lowering of the ground-water during the autumn months. Unfortunately no data have ever been collected in Baltimore on which to base an opinion on this important point. No systematic observations have ever been made on the height of the ground-water at different seasons, nor is any information available as to the nature of the soil in the different portions of the city. It is to be hoped that the new topographical survey will prepare maps, such as those made for Berlin and other cities, showing the distribution in the wards of clay, gravel and sandy soils.

(c) *Conveyance through Food Stuffs.*—Here the chief danger is the contamination of milk, which has been shown to have been the source of the disease in many epidemics. The infection is usually conveyed in the water with which the pans are scoured, but the possibility of direct infection must also be borne in mind, as when those engaged in milking the cows have also to do with the care and handling of persons sick with the disease. Baltimore has inspection of neither milk nor dairies.

We need information regarding the number of city cow-sheds and their condition, and also the proportionate amount of milk supplied

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to the citizens by them. In a very considerable number of these dairies the cows are fed on swill, the quality of which is extremely bad. Even when kept clean, dairies in crowded localities are exposed to very serious dangers. Milk is of all fluids the most susceptible to infection, and forms a culture medium of the very best kind, particularly for typhoid germs, which develop without altering the appearance of the milk. The dust and sweepings, blown in all directions from the unwatered streets, must very often contain germs which, even in any well-protected city dairy, might reach the open pans. When, however, one sees the condition of disgusting filth in which some of these cow-sheds are, with heaps of manure in close proximity, the surface sewage running close by, the whole ground saturated, no adequate provision for properly scouring the pans, the cow-stables themselves small and poorly lighted and horribly dirty, the cows ill-nourished and dirty, the only food in many instances distillery refuse, one can then appreciate how readily under such circumstances the milk becomes contaminated. There does not appear to be any provision, moreover, by which the Health Office can close a dairy dangerously infected. Thus five members of one family were admitted to my wards; two members of the family had been ill at home; one had died. The people lived in a small two-story house in the 17th ward, with a small cow-stable in the back yard, where eight cows were kept, and everything about in a most insanitary condition. The dairy was removed to a place a few blocks distant, and at the time of my visit was in a condition as disgustingly dirty as it had been in the previous locality. The business was being carried on as usual!

The sanitary area should be much enlarged, and at *irregular* intervals *every dairy* from which milk is supplied to the citizens should be thoroughly inspected, and a report upon its condition and upon that of the animals filed in the Health Office.

Air-borne contagion in typhoid fever is generally recognized, though naturally many of the instances are open to the suspicion of other possible modes of infection. As it has been shown that the typhoid germs will grow upon many of the food-stuffs, it does not seem at all improbable that germs diffused in the dust of the dried excreta, lighting on milk, meat and vegetables, find conditions suitable for their development.

Cold, lifeless things, figures make no more impression on the ordinary mind than would the enumeration of the days of the year; not more also does the statement that at an estimate of an average of six weeks' illness to each case, there have been from 1888 to 1892 (inclusive) 82,512 weeks of lingering illness, about 1600 years. When beneath untouched lintels the destroyer, *æquo pede*, enters our own door, in weeks of suspense, if not in the anguish of loss—needless loss—such as that which has been felt in 1146 families of this city within five years—then only can be realized to the full the bitter penalties attached to the transgression of well-known sanitary laws.

The direct money loss in the community from typhoid fever alone during the past five years may be readily estimated. The loss in wages, the expenditure on attendance upon the sick, and the cost of feeding may be placed at the very low average of ten dollars a week, which would make a total loss of 825,120 dollars for the five years, above 165,000 dollars a year, to say nothing of the yearly loss of 229 lives—lives, too, at the period of greatest value to the State.

Von Ziemssen has calculated that between 1881 and 1888, owing to the extraordinary reduction already referred to in the prevalence of typhoid fever in Munich, there had been a saving to the inhabitants at large of very nearly 3,000,000 of marks; and he states that if the morbidity had persisted during these eight years at the same rate, the loss in wages, cost of feeding and attendance would have reached a total far in excess of the actual cost of the sanitary improvements.

In conclusion it may be stated that the following are the

MEASURES NECESSARY FOR THE PREVENTION OF THE DISEASE.

1. Scrupulous care on the part of physicians in charge of cases, that (*a*) the stools are thoroughly disinfected, and (*b*) that all sources of contamination are prevented from the soiled clothing, etc.; (*c*) active co-operation in notifying the health authorities of the existence of cases.

2. The presence of typhoid fever in a city means bad drainage, or polluted water-supply, or both, and since the morbidity and mortality may be reduced to a minimum by a proper sewage system and an ample supply of pure water, it behooves civilized communities to insist upon these elementary measures of public health. Baltimore

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has no sewage system, and has the unenviable distinction of having the largest number of privy pits of any city on this continent, the major portion of which are, in the words of the last report of the medical officer of health (Dr. McShane), "filthy, unsanitary, threatening and positively dangerous." The experience of other cities warrants the statement that with a thorough system of subsoil drainage the death-rate from typhoid fever could be reduced from its present rate of above 5 per 10,000 living to between one and two. The water sources are unprotected, and an increasing population along the streams, to use again Dr. McShane's words, "augments the danger of pollution."

3. To insure safety there must be a rigid and frequent inspection of dairies and of the households of dairymen. The city may itself be clean and an outbreak of typhoid fever have its source in a polluted dairy many miles distant.

4. In the annexed districts and other sections the surface-wells should be abolished altogether.

Note.—This paper was at the printer's before I received a copy of the *Vital Statistics of the District of Columbia and Baltimore*, by Dr. J. S. Billings. The death-rate from typhoid fever is lower than I have stated, owing to the fact that typho-malarial cases were not included. One gleans, too, the extraordinary information—which tinctures the whole report with doubt—that malaria during the six years covered by the report caused more deaths than typhoid fever. It may, on the contrary, be stated that malaria does not prevail extensively in Baltimore, except at certain seasons and in certain districts, and that the death-rate from it is trifling, not more than from 0.5 to 1 per cent of the cases.

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THE ARMY SURGEON.

BY

WILLIAM OSLER, M.D.,

PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE.

FROM

THE MEDICAL NEWS,

March 24, 1894.

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"THE ARMY SURGEON."

DR. WILLIAM OSLER, Professor of Medicine in the Johns Hopkins University, Baltimore, recently delivered an address at the closing exercises of the Army Medical School, Washington, on "The Army Surgeon," which is well deserving of consideration on account of the professional distinction of Dr. Osler and the freshness and point with which he manages to treat the subject. We can only touch, however, upon a few of the more salient features of his address. After stating that about all subjects there are some questions which are more freely handled by one who is unhampered by too particular knowledge, and alluding to his army medical surroundings at Washington—to the library, museum, index catalogue, at his elbow like a dictionary, and the medical history of the late war—he goes on to describe briefly the opportunities afforded by the life of an army surgeon. There are some things which the wandering medical officer must, of course, forego. Frequent change from station to station has its hardships and disadvantages; but if permanence of residence is undoubtedly good for the pocket, it is not always best for wide mental vision. It is fortunate, perhaps, if service in one place is never long enough to let the roots strike so deeply as to make the process of transplantation too painful. Without local ties, independent of the public, the young army surgeon escapes many of the anxieties which fret the civil practitioner—the pangs of disprized worth, the years of weary waiting, the uncertainty of effort. In change—that heaven of life denied to so many—is to be found a strong corrective to some unpleasant foibles. Self-satisfaction on such slender grounds is sometimes so active in individuals and communities that it is comparable to the delusions of grandeur in the insane. In a nomad life this common infirmity, to the entertainment of which the twin sisters, Use and wont, lend their ever-ready aid, will scarcely prevail. In the history of the profession there are grounds for the statement that isolation promotes originality. In the early years of army service faithfulness in the day of small things will insensibly widen the powers and correct the faculties, and in moments of despondency comfort may be derived from a knowledge that some of the best work has come from men whose clinical field was limited, but well tilled. The value of experience is not in seeing much, but in seeing wisely. Growth in the acquisition of facts is not necessarily associated with development. Many grow through life mentally as a crystal by simple accretion, while the growth which is organic and enduring is totally different and marked by changes of another kind and of an unmistakable character. Alluding to the *clientèle* in which the army surgeon works, it is said to have more stability, a less extended range of variation, than that dealt with in civil life, which adds a value to the studies of army medical officers in their investigations in hygiene, dietetics and medicine. Army surgeons scarcely appreciate that in their work they may follow the natural history of a disease under the most favourable circumstances, the conditions being less disturbing than those which prevail either in family practice or in the routine of a general hospital. Many common disorders may be tracked from inception to close. Dr. Osler, alluding to the pursuit of the sciences cognate to medicine, such as botany, zoology, geology and ethnology, adds that the first duty of the medical officer is nevertheless to medicine as the best way to serve the department, the profession and the public. Setting aside generalities, however, he points to the experiments and observations on the gastric juice and the physiology of digestion by William Beaumont,

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THE ARMY SURGEON.¹

BY WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

GENERAL SCHOFIELD, MR. SURGEON-GENERAL,
PRESIDENT ALDEN, AND PROFESSORS OF THE FACULTY:
At the outset I am sure you will permit me, on behalf of the profession, to offer to the Army Medical Department hearty congratulations on the completion of the arrangements which have made possible this gathering. With capacities strained to the utmost in furnishing to students an ordinary medical education, the schools at large cannot be expected to equip army surgeons with the full details of special training. A glance at the curriculum just completed brings into sharp relief the disabilities under which previous classes must have proceeded to their labors, the members of which have had to pick up at random—in many cases have probably never acquired—the valuable knowledge traversed in the lectures and laboratory exercises of the session. But greatest of all the advantages of an army medical school must be counted the contact of the young officers with their seniors, with the men under whose directions they subsequently have to work. In comparison with their predecessors, with what different feelings and ideas will the men before us enter upon their duties in the various posts to which they have been assigned. Instead of hazy notions—perhaps to one fresh from the Examining Board not pleasant ones—of a central authority at Washington, of a Yama enthroned as Secretary of War, and of an exacting Surgeon-General, the young officer who has enjoyed the delightful opportunities of four months' study amid these inspiring surroundings, which teem with reminders of the glories of the corps and of the greatness of his profession, the young

¹ An address delivered at the closing exercises of the Army Medical School, Washington, D. C., February 28, 1894.

officer, I say, must be indeed a muddy-mettled fellow who does not carry away, not alone rich stores of information, but, most precious of all educational gifts, a true ideal of what his life-work should be.

Members of the Graduating Class: Though to you it may not, to me it seems peculiarly appropriate that the Surgeon-General should have asked a civilian to make an address on this occasion. With the strictly military aspects of your future life you have made yourselves familiar; of the merits and demerits of the army as a career for a physician you have in the past four months heard very much; but about all subjects there are some questions which are more freely handled by one who is unhampered by too particular knowledge, and this is my position, I may say my advantage, to-day. For me the Army Medical Department, so far as particulars are concerned, means a library with unsurpassed facilities, the worth of which is doubled by the liberality of its management; a museum in which I have spent some delightful hours; an index-catalogue, which is at my elbow like a dictionary; and the medical history of the late war, particularly the volumes by Woodward and Smart. Further, I have here and there gleaned in my general reading in the history of the profession of this country facts about the corps and its members. I have read the spirited vindication of John Morgan, who may be called the first Surgeon-General, and I am familiar with the names and works of many of your distinguished predecessors who have left their mark in our literature.

But as I write an aspiration of the past occurs, bringing me, it seems, closer to you than any of the points just mentioned, a recollection of the days when the desire of my life was to enter the India Medical Service, a dream of youth, dim now and almost forgotten—a dream of "Vishnu land, what Avatar!"

Speaking, then, from the vantage ground of my ignorance, let me tell you briefly of the opportunities of the life you have chosen. First among your privileges I shall place a feature often spoken of as a hardship, viz., the frequent change from station to station. Permanence of residence, good undoubtedly for the pocket, is not always best for wide mental vision in the physician. You are modern representatives of a professional age long past, of a day when physicians of distinction had

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no settled homes. You are Cyprid larvæ, unattached, free-swimming, seeing much in many places; not fixed, as we barnacles of civil life, head downward, degenerate descendants of the old professional Cirripeds, who laid under contribution not one, but a score of cities.

Without local ties, independent of the public, in, while not exactly of, our ranks, you will escape many of the anxieties which fret the young physician—the pangs of disprized worth, the years of weary waiting, the uncertainty of the effort; and perhaps those sorer trials inevitable in an art engaging equally heart and head, in which, from the very nature of the occupation, the former is apt—in finer spirits—to be touched with a grievous sensibility. In change, that leaven of life denied to so many, you will find a strong corrective to some of the most unpleasant of the foibles which beset us. Self-satisfaction, a frame of mind widely diffused, is manifest often in greatest intensity where it should be least encouraged, and in individuals and communities is sometimes so active on such slender grounds that the condition is comparable to the delusions of grandeur in the insane. In a nomad life this common infirmity, to the entertainment of which the twin sisters, Use and Wont, lend their ever-ready aid, will scarcely touch you, and for this mercy give thanks; and while you must, as men, entertain many idols of the tribe, you may at least escape this idol of the cave. Enjoying the privilege of wide acquaintance with men of very varied capabilities and training, you can, as spectators of their many crotchets and of their little weaknesses, avoid placing an undue estimate on your own individual powers and position. As Sir Thomas Browne says, it is the “nimble and conceited heads that never looked a degree beyond their nests that tower and plume themselves on light attainments,” but “heads of capacity and such as are not full with a handful or easy measure of knowledge think they know nothing till they know all.”

Per contra, in thus attaining a broader mental platform, you may miss one of the great prizes of the profession—a position in a community reached in length of days by one or two, who, having added to learning, culture, to wisdom, charity, pass the evening of their lives in the hearts of their colleagues and of their kind. No gift of Apollo, not the Surgeon-Generalship, not distin-

gushed position in science, no professorship, however honored, can equal this, this which, as wandering Army Surgeons, you must forego. Fortunate is it for you that the service in one place is never long enough to let the roots strike so deeply as to make the process of transplantation too painful. Myself a peripatetic, I know what it is to bear the scars of partings from comrades and friends, scars which sometimes ache as the memories recur of the days which have flown and of the old familiar faces which have gone.

Another aspect of the life of the Army Surgeon, isolation in some degree from professional colleagues, will influence you in different ways—hurtfully in the more dependent natures, helpfully in those who may have learned that “not from without us, only from within comes, or can ever come, upon us light”—and to such the early years of separation from medical societies and gatherings will prove a useful seed-time for habits of study, and for the cultivation of the self-reliance that forms so important an element in the outfit of the physician. And, after all, the isolation is neither so enduring nor so corroding as might have fallen to your lot in the routine of country practice. In it may be retained, too, some measure of individuality, lost with astonishing rapidity in the city mills that rub our angles down and soon stamp us all alike. In the history of the profession there are grounds for the statement that isolation promotes originality. Some of the most brilliant work has been done by men in extremely limited spheres of action, and during the past hundred years it is surprising how many of the notable achievements have been made by physicians dwelling far from educational centres—Jenner worked out his discovery in a village; McDowell, Long, and Sims were country doctors; Koch was a district physician.

So much depends upon the sort of start that a man makes in his profession that I cannot refrain from again congratulating you on the opportunities enjoyed during the past four months, which have not only added enormously to your capabilities for work, but have familiarized you with life at the heart of the organization of which hereafter you will form part, and doubtless have given you fruitful ideas on the possibilities of your individual development. Naturally each one of you will

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desire to make the best use of his talents and education, and let me sketch briefly what I think should be your plan of action.

Throw away, in the first place, all ambition beyond that of doing the day's work well. The travellers on the road to success live in the present, heedless of, taking thought for, the morrow, having been able at some time, and in some form or other, to receive into their heart of hearts this maxim of the Sage of Chelsea: Your business is "not to see what lies dimly at a distance, but to do what lies clearly at hand." Fevered haste is not encouraged in military circles, and if you can adapt your intellectual progress to army rules, making each step in your mental promotion the lawful successor of some other, you will acquire little by little those staying powers without which no man is of much value in the ranks. Your opportunities for study will cover at first a wide field in medicine and surgery, and this diffuseness in your work may be your salvation. In the next five or ten years note with accuracy and care everything that comes within your professional ken. There are, in truth, no specialties in medicine, since to know fully many of the most important diseases a man must be familiar with their manifestations in many organs. Let nothing slip by you; the ordinary humdrum cases of the morning routine may have been accurately described and pictured, but study each one separately as though it were new—so it is so far as your special experience goes; and if the spirit of the student is in you the lesson will be there. Look at the cases not from the standpoint of text-books and monographs, but as so many stepping-stones in the progress of your individual development in the art. This will save you from the pitiable mental attitude of the men who travel the road of practice from Dan to Beersheba, and at every step cry out upon its desolation, its dreariness, and its monotony. With Laurence Sterne, we can afford to pity such, since they know not that the barrenness of which they complain is within themselves, a result of a lack of appreciation of the meaning and method of work.

In the early years of service your advantages will be fully as great as if you had remained in civil life. Faithfulness in the day of small things will insensibly widen your powers, correct your faculties, and in moments of

despondency comfort may be derived from a knowledge that some of the best work of the profession has come from men whose clinical field was limited but well-tilled. The important thing is to make the lesson of each case tell on your education. The value of experience is not in seeing much, but in seeing wisely. Experience in the true sense of the term does not come to all with years, or with increasing opportunities. Growth in the acquisition of facts is not necessarily associated with development. Many grow through life mentally as the crystal, by simple accretion, and at fifty possess, to vary the figure, the unicellular mental blastoderm with which they started. The growth which is organic and enduring, is totally different, marked by changes of an unmistakable character. The observations are made with accuracy and care, no pains are spared, nothing is thought a trouble in the investigation of a problem. The facts are looked at in connection with similar ones, their relation to others is studied, and the experience of the recorder is compared with that of others who have worked upon the question. Insensibly, year by year, a man finds that there has been in his mental protoplasm not only growth by assimilation but an actual development, bringing fuller powers of observation, additional capabilities of nutrition, and that increased breadth of view which is of the very essence of wisdom.

As clinical observers, we study the experiments which Nature makes upon our fellow-creatures. These experiments, however, in striking contrast to those of the laboratory, lack exactness, possessing as they do a variability at once a despair and a delight—the despair of those who look for nothing but fixed laws in an art which is still deep in the sloughs of Empiricism; the delight of those who find in it an expression of a universal law transcending, even scorning, the petty accuracy of test-tube and balance, the law that in man "the measure of all things," mutability, variability, mobility, are the very marrow of his being. The *clivelle* in which you work has, however, more stability, a less extended range of variation than that with which we deal in civil life. In a body of carefully selected active young men, you have a material for study in which the oscillations are less striking, and in which the results of the experiments, *i. e.*, the diseases, have a greater uniformity than in infancy

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and old age, in the enfeebled and debauched. This adds a value to the studies of army medical officers, who often have made investigations in hygiene, dietetics, and medicine, so trustworthy and thorough that they serve us as a standard of comparison, as a sort of *abscissa* or base-line. Thus you have demonstrated to us, and to the community at large, the possibilities of stamping out smallpox by systematic revaccination; in civil practice we strive to reach the low rate of mortality of army hospitals in the treatment of typhoid fever and of pneumonia. Many of the most important facts relating to etiology and symptomatology have come from camp or barrack. I often think that army surgeons scarcely appreciate that in their work they may follow the natural history of a disease under the most favorable circumstances; the experiments are more ideal, the conditions less disturbing than those which prevail either in family practice or in the routine of the general hospital. Many of the common disorders can be tracked from inception to close, as can be done in no other line of medical work, and the facilities for the continuous study of certain affections are unequalled. This, which is a point to be appreciated in the intrinsic education of which I spoke, gives you a decided advantage over your less favored brethren.

Your extraordinary range of observation, from the Florida Keys to Montana, from Maine to Southern California, affords unequalled facilities for the study of many of the vexed problems in medicine—facilities, indeed, which in the diversity of morbid conditions to be studied are equalled in no position in civil life. Let me here mention a few of the subjects that may profitably engage your attention. No question is of more importance at present than the settlement, definitely, of the varieties of fever in the West and South. The studies of Baumgarten in St. Louis, and of Guitéras and others in the Southern States, suggest the possibility that in addition to typhoid fever and malaria—the common affections—there are other fevers the symptomatology and morbid anatomy of which still require careful elucidation. In this you will be walking in the footsteps of notable predecessors in the corps, and in the exhaustive works of Woodward and Smart, to which I have already alluded, and which are always available, you will find a basis from which you may start your personal observa-

tions. More particularly in this direction do we need careful anatomical investigation, since the symptomatology of certain of the affections in question has much in common with that of the ordinary continued fevers of the North. I may call your attention to the satisfactory settlement of the nature of mountain fever by army surgeons, and need hardly add that the specimens contributed by Hoff and by Girard to this museum demonstrate conclusively that it is in reality typhoid fever.

In the Southern posts malaria with its protean manifestations presents still many interesting problems for solution, and you will leave this school better equipped than any of your predecessors for the study and differentiation of its less known varieties. With positive knowledge as to the etiology, and a practical familiarity with methods of blood-examination, you can do much in many localities to give to malaria a more definite position than it at present occupies in the profession, and can offer in doubtful cases the positive and satisfactory test of the microscope. The hematuria of the South requires to be studied anew—the filarial cases separated from the malarial, and, most important of all, the relation of quinine to hematuria positively settled.

In the more distant posts, where, so far as the soldier is concerned, your opportunities for study may be limited, you may add greatly to our knowledge of the disorders prevalent among the Indians. More particularly do we need additional information as to the frequency of tuberculosis among them, and its clinical history. One of your number, Dr. Edwards, has already furnished admirable statistics upon this point, but the field is still open and much remains to be done. In this connection, too, you may be able to carry saving knowledge upon the etiology of the disease, and enforce regulations for its prevention. You have only to turn to the Index-catalogue to see how scanty in reality are the facts in the nosology of the North American Indian.

At many posts there will be presented to you the interesting effects of altitude, with problems of the greatest physiological importance. An excellent piece of work may be done upon its influence upon the red blood-corpuscles, in determining whether, as has been maintained, there is an increase numerically per cubic millimetre, so long as the individual remains in the more

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rarefied atmosphere. Points remain to be settled also upon the effects of altitude upon the chest-capacity, the chest-measurement, and the heart, and our knowledge is still lacking on questions relating to the influence of high altitudes upon many of the ordinary diseases.

To one of you, perhaps, another peculiarly American disease—milk-sickness—may reveal its secret. Our knowledge of its etiology has not been materially increased since the early papers on the subject, which so well described its symptomatology.

These are but a few of the questions suggesting themselves to my mind, to which, as chance affords, you could direct your attention. In a ten or fifteen years' service, travelling with seeing eyes and hearing ears, and carefully-kept note-books, just think what a store-house of clinical material may be at the command of any one of you—material not only valuable in itself to the profession, but of infinite value to you personally in its acquisition, rendering you painstaking and accurate, and giving you, year by year, an increasing experience of the sort to which I have already more than once referred.

In what I have said hitherto I have dwelt chiefly on your personal development, and on the direction in which your activities might be engaged, but while you are thus laying the foundation of an education in all that relates to the technical side of the profession, there are other duties which call for a word or two. In the communities to which you may be sent do not forget that, though army officers, you owe allegiance to an honorable profession, to the members of which you are linked by ties of a most binding character. In situations in which the advantages of a more critical training give you a measure of superiority over your confrères in civil life, let it not be apparent in your demeanor, but so order yourselves that in all things you may appear to receive, not to grant favors. There are regions, *in partibus infidelium*, to which you will go as missionaries, carrying the gospel of loyalty to truth in the science and in the art of medicine, and your lives of devotion may prove to many a stimulating example. You cannot afford to stand aloof from your professional colleagues in any place. Join their associations, mingle in their meetings, giving of the best of your talents, gathering here, scattering there; but

everywhere showing that you are at all times faithful students, as willing to teach as to be taught. Shun as most pernicious that frame of mind, too often, I fear, seen in physicians, which assumes an air of superiority, and limits as worthy of your communion only those with satisfactory collegiate or sartorial credentials. The passports to your fellowship should be honesty of purpose and a devotion to the highest interests of our profession, and these you will find widely diffused, sometimes apparent only when you get beneath the crust of a rough exterior.

If I have laid stress upon the more strictly professional aspects of your career it has been with a purpose. I believe the arrangements in the department are such that, with habits of ordinary diligence, each one of you may attain not only a high grade of personal development, but may become an important contributor in the advancement of our art. I have said nothing of the pursuit of the sciences cognate to medicine, of botany, zoölogy, geology, ethnology, and archeology. In every one of these, so fascinating in themselves, it is true that army medical officers have risen to distinction, but I claim that your first duty is to medicine, which should have your best services and your loyal devotion. Not, too, in the perfunctory discharge of the daily routine, but in zealous endeavor to keep pace with, and to aid in, the progress of knowledge. In this way you will best serve the department, the profession, and the public.

Generalities, of the kind in which I have been indulging, though appropriate to the occasion, are close kin, I fear, to the fancies fond, that vanish like the gay motes which float for a moment in the sunbeams of our mind. But I would fain leave with you, in closing, something of a more enduring kind—a picture that for me has always had a singular attraction, the picture of a man who, amid circumstances the most unfavorable, saw his opportunity and was quick to "grasp the skirts of happy chance." Far away in the northern wilds, where the waters of Lake Michigan and Lake Huron unite, stands the fort of Michilimackinac, rich in the memories of Indian and *voyageur*, one of the four important posts in the upper lakes in the days when the Rose and the Fleur-de-lys strove for the mastery of the Western world. Here was the scene of Marquette's mission, and here

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beneath the chapel of St. Ignace they laid his bones to rest. Here the intrepid La Salle, the brave Tonty, and the resolute Du Luht had halted in their wild wanderings. Its palisades and bastions had echoed the war-whoops of Ojibwas and Ottawas, of Hurons and Iroquois, and had been the scene of bloody massacres and of hard-fought fights. At the conclusion of the war of 1812, after two centuries of struggle, peace settled at last upon the old fort, and early in her reign celebrated one of the most famous of her minor victories, one which carried the high-sounding name of Michilimackinac far and wide, and into circles where Marquette, Du Luht, and La Salle were unknown. Here, in 1820, was assigned to duty at the fort, which had been continued in use to keep the Indians in check, Surgeon William Beaumont, then a young man in the prime of life. On the 22d of June, 1822, the accidental discharge of a musket made St. Martin, a *voyageur*, one of the most famous subjects in the history of physiology, for the wound laid open his stomach, and he recovered with a permanent gastric fistula of an exceptionally favorable kind. Beaumont was not slow to see the extraordinary possibilities that were before him. Early in the second decade of the century the process of gastric digestion was believed to be due to direct mechanical maceration or to the action of a vital principle, and though the idea of a solvent juice had long been entertained, the whole question was *sub judice*. The series of studies made by Beaumont on St. Martin settled forever the existence of a solvent fluid capable of acting on food outside as well as within the body, and in addition enriched our knowledge of the processes of digestion by new observations on the movements of the stomach, the temperature of the interior of the body, and the digestibility of the various articles of food. The results of his work were published in 1833, in an octavo volume of less than 300 pages.¹ In looking through it one cannot but recognize that it is the source of a very large part of the current statements about digestion; but apart altogether from the value of the facts, there are qualities about the work which make it a model

¹ "Experiments and Observations on the Gastric Juice and the Physiology of Digestion," by William Beaumont, M.D., Surgeon in the United States Army. Plattsburg, 1833.

of its kind, and on every page is revealed the character of the man. From the first experiment, dated August 1, 1825, to the last, dated November 1, 1833, the observations are made with accuracy and care, and noted in plain, terse language. A remarkable feature was the persistence with which for eight years Beaumont pursued the subject, except during two intervals when St. Martin escaped to his relatives in Lower Canada. On one occasion Beaumont brought him a distance of two thousand miles to Fort Crawford, on the upper Mississippi, where, in 1829, the second series of experiments was made. The third series was conducted in Washington, in 1832; and the fourth at Plattsburg, in 1833. The determination to sift the question thoroughly, to keep at it persistently until the truth was reached, is shown in every one of the 238 experiments which he has recorded.

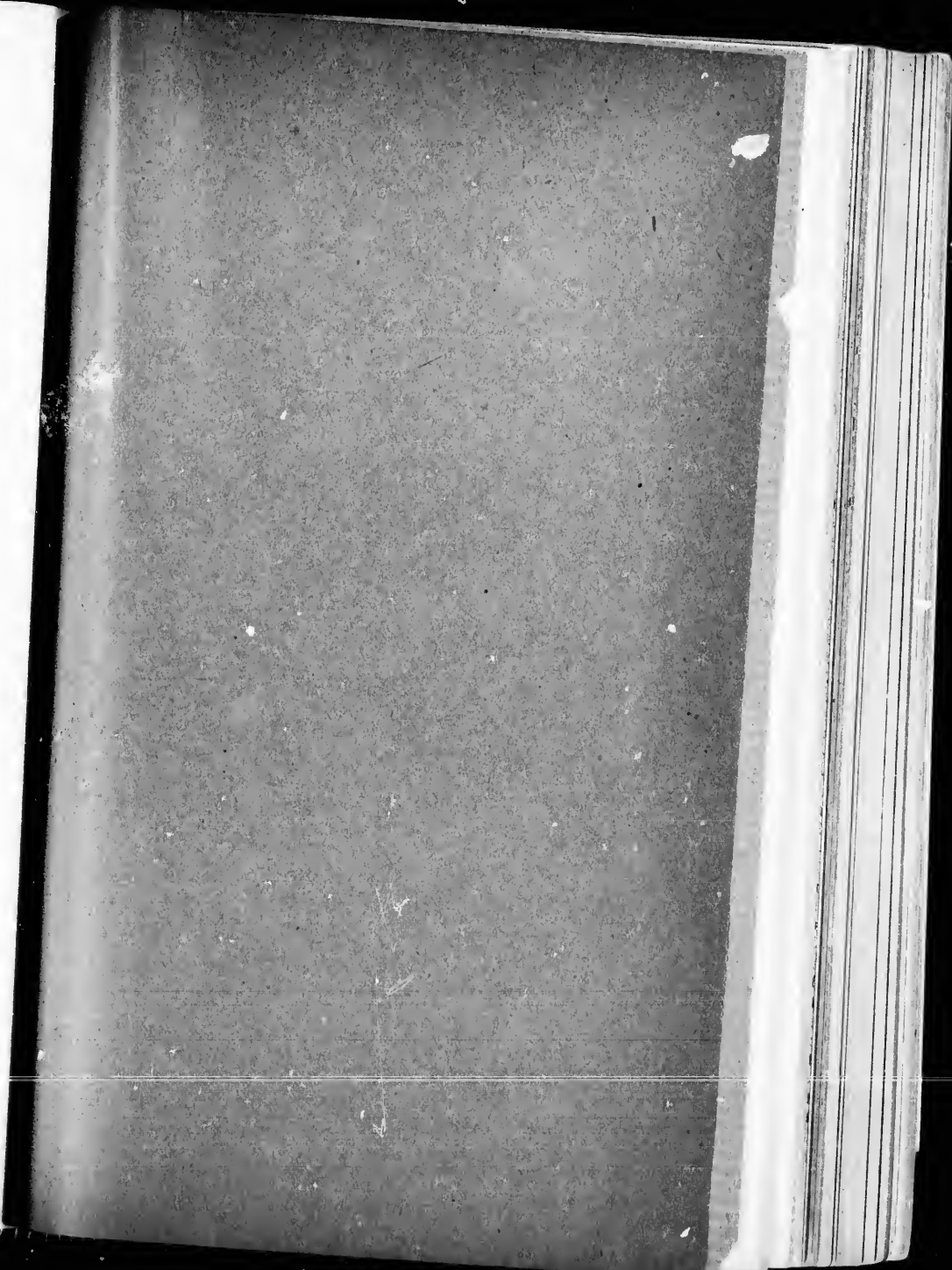
The opportunity presented itself, the observer had the necessary mental equipment and the needed store of endurance to carry to a successful termination a long and laborious research. William Beaumont is indeed a bright example in the annals of the Army Medical Department, and there is no name on its roll more deserving to live in the memory of the profession of this country.

And in closing let me express the wish that each one of you, in all your works begun, continued, and ended, may be able to say with him: "Truth, like beauty, 'when unadorned is adorned the most,' and in prosecuting experiments and inquiries I believe I have been guided by its light."

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THE
LEAVEN OF SCIENCE.

AN ADDRESS DELIVERED AT THE OPENING OF THE WISTAR INSTITUTE OF ANATOMY
AND BIOLOGY OF THE UNIVERSITY OF PENNSYLVANIA, MAY 21, 1894.

BY

WILLIAM OSLER, M.D., F.R.C.P. (LOND.),
Professor of Medicine in the Johns Hopkins University.

Reprinted from
University Medical Magazine,
June, 1894.



Mr. J. W. ...

Mr. J. W. ... requests
the pleasure of Dr. Wm. Osler
company on Saturday evening April 5th 1905
at nine o'clock, at 15th Street Ch.

The time of the ... is requested

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Dear Mr. [unclear]

San Francisco Calif
Dec 27 1894

Prof. Wm. C. Coker M. D.

Dear Doctor

Thanks for
your two addresses. Edwin
Muddell Holmes and The
Learn of Science; I have
read them with unusual
pleasure.

Pliny in Panegyricus
Trajanus dicitur dicit: Ar-
tus enim et Statuas, aras
dianum templaque demolitur
et obscurat oblivio, ne-
gligit carpitque posteritas:
your eulogy of Shippen, Wis-
tar and ride a man ex-
ception to what prevails at
much in our times as in
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you've hasten to bury and
forget the dead. Fortunately
one occasionally hears words
such as yours which are a
rebuke to such a spirit;
and in such words, to still
quote from Pliny, *Scintilla*
honores in quos nihil flammis,
nihil senectuti nihil
successibus licet: vera
gloria sempiterna est.

Again thanking you
for your remembrance
I remain very truly
Yours

W. B. Eames

2400 Spruce, Feb 13, 1894.

Dear Doctor Curtis,

I have just received your
kind letter of the 11th. I
am glad to say you were
successful in your
effort, and I am glad to
know that you were
able to get a
number of
students
to
attend
your
course.

I am looking back over my
life and think that the best
teachers were those who were
successful in raising students
out of the pit of short-sighted
materialism, and helping them to stand
upon high hills that commanded

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a survey not only of the present but of
the past & the probable future. I wish
looking to the present to endeavor to
present a fair & open view of the profession
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view of the medicine of the day as the
state of the past & the future of that
which shall be hereafter, but I do not
know that such is the object of
your own thoughts.

Yours very sincerely,
Wm. H. Hall

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Wm. H. Hall, M. D., &c.

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To-day, thro
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THE LEAVEN OF SCIENCE.

MR. PROVOST, LADIES, AND GENTLEMEN: In the continual remembrance of a glorious past individuals and nations find their noblest inspiration, and if to-day this inspiration, so valuable for its own sake, so important in its associations, is weakened, is it not because in the strong dominance of the individual, so characteristic of a democracy, we have lost the sense of continuity? As we read in Roman history of the ceremonies commemorative of the departed, and of the scrupulous care with which, even at such private festivals as the Ambarvalia, the dead were invoked and remembered, we appreciate, though feebly, the part which this sense of continuity played in the lives of their successors,—an ennobling, engentling influence, through which the cold routine of the present received a glow of energy from 'the touch divine of noble natures gone.' In our modern lives no equivalent to this feeling exists, and the sweet and gracious sense of an ever-present immortality, recognized so keenly and so closely in the religion of Numa, has lost all value to us. We are even impatient of those who would recall the past, and who would insist upon the importance of its recognition as a factor in our lives, impatient as we are of everything save the present with its prospects, the future with its possibilities. Year by year the memory of the men who made this institution fades from out the circle of the hills, and the veil of oblivion falls deeper and deeper over their forms, until a portrait, or perhaps a name alone, remains to link the dead with the quick. To be forgotten seems inevitable, but not without a sense of melancholy do we recognize the fact that the daily life of three thousand students and teachers is passed heedless of the fame, careless of the renown of these men: and in the second state sublime it must sadden the 'circle of the wise,' as they cast their eyes below, to look down on festivals in which they play no part, on gatherings in which their names are neither invoked nor blessed. But ours the loss, since to us, distant in humanity, the need is ever present to cherish the memories of the men who in days of trial and hardship laid on broad lines the foundations of the old colonial colleges.

To-day, through the liberality of General Wistar, we dedicate a fitting monument to one of the mighty dead of the University,—Caspar

Wistar. The tribute of deeds has already been paid, to him in this splendid structure, to all in the stately group of academic buildings which you now see adorning the campus,—the tribute of words remains to be able to offer which I regard a very special honor.

But as this is an Institute of Anatomy, our tribute to day may be justly restricted, in its details at least, to a eulogy upon the men who have taught the subject in this University. About the professorship of anatomy cluster memories which give to it precedence of all others, and in the septemviri of the old school the chairs were arranged, with that of anatomy in the centre, with those of physiology, chemistry, and materia medica on the left, while those of practice, surgery, and obstetrics were placed on the right. With the revival of learning anatomy brought life and liberty to the healing art, and throughout the sixteenth, seventeenth, and eighteenth centuries the great names of the profession, with but one or two exceptions, are those of the great anatomists. The University of Pennsylvania has had an extraordinary experience in the occupancy of this important chair. In the century and a quarter which ended with the death of Leidy, six names appear on the faculty roll as professors of this branch. Dorsey, however, only delivered the introductory lecture to the course, and was seized the same evening with his fatal illness; and in the next year Physick was transferred from the chair of surgery, with Horner as his adjunct. In reality, therefore, only four men have taught anatomy in this school since its foundation. Physick's name must ever be associated with the chair of surgery. We do not know the faculty exigencies which led to the transfer, but we can readily surmise that the youthfulness of Horner, who was only twenty-six, and the opportunity of fleeing for surgery so strong a man as Gibson from the Faculty of the University of Maryland, then a stout rival, must have been among the most weighty considerations.

If in the average length of the period of each incumbency the chair of anatomy in the University is remarkable, much more so is it for the quality of the men who followed each other at such long intervals. It is easy to praise the Athenians among the Athenians, but where is the school in this country which can show such a succession of names in this branch: Shippen, the first teacher of anatomy; Wistar, the author of the first text-book of anatomy; Horner, the first contributor to human anatomy in this country; and Leidy, one of the greatest comparative anatomists of his generation? Of European schools, Edinburgh alone presents a parallel picture, as during the same period only four men have held the chair. The longevity and tenacity of the three Mouros have become proverbial; in succession they held the chair of anatomy for 126 years. Shortly before the

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foundation of this school *Monro secundus* had succeeded his father, and taught uninterruptedly for fifty years. His son, *Monro tertius*, held the chair for nearly the same length of time, and the remainder of the period has been covered by the occupancy of John Goodsir, and his successor, Sir William Turner, the present incumbent.

To one feature in the history of anatomy in this school I must refer in passing. Shippen was a warm personal friend and house-pupil of John Hunter. Physick not only had the same advantages, but became in addition his house-surgeon at St. George's Hospital. Both had enjoyed the intimate companionship of the most remarkable observer of nature since Aristotle, of a man with wider and more scientific conceptions and sympathies than had ever before been united in a member of our profession, and whose fundamental notions of disease are only now becoming prevalent. Can we doubt that from this source was derived the powerful inspiration which sustained these young men. One of them, on his return from England, at once began the first anatomical classes which were held in the colonies; the other entered upon that career so notable and so honorable, which led to the just title of the Father of American Surgery. It is pleasant to think that direct from John Hunter came the influence which made anatomy so strong in this school, and that zeal in the acquisition of specimens which ultimately led to the splendid collections of the Wistar-Horner Museum.

WILLIAM SHIPPEN shares with John Morgan the honor of establishing medical instruction in this city. When students in England they had discussed plans, but it was Morgan who seems to have had the ear of the trustees, and who broached a definite scheme in his celebrated "Discourse," delivered in May, 1765. It was not until the autumn of the year that Shippen signified to the board his willingness to accept a professorship of anatomy and surgery. He had enjoyed, as I have mentioned, the friendship of John Hunter, and had studied also with his celebrated brother, William. Associated with him as fellow-pupil was William Hewson, who subsequently became so famous as an anatomist and physiologist, and as the discoverer of the leucocytes of the blood, and whose descendants have been so prominent in the profession of this city. No wonder, then, with such an education, that the younger Shippen, on his return in 1762, in his twenty-sixth year, should have begun a course of lectures in anatomy, the introductory to which was delivered in the State House on November 16th. To him belongs the great merit of having made a beginning, and of having brought from the Hunters methods and traditions which long held sway in this school. Wistar in his eulogium pays a warm tribute to his skill as a lecturer and as a demonstrator, and to the faithfulness with which he taught the subject for more than forty years. Apart

from his connection with this institution he served as Director-General of the Military Hospitals from 1777 to 1781, and was the second president of the College of Physicians.

In the history of the profession of this country CASPAR WISTAR holds an unique position. He is its Avicenna, its Mead, its Fothergill, the very embodiment of the physician who, to paraphrase the words of Armstrong, used by Wistar in his Edinburgh Graduation Thesis, "Sought the cheerful haunts of men, and mingled with the bustling crowd." He taught anatomy in this school as adjunct and professor for twenty-six years. From the records of his contemporaries we learn that he was a brilliant teacher, "the idol of his class," as one of his eulogists says. As an anatomist he will be remembered as the author of the first American Text-Book on Anatomy, a work which was exceedingly popular, and ran through several editions. His interest in the subject was not, however, of the 'knife and fork' kind, for he was an early student of mammalian palaeontology, in the development of which one of his successors was to be a chief promotor. But Wistar's claim to remembrance rests less upon his writings than upon the impress which remains to this day of his methods of teaching anatomy. Speaking of these, Horner, who was his adjunct and intimate associate, in a letter dated February 1st, 1818, says, "In reviewing the several particulars of his course of instruction, it is difficult to say in what part his chief merit consisted; he undertook everything with so much zeal, and such a conscientious desire to benefit those who came to be instructed by him, that he seldom failed of giving the most complete satisfaction. There were, however, some parts of his course peculiar to himself. These were the addition of models on a very large scale to illustrate small parts of the human structure; and the division of the general class into a number of sub-classes, each of which he supplied with a box of bones, in order that they might become thoroughly acquainted with the human skeleton, a subject which is acknowledged by all to be at the very foundation of anatomical knowledge. The idea of the former mode of instruction was acted on for the first time about fifteen years ago." We have no knowledge of a collection of specimens by Shippen, though it is hard to believe that he could have dwelt in John Hunter's house and remained free from the insatiable hunger for specimens which characterized his master. But the establishment of a museum as an important adjunct to the medical school was due to Wistar, whose collections formed the nucleus of the splendid array which you will inspect to-day. The trustees, in accepting the gift on the death of Dr. Wistar, agreed that it should be styled the Wistar Museum, and now, after the lapse of seventy-six years, the collection has found an appropriate home in an Institute of Anatomy which bears his honored name.

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But Wistar has established a wider claim to remembrance. Genial and hospitable, he reigned supreme in society by virtue of exceptional qualities of heart and head, and became, in the language of Charles Caldwell, "the *sensorium commune* of a large circle of friends." About no other name in our ranks cluster such memories of good fellowship and good cheer, and it stands to-day in this city a synonym for *esprit* and social intercourse. Year by year his face, printed on the invitations to the "Wistar Parties" (still an important function of winter life in Philadelphia) perpetuates the message of his life, "Go seek the cheerful haunts of men."

How different was the young prosector and adjunct who next taught the subject! HORNER was naturally reserved and diffident, and throughout his life those obstinate questionings which in doubt and suffering have so often wrung the heart of man were ever present. Fightings within and fears without harassed his gentle and sensitive soul, on which mortality weighed heavily, and to which the four last things were more real than the materials in which he worked. He has left us a *journal intime*, in which he found, as did Amiel, of whom he was a sort of medical prototype, "a safe shelter wherein his questionings of fate and the future, the voice of grief, of self-examination and confession, the soul's cry for inward peace, might make themselves freely heard." Listen to him: "I have risen early in the morning, ere yet the watchman had cried the last hour of his vigil, and in undisturbed solitude giving my whole heart and understanding to my Maker, prayed fervently that I might be enlightened on this momentous subject, that I might be freed from the errors of an excited imagination, from the allurements of personal friendship, from the prejudices of education, and that I might, under the influence of Divine grace, be permitted to settle this question in its true merits." How familiar is the cry, the great and exceeding bitter cry of the strong soul in the toils and doubtful of the victory! Horner, however, was one of those on whom both blessings rested. Facing the spectres of the mind, he laid them, and reached the desired haven. In spite of feeble bodily health and fits of depression, he carried on his anatomical studies with zeal, and as an original worker and author brought much reputation to the University. Particularly did he enrich the museum with many valuable preparations, and his name will ever be associated with that of Wistar in the anatomical collection which bears their names.

But what shall I say of LEBBY? the man in whom the leaven of science wrought with labor and travail for so many years. The written record survives, and such a record! scarcely equalled in variety and extent by any naturalist, but how meagre is the picture of the man as known to his friends. The traits which made his life of such value—

the patient spirit, the kindly disposition, the sustained zeal—we shall not see again incarnate. The memory of them alone remains. As the echoes of the eulogies upon his life have scarcely died away, I need not recount to this audience his ways and work, but upon one aspect of his character I may dwell for a moment, as illustrating an influence of science which has attracted much attention and aroused discussion. So far as the facts of sense were concerned, there was not a trace of Pyrrhonism in his composition, but in all that relates to the ultra-rational no more consistent disciple of the great sceptic ever lived. There was in him, too, that delightful *ἀταραξία*, that imperturbability which is the distinguishing feature of the Pyrrhonist, in the truest sense of the word. A striking parallel exists between Leidy and Darwin in this respect, and it is an interesting fact that the two men of this century who have lived in closest intercourse with nature should have found full satisfaction in their studies and in their domestic affections. In the autobiographical section of the life of Charles Darwin, edited by his son Francis, in which are laid bare with such charming frankness the inner thoughts of the great naturalist, we find that he, too, had reached in supra-sensuous affairs that state of mental imperturbability in which, to borrow the quaint expression of Sir Thomas Browne, they stretched not his *pia mater*. But while acknowledging that in science scepticism is advisable, Darwin says that he was not himself very sceptical. Of these two men, alike in this point, and with minds distinctly of the Aristotelian type, Darwin yet retained amid an overwhelming accumulation of facts—and here was his great superiority—an extraordinary power of generalizing principles from them. Deficient as was this quality in Leidy, it was not associated in him with “the curious and lamentable loss of the higher æsthetic taste” which Darwin mourns, and which may have been due in part to protracted ill health, and to an absolute necessity of devoting all his capabilities to collecting facts in support of his great theory.

When I think of Leidy's simple life, of his devotion to the study of nature, of the closeness of his communion with her for so many years, there recur to my mind time and again the lines,—

“He is made one with nature; there is heard
His voice in all her music, from moan *the*
Of thunder to the song of night's sweet bird;
He is a presence to be felt and known
In darkness and in light, from herb and stone,
Spreading itself where'er that Power may move
Which has withdrawn his being to its own.”

Turning from the men to the subject in which they worked, from the past to the present, let us take a hasty glance at some of the devel-

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opments of human anatomy and biology. Truth has been well called the daughter of Time, and even in anatomy, which is a science in a state of fact, the point of view changes with successive generations. The following story, told by Sir Robert Christison, of Barclay, one of the leading anatomists of the early part of this century, illustrates the old attitude of mind still met with among 'bread and butter' teachers of the subject. Barclay spoke to his class as follows: "Gentlemen, while carrying on your work in the dissecting-room, beware of making anatomical discoveries; and above all beware of rushing with them into print. Our precursors have left us little to discover. You may, perhaps, fall in with a supernumerary muscle or tendon, a slight deviation or extra branchlet of an artery, or, perhaps, a minute stray twig of a nerve,—that will be all. But beware! Publish the fact, and ten chances to one you will have it shown that you have been forestalled long ago. Anatomy may be likened to a harvest-field. First come the reapers, who, entering upon untrodden ground, cut down great store of corn from all sides of them. These are the early anatomists of modern Europe, such as Vesalius, Fallopius, Malpighi, and Harvey. Then come the gleaners, who gather up ears enough from the bare ridges to make a few loaves of bread. Such were the anatomists of last century,—Valsalva, Cotunnus, Haller, Winslow, Vicq d'Azyr, Camper, Hunter, and the two Monros. Last of all come the geese, who still contrive to pick up a few grains scattered here and there among the stubble, and waddle home in the evening, poor things, cackling with joy because of their success. Gentlemen, we are the geese." Yes, geese they were, gleaning amid the stubble of a restricted field, when the broad acres of biology were open before them. Those were the days when anatomy meant a knowledge of the human frame alone; and yet the way had been opened to the larger view by the work of John Hunter, whose comprehensive mind grasped as proper subjects of study for the anatomist all the manifestations of life in order and disorder.

The determination of structure with a view to the discovery of function has been the foundation of progress. The meaning may not always have been for "him who runs to read;" often, indeed, it has been at the time far from clear; and yet a knowledge in full detail of the form and relations must precede a correct physiology. The extraordinary development of all the physical sciences, and the corresponding refinement of means of research, have contributed most largely to the enlightenment of the 'geese' of Barclay's witticism. Take the progress in any one department which has a practical aspect, such as, in the anatomy and physiology of the nervous system. Read, for example, in the third edition of Wistar's "Anatomy," edited by Hor-

ner in 1825, the description of the convolutions of the brain, on which to-day a whole army of special students are at work, medical, surgical, and anthropological, and the functions of which are the objective point of physiological and psychological research, — the whole subject is thus disposed of: "The surface of the brain resembles that of the mass of the small intestine, or of a convoluted, cylindrical tube; it is, therefore, said to be convoluted. The fissures between these convolutions do not extend very deep into the substance of the brain." The knowledge of function correlated with this meagre picture of structure is best expressed, perhaps, in Shakespearian diction, "that when the brains were out, the man would die." The laborious, careful establishment of structure by the first two generations in this century led to those brilliant discoveries in the functions of the nervous system which have not only revolutionized medicine, but have given to psychologists almost enough of metaphysics to enable them to dispense with metaphysics altogether. It is particularly interesting to note the widespread dependence of many departments on accurate anatomical knowledge. The new cerebral anatomy, particularly the study of the surface of the brain, so summarily dismissed in a few lines by Wistar, made plain the path for Hitzig and Fritsch, the careful dissection of cases of disease of the brain prepared the way for Hughlings Jackson; and gradually a new phrenology on a scientific basis has replaced the crude notions of Gall and Spurzheim; so that with the present generation, little by little, there has been established, on a solid structure of anatomy, the localization of many of the functions of the brain. Excite with a rough touch, from within or from without, a small region of that mysterious surface, and my lips may move, but not in the articulate expression of thought, and I may see, but I cannot read the page before me; touch here and sight is gone, and there again and hearing fails. One by one the centres may be touched which preside over the muscles, and they may, singly or together, lose their power. All these functions may go without the loss of consciousness. Touch with the slow finger of Time the nutrition of that thin layer, and backward by slow degrees creep the intellectual faculties, back to childish simplicity, back to infantile silliness, back to the oblivion of the womb.

To this new cerebral physiology, which has thus gradually developed with increasing knowledge of structure, the study of cases of disease has contributed enormously, and to day the diagnosis of affections of the nervous system has reached an astonishing degree of accuracy. The interdependence and sequence of knowledge in various branches of science is nowhere better shown than in this very subject. The facts obtained by precise anatomical investigation, from experiments on animals in the laboratory, from the study of nature's experi-

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ments upon us in disease, slowly and painfully acquired by many minds in many lands, have brought order out of the chaos of fifty years ago. In a practical age this vast change has wrought a corresponding alteration in our ideas of what may or may not be done in the condition of perverted health which we call disease, and we not only know better what to do, but also what to leave undone. The localization of centres in the surface of the brain has rendered it possible to make, with a considerable degree of certainty, the diagnosis of focal disease, and MacEwen and Horsley have supplemented the new cerebral physiology and pathology by a new cerebro-spinal surgery, the achievements of which are scarcely credible.

But this is not all; in addition to the determination of the centres of sight, hearing, speech, and motor activities, we are gradually reaching a knowledge of the physical basis of mental phenomena. The correlation of intelligence and brain weight, of mental endowment and increased convolution of the brain surface, was recognized even by the *gleaners* of Barclay's story; but within the past twenty-five years the minute anatomy of the organ has been subjected to extensive study by methods of ever-increasing delicacy, which have laid bare its complex mechanism. The pyramidal cells of the cerebral gray matter constitute the anatomical basis of thought, and with the development, association, and complex connection of these psychical cells, as they have been termed, the psychical functions are correlated. How far these mechanical conceptions have been carried, may be gathered from the recent Croonian Lecture before the Royal Society, in which Ramón y Cajal based the action and the degree, and the development of intelligence upon the complexity of the cell mechanism and its associations. Even the physical basis of moody madness has not evaded demonstration. Researches upon the finer structure of the cerebral cortex lead to the conclusion that imbecility, mental derangement, and the various forms of insanity are but symptoms of diseased conditions of the pyramidal cells, and not separate affections of an indefinable entity, the mind. Still further; there is a school of anthropologists which strives to associate moral derangement with physical abnormalities, particularly of the brain, and urges a belief in a criminal psychosis, in which "men are villains by necessity, fools by heavenly compulsion, knaves, thieves, and treachers by spherical predominance." This remarkable revolution in our knowledge of brain functions has resulted directly from the careful and accurate study by Barclay's 'geese,' of the anatomy of the nervous system. Truly the gleaning of the grapes of Ephraim has been better than the vintage of Abi-Ezer.

The study of structure, however, as the basis of vital phenomena, the strict province of anatomy, forms but a small part of the wide

subject of biology, which deals with the multiform manifestations of life, and seeks to know the laws governing the growth, development, and actions of living things. John Hunter, the master of Shippen and Physick, was the first great biologist of the moderns, not alone because of his extraordinary powers of observation and the comprehensive sweep of his intellect, but chiefly because he first looked at life as a whole, and studied all of its manifestations, in order and disorder, in health and in disease. He first, in the words of Buckle, "determined to contemplate nature as a vast and united whole, exhibiting, indeed, at different times, different appearances, but preserving amidst every change, a principle of uniform and uninterrupted order, admitting of no division, undergoing no disturbance, and presenting no real irregularity, albeit to the common eye irregularities abound on every side." We of the medical profession may take no little pride in the thought that there have never been wanting men in our ranks who have trodden in the footsteps of this great man; not only such giants as Owen, Huxley, and Leidy, but in a more humble way many of the most diligent students of biology have been physicians. From John Hunter to Charles Darwin enormous progress was made in every department of zoology and botany, and not only in the accumulation of facts relating to structure, but in the knowledge of function, so that the conception of the phenomena of living matter was progressively widened. Then with the "Origin of Species" came the awakening, and the theory of evolution has not only changed the entire aspect of biology, but has revolutionized every department of human thought.

Even the theory itself has come within the law; and to those of us whose biology is ten years old, the new conceptions are, perhaps a little bewildering. The recent literature shows, however, a remarkable fertility and strength. Around the nature of cell-organization the battle wages most fiercely, and here again the knowledge of structure is sought eagerly as the basis of explanation of the vital phenomena. So radical have been the changes in this direction that a new and complicated terminology has sprung up, and the simple, undifferentiated bit of protoplasm has now its cytosome, cytolymp, caryosome, chromosome, with their somacules and biophores. These accurate studies in the vital units have led to material modifications in the theory of descent. Weismann's views, particularly on the immortality of the unicellular organisms, and of the reproductive cells of the higher forms, and on the transmission or non-transmission of acquired characters, have been based directly upon studies of cell structure and cell-fission.

In no way has biological science so widened the thoughts of men as in its application to social problems. That throughout the ages, in the gradual evolution of life, one unceasing purpose runs;

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that progress comes through unceasing competition, through unceasing selection and rejection; in a word, that evolution is the one great law controlling all living things, "the one divine event to which the whole creation moves," this conception has been the great gift of biology to the nineteenth century. In his recent work, Kidd thus states the problem in clear terms: "Nothing tends to exhibit more strikingly the extent to which the study of our social phenomena must in future be based on the biological sciences than the fact that the technical controversy now being waged by biologists as to the transmission or non-transmission to offspring of qualities acquired during the lifetime of the parent, is one which, if decided in the latter sense, must produce the most revolutionary effect throughout the whole domain of social and political philosophy. If the old view is correct, and the effects of use and education *are* transmitted by inheritance, then the Utopian dreams of philosophy in the past are undoubtedly possible of realization. If we tend to inherit in our persons the result of the education and mental and moral culture of past generations, then we may venture to anticipate a future society which will not deteriorate, but which may continue to make progress even though the struggle for existence be suspended, the population regulated exactly to the means of subsistence, and the antagonism between the individual and the social organism extinguished. But if the views of the Weismann party are in the main correct, if there can be no progress except by the accumulation of congenital variations above the average to the exclusion of others below; if, without the constant stress of selection which this involves, the tendency of every higher form of life *is actually retrograde*; then is the whole human race caught in the toils of that struggle and rivalry of life which has been in progress from the beginning. Then must the rivalry of existence continue, humanized as to conditions it may be, but immutable and inevitable to the end. Then also must all the phenomena of human life, individual, political, social, and religious, be considered as aspects of this cosmic process, capable of being studied and understood by science only in their relations thereto."

Biology touches the problems of life at every point, and may claim, as no other science, completeness of view and a comprehensiveness which pertains to it alone. To all whose daily work lies in her manifestations the value of a deep insight into her relations cannot be overestimated. The study of biology trains the mind in accurate methods of observation and correct methods of reasoning, and gives to a man clearer points of view, and an attitude of mind more serviceable in the working day-world than that given by other sciences, or even by the humanities. Year by year it is to be hoped that young men will obtain in this Institute a fundamental knowledge of the laws of life.

To the physician particularly a scientific discipline is an incalculable gift, which leavens his whole life, giving exactness to habits of thought and tempering the mind with that judicious faculty of distrust which can alone, amid the uncertainties of practice, make him wise unto salvation. For perdition inevitably awaits the mind of the practitioner who has never had the full inoculation with the leaven, who has never grasped clearly the relations of science to his art, and who knows nothing, and perhaps cares less, for the limitations of either.

And, Mr. Provost, I may be permitted on higher grounds to congratulate the University of Pennsylvania on the acquisition of this Institute. There is great need in the colleges of this country of men who are thinkers as well as workers,—men with ideas, men who have drunk deep of the Astral wine, and whose energies are not sapped in the treadmill of the class-room. In these laboratories will be given opportunities for this higher sort of university work. The conditions about us are changing rapidly, and in the older states utility is no longer regarded as the test of fitness, and the value of the intellectual life has risen enormously in every department. Germany must be our model in this respect. She is great because she has a large group of men pursuing pure science with unflagging industry, with self-denying zeal, and with high ideals. No secondary motives sway their minds, on cry reaches them in the recesses of their laboratories, "of what practical utility is your work?" but unhampered by social or theological prejudices they have been enabled to cherish "the truth which has never been deceived,—that complete truth which carries with it the antidote against the bane and danger which follow in the train of half-knowledge." (Helmholtz.)

The leaven of science gives to men habits of mental accuracy, modes of thought which enlarge the mental vision, and strengthens—to use an expression of Epicurus—"the sinews of the understanding." But is there nothing further? Has science, the last gift of the gods, no message of hope for the race as a whole; can it do no more than impart to the individual *ἀκαταραξία*, imperturbability amid the storms of life, judgment in times of perplexity? Where are the bright promises of the days when "the kindly earth should slumber rapt in universal law"? Are these, then, futile hopes, vain imaginings of the dreamers, who from Plato to Comte have sought for law, for order, for the *civitas Dei* in the *regnum hominis*?

Science has done much, and will do more, to alleviate the unhappy condition in which so many millions of our fellow-creatures live, and in no way more than in mitigating some of the horrors of disease; but we are too apt to forget that apart from and beyond her domain lie those irresistible forces which alone sway the hearts of men. With

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reason science never parts company, but with feeling, emotion, passion, what has she to do? They are not of her; they owe her no allegiance. She may study, analyze, and define, she can never control them, and by no possibility can their ways be justified to her. The great philosopher who took such a deep interest in the foundation of this University chained the lightnings, but who has chained the wayward spirit of man. Strange compound, now wrapt in the ecstasy of the beatific vision, now wallowing in the fogs of iniquity, no leaven, earthly or divine, has worked any permanent change in him. Listen to the words of a student of the heart of man, a depicter of his emotions: "In all ages the reason of the world has been at the mercy of brute force. The reign of law has never had more than a passing reality, and never can have more than that so long as man is human. The individual intellect, and the aggregate intelligence of nations and races, have alike perished in the struggle of mankind, to revive again, indeed, but as surely to be again put to the edge of the sword. Look where you will throughout the length and breadth of all that was the world, 5000 or 500 years ago; everywhere passion has swept thought before it, and belief, reason. Passion rules the world, and rules alone. And passion is neither of the head nor of the hand, but of the heart. Love, hate, ambition, anger, avarice, either make a slave of intelligence to serve their impulses, or break down its impotent opposition with the unanswerable argument of brute force, and tear it to pieces with iron hands." (Marion Crawford.)

Who runs may read the scroll which reason has placed as a warning over the human menageries: "chained, not tamed." And yet who can doubt that the leaven of science, working in the individual, leavens in some slight degree the whole social fabric. Reason is at least free, or nearly so; the shackles of dogma have been removed, and faith herself, freed from a morganatic alliance, finds in the release great gain.

One of the many fertile fancies of the "laughing philosopher," a happy anticipation again of an idea peculiarly modern, was that of the influence upon us for weal or woe of Externals, of the idola, images, and effluences which encompass us,—of Externals upon which so much of our happiness, yes, so much of our every character depends. The trend of scientific thought in this, as in the atomic theory, has reverted to the Sage of Abdera; and if environment really means so much, how all-important a feature in education must be the nature of these encompassing effluences. This magnificent structure, so admirably adapted to the prosecution of that science from which modern thought has drawn its most fruitful inspirations, gives completeness to the already exhilarating *milieu* of this University. Here, at last, Mr.

Provost, and largely owing to your indomitable energy, are gathered all the externals which make up a *Schola major* worthy of this great Commonwealth. What, after all, is education but a subtle, slowly-affected change, due to the action upon us of the Externals; of the written record of the great minds of all ages, of the beautiful and harmonious surroundings of nature and of art, and of the lives, good or ill, of our fellows,—these alone educate us, these alone mould the developing minds. Within the bounds of this campus these influences will lead successive generations of youth from matriculation in the college to graduation in the special school, the complex, varied influences of Art, of Science, and of Charity; of Art, the highest development of which can only come with that sustaining love for ideals which, 'burns bright or dim as each are mirrors of the fire for which all thirst;' of Science, the cold logic of which keeps the mind independent and free from the toils of self-deception and half-knowledge; of Charity, in which we of the medical profession, to walk worthily, must live and move and have our being.

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OLIVER WENDELL HOLMES

REMARKS MADE AT THE JOHNS HOPKINS MEDICAL
SOCIETY, OCTOBER 15, 1894

BY

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•Remark
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OLIVER WENDELL HOLMES.*

BY WM. OSLER, M. D.

Very fitting indeed is it that he who had lived to be "the last leaf upon the tree" should have fallen peacefully in the autumn which he loved so well. Delightful, too, to think that although he had, to use the expression of Benjamin Franklin, intruded himself these many years into the company of posterity, the freshness and pliancy of his mind had not for a moment failed. Like his own wonderful "one-hoss shay," the end was a sudden breakdown; and though he would have confessed, no doubt, to "a general flavor of decay" there was nothing local, and his friends had been spared that most distressing of all human spectacles, those cold gradations of decay, in which a man takes nearly as long to die as he does to grow up, and lives a sort of death in life, "*ita sine vita vivere, ita sine morte mori.*"

Enough has been said, and doubtless well said, by those who make criticism their vocation, upon the literary position and affinities of Oliver Wendell Holmes, and I shall spare your perhaps already surcharged ears. He has been sandwiched in my affections these many years between Oliver Goldsmith and Charles Lamb. More than once he has been called, I think, the American Goldsmith. Certainly the great distinction of both men lies in that robust humanity which has a smile for the foibles and a tear for the sorrows of their fellow-creatures. The English Oliver, with a better schooling for a poet (had he not learned in suffering what he taught in song?), had a finer fancy and at his best a clearer note. With both writers one is at a loss to know which to love the better, the prose or the poetry. Can we name two other prose-writers of equal merit, who have so successfully courted the "draggled-tailed Muses," as Goldsmith calls them? Like Charles Lamb, Holmes gains the affections of his readers at the first sitting,

*Remarks made at the Johns Hopkins Medical Society, October 15, 1894.

and the genial humor, the refined wit, the pathos, the tender sensitiveness to the lights and shadows of life, give to the Breakfast Table Series much of the charm of the Essays of Elia. ✕

While it is true that since Rabelais and Linaere no generation has lacked a physician to stand unabashed in the temple at Delos, a worshipper of worth and merit amid the votaries of Apollo, I can recall no name in the past three centuries eminent in literature—eminent, I mean, in the sense in which we regard Goldsmith—which is associated in any enduring way with work done in the science and art of medicine. Many physicians, active practitioners—Sir Thomas Browne, for example—have been and are known for the richness and variety of their literary work; but, as a rule, those who have remained in professional life have courted the “druggie-tailed Muses” as a gentle pastime, “to interpose a little ease” amid the worries of practice. Few such have risen above mediocrity; fewer still have reached it. We know the names of Garth, of Arbuthnot and of Akenside, but we neither know them nor their works. The list is a long one, for the rites of Apollo have always had a keen attraction for the men of our ranks, but the names fill at the best a place in the story of the literature of the country, not a place in the hearts and lives of the people. Far otherwise is it with a select group of men, Goldsmith, Crabbe and Keats, at the outset members of our profession, but who early broke away from its drudgery. In pride we claim them, though in reality no influence of their special studies is to be found in their writings. Two of these, at least, reached the pure empyrean, and to use Shelley’s words, robed in dazzling immortality, sit on thrones

“built beyond mortal thought,
Far in the Unapparent.”

Oliver Wendell Holmes may not reach the same exalted sphere, but he will always occupy a unique position in the affections of medical men. Not a practitioner, yet he retained for the greater part of his active life the most intimate connection with the profession, and as Professor of Anatomy at Harvard University, kept in touch with it for nearly forty years. The festivals at Epidaurus were never neglected by

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him, and as the most successful combination which the world has ever seen of the physician and the man of letters, he has for years sat amid the Esculapians in the seat of honor.

During the nineteenth century three schools in succession have moulded the thoughts and opinions of the medical profession in this country. In the early period English ways and methods prevailed, and (as in the colonial days) the students who crossed the Atlantic for further study went to Edinburgh or to London. Then came a time between 1825 and 1860 when American students went chiefly to Paris, and the profession of the country was strongly swayed by the teaching of the French school. Since 1860 the influence of German medicine has been all-powerful, but of late American students are beginning to learn that their "wanderjahre" should be truly such, and that when possible they should round out their studies in France and England.

In the thirties a very remarkable body of young Americans studied in Paris, chiefly under the great Louis—Oliver Wendell Holmes, James Jackson, Jr., Henry I. Bowditch and George C. Shattuck, from Boston, Swett, from New York, Gerhard and Stillé, from Philadelphia, and Power, from Baltimore. They brought back to this country scientific methods of work and habits of accurate, systematic observation, and they had caught also, what was much more valuable, some of his inspiring enthusiasm. So far as I know, one alone of Louis's American pupils remains, full of years and honors—Prof. Stillé, of the University of Pennsylvania.

More than once in his writings Holmes refers to his delightful student days in France, and the valedictory lecture to his class in 1882 is largely made up of reminiscences of his old Paris teachers.

The fulness of Holmes's professional equipment is very evident in his first contributions to medicine. In the years 1836 and 1837 we find him successfully competing for the Boylston prizes, with essays on Intermittent Fever in New England, on Neuralgia, and on the Utility and Improvement of Direct Exploration in Medical Practice. Of these the essay on intermittent fever is in many ways the most important, since it contains a very thorough review of the testimony of the early New England writers on the subject, for which

purpose he made a careful and thorough examination of the records of the first century of the settlements. Here and there throughout the essay there is evidence of his irrepressible humor. Referring to the old writers, he says, that because indexes are sometimes imperfect, he has looked over all the works page by page, with the exception of some few ecclesiastical papers, sermons and similar treatises of Cotton Mather, "which, being more likely to cause a fever than to mention one, I left to some future investigator." The essay shows great industry, and is of value to-day in showing the localities in which malaria prevailed in the early part of this century, and at the time at which he wrote. The essay on neuralgia is not so interesting, but is an exhaustive summary of the knowledge of the disease in the year 1836. The third dissertation, on direct exploration, of much greater merit, is a plea for the more extended use of auscultation and percussion in exact diagnosis. The slowness with which these two great advances were adopted by our fathers contrasts in a striking manner with the readiness with which at the present day we take up with new improvements and appliances. Avenbrugger's work on percussion dates from 1761, but it was not until the beginning of this century that the art of percussion was revived by Corvisart and Laennec; while Piorry, as Holmes says, succeeded in creating himself a European reputation by a slight but useful modification in the art, referring to his pleximeter, of which in another place he says that Piorry "makes a graven image." The great discoveries of Laennec make their way very slowly to general adoption, and to this Holmes refers when he says, "it is perfectly natural that they (speaking of the older practitioners) should look with suspicion upon this introduction of medical machinery among the old, hard-working operatives; that they should for a while smile at its pretensions, and when its use began to creep in among them, that they should observe and signalize all the errors and defects which happened in its practical application."

Gerhard's work on the diagnosis of diseases of the chest was published in 1836, and with this essay of Holmes's opened to the American profession the rich experience of the French school in the methods of direct exploration in all disorders of the

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chest and of the heart. Holmes's essay may be read to-day by the student with great profit; it is particularly rich in original references to the older writers. Readers of the *Autocrat* and of others of Holmes's literary works have been surprised at the readiness with which he quotes and refers to the fathers of the profession, a facility readily explained by these Boylston prize dissertations; and in their preparation he had evidently studied not only the modern authors of the day, but he had gone in the original to the great masters from Hippocrates to Harvey.

The prize essay does not constitute the most enduring form of medical literature, and though the dissertation on Malaria is in some respects one of the very best of the long series of Boylston essays, yet we could scarcely have spoken of a medical reputation for Dr. Holmes had it to rest upon these earlier productions. A few years later, however, he contributed an article which will long keep his memory green in our ranks.

Child-bed fever was unhappily no new disorder when Oliver Wendell Holmes studied, nor had there been wanting men who had proclaimed forcibly its specific character and its highly contagious nature. Indeed, so far back as 1795, Gordon, of Aberdeen, not only called it a specific contagion, but said he could predict with unerring accuracy the very doctors and nurses in whose practice the cases would develop. Rigby, too, had lent the weight of his authority in favor of the contagiousness, but the question was so far from settled that, as you will hear, many of the leading teachers scouted the idea that doctors and nurses could convey the disorder. Semmelweis had not then begun to make his interesting and conclusive observations, for which his memory has recently been so greatly honored.

In 1842, before the Boston Society for Medical Improvement, Dr. Holmes read a paper entitled "The Contagiousness of Puerperal Fever," in which he brought forward a long array of facts in support of the view that the disease was contagious, conveyed usually by the doctor or the nurse, and due to a specific infection. At the time there certainly was not an article in which the subject was presented in so logical and so convincing manner. As Sidney Smith says, it is not the man who first says a thing, but it is he who says it so long, so

loudly and so clearly that he compels men to hear him—it is to him that the credit belongs; and so far as this country is concerned, the credit of insisting upon the great practical truth of the contagiousness of puerperal fever belongs to Dr. Holmes. The essay is characterized in places by intensesness and great strength of feeling. He says he could not for a moment consent to make a *question* of the momentous fact which should not be considered a subject for trivial discussion, but which should be acted upon with silent promptitude. “No negative facts, no passing opinions, be they what they may or whose they may, can form any answer to the series of cases now within the reach of all who choose to explore the records of medical science.” Just before the conclusions the following eloquent paragraphs are found, portions of which are often quoted:—“It is as a lesson rather than as a reproach that I call up the memory of these irreparable errors and wrongs. No tongue can tell the heart-breaking calamities they have caused; they have closed the eyes just opened upon a new world of life and happiness; they have bowed the strength of manhood into the dust; they have cast the helplessness of infancy into the stranger’s arms, or bequeathed it with less cruelty the death of its dying parent. There is no tone deep enough for record, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden, or stretches her aching limbs. The very outcast of the street has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law brought down upon its victims by a machinery as sure as destiny, is arrested in its fall at a word which reveals her transient claims for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should regard it negligently, unadvisedly, or selfishly.”

The results of his studies are summed up in a series of eight conclusions, and the strong ground which he took may be gathered from this sentence in the last one: “The time has

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come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime." Fortunately this essay, which was published in the ephemeral New England Quarterly Journal of Medicine, was not destined to remain unnoticed. The statements were too bold and the whole tone too resolute not to arouse the antagonism of those whose teachings had been for years diametrically opposed to the contagiousness of puerperal fever. Philadelphia was the centre of the teaching and work in obstetrics in this country, and if we can speak at all of an American school of obstetricians it is due to the energy of the professors of this branch in that city, and for the sake of the memory of the men we could wish expunged the incident to which I will now allude.

In 1852 the elder Hodge, Professor of Obstetrics at the University of Pennsylvania, published an essay on the non-contagious character of puerperal fever, and in 1854 Charles D. Meigs, Professor of Obstetrics at the Jefferson Medical College, published a work on the nature, signs, and treatment of child-bed fevers, in a series of letters addressed to students of his class. Both of these men, the most distinguished professors of obstetrics in America, took extreme ground against Holmes, and Meigs handled him rather roughly.

Nothing daunted, in the following year (1855) Holmes reprinted the essay, calling it *Puerperal Fever as a Private Pestilence*. He clearly appreciated the character of the work he was doing, since in the introduction he says, "I do not know that I shall ever again have so good an opportunity of being useful as was granted to me by the raising of the question which produced this essay." The point at issue is squarely put in a few paragraphs on one of the first pages; the affirmative in a quotation from his essay: "The disease known as puerperal fever is so far contagious as to be carried from patient to patient by physicians and nurses" (1843). The negative in two quotations, one from Hodge (1852), who "begged his students to divest their minds of the dread that they could ever carry the horrible virus"; and of Meigs (1854), who says, "I prefer to attribute them (namely, the deaths) to accident or Providence, of which I can form a conception, rather than to a contagion of which I cannot form any clear idea."

The introduction to the essay, which was reprinted as it appeared in 1842, is one of the ablest and most trenchant pieces of writing with which I am acquainted. There are several striking paragraphs; thus, in alluding to the strong and personal language used by Meigs, Holmes says: "I take no offence and attempt no retort; no man makes a quarrel with me over the counterpane that covers a mother with her newborn infant at her breast." He appeals to the medical student not to be deceived by the statements of the two distinguished professors which seem to him to encourage professional homicide. One paragraph has become classical: "They naturally have faith in their instructors, turning to them for truth, and taking what they may choose to give them; babies in knowledge, not yet able to tell the breast from the bottle, pumping away for the milk of truth at all that offers, were it nothing better than a professor's shriveled forefinger."

The high estimate in which this work of Holmes' is held has frequently been referred to by writers on obstetrics.

+ Some years ago in an editorial note I commented upon a question which Dr. Holmes had asked in his "Hundred Days in Europe." Somewhere at dinner he had sat next to a successful gynæcologist who had saved some hundreds of lives by his operations, and he asked, "Which would give the most satisfaction to a thoroughly humane and unselfish being, of cultivated intelligence and lively sensibilities: to have written all the plays which Shakespeare has left as an inheritance for mankind, or to have snatched from the jaws of death more than a hundred fellow-creatures, and restored them to sound and comfortable existence?" I remarked that there was nobody who could answer this question so satisfactorily as the Autocrat, and asked from which he derived the greater satisfaction, the *essay on puerperal fever*, which had probably saved many more lives than any individual gynæcologist, or the *Chambered Nautilus*, which had given pleasure to so many thousands. The journal reached Dr. Holmes, and I read you his reply to me, under date of January 21st, 1889:

"I have rarely been more pleased than by your allusion to an old paper of mine. There was a time certainly in which I would have said that the best page of my record was that in which I had fought my battle for the poor poisoned women.

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I am reminded of that essay from time to time, but it was published in a periodical which died after one year's life, and therefore escaped the wider notice it would have found if printed in the *American Journal of the Medical Sciences*. A lecturer at one of the great London hospitals referred to it the other day and coupled it with some fine phrases about myself which made me blush, either with modesty or vanity, I forget which.

"I think I will not answer the question you put me. I think oftenest of the 'Chambered Nautilus,' which is a favorite poem of mine, though I wrote it myself. The essay only comes up at long intervals. The poem repeats itself in my memory, and is very often spoken of by my correspondents in terms of more than ordinary praise. I had a savage pleasure, I confess, in handling those two professors—learned men both of them, skillful experts, but babies, as it seemed to me, in their capacity of reasoning and arguing. But in writing the poem I was filled with a better feeling—the highest state of mental exaltation and the most crystalline clairvoyance, as it seemed to me, that had ever been granted to me—I mean that lucid vision of one's thought and all forms of expression which will be at once precise and musical, which is the poet's special gift, however large or small in amount or value. There is more selfish pleasure to be had out of the poem—perhaps a nobler satisfaction from the life-saving labor."

Last year at the dinner of the American Gynæcological Society in Philadelphia a letter from Dr. Holmes was read referring to the subject in very much the same language as he uses in his letter to me. One or two of the paragraphs I may quote. "Still I was attacked in my stronghold by the two leading professors of obstetrics in this country.

"I defended my position, with new facts and arguments, and not without rhetorical fervor, at which, after cooling down for half a century, I might smile if I did not remember how intensely and with what good reason my feelings were kindled into the heated atmosphere of superlatives.

"I have been long out of the way of discussing this class of subjects. I do not know what others have done since my efforts; I do know that others had cried out with all their

might against the terrible evil, before I did, and I gave them full credit for it.

"But I think I shrieked my warning louder and longer than any of them, and I am pleased to remember that I took my ground on the existing evidence before the little army of microbes was marched up to support my position."

Fortunately, Dr. Holmes's medical essays are reprinted with his works. Several of them are enduring contributions to the questions with which they deal: all should be read carefully by every student of medicine. The essay on Homeopathy remains one of the most complete exposures of that therapeutic fad. There is no healthier or more stimulating writer to students and to young medical men. With an entire absence of nonsense, with rare humor and unflinching kindness, and with that delicacy of feeling characteristic of a member of the Brahmin class, he has permanently enriched the literature of the race.

Search the ranks of authors since Elia, whom in so many ways Holmes resembled, and to no one else could the beautiful tribute of Landor be transferred with the same sense of propriety:

"He leaves behind him, freed from grief and fears,
Far nobler things than tears,
The love of friends without a single foe,
Unequaled lot below."

OLIVER WEAVER

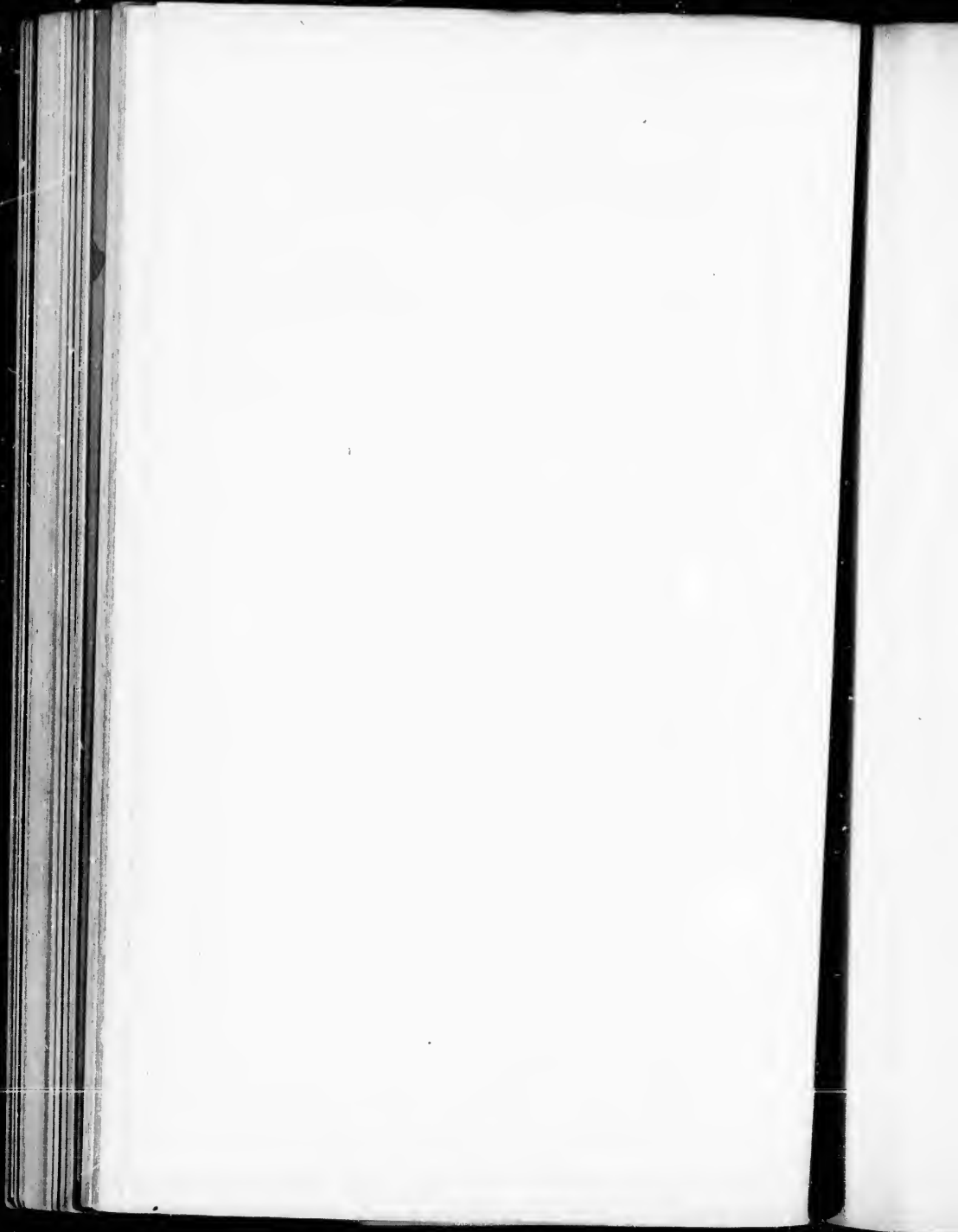
The greater classical prose eclipsed his professional work guiding current on various points like-work of the discussed by Landor that in 1840 from the Parisian himself by winning succession. The were Intermittent and the Utility tion in Medical intermittent fever the views and writers, and are localities in which essay on neuralgia all that was known. The third dissertation us back to an intimate. It may be briefly tended use of auscultation of exact diagnosis slowness with which adopted by our friends with the readiness take up new improvements brugger's work on was not until the art of percussion Laennec; while I creating for himself but useful modifications pleximeter, of which Piorry "makes a good use of Laennec made the fact which Hahnemann's passage: "It is peculiar of older practitioners upon this introduction old, hard-working men awhile smile at its

OLIVER WENDELL HOLMES, AS PHYSICIAN.

THE greater glory of Wendell Holmes, the writer of classical prose and poetry, has for the most part eclipsed his record as a physician. Yet his purely professional work had in its time no mean share in guiding current medical opinion to sound conclusions on various points of importance. This aspect of the like-work of the distinguished American has been ably discussed by Dr. William Osler, of Baltimore. We learn that in 1836 and 1837—shortly after his return from the Parisian schools—young Holmes distinguished himself by winning several of the Boylston prizes in succession. The subjects which he chose for his theme were Intermittent Fever in New England, Neuralgia, and the Utility and Improvement of Direct Exploration in Medical Practice. Of these essays, the one on intermittent fever contained a laborious summary of the views and observation of earlier New England writers, and are of value to-day because they show the localities in which malaria was then prevalent. The essay on neuralgia contains an exhaustive review of all that was known of that malady in the year 1836. The third dissertation, that on direct exploration, takes us back to an interesting epoch in practical medicine. It may be briefly described as a plea for the extended use of auscultation and percussion as methods of exact diagnosis. As Dr. Osler aptly remarks, the slowness with which these two great advances were adopted by our fathers contrasts in a striking manner with the readiness with which at the present day we take up new improvements and appliances. Avenbrugger's work on percussion dates from 1761, but it was not until the beginning of this century that the art of percussion was revived by Corvisart and Laennec; while Piorry, as Holmes says, succeeded in creating for himself an European reputation by a slight but useful modification in the art, referring to his pleximeter, of which he says in another place that Piorry "makes a graven image." The great discoveries of Laennec made their way slowly to general adoption, a fact which Holmes explains in the following passage: "It is perfectly natural that they, speaking of older practitioners, "should look with suspicion upon this introduction of medical machinery among the old, hard-working operatives; that they should for awhile smile at its pretensions, and when its use began

ng them, that they should observe and the errors and defects which happened in application." These three essays were of great promise, and that on malaria has as "in some respects one of the very best series of Boylston essays." Some years Holmes embarked upon another medical theme, which he achieved solid and lasting fame at that time, strange as it may now seem, when his country scouted the idea that fever could be conveyed by doctors and patients. In 1842 Dr. Holmes, before the Society for Medical Improvement, read a paper on the Contagiousness of Puerperal Fever, in which he supported the theory that the disease was a powerful and logical result of the manner in which his countrymen to an unrecognized utmost practical importance. His attitude roused the antagonism of his countrymen for years been diametrically opposed to the contagiousness of puerperal fever. He argued on tediously, and ten years later his chief opponents two professors of medicine, one of the latter, Dr. Meigs, in 1852, one of the latter, Dr. Meigs, said "to divest their minds of the idea that they could ever carry the horrible virus"; other, Dr. Hodge, said of this class of fever to attribute them to accident or to contagion of which I cannot form any clear conception, rather than to the dispute more than justified the views of those whose work is still widely quoted in the literature on obstetrics. The whole of his essays have been reprinted, and several of them, such as that on homœopathy, are enduring contributions to the literature of the questions with which they deal. For forty years Dr. Holmes filled the post of Professor of Anatomy at Harvard University, and the fact that he was able to contribute to the advance of the science and art of medicine in the midst of a busy literary life is no small testimony to the versatility of the genius which has placed him among the foremost writers of the century.

to creep among them, that they should observe and signalise all the errors and defects which happened in its practical application." These three essays were undoubtedly of great promise, and that on malaria has been described as "in some respects one of the very best of the long series of Boylston essays." Some years later, however, Holmes embarked upon another medical subject, in which he achieved solid and lasting renown. At that time, strange as it may now seem, the leading teachers of his country scouted the idea that puerperal fever could be conveyed by doctors and nurses to their patients. In 1842 Dr. Holmes, before the Boston Society for Medical Improvement, read a paper upon "The Contagiousness of Puerperal Fever," in which he supported the theory that the disease was contagious. His essay was of a powerful and logical nature, and its great merit lay in the manner in which he drew the attention of his countrymen to an unrecognised point of the utmost practical importance. His bold and resolute attitude roused the antagonism of those whose teachings had for years been diametrically opposed to the contagiousness of puerperal fever. The controversy dragged on tediously, and ten years later we still find among his chief opponents two professors of obstetrics. In 1852, one of the latter, Dr. Meigs, begged his students "to divest their minds of the dread that they could ever carry the horrible virus"; while in 1854 the other, Dr. Hodge, said of that class of deaths, "I prefer to attribute them to accident or Providence, of which I can form a conception, rather than to a contagion of which I cannot form any clear idea." The issue of the dispute more than justified the position of Holmes, whose work is still widely quoted by American writers on obstetrics. The whole of his essays have been reprinted, and several of them, such as that on homœopathy, are enduring contributions to the literature of the questions with which they deal. For forty years Dr. Holmes filled the post of Professor of Anatomy at Harvard University, and the fact that he was able to contribute to the advance of the science and art of medicine in the midst of a busy literary life is no small testimony to the versatility of the genius which has placed him among the foremost writers of the century.





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INTRODUCTORY REMARKS TO COURSE OF
CLINICAL DEMONSTRATIONS ON TYPHOID FEVER.

POST-GRADUATE COURSE, JOHNS HOPKINS HOSPITAL, OCTOBER 3, 1894.

By William Osler, M. D.,
Professor of Medicine, Johns Hopkins University.

Reprinted from the MARYLAND MEDICAL JOURNAL, November 17, 1894.

TYPHUS fever has almost gone; relapsing fever we never see now; yellow fever has not reached these latitudes for many years; malarial fevers are becoming yearly less frequent; one member only of the old group of the fevers remains in full possession of its rights and privileges, still remains a witness to civic incapacity, to municipal folly, to domestic carelessness, and shall I not add, to professional supineness? Typhoid fever, the autumnal fever of the physician of the latter part of the last and of the beginning of this century, the slow nervous fever of Huxham, still numbers scores of victims in cities, towns and villages; and today, as at the beginning of the century, it is the serious fever of the year.

No disease demands a more careful and thorough study, since its manifestations are so varied and the larger your experience the more impressed will you be at the complexity of the picture which it presents.

Preliminary to, or rather concurrent with, your observation of the cases in the wards I would urge you to read the important literature on the subject, of which you will find the following in the library. Louis's great work on typhoid, both the original and the translation, by H. J. Bowditch; Gerhard's articles in the *American Journal of the*

Medical Sciences, for 1837, in which for the first time the essential differences between typhus and typhoid fevers were clearly and succinctly announced; Bartlett's work on fevers (1842), in which the two diseases were separately considered and the differences fully acknowledged; Jenner's articles (1848), which have been recently reprinted with his contributions on diphtheria; the great work of Murchison on the continued fevers; the article by Liebermeister in von Ziemssen's *Encyclopedia*; while in Vol. 1 of the new French *Traité de Médecine* you will find an elaborate account by Chanternesse of the bacillus and the conditions under which it develops. I have also given the librarian for your use Brand's brochure on the treatment of typhoid fever.

Let me at the outset refresh your memories upon one or two points in the etiology of the disease. The bacilli of their germs are very widely spread, and though the possibility of infection through the air cannot be denied, yet undoubtedly they enter chiefly through the digestive tract with food or water. They settle in the lymph follicles of the intestine, in the mesenteric glands, in the spleen, and to a less extent in the liver, and after a variable period (the stage of incubation, in which they are growing and extending) produce suffi-

ent toxic material to cause symptoms. It is important to bear in mind that they do not settle on the mucosa of the bowel, but that they grow *in* its tissue, and they are not found in the feces until the middle or toward the end of the second week. It is an infection of the chylopoietic lymphatic system, not of the intestine alone, and there are fatal cases in which the bowel lesion, believed to be characteristic, has been extremely slight or even absent. There may be the most intense toxic and nervous manifestations with very slight intestinal affection.

The dangers of the disease in order of severity are: 1. The general toxemia. 2. The intestinal lesion. 3. The secondary infections. The typho-toxines may be produced in such quantity as rapidly to overwhelm the system, and patients may succumb within a week or ten days with intense nervous symptoms before the ulcers form in the intestines. In other instances the system fails gradually in a less profound but more prolonged toxemia.

The dangers from the intestinal lesion are very great. As the necrotic tissue separates, blood-vessels may be eroded and cause a fatal hemorrhage or the sloughs may be so deep as to extend through the entire wall, or in separating leave so thin a base that perforation subsequently occurs. These two accidents together account for fifty per cent. of the fatal cases.

Primarily causing an affection of the chylopoietic lymph glands the typhoid bacilli may themselves pass to distant organs and excite inflammations—nephritis, meningitis, pneumonia, etc., but more often the organs, weakened by the prolonged fever, fall a prey to the colon bacilli, the staphylococci, the streptococci, and the micrococcus lanceolatus, which cause the secondary complications and which constitute the third great danger in the disease.

Upon the question of the treatment of typhoid fever the profession has not reached any unanimity. I must say that the cases are still, as a rule, overdosed. I am sometimes appalled at the number and variety of drugs which are

poured into an unfortunate victim with this disease. You will here have an opportunity of seeing what a non-medical plan of treatment can do, since a very large majority of our cases receive no drugs from the beginning to the close. We employ a systematic hydrotherapy, believing that on this plan a certain percentage of the cases are saved, and we shall continue to use it until some method is devised by which the mortality in large series of cases in hospital practice is reduced below six or seven per cent.

Not much progress has been made with the so-called specific treatment of the disease. Sterilized typhoid cultures have been used, but the number of cases is as yet scarcely sufficient upon which to base any positive opinion. I show you here the charts of two cases in which during last session we then employed cultures. Both were cases of great severity, and one patient after seven injections seemed so ill that we thought it better to abandon the injections and return to the baths. In the other case also the injections did not seem to have any special influence. Following one of the injections in half an hour the patient had a very heavy chill.

We should not, however, be discouraged, as the outlook for serum therapy seems at present unusually bright. Specific medication in the fevers has not kept pace with the enormous development in our knowledge of their etiology. Take, for example, the cases admitted during the past two days which you saw in Ward F this morning. In beds 8 and 10 we could say positively that by specific medication the fever would disappear and the patients would be afebrile at the time of the next ward visit on Friday; whereas in the patients in beds 23 and 24 by no method of procedure with which we are acquainted could we arrest the progress of the fever. It is, however, quite possible that some day we may have typhoid fever under our control just as we have malarial fever.

I should like to call your attention to the fact that we do not give a preliminary calomel purge, nor do we mind if constipation exists. In looking over

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any long series of cases you will find that those with constipation do better as a rule than those with diarrhea. It is extremely interesting to note how from time to time the profession returns to old ideas on practice which it had abandoned years ago. At present you will see a good deal in the journals about the eliminative and purgative treatment of typhoid fever. To promote in every way the excretion of the toxins (by keeping the skin active and by stimulating the flow of urine) is a most rational indication, best met by the use of water, external and internal. If the bacilli manufactured their poisons on the surface of the mucosa, calomel laxatives and intestinal antiseptics of various sorts would be indicated, but as I mentioned to you, the universal opinion of bacteriologists is that the bacilli are not found in the feces or on the mucosa until about the middle of the second week, by which time in severe cases a profound toxemia may have developed and many even have proved fatal. Later in the disease, when the sloughs have separated and the ulcers are present, the use of purgatives is, I hold, very bad practice.

The statistical details of the cases treated in the hospital during the first four years you will find in the Report on Typhoid Fever issued last spring.

During the fifth year of the hospital, ending May 15, 1894, eighty cases were treated to a termination, of which five died, a mortality of 6.2 per cent.; the total mortality during the four years since the introduction of the Brand's method has been in the 276 cases, 6.8 per cent. Of the fatal cases last year, two were admitted at the end of the second week; one was a man with extensive tuberculosis of the lymph glands; one died of perforation. One case, supposed to have meningitis, is of exceptional interest, as it illustrates one of the commonest mistakes in the diagnosis of typhoid fever. The case has very exceptional pathological features and will be reported in full by Dr. Flexner, but I will give you a brief abstract of the history. A colored girl, aged 18, had been ill, so she stated, for about five

weeks before coming to hospital, during which time she had been feverish and had had occasional looseness of the bowels. On admission the temperature was 103°; pulse 120 and the tongue dry and brown. The abdomen was a little distended and the spleen could readily be felt. There was no diazo-reaction in the urine. She was irrational and had much vomiting. She was given sponge baths and ordered a creasote mixture and morphia hypodermically in the evening.

On the 24th and 25th she remained much in the same condition, constantly moaning, but with the head thrown back. The temperature did not rise above 103°. On the 26th the vomiting was very persistent. It was noticed that the right arm was rigid, and it was very difficult to flex it. The pupils were equal and reacted to light. On the 27th the temperature fell to 99°; the head was thrown back; she resisted slightly any attempt to bend the neck; she answered questions with difficulty and was much confused. She lay with the eyes open and with a rather staring expression. She moved the left arm readily, but the right lay extended and motionless by her side, and if it were touched she cried out. There did not appear to be any tenderness about the joints, but there was a good deal of sensitiveness of the general surface. The deep reflexes of the left arm were active. There was well-marked ankle clonus on both sides and the knee-jerks appeared to be lively. The uterus and its annexa were normal. There was a small amount of albumen in the urine, with a few red blood cells.

On the 29th the rigidity of the muscles of the neck seemed greater. The stiffness of the right arm persisted. The temperature on the 28th and 29th ranged from 98.2° to 100°; the greater part of the 29th it was below 99°. At the time of my visit on the 30th the right arm showed slight clonic movements, and at intervals became quite rigid. The temperature remained low on the 30th, and it was noticed that there was a slight swelling in the left parotid region. This led to a suspicion on the part of

Dr. Thayer that the whole trouble might really be typhoid fever. Previous to this we had regarded the case as one of meningitis. The vomiting continued and she sank and died on the evening of May 1. It is interesting to note that for nearly five days previous to her death the temperature for the greater part of each day was between 98° and 99°.

The autopsy showed characteristic lesions of typhoid fever, with the most extensive distribution of the typhoid bacilli in liver, spleen, lungs, kidneys

and bone-marrow. The brain and spinal cord showed no changes.

Many of the so-called sporadic cases of meningitis are instances of this cerebro-spinal type of typhoid fever, in which the brunt of the disease falls upon the nervous system. The cases are sometimes extremely difficult to recognize, but it is well for you always to bear in mind Stokes's dictum, that in fever "there is no single nervous symptom which may not and does not occur independently of any appreciable lesion of the brain, nerves or spinal cord."

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JANUARY, 1895

CANCER OF THE STOMACH WITH VERY RAPID
COURSE.

By WILLIAM OSLER, M.D.,
Professor of Medicine, Johns Hopkins University.

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CANCER OF THE STOMACH WITH VERY RAPID COURSE.

By WILLIAM OSLER, M. D.,

Professor of Medicine, Johns Hopkins University

The diagnosis of cancer of the stomach may be obscured by many causes, among which perhaps the least frequent are variations in the duration of the disease. The disease rarely lasts more than two or three years; a duration indeed of three years is most exceptional, while a rapid course—three months or less—is still more uncommon, even in young persons, in whom, as Mathien (quoted by Welch) points out, the progress of the disease is often rapid.

I have had under observation two cases only in which the course of the disease was remarkably rapid. In one of these, reported by Dr. Thayer,¹ the entire duration from the onset of the symptoms (the patient being a strong, well-developed man, aged 40) was under six weeks. With the exception of occasional bilious attacks he had always enjoyed good health. The chief symptom was incessant vomiting. At the post-mortem there was found an infiltrating, not ulcerated, cancer at the pylorus, without dilatation of the organ. In this case the fatal result was not due primarily to the cancer, which was not larger than a walnut, but to the vomiting excited by its presence.

In the following instance the acute symptoms developed in a man who had had dyspepsia for years, and who had been for eighteen months a martyr to vertigo of the type of Menière's disease. The case presents several features of special interest:

- (1) The complete relief of agonizing vertigo by the correction of refraction errors.
- (2) The onset of acute symptoms (uncontrollable vomiting) and death within two weeks, without any previous aggravation of the existing dyspepsia or serious loss in weight.
- (3) Vomitus of an extremely offensive (almost fecal) odor, due to sloughing of the cancer.

Dyspepsia for many years; for Eighteen Months Attacks of Vertigo of Great Severity; Complete Relief by Correction of Refraction Errors; Sudden Onset of Severe Gastric Symptoms and Death within Two Weeks; Diffuse Infiltrating Carcinoma of the Stomach with Sloughing.—A. B., aged 54, seen April 4, complaining of vertigo and of stomach trouble.

The family history is good; there are no similar affections that he knows of in any of his near relatives.

¹ Johns Hopkins Hospital Bulletin, Vol. 11.

The patient is a brick-maker by occupation. His habits have been good. He has been a steady smoker until about a month ago.

The patient was well and strong as a young man, and has throughout life enjoyed tolerably good health, though for many years he has had dyspepsia, but never very badly until within the past eighteen months. Two years ago he had an attack of biliary colic severe enough to require hypodermic injections of morphia. Four months afterwards he had a second attack, with great pain in the right side. After this the skin was a little yellow. He has had no attacks since of a similar character. For about eighteen months he has had attacks of severe vertigo associated with flatulency. The first one occurred while he was sitting at the table in a restaurant drinking claret-punch. He jumped up and said to his wife, "Catch me, catch me," and had to get hold of the table to steady himself. He had a sensation as if a cannon-ball had burst in his head, and as if everything was in motion. The attack lasted about an hour. He did not vomit, but looked pale, and broke out into a profuse perspiration. He has had only two attacks of similar severity, one while in his carriage. He said it seemed as if the horse was down and everything was turning over. This attack lasted about an hour. He had to go to bed and felt very badly, and after it he was all confused in his head.

The milder attacks have occurred with great frequency. Scarcely a day passes without one or two; thus, yesterday after breakfast his stomach felt badly and he had a good deal of belching. Then, as he expresses it, his head went off at once, and he generally cries to his wife, "Come and catch me." Coming home just before dinner he had another spell. When they are at all severe he gets pale and cool, and perspiration rolls off his face in beads. He belches all the time during an attack, and on some days he belches continually. He has no pain whatever in the chest or elsewhere. The attacks do not come on during sleep, but he has had several of them while in bed.

From his statement the vertigo apparently is both subjective and objective. Objects go to the right, but he feels that he turns also. In the attacks it is impossible for him to walk. It appears to him that one foot goes about ten feet higher than the other. If the head is held tight the attacks do not appear to be so severe. He has never lost consciousness, though he sometimes feels faint. There is no throbbing at the heart. The longest interval he has ever passed without an attack is two weeks.

He lays the greatest stress upon the condition of the stomach, and says that everything comes from it, and that the belching is incessant and most distressing.

Though he did not complain of difficult hearing, it was evident

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that he was a little deaf, and on questioning him he stated that deafness had been coming on for several years past, particularly in the right ear, in which there is a singing noise almost constantly. In the spells it is much louder, and sometimes there is the explosive burst already spoken of. He thinks he is never without the noise in the ear.

Present Condition.—A small-framed man, a little pale, with feeble musculature. He belches loudly at intervals. The pulse is 76. No special sclerosis of the arteries. Apex-beat not visible, not palpable. No increase in area of dulness. The second sound is very ringing and accentuated at the base. There is a soft systolic murmur at the aortic area. No diastolic murmur audible. The liver is not enlarged. No tenderness on palpation at costal margin. The stomach is moderately distended. Tympany extends from fifth rib to three finger-breadths above the navel. Spleen not palpable. Hearing is much impaired on right side. He says he has been deaf in this ear for seven or eight years. He can hear the watch in close contact. In the left ear can hear it at a distance of six inches.

Dr. Theobald, to whom I referred the patient for examination of the ears, wrote that there was deafness in the right ear, due to changes in the auditory nerve or its expansion in the labyrinth, and that there was also slight deafness in the left ear. The examination of the eyes showed a rather high grade of hypermetropia, with a decided amount of astigmatism, which he thought would be materially benefited by glasses, as the error of refraction was possibly an important factor in causing the attacks, though the condition of the ears was such that it was reasonable to suppose that they also might have something to do with it. The change in the patient from the use of the properly-adjusted glasses was most remarkable. He came to see me again towards the end of May, and said that he was living a new life; that not only had he had no severe attack, but that the milder attacks had disappeared completely. His stomach still troubled him, but he said was not nearly as bad as it had been.

I did not see this patient again until June 29 (with Dr. Benzinger). His stomach had been worrying him for some weeks, though he had kept about and had been transacting his business as usual until June 22. On that day he began to have vomiting, and could not retain anything on the stomach. Since then he has not been able to take anything into his stomach without aggravating the vomiting. In the intervals between the attacks he is comfortable, has no pain, and the only distress is just prior to and during the attacks, which recur every three or four hours. The material vomited was at first watery, grayish in color, and not bloody.

To-day when I saw him his condition was as follows: He looked

very much as he did in April; perhaps a little thinner. The color of the lips is good. There is no fever. The tongue is moist, and has a slight fur. He belches at intervals. The material vomited to-day was reddish-brown in color, and contained flakes of blood, and on settling it had a distinct coffee-ground sediment. The abdomen was not distended and was nowhere painful. Nothing could be felt in the region of the stomach; there was evidently no dilatation.

I thought from the acute onset and severity that it might possibly be a severe gastric crisis in connection with his labyrinthine disease. I did not see him on the 30th.

July 1. The condition of the patient is unchanged. About every two or three hours he vomits from six to eight ounces of a thin fluid, blood-stained and highly offensive, and which contains also fragments of blood clot, and sometimes shreds of necrotic tissue. All the usual remedies have been tried to allay the vomiting without any avail, and even if he takes a little water it is thrown off at once. He has been fed by the bowel, and given large injections of brandy and water. Apart from the vomiting spells he says he is very comfortable and has no pain. The examination of the epigastrium is negative. The recti are somewhat resistant, but there is not the slightest distention, and no pain on deep pressure.

On Monday and Tuesday the vomiting continued, and he grew weaker, but even now he did not look very badly, and the pulse kept up wonderfully. He retained the injections very well. The odor of the vomitus had become, if possible, worse, and now appeared to have a distinctly fecal smell; the character of it remained about the same, a thin reddish-brown fluid, with a coffee-ground sediment. The odor was such that we suspected perforation into the bowel. It was remarkable how much he brought up from the stomach in the twenty-four hours, at least two pints, yet for more than a week he had taken nothing into his stomach.

The examination of the fluid showed that it was acid, reacted feebly for free hydrochloric acid, contained red blood-corpuscles, granular *débris*, but no formed elements. On Tuesday evening at 9.20 I examined the material which had been vomited at 8.40 P.M. It was extremely foul, with a distinctly fecal odor. Nothing characteristic was found in the fragments of blood clot or in the sediment. A *Cercomonas* was seen. The pipette which I used to remove the fluid had been standing in a jar of water, but I had, as a precautionary measure, drawn alcohol into it before using.

On Wednesday, July 4, the condition of the patient remained much the same, but he became weaker after each vomiting spell. In the evening it was evident that he was failing very rapidly, and he

had not the strength to vomit. He sank and died on the morning of the 5th.

Autopsy, by Dr. L. F. Barker.—Only the abdomen was examined. The peritoneal cavity contained the preserving fluid of the undertaker.

The greater curvature of the stomach and a small portion of its anterior wall were alone visible, the rest of the organ being covered by the left lobe of the liver. On lifting this the stomach had a grayish-red appearance, was small, and the walls looked infiltrated. Neither the transverse colon nor any coil of the small bowel was adherent. The organ was opened *in situ*. There was some bloody fluid in the cavity, of the same nature as that which he had vomited. The body of the organ was the seat of a diffuse infiltrated carcinoma. In the lesser curvature and the posterior wall in an area nearly the size of the palm of the hand sloughing had taken place. There was a large, flat, ulcerated surface to which shreds of necrotic tissue were adherent. The index finger could be passed into the pyloric orifice; the cardiac orifice was free. There was no perforation. The liver was smooth, and there were no changes in the other abdominal organs.

Of course, the anatomical condition made it perfectly plain that the growth in the stomach had been of considerable duration, but it had not seriously undermined his health or strength. I rarely remember to have seen such a remarkable change in a patient as in this man after the correction of his refraction error by Dr. Theobald. As he expressed it, he was "living a new life," and when I saw him towards the end of May he looked very much better. The dyspepsia still worried him, but he no longer had the incessant belching. Yet the onset of his serious and fatal illness was within a month of this date. This form of infiltrating neoplasm disturbs in the least degree the functions of the stomach, and there are many instances of persons who have had diffuse carcinoma, whose appetite and digestion have remained good almost to the end.

From the character of the vomit and the horrible stench in this case, I fully believed that sloughing had occurred, but there was also a fecal odor of the vomitus, which led us to suspect perforation of the bowel as well. Very possibly in the persistent and long-continued vomiting there was more or less regurgitation of the contents of the intestine.

By no means the least interesting feature in the case was the entire relief of the severe vertigo by glasses.

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TEACHING AND THINKING
The Two Functions of a Medical School.

BY

WM. OSLER, M.D., F.R.C.P., Lond.,
Professor of Medicine Johns Hopkins University, Baltimore.

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TEACHING AND THINKING.*

THE TWO FUNCTIONS OF A MEDICAL SCHOOL.

Many things have been urged against our nineteenth century civilization—that political enfranchisement only ends in anarchy, that the widespread unrest in matters spiritual leads only to unbelief, and that the best commentary on our boasted enlightenment is the picture of European wars and the nations everywhere gnarring at each other's heels. Of the practical progress in one direction, however, there can be no doubt; no one can dispute, *viz.*, the enormous increase in the comfort of each individual life. Collectively the human race, or portions of it at any rate, may have in the past enjoyed periods of greater repose, and longer intervals of freedom from strife and anxiety; but the day has never been when the unit has been of such value, when the man, and the man alone, has been so much the measure, when the individual as a living organism has seemed so sacred, when the obligations to regard his rights have seemed so imperative. But these changes are as naught in comparison with the remarkable increase in his physical well-being. The bitter cry of Isaiah that with the multiplication of the nations their joys had not been increased, still

* Remarks made at the opening of the new building of the Medical Faculty McGill College, by William Osler, M.D., F.R.C.P., Lond., Professor of Medicine Johns Hopkins University, Baltimore.

echoes in our ears. The sorrows and troubles of men, it is true, may not have been materially diminished, but bodily pain and suffering, though not abolished, have been assuaged as never before, and the share of each in the *Weltschmerz* has been enormously lessened.

Sorrows and griefs are companions sure sooner or later to join us on our pilgrimage, and we have become perhaps more sensitive to them, and perhaps less amenable to the old time remedies of the physicians of the soul; but the pains and woes of the body, to which we doctors minister, are decreasing at an extraordinary rate, and in a way that makes one fairly gasp in hopeful anticipation.

In his *Grammar of Assent*, in a notable passage on suffering, John Henry Newman asks, "Who can weigh and measure the aggregate of pain which this one generation has endured, and will endure, from birth to death? Then add to this all the pain which has fallen and will fall upon our race through centuries past and to come." But take the other view of it—think of the Nemesis which has overtaken pain during the past fifty years! Anaesthetics and antiseptic surgery have almost manueled the demon, and since their introduction the aggregate of pain which has been prevented far outweighs in civilized communities that which has been suffered. Even the curse of travail has been lifted from the soul of woman.

The greatest art is in the concealment of art, and I may say that we of the medical profession excel in this respect. You of the public who hear me go about the duties of the day profoundly indifferent to the facts I have just mentioned. You do not know, many of you do not care, that for the cross-legged Juno who presided over the arrival of your grandparents, there now sits a benign and straight-legged goddess. You take it for granted that if a shoulder is dislocated there is chloroform and a delicious Nipentle instead of the agony of the pulleys and paraphernalia of fifty years ago. You accept with a selfish complacency, as if you were yourselves to be thanked for it, that the arrows

of destruction fly not so thickly, and that the pestilence now rarely walketh in the darkness; still less do you realize that you may now pray the prayer of Hezekiah with a reasonable prospect of its fulfillment, since modern science has made to almost everyone of you the present of a few years.

I say you do not know these things. You hear of them, and the more intelligent among you perhaps ponder them in your hearts, but they are among the things which you take for granted, like the sunshine, and the flowers, and the glorious heavens.

'Tis no idle challenge which we physicians throw out to the world when we claim that our mission is of the highest and of the noblest kind, not alone in curing disease but in educating the people in the laws of health, and in preventing the spread of plagues and pestilences; nor can it be gainsaid that of late years our record as a body has been more encouraging in its practical results than those of the other learned professions. Not that we all live up to the highest ideals, far from it—we are only men. But we have ideals, which means much, and they are realizable, which means more. Of course there are Gehazis among us who serve for shekels, whose ears hear only the lowing of the oxen and the jingling of the guineas, but these are exceptions, and the rank and file labour earnestly for your good, and self-sacrificing devotion to your interests animates our best work.

The exercises in which we are to-day engaged form an incident in this beneficent work which is in progress everywhere: an incident which will enable me to dwell upon certain aspects of the university as a factor in the promotion of the physical well-being of the race.

A great university has a dual function, to teach and to think. The educational aspects at first absorb all its energies, and in the equipment of the various departments and in providing salaries, it finds itself hard pressed to fulfil even the first of these duties. The Dean has told us

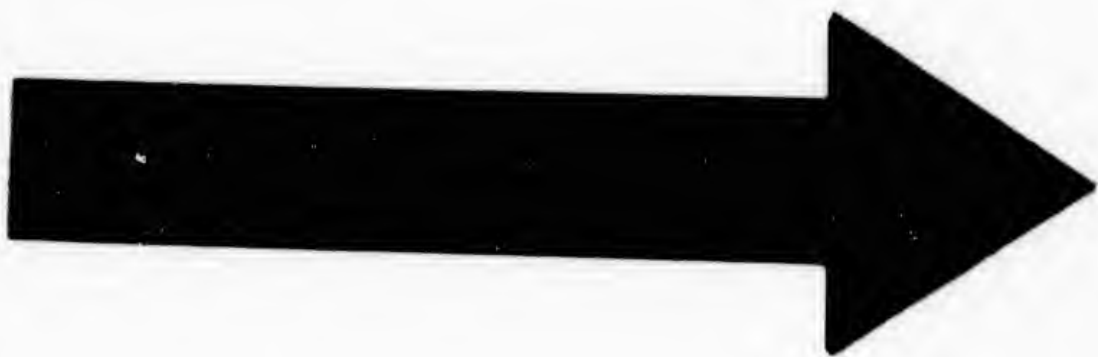
the story of the progress of the medical school of this institution, which illustrates the struggles and difficulties, the worries and vexations attendant upon the effort to place it in the first rank as a teaching body. I know them well, since I was in the thick of them for ten years, and see to-day the realization of many of my day-dreams. Indeed in my wildest flights I never thought to see such a splendid group of buildings as I have just inspected. We were modest in those days, and I remember when Dr. Howard showed me in great confidence the letter of the Chancellor in which he conveyed his first generous bequest to the Faculty, it seemed so great that in my joy I was almost ready to sing my *Nunc dimittis*. The great advances, here at the Montreal General Hospital and at the Royal Victoria (both of which institutions form most essential parts of the medical schools of this city) mean increased teaching facilities, and of necessity better equipped graduates, better equipped doctors! Here is the kernel of the whole matter, and it is for this that we ask the aid necessary to build large laboratories and larger hospitals in which the student may learn the science and art of medicine. Chemistry, anatomy and physiology give that perspective which enables him to place man and his diseases in their proper position in the scheme of life, and afford at the same time that essential basis upon which alone a trustworthy experience may be built. Each one of these is a science in itself, complicated and difficult, demanding much time and labour for its acquisition, so that in the few years which are given to their study the student can only master the principles and certain of the facts upon which they are founded. Only so far as they bear upon a due understanding of the phenomena of disease do these subjects form part of the medical curriculum, and for us they are but means—essential means it is true—to this end. A man cannot become a competent surgeon without a full knowledge of human anatomy and physiology, and the physician without physiology and chemistry flounders along in an aimless fashion, never able to gain any accurate conception

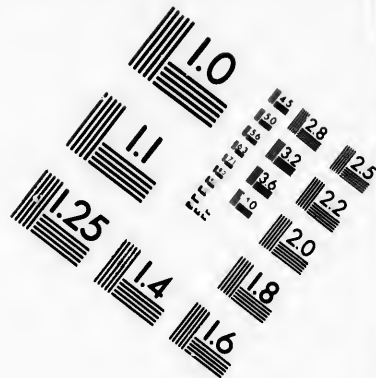
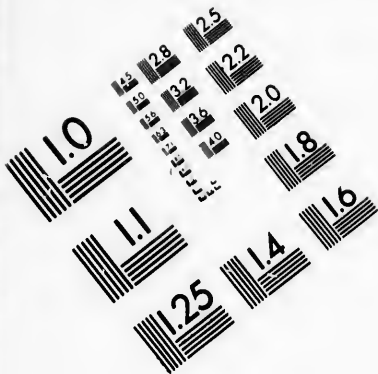
of disease, practising a sort of pop-gun pharmacy, hitting now the mark and again the patient, he himself not knowing which.

The primary function of this department of the university is to teach men disease, what it is, its manifestations, how it may be prevented, and how it may be cured; and to learn these things the four hundred young men who sit on these benches have come from all parts of the land. But it is no light responsibility which a faculty assumes in this matter. The task is not easy, being beset with countless difficulties, some inherent in the subject, others inherent in the men themselves, and not a few bound up with the "fool multitude" among which we doctors work.

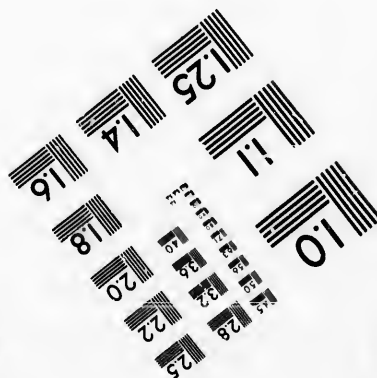
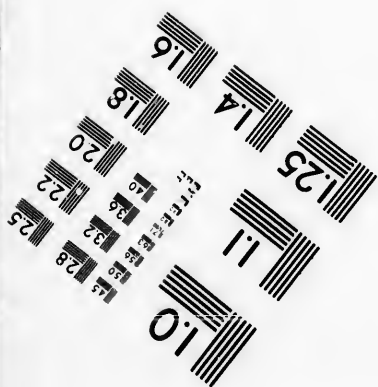
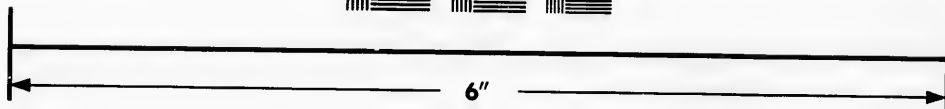
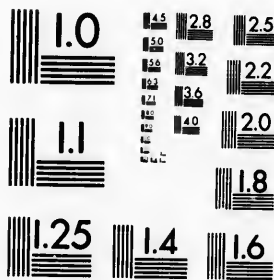
The processes of disease are so complex that it is excessively difficult to search out the laws which control them, and although we have seen a complete revolution in our ideas, what has been accomplished by the new school of medicine is only an earnest of what the future has in store. The three great advances of the century have been a knowledge of the mode of controlling epidemic diseases, the introduction of anesthetics, and the adoption of anti-septic methods in surgery. Beside them all others sink into insignificance, as these three contribute so enormously to the personal comfort of the individual. The study of the causes of so-called infectious disorders has led directly to the discovery of the methods for their control; for example, such a scourge as typhoid fever becomes almost unknown in the presence of perfect drainage and an uncontaminated water supply. The outlook, too, for specific methods of treatment in these affections is most hopeful. The public must not be discouraged by a few, or even by many failures. The thinkers who are doing the work for you are on the right path, and it is no vain fancy that before the twentieth century is very old there may be effective vaccines against many of the contagious diseases.

But a shrewd old fellow remarked to me the other day, "Yes, many diseases are less frequent, others have disap-





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peared, but new ones are always cropping up, and I notice that with it all there is not only no decrease, but a very great increase in the number of doctors."

The total abolition of the infectious group we cannot expect, and for many years to come there will remain hosts of bodily ills, even among preventable maladies, to occupy our labours; but there are two reasons which explain the relative numerical increase in the profession in spite of the great decrease in the number of certain diseases. The development of specialties has given employment to many extra men who now do much of the work of the old family practitioner, and again people employ doctors more frequently and so give occupation to many more than formerly.

It cannot be denied that we have learned more rapidly how to prevent than how to cure diseases, but with a definite outline of our ignorance we no longer live now in a fool's Paradise, and fondly imagine that in all cases we control the issues of life and death with our pills and potions. It took the profession many generations to learn that fevers ran their course influenced very little, if at all, by drugs, and the £60 which old Dover complained were spent in medicine in a case of ordinary fever about the middle of the last century is now better expended on a trained nurse, with infinitely less risk, and with infinitely greater comfort to the patient. Of the difficulties inherent in the art not one is so serious as this which relates to the cure of disease by drugs. There is so much uncertainty and discord even among the best authorities (upon non-essentials it is true) that I always feel the force of a well-known stanza in "Rabbi Ben Ezra," which, however, I could not quote in the tender ears of students.

One of the chief reasons for this uncertainty is the increasing variability in the manifestations of any one disease. As no two faces, so no two cases are alike in all respects, and unfortunately it is not only the disease itself which is so varied, but the subjects themselves have peculiarities which modify its action.

With the diminished reliance upon drugs, there has been a return with profit to the older measures of diet, exercise, baths, and frictions, the remedies with which the Bythénian Aselepiades doctored the Romans so successfully in the first century. Though used less frequently, medicines are now given with infinitely greater skill: we know better their indications and contradictions, and we may safely say (reversing the proportion of fifty years ago) that for one damaged by dosing, one hundred are saved.

Many of the difficulties which surround the subject relate to the men who practice the art. The commonest as well as the saddest mistake is to mistake one's profession, and this we doctors do often enough, some of us without knowing it. There are men who have never had the preliminary education which would enable them to grasp the fundamental truths of the science on which medicine is based. Others have poor teachers, and never receive that bent of mind which is the all important factor in education; others again fall early into the error of thinking that they know it all, and benefiting neither by their mistakes or their successes, miss the very essence of all experience, and die bigger fools, if possible, than when they started. There are only two sorts of doctors; those who practice with their brains, and those who practice with their tongues. The studious, hard working man who wishes to know his profession thoroughly, who lives in the hospitals and dispensaries, and who strives to obtain a wide and philosophical conception of disease and its processes, often has a hard struggle, and it may take years of waiting before he becomes successful; but such form the bulwarks of our ranks, and outweigh scores of the voluble Casios who talk themselves into, and often out of, practice.

Now of the difficulties bound up with the "fool multitude" in which we doctors work, I hesitate to speak in a mixed audience. Common sense in matters medical is rare, and is usually in inverse ratio to the degree of education. I suppose as a body, clergymen are better educated

than any other, yet they are notorious supporters of all the nostrums and humbuggery with which the daily and religious papers abound, and I find that the further away they have wandered from the decrees of the Council of Trent, the more apt are they to be steeped in thaumaturgic and Galenic superstition. But know also, man has an inborn craving for medicine. Generations of heroic dosing have given his tissues such a thirst that even young infants in the higher circles of society have been known to cry for certain drugs. As I once before remarked, the desire to take medicine is the one feature which distinguishes man the animal, from his fellow creatures. It is really one of the most serious difficulties with which we have to contend. Even in minor ailments, which would yield to dieting or to simple home remedies, the doctor's visit is not thought to be complete without the prescription. And now that the pharmacists have cloaked even the most nauseous remedies, the temptation is to use medicine on every occasion, and I fear we may return to that state of polypharmacy, the emancipation from which has been the gift of Hahnemann and his followers to the race. As the public becomes more enlightened, and as we get more sense, dosing will be recognized as a very minor function in the practice of medicine in comparison with the old measures of Aesclepiades.

After all, these difficulties—in the subject itself, in us, and in you—are lessening gradually, and we have the consolation of knowing that year by year the total amount of unnecessary suffering is decreasing at a rapid rate.

In teaching men what disease is, how it may be prevented, and how it may be cured, a University is fulfilling one of its very noblest functions. The wise instruction and the splendid example of such men as Holmes, Sutherland, Campbell, Howard, Ross, Macdonnell, and others have carried comfort into thousands of homes throughout this land. The benefits derived from the increased facilities for the teaching of medicine which have come with the great changes made here and at the hospitals during the past

few years, will not be confined to the citizens of this town, but will be widely diffused and felt in every locality to which the graduates of this school may go : and every gift which promotes higher medical education, and which enables the medical faculties throughout the country to turn out better doctors, means fewer mistakes in diagnosis, greater skill in dealing with emergencies, and the saving of pain and anxiety to countless sufferers and their friends.

The physician needs a clear head and a kind heart : his work is arduous and complex, requiring the exercise of the very highest faculties of the mind, while constantly appealing to the emotions and finer feelings. At no time has his influence been more potent, at no time has he been so powerful a factor for good, and as it is one of the highest possible duties of a great University to fit men for this calling, so it will be your highest mission, students of medicine, to carry on the never-ending warfare against disease and death, better equipped, abler men than your predecessors, but animated with their spirit and sustained by their hopes, " for the hope of every creature is the banner that we bear."

The other function of a University is to think. Teaching current knowledge in all departments, teaching the steps by which the *status præsens* has been reached, and teaching how to teach, form the routine work of the various college faculties, which may be done in a perfunctory manner by men who have never gone deeply enough into their subjects to know that really thinking about them is in any way important. What I mean by the thinking function of a University, is that duty which the professional corps owes to enlarge the boundaries of human knowledge. Work of this sort makes a University great, and alone enables it to exercise a wide influence on the minds of men.

We stand to-day at a critical point in the history of this faculty. The equipment for teaching, to supply which has taken years of hard struggle, is approaching completion, and with the co-operation of the General and the Royal

Victoria Hospitals students can obtain in all branches a thorough training. We have now reached a position in which the higher university work may at any rate be discussed, and towards it progress in the future must trend. It may seem to be discouraging, after so much has been done and so much has been so generously given, to say that there remains a most important function to foster and sustain, but this aspect of the question must be considered when a school has reached a certain stage of development. In a progressive institution the changes come slowly, the pace may not be perceived by those most concerned, except on such occasions as the present, which serve as landmarks in its evolution. The men and methods of the old Coté street school were better than those with which the faculty started; we and our ways at the new building on University street were better than those of Coté street; and now you of the present faculty teach and work much better than we did ten years ago. Everywhere the old order changeth, and happy those who can change with it. Too many, like the defeated gods in Keats' Hyperion, unable to receive the balm of the truth, resent the wise words of Oceanus (which I quoted here with very different feelings some eighteen years ago in an introductory lecture):

"Still on our heels a fresh perfection treads,

* * * * * born of us,

Fated to excel us."

Now the fresh perfection which will tread on our heels will come with the opportunities for higher university work. Let me indicate in a few words its scope and aims. Teachers who teach current knowledge are not necessarily investigators; many have not had the needful training; others have not the needful time. The very best instructor for students may have no conception of the higher lines of work in his branch, and contrariwise, how many brilliant investigators have been wretched teachers? In a school which has reached this stage and wishes to do thinking as well as teaching, men must be selected who are not only thoroughly *au courant* with the best work in their depart-

ment the world over, but who also have ideas, with ambition and energy to put them into force,—men who can add, each one in his sphere, to the store of the world's knowledge. Men of this stamp alone confer greatness upon a university. They should be sought for far and wide; an institution which wraps itself in Strabo's cloak and does not look beyond the college gates in selecting professors may get good teachers, but rarely good thinkers.

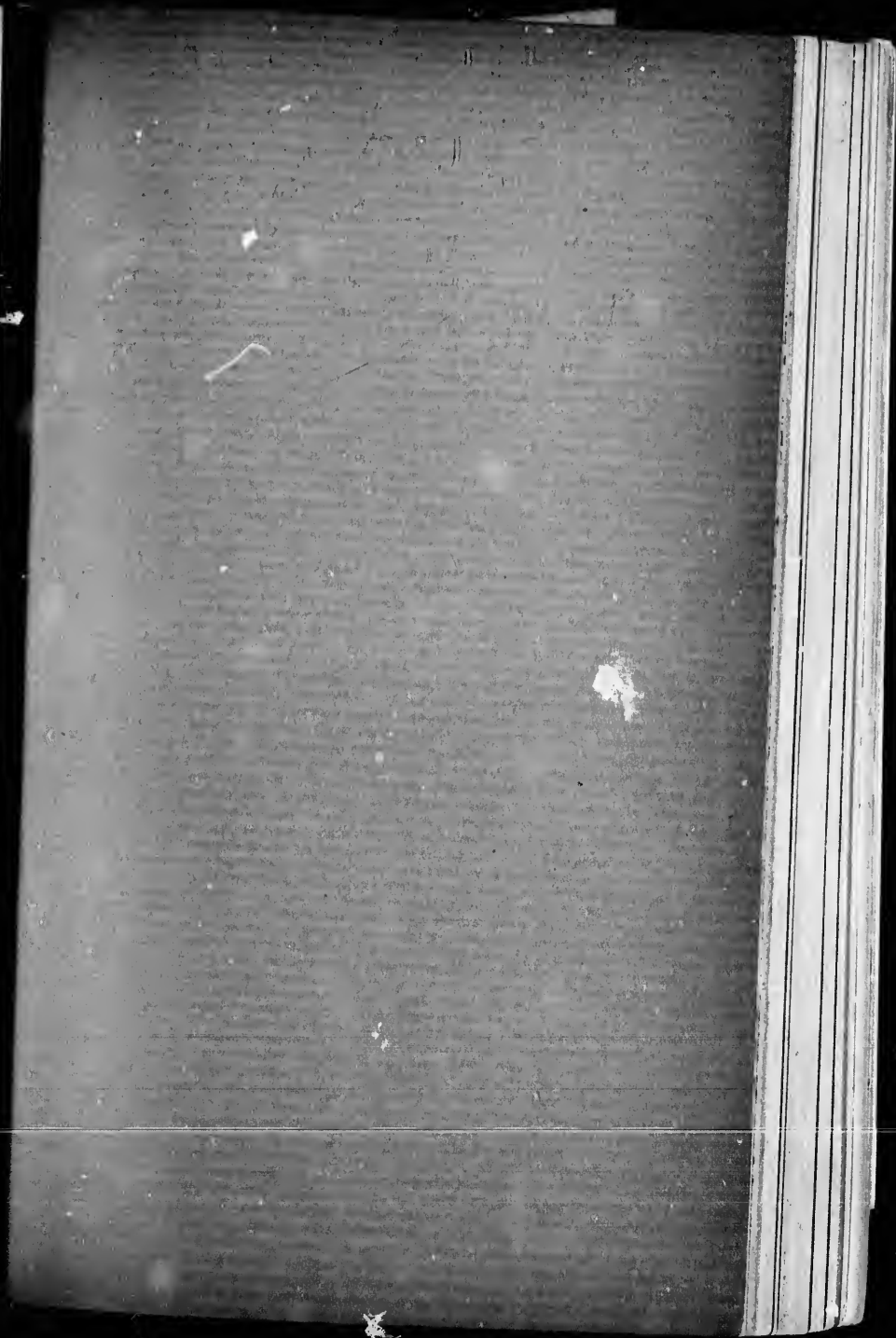
One of the chief difficulties in the way of advanced work is the stress of routine class and laboratory duties, which often saps the energies of men capable of higher things. There are two essential provisions, first, to give the professors plenty of assistance, so that they will not be worn out with teaching; and, second, to give encouragement to graduates and others to carry on researches under their direction. With a system of fellowships and research scholarships a university may have a body of able young men, who on the outposts of knowledge are exploring, surveying, defining and correcting. Their work is the outward and visible sign that a university is thinking. Surrounded by a group of bright young minds, well trained in advanced methods, not only is the professor himself stimulated to do his best work, but he has to keep far afield and to know what is stirring in every part of his own domain.

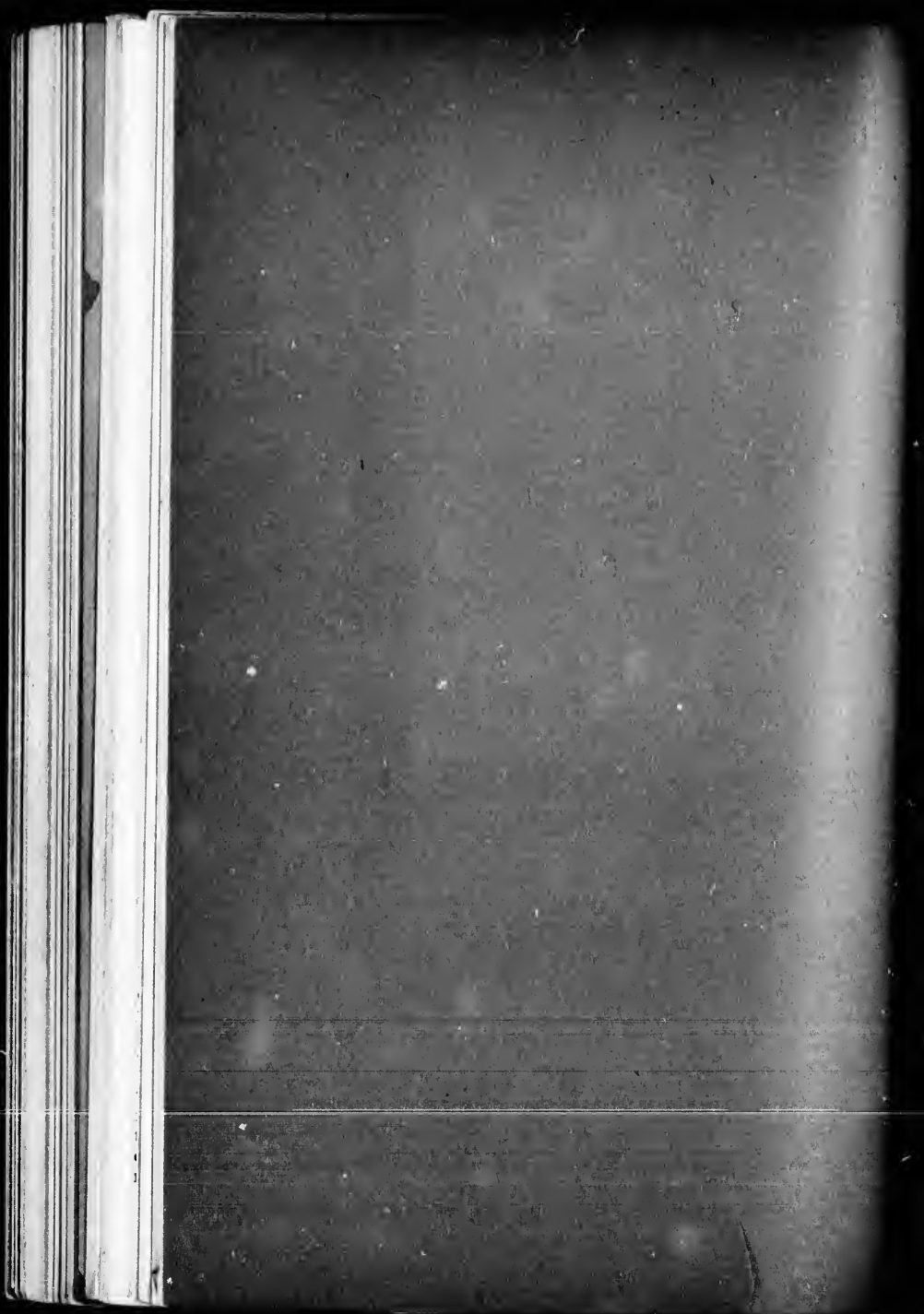
With the wise co-operation of the university and the hospital authorities Montreal should become the Edinburgh of America, a great medical centre to which men will flock for sound learning, whose laboratories will attract the ablest students, and whose teaching will go out into all lands, universally recognized as of the highest and of the best type.

Nowhere is the outlook more encouraging than at McGill. What a guarantee for the future does the progress of the past decade afford! No city on this continent has so liberally endowed higher education. There remains now to foster that undefinable something which, for want

of a better term, we call the university spirit, a something which a rich institution may not have, and with which a poor one may be saturated, a something which is associated with men and not with money, which cannot be purchased in the market or grown to order, but which comes insensibly with loyal devotion to duty and to high ideals, and without which *Nehushtan* is written on its portals.

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Case of Sporadic Cretinism (Infantile Myx-
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Thyroid Extract.

BY

WILLIAM OSLER, M.D.

Professor of Medicine, Johns Hopkins University

FROM

ARCHIVES OF PEDIATRICS,

February, 1895.

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CASE OF SPORADIC CREPINISM (INFANTILE
MYXCEDEMA) TREATED SUCCESSFULLY
WITH THYROID EXTRACT.

BY WILLIAM OSLER, M.D.

Professor of Medicine, Johns Hopkins University.

In my paper upon sporadic cretinism in America, read before the Association of American Physicians, in May 1893, I reported three cases of this disorder. One of these which had been under Dr. Booker's observation, subsequently passed out of sight. The other cases have been treated with the thyroid extract. In the girl aged nineteen the treatment has not been very systematically carried out by the patients, and the condition has not materially improved.

In the third case the results have been truly remarkable. I give the notes in full from the American Journal of Medical Sciences, Nov., 1893.

M., aged two years and three months, was brought to me first from the Eastern Shore of Maryland, January 10, 1892. The parents (first cousins) are healthy and strong. No hereditary ailments on either side; no members of the family have had goitre. The patient was the second child; the labor was easy, and she throve well. Nothing special was noticed about the child until the end of the first year, when it was suspected something might be wrong, as she had not cut her teeth, and did not attempt to walk or to talk. Throughout her second year she grew fairly well, but had several attacks of slight fever, and did not develop as other children, making no attempts to crawl or to walk, and seemed unnaturally quiet and dull. She did not cut the incisor teeth until she was nearly two years old. Within the past six months she has changed remarkably in color, has become very pale and waxy, and the face and limbs seem puffy

and swollen. She has taken milk well, and has developed a little mentally; smiles, and attempts to repeat her own name when it is said, and has learned to say "mamma" and "papa."

Present Condition.—Under-sized child for her age. Aspect is very striking; color pale; face, very broad across; the mouth is open; tongue protrudes, and is evidently enlarged; the lips are full and heavy; the cheeks very large, almost pendulous; the hair is almost straight; the eyes are blue; the sclerotics very pale; the eyelids glossy and infiltrated. The forehead is large, not badly shaped; the head well formed, rather prominent behind; the anterior fontanelle is not quite closed. She looks good-tempered, but takes very little notice, and smiles in a feeble way. The facial aspect is that of a cretinoid idiot. The muscles of the arms are feebly developed; the subcutaneous tissues are much infiltrated; the hands are swollen and glossy—not tense, and look œdematous, but the infiltration is firm, and only yields on prolonged pressure. The legs look large; the thighs present several folds; the skin looks glossy, and the subcutaneous tissues are much infiltrated. The skin over the dorsal portion of the feet is very glossy and tense, and on firm pressure pits with distinctness. The abdomen is distended and the superficial veins prominent. Palpation is negative; the edge of the liver is palpable about six cm. below the costal margin. The edge of the spleen is not palpable, nor does the organ appear to be enlarged. The thorax is well formed; no trace of rickety enlargement of the ends of the ribs; no evidences of rickets in the long bones. The apex-beat of the heart is just within the nipple line. There is a systolic murmur with the first sound, which is loud and intense at the pulmonary cartilage; the breath sounds are clear. There is no enlargement of the superficial lymphatic glands; the thyroid gland is not enlarged; the cricoid cartilage can be well felt, as can also the entire trachea as low as the sternum, and it can be taken between the two fingers quite plainly. Dr. Halsted thought he could feel the thyroid beneath the sternomastoid muscle. The percussion note on the first bone of the sternum is clear. The examination of the blood showed a moderate increase of leucocytes and some irregularity in the size of the red blood-corpuscles.

The condition was diagnosed sporadic cretinism. As it was evident that the blood condition of the child was very much below par, she was ordered the syrup of the iodide of iron.

March 1, 1893.—Patient brought again to-day. In the year and two months which have elapsed since I saw the child she has improved remarkably. She is now three-and-a-half years old. Her height is 75 cm. She looks more intelligent, takes more notice, and the facial expression is decidedly brighter. She tries to say a few words, and has begun to walk with a little assistance. The most striking changes are the disappearance in great part of the anæmia and lessening of the subcutaneous œdema which was so marked a feature. She still has a little infiltration about the eyelids and cheeks. The limbs also look full, and they are firm. The skin is a little glossy over the hands and feet. The tongue does not protrude so often from the mouth, though when the face is in repose it is frequently seen protruding slightly. The face looks broad and full, and the expression and aspect are still cretinoid; head is 51.5 cm. in circumference, the abdomen 54.5 cm. The neck is thick and short, and presents a large transverse fold of fat. The thyroid gland is not palpable, and below the thyroid cartilage the trachea can be felt with the greatest distinctness and grasped between the fingers down to the sternum.

Treatment with the thyroid extract was begun in March 1893. At first Dr. Hewetson, one of my assistants, who superintended the treatment of the case, prepared the glycerine extract, and the child took an amount corresponding to about a quarter of the gland in the twenty-four hours. This she took throughout the summer and autumn, but for the past four or five months she has been taking the desiccated gland.

The child was brought to me on April 28, 1894. The change has been of an extraordinary character, and is manifest: first, in entire loss of the cretinoid aspect; the color is good, the nutrition evidently very much improved, the flesh firm and solid; second, she has begun to develop rapidly, and in the fourteen months which have elapsed since the last measurements she has grown four inches in height; third, she now walks and runs about everywhere; and fourth, the mental development has been proportionately striking. Fourteen months ago, though she would try to say a few words, her vocabulary was confined to mamma and papa, but she now talks clearly, and says almost everything.

No one meeting the child for the first time would have any idea that there was anything peculiar about her, though she is, of course, still undersized, undeveloped,

and does not talk so plainly as a child of four years and eight months.

The case adds another to those in which beneficial effects have followed the administration of the thyroid extract in infantile myxœdema.

Oct. 1894.—The improvement in this case continues. I saw the patient again in July. She is a very bright active child, in whom no one would notice that there had been anything wrong, and in whom no one would notice anything amiss except, perhaps, that she does not talk as plainly as a child should at her age.

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ARCHIVES OF PEDIATRICS

EDITED BY

DILLON BROWN, M. D.,

Adjunct Professor of Pediatrics in the New York Polyclinic, etc.

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TYPHOID FEVER IN COUNTRY DISTRICTS.

BEING THE SUBJECT FOR GENERAL DISCUSSION AT THE NINETY-SEVENTH ANNUAL SESSION OF THE MEDICAL AND CHIRURGICAL FACULTY OF THE STATE OF MARYLAND.

By *William Osler, M. D.*,
Professor of Medicine, Johns Hopkins University.

Reprinted from the MARYLAND MEDICAL JOURNAL, May 11, 1895.

THE dwellers in cities have a very deep concern in the prevalence of typhoid fever in country towns and districts. In the first place we treat in the city many cases which originate in the country, cases which too often go to swell our mortality bills. During the past six years I have had under my care in the public or private wards of the Johns Hopkins Hospital 89 patients who have come from outside the city limits. The figures are as follows, from a total of nearly 400 : Patients from Baltimore County, 58 ; from Maryland outside Baltimore County, 14 ; from outside Maryland, 17.

Secondly, we take our holidays in the country at the latter half of the summer and in the autumn, the very seasons when typhoid fever is most prevalent. Since we have no means of knowing the number of cases which occur annually in the city, we have of course no way of ascertaining how many have been the unfortunates who, in seeking health in country resorts and seaside places, have found serious illness and not infrequently death. General impressions are not of much value, but I think there are many doctors in practice in this town who could give some specific figures as to the number of persons who have returned to town with the disease, or who

have been attacked while in the country. Cases of the kind have not infrequently come under my observation during the past five or six years, and I know of instances in which many members of a family have been infected during their residence in country places.

Thirdly, our water supply is derived from streams which pass through fairly populous districts in which every autumn typhoid fever prevails.

And lastly, the country sends daily for our consumption an enormous quantity of a food material ; namely, milk which is especially liable under suitable circumstances to infection with typhoid germs.

The following questions may be profitably discussed by this meeting : First the prevalence of typhoid fever in country districts. We naturally turn for the statistics to the Report of the State Board of Health. So far as I can recall in the last published report of this board for the years 1892-93 the references to typhoid fever are very scanty, and no statements are to be found from which one may glean any information about the incidence of the disease in the counties and towns of the State. I would like very much to ask the Chairman and the Secretary of the Board the reason for this omission. The matter is of ex

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treme importance and directly concerns the health of the citizens. I suppose the absence of all facts relating to the subject is due to an imperfect organization of the Board.

While the notification of cases of typhoid fever is not compulsory there must be great difficulty in getting accurate figures as to the prevalence of the disease. We are not a whit better off in the city. There were 257 deaths (I include the typho-malarial fevers) last year (1894), but who can tell us how many cases? Shall we put the mortality at 10 per cent. and say 2570, or at 15 per cent. and say 3855 cases? We may take no small shame upon ourselves as a profession that such a state exists. It is useless to scold Dr. McShane or to abuse the members of the State Board of Health. Such a condition at this end of the century is a disgrace to us as a profession, and to us individually. The Report of the State Board to which I referred indicates weakness, inherited or acquired, of a most disastrous quality, and if any member of this ancient and honorable Faculty can read the same without a blush I am sorry for his intellectual medulla.

The notification of every case of typhoid fever in the city and throughout the State should be enforced at the earliest possible date. We could then ascertain the percentage of cases which really originate within the city limits, and by a proper system of co-operation of the County and State Boards every local outbreak could be studied and precautionary measures taken.

A second point which can be discussed with advantage relates to conditions in the smaller towns and country places favoring the development and spread of typhoid fever. Outbreaks of typhoid fever in a town like Cumberland, in which the people had been drinking water contaminated by the sewage of from $\frac{1}{3}$ to $\frac{1}{4}$ of the population, are of course not remarkable. But such outbreaks are not nearly so dangerous to us in the city as the smaller house-epidemics in country places, which are by no means uncommon. In many of these it is extremely difficult to trace the in-

fection, as the remarkable one which I put on record a few years ago. In a farm house in Harford County, in which during the months of August, September, October and November there were ten cases with four deaths; three of these followed the arrival of a member of the family from Ocean City, with what was thought to be malaria, but which turned out to be severe typhoid. The water supply in this instance was certainly not contaminated, since it was used in common with another large family consisting of many persons at the susceptible age. Here the food supply might have become in some way infected though Dr. Sappington, who had charge of the cases, seemed to think that it was most probably transmitted by direct contagion.

A State board of health of any efficiency would receive early notification of every house outbreak, and with a proper corps of inspectors, suitable means could be taken to prevent, at any rate, diffusion of the poison. How interesting it would be to know just how many cases of the disease occurred last autumn along the watershed of the Gunpowder and Jones' Falls, both of which streams are liable to pollution. We can never be free from danger on this score until the city has complete control of the streams.

The third point for discussion, and in reality the most important one, relates to the possible contamination of the milk supply of this city. How many cases of typhoid fever occur in the families of those who in this State supply milk to the citizens of this town. Can Dr. McShane answer, or can any member of the State Board of Health answer, or if they cannot, can they tell us how to obtain the facts at our next typhoid season so that an answer could be given? The dairy industry, as we all know, is enormous, and one of the greatest imports in the health of the city. The readiness with which typhoid fever is transmitted by milk has been amply demonstrated; nor does it require that a man ill himself with typhoid fever should milk cows or be in contact with the milk. A man whose boy is ill with

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the disease, or the woman who has been nursing her daughter, may readily, in several ways, carry the infection.

As a medium for the development of the typhoid bacilli milk is well known to be most favorable. It is probably not alone from the water of a contaminated well used for washing the milk cans that infection arises, but in many instances from the direct contact of dirty hands with the milk or with the vessels in which it is placed. The only possible safeguard is in a rigid system of inspection of every dairy which supplies milk to the city, an inspection which should be frequent, systematic and thorough.

I have no desire to take up the time of the Faculty with figures from other localities. There are those which show, as in New York State, that while typhoid is progressively decreasing in our large cities, it is progressively increasing in the country districts. Baltimore, with a mortality from this preventable of between 5 and 6 per 10,000 of popu-

lation, ranks with the unsewered towns, the sanitary conditions of which are still antique. We shall probably never reduce the death rate from this disease to the ratio of modern cities until the cesspool system is completely abolished. But before that great work is undertaken, the citizens should demand that at any rate the sources of contamination from outside should be reduced to a minimum; that our sources of water supply should be scrupulously guarded; and that our citizens should be guarded against all possibility of infection through the milk.

The points, I think, which could be discussed with advantage this evening are:

1. The actual prevalence of typhoid fever in the country districts and small towns throughout this State.

2. The measures which should be adopted to prevent contamination of our water supply.

3. The question of the inspection of dairy farms.

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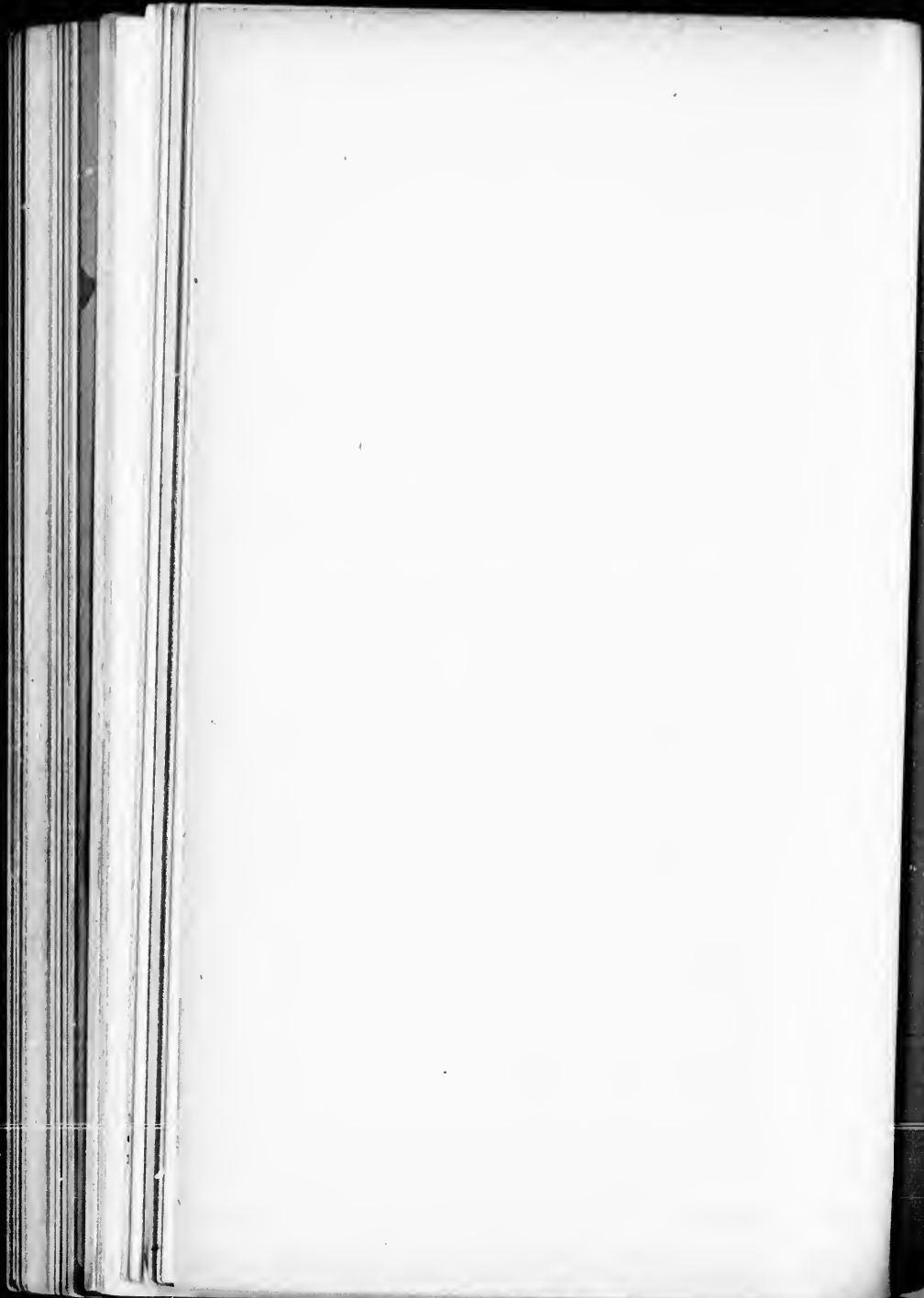
VISIBLE CONTRACTILE TUMOUR OF THE PYLORUS
FOLLOWING ULCER OF THE STOMACH.

BY

WILLIAM OSLER, M.D., LL.D., F.R.C.P..

Professor of Medicine, Johns Hopkins University. Baltimore.

Reprinted from the Montreal Medical Journal, August, 1895.



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VISIBLE CONTRACTILE TUMOUR OF THE PYLORUS FOLLOWING ULCER OF THE STOMACH.

By WILLIAM OSLER, M.D., LL.D., F.R.C.P.,
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In stricture of the orifice one can not infrequently feel the contractions in the enormously hypertrophied pyloric region of the stomach. In such cases a wave of peristalsis may be felt, during which the anterior wall of the organ hardens, and then, as the wave approaches the pylorus, a firm, hard mass may be grasped, which gradually relaxes, sometimes with a gurgling of gas. In very thin patients with much dilatation of the stomach the peristalsis is readily to be seen and the pyloric tumour may also become visible. In the following case the tumour at the pylorus was remarkably distinct, and as it hardened in contraction lifted the skin in the epigastric region, so that a prominent mass could be seen even at a distance. The large size of the tumour suggested the possibility of carcinoma, but the history, and the evident muscular character of the mass, made me feel sure that it was chiefly due to the hypertrophied muscularis.

The subsequent history of the case, too, is of interest. Successful gastro-enterostomy was performed by Dr. Bressler, and three weeks subsequently the Murphy button which had been used perforated the colon, causing fatal peritonitis.

Attacks of gastralgia—Hæmatemesis—Prominent tumour at pylorus, which relaxes and contracts and appears and disappears beneath the skin—Dilatation of the stomach—Gastro-enterostomy; perforation of the colon by the Murphy button.

B. S., aged 28, admitted to the Johns Hopkins Hospital December 1st, 1893, complaining of pains in the stomach. His family history is good.

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He has been healthy, with the exception of attacks of dyspepsia. He uses alcohol in moderation.

In May, 1892, after an indiscretion in diet, he had cramp-like pains in the left side of the abdomen. The attack did not last very long but the pains recurred in a few days and continued for about a month at varying intervals. They had no relation to meals, and although he was often nauseated, he only occasionally vomited. He was confined to bed in this illness and lost considerably in weight. From his description it was evident that the pain was of very great severity. After getting up he felt fairly well, except for an occasional dull, aching pain in the abdomen. He kept at work and was very well all through the summer and autumn.

In December, 1892, he again began to have attacks of pain, cramp-like in character and of great severity, coming on as a rule three or four hours after meals and lasting for an hour or two. Throughout the winter of 1892-93 he was in the house and in bed a great part of the time, not able to work. Towards the spring he vomited at intervals large quantities of food, a quart at a time. In May he vomited blood in large amounts. He said it looked like finely minced liver; for several days afterwards the stools were dark and tarry. After this he got quite well, the appetite returned, he gained in weight, and went back to work. Towards the latter part of the summer he noticed a lump in the left side of the abdomen, which has increased in size. A week ago the patient had a return of the severe cramp-like spasms, and he has since vomited blood four times, not, however, in very large amounts.

On admission the patient looked a little emaciated, but the lips and mucous membranes were of fairly good colour; no fever; weight 128 pounds. Examination of the thoracic organs is negative. The abdomen looks natural; the left epigastric region is perhaps a little fuller than the right. The stomach occupies a small area almost completely covered by the ribs. It does not extend lower than the seventh space on the left side. On deep inspiration an elongated mass is felt $\frac{1}{2}$ inch from beneath the costal margin. After dilatation with bicarbonate of soda and tartaric acid the left epigastric region becomes much fuller. The mass is now to the right of the middle line, feels firm and hard, and gas can be felt bubbling through it. The area of stomach tympany is greatly increased, extending almost to the umbilicus and passes the median line. Above it extends nearly to the nipple. On inspection waves of contraction are seen to pass from left to right, and there is a distinct hour-glass contraction. Liver and spleen are not enlarged. At 9.45 a.m. the patient's stomach was emptied and washed, and the milk he had taken at 7 a.m. came out

curdled, and but little diminished in amount. At 12.30 the patient took 250 cc. of clear broth, from 50 to 100 grammes of meat cut small, about the same amount of bread and 250 cc. of water. At 5.30 p.m. about 250 cc. of fluid mucus with finely divided food, yellowish brown in colour and with a rancid odour, were removed. This reacted with phloroglucin-vanillin for HCl, and with Ullmann's test for lactic acid. Peptones were present; 10 cc. were neutralized by 13.5 cc. of deci-normal sodium hydrate solution, and 10 cc. of the juice shaken thoroughly with ether were neutralized by 10.2 cc. of deci-normal sodium hydrate.

The patient was ordered five grains of bicarbonate of soda every two hours in milk. He improved rapidly, gained in weight, took small quantities of food at short intervals, and seemed to be doing well. The test meals always gave a marked increase in the total acidity.

Special attention was directed to the condition of the tumour. It was extremely variable in position, depending entirely upon the degree of distension of the stomach. Shortly after admission it was noticed that the tumour mass was visible beneath the skin, appearing and disappearing. On watching the epigastric region an elevation of the skin took place, usually midway between the navel and the ensiform cartilage, and a definite tumour projected, which could be seen plainly at some distance away. After remaining for from half a minute to a minute it gradually disappeared. On palpation, when visible, there is to be felt an extremely firm, hard, somewhat sausage-shaped mass, which, as it disappears, relaxes and gets soft. There is no visible peristalsis, except when the stomach is inflated.

The patient remained in the hospital throughout December, gained somewhat in weight, and took his food well. He was discharged January 7th, 1894.

On January 15th he was re-admitted, complaining of a severe burning pain in the epigastrium, only relieved by eating. While at home he took from five to ten grains of bicarbonate of soda every two hours. Shortly after admission I made the following note: "The tumour mass in the abdomen appears and disappears as formerly noted. It occupies a position to the left of the median line. The variations in it are very striking. As it contracts and becomes hard it lifts the skin and can be then plainly seen. As the contraction relaxes it disappears, often with a sizzling sound, which can be heard, and then becomes much softer to the touch. But even in this state the tubular induration can be felt. There are now, without inflation, slight waves of peristalsis seen to the left of the tumour mass below the costal margin."

January 26th. After having had no food since 10 p.m., the tube was passed at 8 a.m., and 266 cc. of a yellowish brown fluid of the consistency of thin gruel were withdrawn; odor rancid. It reacted strongly to litmus paper, and the phloroglucin-vanillin for acid; no reaction for the lactic acid test. The total acidity was neutralised by 6.5 cc. deci-normal sodium hydrate solution. During the latter part of January the patient did not do so well. There was evidently more dilatation of the stomach, and the waves of peristalsis were plainly seen without artificial inflation. The pyloric tumour was no longer visible, and was felt much further to the right, midway between the navel and the costal border. From three to five hours after the taking of food there was usually found about a litre of yellowish-brown, rancid, frothy fluid.

On February 15th the following note was made: "This morning the outlines of the stomach are very distinct, and the peristalsis active, the pyloric outlines reaching nearly to the right mammillary line. The mass at the pylorus is not nearly so distinct, and is no longer to be felt near the middle line, but can be made out in the right parasternal line, evidently covered by the distended pyloric portion of the stomach. Palpation increases the peristalsis."

On the 26th of February the patient vomited 200 cc. of bright blood. The peristalsis was very active. The greater curvature of the stomach extends two fingers breadth below the level of the navel. The tumour mass to-day is far over in the right hypogastrium. The patient was ordered enemata of peptonized milk and egg, and given only albumen water by the mouth, with bicarbonate of soda every two hours.

28th. The stomach is much redneed; the pyloric tumour is in the median line; there is no peristalsis.

March 2nd. The patient has had no more vomiting, and is much better. The abdomen looks natural; there is no peristalsis. The pyloric tumour is to-day just above and to the right of the umbilicus. The contraction and relaxation are apparent to-day.

The patient during this attack has lost in weight. Thus he weighed 132 pounds on the 13th; he now only weighs 123 pounds.

March 5th. Patient insists on going home; he has been better for the past few days. The dilatation of the stomach has very much lessened. The pyloric tumour is situated just below the ensiform cartilage. No peristalsis is seen. The stomach bulges just beneath the left costal margin. The tumour mass is not nearly so variable and almost constantly hard and firm.

Remarks—This case presented many points of interest, and was

shown repeatedly in the ward classes. The age of the patient, the history of dyspepsia, the gastralgic attacks, the vomiting of large quantities of blood, and the persistent hyperacidity of the gastric juice, pointed unmistakably to ulcer. The tumour mass was the feature of special comment. The most remarkable phenomenon was its phantom character. It would lift the skin in the middle line, between the navel and the ensiform cartilage, appearing as a definite tumour transversely placed, and was then to the touch firm and hard. After lasting for from half a minute to a minute it would gradually disappear, with sometimes an audible sizzling sound; on palpation the tumour mass became very much softer, but even when relaxed it was evident as a somewhat sausage-shaped, tubular body, which could be rolled beneath the fingers. The only rational explanation seemed to be that in consequence of the ulcer there was much cicatricial puckering, with narrowing of the pyloric orifice, and consecutive hypertrophy of the pyloric zone. The phantom character of the tumour could be alone explained on the supposition of an alternate contraction and relaxation of the hypertrophied muscular tissues about the pylorus; and with this the evidence obtained on palpation was fully in accord, since when the tumour was visible beneath the skin, it was excessively firm and hard. Relaxation took place under the hand, and with a marked change in the consistency. The variations in position and size of the tumour, with the increase in the dilatation, is often noticed in pyloric masses of this character. The patient was urged to have an operation, but would not consent.

January 20th, 1895. Since the above remarks were written, I ascertained that this patient, during the summer of 1894, came under the care of Dr. Bressler, who performed successfully gastro-enterostomy, using Murphy's button. At the end of the third week, after convalescence was established, general peritonitis developed, of which he died.

Dr. Bressler very kindly sent the specimen to me for examination and description.

The specimen consists of stomach, except cardia, with the coil of intestine removed *en masse*. Attached to the greater curvature of the stomach, about 6 cm. from pylorus, is a portion of the small intestine (jejunum). The line of attachment is shown in front; narrow, clean, and without adhesions. The artificial orifice between intestine and stomach admits the index finger. The transverse colon passes directly behind the attachment of the stomach and intestine. At the splenic flexure Murphy's button has lodged, and has caused a perforation 2 by 1.2 cm. The pyloric region of the stomach is enlarged, the transverse

colon and omentum adherent, and there is considerable thickening of peritoneal tissues about it. When the duodenum is opened, the thickened lips of the pylorus can be seen, and a circular orifice about 5 mm. in diameter. From the stomach, the little finger cannot be inserted into the ring. There is a narrow channel through which a lead pencil could be passed. When laid open, the thickened walls seem to be made up of a greyish connective tissue, and enormous thickening of the muscularis. The wall measures in one place 14 mm. The mucous membrane corresponding to the thickened portion is in places puckered, looks thin, and at one point, corresponding to the anterior wall, and about 3 cm. from the duodenal orifice, there is an area 15 by 10 mm., which looks like the floor of a healing ulcer. The whole muscular coat of stomach is greatly hypertrophied.

A portion of the pylorus was cut out from the peritoneum to the floor of the ulcer, and I am indebted to Dr. Blumer for sections. There was nowhere any trace of carcinoma. Almost the entire mass was made up of enormously hypertrophied muscularis. Near the floor of the ulcer a large artery was cut across, which showed a thickened muscularis and great proliferation of the sub-endothelial layer.

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CHAPTER VI.

DISEASES THE DIRECT OR INDIRECT RESULT OF INFECTION.

By WILLIAM OSLER, M.D.

CEREBRO-SPINAL MENINGITIS.

Definition. A specific infectious disease, occurring sporadically and in epidemics, characterized anatomically by inflammation of the brain and spinal cord, and clinically by an exceedingly irregular course, the chief symptoms being fever, pain in the head and back, muscular spasms, and, in severe forms, delirium and coma.

Etiology. The history of the disease during the present century, from the date of the first recognized epidemic in Geneva, in 1805, is fully given in the works of Hirsch, of Stillé, and of Joseph Jones.

Children and young adults are most susceptible to the disease, but in some epidemics adults have been chiefly attacked. Males and females appear to be equally liable. The most severe epidemics have been in country districts. In 1873 the disease was very prevalent in the valley of the Ottawa River, and the villages and country districts suffered much more severely than did the cities of Ottawa and Montreal.

The affection has broken out simultaneously in regions far distant from each other. The concentration of population, as in large barracks and work-houses, favors the development of the disease; and in France during the fourth decade the numerous epidemics were almost confined to military hospitals. The outbreaks have occurred most frequently in the winter and spring, and have developed in exceptionally severe weather. Some writers have laid great stress on excessive moisture as a factor. The most serious outbreaks have been in towns and villages with very defective sanitary conditions. Poverty and overcrowding, with the coincident misery and squalor of large families dwelling together in small, imperfectly ventilated houses or in tenements, favor the development of the disease. Overexertion, as in prolonged marches, has been found by military surgeons to have an important influence.

The disease does not appear to be directly contagious. It is exceptional, indeed, to have two cases in the one house, and physicians and nurses are rarely attacked. On the other hand, there is very strong evidence in favor of the view that the poison may be transmitted by individuals from one place to another. Several striking instances of this are reported by Hirsch.

Evidence is accumulating in favor of the view that the micrococcus lancolatus bears an etiological relation to the disease. Its presence has been demonstrated in the exudate of the meninges in many epidemics. It is also present in the meningitis secondary to pneumonia, and it has been found now in many instances of sporadic cerebro-spinal meningitis. The same organism has also been demonstrated in the meningitis developing in the course of

diseases other than pneumonia and in that following injury. Altogether, the bacteriological observations of the past ten years point to the association of the micrococcus lanceolatus with both the sporadic and the epidemic forms of the disease. Other organisms have been met with in purulent meningitis, the staphylococcus pyogenes aureus, the typhoid bacillus, the colon bacillus, and other less definite forms.

There are insuperable difficulties in the way of a rational explanation of the conditions favoring the growth and development of the organism in the meninges. The micrococcus lanceolatus is a normal occupant of the body in a very considerable proportion of all individuals, at least 20 per cent., according to some authors.

The possibility of the disease being due to an auto-infection has been suggested through the nasal fossa by Strümpell and through the intestine by Flexner and Barker. There are serious difficulties, however, in the way of accepting such views which offer no explanation whatever of the epidemic prevalence, or of the remarkable facts quoted by Hirsch in favor of its transmission from one locality to another by a third person.

Morbid Anatomy. The patient may die before any inflammatory exudate occurs in the meninges, and then the condition is one of an extreme grade of hyperemia and of a slight serous effusion. In well-developed cases on external inspection the petechiæ, sometimes herpes, may be noticed on the skin. On removing the skull-cap the dura is tense, and its inner surface hyperæmic; the sinuses full of firm clots. On exposing the cerebral cortex in severe cases the convolutions may be covered completely with a creamy exudate. Often this is patchy, most marked, perhaps, on either side of the longitudinal fissure and in the chief sulci. The cortical veins may be distended and prominent, and the smaller vessels of the pia are deeply engorged. Occasionally superficial hemorrhages are seen; the exudate is upon the pia mater; the arachnoid itself may be opaque. The effusion is usually abundant at the base of the brain about the chiasma and in the Sylvian fissures, and may cover completely the pons and medulla. The lesions are not confined to the meninges, but the cerebral substance is also involved, and the process is in reality a meningo-encephalitis. The gray matter is hyperæmic, juicy, and foci of infiltration and of hemorrhage may be seen. Abscesses of some size are occasionally found. The inflammation may involve the nerves at the base, which are surrounded with the fibrinous exudate. The ventricles may contain only an increased amount of serum, but in some instances the inflammation is most intense on the velum and choroidal plexuses. The ependyma is softened, cecymosed, infiltrated with and covered by pus, and the ventricular contents may be of the same nature. In cases which have lasted for a long time there may be no longer any fibrinous exudates, but there are areas of meningeal thickening, adhesions, and most constant of all great increase in the serous effusion, which may cause great dilatation of the ventricles (hydrocephalus). Even in cases in which death has taken place so soon as the fifth week the ventricular effusion has amounted to three pints. The spinal meninges show the same lesions. Small hemorrhages are not uncommon. The exudate may be, in very acute cases, only a turbid serum, but more commonly a creamy, thick material, chiefly on the posterior part of the cord. Frequently it collects more particularly in certain regions, producing irregular bulgings on the arachnoid. The greater grade of exudation on the posterior surface is due entirely to the effect of gravity. In some instances the entire cord is imbedded in a thick, grayish-yellow lympho-purulent exudate. The substances of the cord may show the same changes as in the brain, namely, hemorrhages and infiltration with leucocytes, sometimes foci of such extent as to form small miliary abscesses. Microscopically the exu-

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date consists of polymuclear leucocytes, lymphoid cells, larger cells with vacuolar nuclei, and even cells larger still, which in some places are very numerous, and even these contain other leucocytes and red blood cells within them. (Flexner and Barker.) The micrococcus lanceolatus may usually be demonstrated in the exudate. The changes in the other organs are those usually associated with fever. In very severe cases there may be hemorrhages on the serous membranes. The lungs often show changes, bronchitis, intense hyperemia and edema, and sometimes lobular, less frequently lobar pneumonia. Acute inflammation of the pleura and of the pericardium has also been found; endocarditis is rare; colitis may be present. The spleen usually varies in size according to the period at which death has occurred. It may sometimes be greatly enlarged.

Symptomatology. A stage of incubation with prodromal symptoms is rare. Loss of appetite, malaise, headache, pain in the limbs occur in a few cases. The onset, as a rule, as in pneumonia, is abrupt, and the patient, without preliminary symptoms of any moment, is seized with a chill or with violent headache, vomiting, and fever. Few disorders present so varied a symptomatology, and the cases are perhaps best described in groups characterized by special features.

1. *Fulminant form.* No acute disease—cholera scarcely excepted—may kill with such rapidity as cerebro-spinal meningitis. Cases are on record in which death occurred after an illness of ten hours, or even of five hours. This type is seen with variable frequency in different epidemics. In the recent one studied by Flexner and Barker ten patients died within forty-eight hours after the appearance of the symptoms. The onset is abrupt, with a violent chill, and without the slightest premonition the patient may be seized with agonizing headache, vomiting, high fever, active delirium, succeeded by great depression of the vital functions, gradual somnolence, sometimes spasms or rigidity of the muscles, or even general convulsions. Death may occur before the development of petechie on the skin, but in cases which last for more than twenty-four hours herpes and ecchymoses are almost invariably present. The fever in this so-called apoplectic type is not necessarily high. In many of the cases it has been quite moderate, 102° and 103° ; the pulse may be rapid and feeble, but instances are on record in which it has been slow, falling to 50 or 60 in the minute.

2. *Ordinary form.* Commonly without any prodromal symptoms the disease sets in with severe chill, headache, and vomiting. The headache, usually severe and accompanied with great sensitiveness to light and to noises, may be diffuse over the entire head, or localized chiefly to the occiput or the forehead. It is one of the most constant features of the disease. The temperature rises rapidly and may reach 103° or 104° , sometimes higher, but occasionally even in severe cases the pyrexia is not at the outset or during the course of a high grade. The pulse is full and strong; later irregular, and when symptoms of depression occur feeble and rapid. The pyrexia, which has no fixed type, does not really bear any relation to the severity of the other symptoms. Vomiting, which occurs early, may cease within twenty-four hours, or in exceptional cases recurs throughout the course of the disease. An early and important symptom is a painful stiffness in the muscles of the neck and of the back, accompanied with aching, which often extends into the limbs. As the disease progresses, usually from the second to the fifth day, this stiffness becomes more marked, and there may be rigidity of the muscles of the back and neck, the latter causing marked retraction of the head. Opisthotonos is not common, but orthotonos, in which the trunk is rigid and firm, is not infrequent. Cases have been described in which the general rigidity and stiffness was such that the body could be moved like a

statue. Unilateral spasm of the back muscles, leading to pleurosthenos is rare. Except in early childhood and a short time before death general convulsions are not common. Tremor or clonic spasms may be present. Spasm of the muscles of the face may also occur. Lesions of the nerves at the base may cause paralysis of the muscles supplied by the third, inequality of the pupils, nystagmus, deafness, and disturbances of the sense of smell. Sighing, respirations, and Cheyne-Stokes breathing are met with in some instances. Intra-ocular changes are common, particularly passive congestion of the retinal veins and optic neuritis. Disturbance of sensation is common, particularly hyperæsthesia of the skin, and the patient may cry out when attempting to move the trunk or limbs. In part this may be due to hyperæsthesia, and sometimes to the tension spasm in the muscles. It may be very marked in the legs, and the slightest movement may be sufficient, even in a patient in a profound stupor, to cause reflex spasms.

The cutaneous features of the disease are important. The petechial rash, which has given the name "spotted fever" to the affection, is very variable. Stillé states that they were present in only 37 of 98 cases in the Philadelphia Hospital. With the ecchymoses there may be roseola and erythema, or these latter may occur alone. The distribution of the petechiæ may be symmetrical. In the epidemic at Lonaeoning, studied by Flexner and Barker, the petechial eruption was comparatively rare, but an indistinct purplish mottling over the surface of the body was more common. Herpes is perhaps more frequent in this than in any other disease. It is seen first upon the face, either on the nose or lips, but often extends, and is symmetrical in its distribution. Urticarial forms of erythema, pemphigus, and in a few instances gangrene of the skin have been described.

As already mentioned, vomiting is an early and a prominent symptom. The tongue in protracted cases is dry and covered with sordes. Lacunar tonsillitis sometimes occurs. Difficulty in swallowing may be due either to the extreme retraction of the neck or to disturbed innervation. Diarrhœa is not common, but in four of the Lonaeoning cases already referred to there was well-marked dysentery. The abdomen is somewhat retracted. Jaundice has been met with in a few instances. The spleen is sometimes enlarged, but, from the varying statements made with reference to it, it evidently is not a common feature. Of respiratory symptoms disturbed rhythm in breathing is common, particularly toward the close, and the respirations may be of the Cheyne-Stokes type. Epistaxis is a very frequent feature in some epidemics. Bronchitis, broncho-pneumonia, and pneumonia occasionally occur, and in the protracted cases there is much hypostatic congestion at the bases.

In the severer cases the urine is albuminous and may show the presence of hyaline and granular casts. Phosphates are often in excess, and blood may be present in the severer cases. Marked polyuria has been noted, and it has sometimes persisted for years. Glycosuria may also occur. The blood condition was carefully studied by Flexner and Barker, who found marked leucocytosis in all the cases. Neither the red corpuscles nor the hæmoglobin showed any special changes.

The course of the disease is extremely variable. More than one-half of the deaths occur within the first five days. Improvement is indicated by a fall in the fever, lessening of the spasm, and a return of consciousness. Convalescence may be extremely tedious, and after the acute symptoms have subsided may be interrupted by the complications and sequelæ to be mentioned shortly.

3. *Anomalous form.* (a) *Abortive type.* The attack may set in acutely with high fever, severe headache, photophobia, but in a few days all these symptoms subside and rapid convalescence is established. Strümpell distin-

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guishes between the abortive form, setting in with great intensity, and the mild, ambulant cases, which have been described, in which the patients complain of headache, nausea, unpleasant sensations in the back and limbs, and stiffness in the neck. There may be no initial vomiting and very slight fever. Such cases could only, in reality, be recognized as due to the poison of the disease during the prevalence of an epidemic.

(b) *Intermittent type.* In this form the fever is of an intermittent type, assuming sometimes a quotidian, sometimes a tertian character, and in the intervals of the fever there may be almost complete freedom from the other symptoms of the disease. This is a form upon which we require further information.

(c) *Chronic type.* The attack may be protracted for two or three months, or even extend to six months, and may lead to the most intense marasmus. There are recurrences of the fever; thus Heubner gives an instance of a lad, aged seven years, who had repeated recurrences from the end of February until the end of June, and, though worn to a skeleton, he made a complete recovery.

COMPLICATIONS AND SEQUELÆ. Endocarditis and pericarditis are rare. Pneumonia, lobar or lobular, is a frequent complication in some epidemics. The percentage of cases is, however, very variable in different epidemics; in some a majority of the cases have presented this complication. It may be present only toward the close of an epidemic. Parotitis has been described, and occurred in a number of cases in the Lonaconing epidemic.

A remarkable complication is the arthritis first described by James Jackson, Sr., the number of cases varying considerably in different epidemics. In the Lonaconing epidemic twenty per cent. of the severer cases had joint affections, the knees, elbows, wrists, and ankles being involved. There were some cases in which, had it not been for the initial symptoms indicating a meningitis, the disease would have been diagnosed acute rheumatism. "Kernig has described a symptom which he thinks is pathognomonic of meningitis. In thirteen cases he observed a peculiar flexion-contracture (beuge-contraktur) of the knee-joints, which could not be reduced when the patient was in the sitting position. In attempting to extend the knee, the leg could not be straightened further than a point where it made an angle of about 135° with the thigh, although when lying or standing this contracture was completely absent. If the patient lay on his side with the thighs drawn up the symptom was still present. It has been claimed that the same phenomena may be seen in many other conditions (old age, chronic alcoholism, etc.), but Kernig asserts that he has examined thousands of individuals with particular reference to this point, and has never found this contracture except in cases of meningitis."

The most important sequelæ are those affecting the special senses. Keratitis may develop with ulceration; less often iritis. The double optic neuritis may be followed by atrophy and blindness. Serious auditory lesions are still more common. Deafness may follow inflammation of the labyrinth, and in children this not infrequently leads to the condition of deaf-mutism. It is interesting to note that in the deaf-mute institution at Bamberg, of forty-two pupils in 1874, all had become deaf mutes from epidemic meningitis (von Ziemssen).

Mental feebleness and aphasia have occasionally followed the disorder. Headache may persist for months or years after an attack. Von Ziemssen regards chronic hydrocephalus as a frequent sequelæ, the symptoms being "paroxysms of severe headache, pains in the neck and extremities, vomiting, loss of consciousness, convulsions, and involuntary discharges of feces and urine." Paralysis of some of the cranial nerves may persist. Occasionally

there is paralysis and wasting of the extremities due to multiple neuritis (Mills).

Diagnosis. During an epidemic the recognition of the disease is easy, and the description of the anomalous types is now so clear that they, too, are not often overlooked. On the other hand, mistakes frequently arise in the sporadic form, but cases of other acute infectious disorders are more often diagnosed cerebro-spinal meningitis than are cases of this disease overlooked. The disease must be recognized from

1. *Certain of the Acute, Infectious Diseases.* These are very likely to present cerebro-spinal manifestations which simulate those of the true cerebro-spinal fever. Typhoid fever, beginning with marked cerebral manifestations, delirium, tremor, and subsequently developing more or less rigidity of the muscles and retraction of the neck, may present a very deceptive picture. I have known at least three instances in which the diagnosis was made of cerebro-spinal fever, but post-mortem the lesions were those of typhoid fever, and the meninges presented only extreme congestion. The presence of rose spots, the development of tympanites and other intestinal features, and the gradual subsidence of the meningeal symptoms may lead to a revision of diagnosis. Many of these cases, unless an autopsy is secured, go into the mortality bills as cerebro-spinal fever. So also in typhus fever, the headache, backache, vomiting, hyperaesthesia, and the presence of roseola and petechiae may for a time leave the practitioner in doubt. In certain of the severer types of smallpox the agonizing headache and the petechial rash may lead to the diagnosis of cerebro-spinal meningitis. A four-year-old child became ill suddenly with fever, pains in the back and head, and on the second or third day petechiae appeared on the skin. There were retraction of the head and marked rigidity of the limbs. Cerebro-spinal meningitis existed in Montreal at the time, and both the physician under whose care the child was, and Dr. R. P. Howard, who saw it in consultation, agreed that the symptoms were highly suggestive of this disease. The cutaneous hemorrhages became more abundant, the spasm and rigidity were extreme, hematemesis occurred, and the child died on the sixth day. At the post-mortem there were no lesions of meningitis, and in the deeply hemorrhagic skin papules could be readily felt. The post-mortem diagnosis of smallpox was undeniably confirmed by the mother taking the disease and dying of it.

Other Forms of Meningitis. It is to be remembered that poliomyelitis may occur in epidemic form. In the remarkable outbreak which occurred in 1894 about Rutland, Vermont, and which is described by Caverly, of that town, many of the cases were thought at first to be cerebro-spinal fever.

(a) *Tuberculous.* Here the insidious onset and more protracted course are important points, and, as the meninges of the cord are not often affected, backache and rigidity and retraction of the head are seldom seen. The skin eruptions are also rare in tuberculous meningitis, and the presence of petechiae and herpes is against the tuberculous form. On the other hand, local palsies of the ocular muscles, hemiplegia, and aphasia are more common, and, important of all, the determination of local tuberculous disease in other parts.

(b) *Pneumonic Meningitis.* As the membranes of the brain are chiefly involved there is commonly at first active delirium, frequently tremor and motor spasm, but not often great retraction of the muscles of the neck or back. In sporadic cases it may be very difficult to determine whether the pneumonia has been a complication of the meningitis, or the meningitis a sequence of the pneumonia. There have been epidemics of cerebro-spinal meningitis in which a large majority of the cases were complicated by pneumonia.

3. *Certain toxic conditions,* particularly uraemia, may be associated with convulsions, rigidity and coma, and simulate in some degree cerebro-spinal menin-

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gitis. The absence of fever and the conditions under which the symptoms arise, and in uremia, the presence of albumin and tube-casts in the urine should make the diagnosis clear.

Prognosis. The mortality has ranged in various epidemics from 20 to 75 per cent. Hirsch states that of 15,632 cases 37 per cent. died. In children the death-rate is higher than in adults. Cases with deep coma, repeated convulsions, and high fever rarely recover. In the chronic form, even after the symptoms have persisted for months and there is extreme wasting with contractures, perfect recovery may occur.

Treatment. Considering the frequent association of the disease with filthy surroundings, an important prophylactic measure is the thorough cleansing of towns and villages in localities liable to the disorder.

As in other specific fevers careful nursing and feeding are the most important elements in the treatment. The room should be kept dark and thoroughly ventilated. The diet should consist of milk and strong broths. Many cases are very difficult to feed, and it may be necessary to use the stomach tube, or to resort to rectal injections. In the more chronic cases stimulants should be freely given.

In strong, robust patients with high fever and much mental excitement, abstraction of blood by wet cups, or even in suitable instances general blood-letting may be employed. The application of cold to the head and spine, which was recommended so strongly by the New England physicians in the first epidemics in this country, is of great service. The ice-cap to the head and the spinal ice-bag may be kept continually applied. With high fever and active delirium or coma the cold bath may be used, or cold sponging, or, if necessary, the cold pack. Counter-irritation is of doubtful benefit, and if applied at all the good effects are probably obtained by the light application of the Paquelin cautery.

Of the drug treatment of the disease we have no satisfactory knowledge. Opium has been much used by American physicians. It is particularly recommended by Stillé. Hypodermics of morphine may be used in reducing the violence of the muscular spasms. It should be freely used until the symptoms are controlled. Mercury, iodide of potassium, quinine, the salicylates, ergot, belladonna, and calabar bean are a few among the host of drugs which have been recommended.

TETANUS (Trismus—Lockjaw).

Definition. An acute infectious disease characterized by tonic spasms of the voluntary muscles, with marked exacerbations. As the disease shows itself first in the muscles of the jaw the names trismus and lockjaw have been applied to it.

The affection was well known to the ancients, and the descriptions given of it by Hippocrates and Aretæus are particularly graphic. The disease commonly follows trauma (traumatic tetanus), but may occur spontaneously or after exposure to cold (so-called idiopathic or rheumatic tetanus), and, lastly, an important variety develops in newborn children (trismus neonatorum).

Etiology. The disease is more frequent in hot climates, and has prevailed extensively in the West Indies and in the Southern States of America. The mortality in some of the West India Islands from trismus neonatorum has been enormous. The colored races are more prone than is the Caucasian. The incidence of the disease in military campaigns has varied remarkably; thus in the Franco-Prussian War and in the Civil War in this country very few cases were observed. The disease may be endemic in certain localities.

Attention was early called in this country to its prevalence at the eastern end of Long Island.

The disease occurs also in horses in which veterinarians have long recognized its infectious nature, as cases are very apt to develop simultaneously or successively in the one stable. Cattle and sheep are also affected.

After the first month of life the disease is rare in children. It prevails most frequently in the third and fourth decades. Males are somewhat more frequently affected than females.

In a very large proportion of all cases there is a trauma. Since the recognized specific character of the malady, many now doubt if the disease ever occurs without a lesion of the surface, through which the poison may be introduced. It may follow wounds of any kind, but is more common after contused or lacerated wounds, particularly when the nerves are involved. Wounds of the extremities, particularly of the hand, are most liable to become infected. The disease has also followed frost-bite and burns, the removal of a tooth, and even the most trifling injuries, as the sting of an insect, or a small splinter of wood. It is rare after surgical operations. Cases have occurred during the progress of vaccination. A special form of it is met with in connection with the open surface of the uterus after parturition—the puerperal tetanus—of which mention will be made later.

It is interesting to note that in a large proportion of all the cases there has been in the injury a possibility of contamination by the soil. "Since attention has been given to the point, it has been observed that in a considerable proportion of the cases the injury involved contamination of the wound with soil, as in falls on the ground, a puncture by a broken stick or stake which had been in the earth, or by a splinter from a dirty floor. Such a splinter from the floor of a skittle alley, penetrating beneath the nail, has produced it; one fatal case was due to a compound fracture of both femora, from a fall in which the ends of the bones were covered with earth; gardeners have suffered from punctures by sticks. In most of these cases the tetanus bacilli were found in the source of the contaminating material; their presence explains the influence of these injuries. They have been found in spiders' webs, and tetanus has followed the application of such webs as a styptic (a popular custom in some places), and also the application of earth to a wound." (Gowers.)

The experience of the Civil War is interesting in connection with the instances of the disease in military surgery. Of 505 cases of tetanus the following was the distribution: upper limb, 137; distributed as follows: shoulder, 31; arm, 37; coude, 7; forearm, 24; thumb, 4; hand, 37; lower limb, 292 cases: hanche, 2; thigh, 99; knee, 17; leg, 95; coudepieu, 22; and foot, 57. It is interesting to note that these figures do not confirm the usual statement that tetanus more usually follows wounds of the hand than of the foot. The relative frequency of the disease after operations and wounds is as follows: in 29,980 amputations there were 116 cases of tetanus; in 1656 resections there were 15 cases; and in 212,076 wounds there were 374 cases.

The Tetanus Bacillus. The disease is caused by a specific organism, discovered by Nicolaïer, and subsequently studied elaborately by Kitasato. The organism may be procured by inoculating an agar tube with pus from a wound of a human being suffering from tetanus, which in the incubator at 35° to 37° C. shows the characteristic drum-stick bacilli. "The bacilli grow out into long threads at ordinary room temperature; but form the characteristic spores at 35° to 37° C. in the incubator in about twenty-four hours. They then appear as short, fine rods, with a large round knob on one end, the knob constituting the resistant, glistening spore. The bacilli have independent, but slow motion." (Bolton.)

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The bacilli and its spores are widely spread in the soil of inhabited regions: of twenty-three specimens of soil taken from various parts of Copenhagen, sixteen proved virulent when inoculated into animals. The resistance of the organism is very great, and the virus has proved virulent in pus which has been dried for many months. The bacillus has been demonstrated in the dust from the floor of the wards of a military hospital.

Products of the Growth of the Bacilli. The filtrate of the culture three or four weeks old, entirely free from germs, contains the specific poison of tetanus, from which Brieger has separated two basic bodies, which are called tetanin and tetano-toxine. Brieger and Fraenkel have also separated a potent toxalbumen, but the true chemical nature of the poison has not been accurately determined.

With the products of the growth of the tetanus bacillus the disease is very readily produced experimentally, and comparatively small doses are required to kill a mouse—0.001 ccm. of the filtrate. Dogs, which are immune naturally, require a proportionately larger dose. The poison is not effective when administered through the stomach. The disease produced experimentally presents a picture similar to that seen in man. It is interesting to note that the cramps develop first in the muscles nearest the seat of inoculation. The effects are produced by the poison, not by the bacilli at the site of the inoculation. This is shown by the fact that the identical symptoms are produced by the germ-free filtrate of the pure culture, and also by the interesting experiments of Kitasato, who injected the tetanus bacilli into a mouse, at the root of the tail, and excised and burnt the seat of inoculation at various times afterward, as half an hour, an hour, an hour and a half, destroying in this way all the bacilli at the seat of inoculation. Only those animals in which the seat of inoculation was treated locally by incision and burning half an hour after injection recovered; the others died of the disease, showing that within an hour enough of the poison is absorbed to produce the symptoms and cause fatal results. There are several very interesting points still to be worked out about the production of the poison; thus it has been shown that when the cultures are grown at 20° to 22° C. they do not for several days produce any poison, and are no longer virulent. It is interesting, too, to note that these non-poisonous bacilli may become toxic when grown with other forms not capable of producing the disease. In accidental infection the local suppuration produced by other organisms inoculated at the same time may furnish the very condition favorable for the production of the tetanus poison. There is experimental evidence to show that the poison works like strychnine, and has its action upon the spinal cord.

Morbid Anatomy. The condition of the wound is variable. Very often the nerves in the locality have been found reddened and swollen, but in a majority of the cases they have been normal. No characteristic lesions occur in the brain or cord. Congestion of the bloodvessels, small hemorrhages, perivascular exudation, increased pigmentation in the ganglion cells have been described, but these changes are neither uniform nor distinctive. Minute ecchymoses are common on the serous surfaces. (Edema and hypostatic congestion of the lungs are frequently present. Rupture of muscle fibres may result from the intensity of the spasms.

Symptoms. Following an injury the first indications of the disease are usually manifest within ten days. In Yandell's statistics in two-fifths of the cases, and in Joseph Jones's statistics in four-fifths of the cases, the symptoms began before the fifteenth day. Slight stiffness of the neck and of the muscles of the jaw is the earliest feature, or the patient complains of difficulty in mastication, or that the movements of the tongue are not so free in talking.

In a few cases chilly feelings or even rigors may precede these symptoms and for a day or so there may be sensitiveness or even pain in the wound. Gradually the tonic spasm of the muscles increases until the condition of trismus or lockjaw becomes so marked that the jaws are separated with the greatest difficulty. With the muscles of mastication those of the face are also involved, so that the angles of the mouth are drawn outward and upward, producing the sardonic grin, *risus sardoniacus*. With increasing involvement of the muscles of the neck the head is drawn backward and the muscles of the back become rigid, and the contraction may be extreme enough to cause marked arching of the vertebral column. The body may either remain perfectly straight, the condition known as orthotonos; or depending upon the strength of the spasm of the different groups, opisthotonos, in which the back is arched like a bow; emprosthotonos, in which the body is bent forward; or pleurosthotonos, in which it is turned to one side. The tonic spasm may involve the muscles of the legs and arms, but as a rule the arms and hands are not much affected. While the rigidity is tonic in character there are frequent clonic exacerbations, which are apt to be excited by peripheral irritation, such as a draught of air, or a touch, or a noise. These exacerbations vary very much in frequency and severity, and they bear some proportion to the intensity of the disease. At first the rigidity is not very painful, but subsequently the suffering is extreme from the violent contraction. In very severe attacks the thorax may be rigidly compressed by the muscles. The respirations are rapid, and spasm of the glottis may occur, causing asphyxia. In the severe paroxysms sweating may be profuse. The heart's action is increased during the paroxysm; the pulse may be from 130 to 160². The temperature is very variable. It may be normal throughout or present only a very slight increase. In a few cases the disease is associated with hyperpyrexia, particularly as an ante-mortem phenomenon, and there are instances in which the body heat has reached from 110° to 114°. The urine is scanty, and according to Senator the amount of nitrogenous matter is not increased. There may be retention from spasm. The mind usually remains clear, except toward the close in protracted cases. Death may occur during a paroxysm either from asphyxia or cardiac dilatation. There is an instance on record in which rupture of the walls of the heart occurred during the violence of the spasm. In other cases the fatal result is brought on by exhaustion.

There are certain varieties which are of interest. In the *head-tetanus* of Rose, which has followed in a majority of instances wounds of the face, trismus, dysphagia, respiratory distress, and facial paralysis are the prominent features. On account, too, of the spasm in the deglutition muscles, and consequent difficulty in deglutition, this form has been called also tetanus hydrophobicus. The cause of the facial paralysis is not known. There may be also paralysis of the eye muscles on the same side. This modification is not very common. Janin¹ has collected all the cases, thirty-one in number, up to 1892, and he regards it as a form in which the toxic materials act chiefly in the medulla. The attacks recur at varying intervals, but they may be almost continuous. In other cases they are extremely slight; the most serious attacks are those caused by attempting to take food, when there may be spasm of the muscles of deglutition and great interference with the respiration.

Tetanus neonatorum, a rare form in temperate regions, and fortunately now rare in the tropics, was formerly very common in certain countries, particularly in the West Indies, where in some islands one-half of the negro

¹ Paris Thesis. Du Tetanus Bulbaire, 1892.

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children died of the disease. Hillary, in his *Diseases Prevalent to the West India Islands*, gives the following graphic account of the disorder: "For when the child lays in this miserable, rigid, immovable condition, upon moving its hands or feet in the most gentle manner, or softly touching any part of its body, or giving it the least motion, even feeling its pulse in the most gentle, tender manner, or the least noise, or even touching its clothes, will bring on the convulsive spasms, and cause it to be strongly convulsed backward, or drawn into a rigid straight line, strongly extended and immovable like a statue, and will so remain immovable out of either of those postures, for a considerable time, a minute or two." (Edition by Benjamin Rush, 1811).

In the Southern States of America the disease was formerly very common. Puerperal tetanus is now fortunately rare, but formerly in some countries it proved the most fatal of all forms of the disease. The disease begins, as a rule, within five or ten days after parturition. In a number of cases it has followed abortion.

Whether tetanus ever occurs idiopathically has been doubted, but there are cases on record, particularly in army practice, in which, without any apparent external injury, the disease has developed after exposure to cold.

Mortality. The prognosis is always extremely grave, and two of the aphorisms of Hippocrates may be quoted at the present day, namely, "the spasm supervening on a wound is fatal," and "such persons as are seized with tetanus die within four days, or if they pass these they recover." In the traumatic cases the death-rate is not less than 80 per cent. In the cases which develop without any wound the mortality is not nearly so high. From the puerperal form recovery is excessively rare, and the form in infants is also very fatal. Death occurs from asphyxia, or from heart strain, which in one case has resulted in rupture of the wall. Favorable indications are late onset, absence of fever, and localization of the spasms to the muscles of the neck and jaw.

Diagnosis. In well-developed cases following injury no possible difficulty could arise. From strychnine poisoning, which presents very similar muscular spasms, it is differentiated by the following points: The anamnesis, the rapid development of the symptoms, and the greater extension and the reflex spasms, as well as the fact that the jaw muscles in strychnine poisoning are not involved early if at all, and between the paroxysms there may be no muscular rigidity. These points should suffice to distinguish it from strychnine poisoning. The question has been raised by the defence in murder trials, as in the celebrated Palmer case,

In hydrophobia, for which the head tetanus may be mistaken, there is no special spasm of the jaw, or any rigidity of the muscles, or paroxysms in which the cervical and dorsal muscles are involved. In tetany the distribution of the spasm, chiefly in the hands and feet, the special involvement of the hands, their peculiar position, and the conditions under which it develops should suffice usually to separate the affections. Hysteria, which may imitate almost any one of the diseases with motor phenomena, rarely presents the picture of tetanus. "But trismus, causing persistent closure of the jaw, occurs in hysteria. It may succeed a convulsion, and last until another, or it may come on without obvious cause, continue for a few hours or days, and then suddenly vanish. It is prone to recur, and this character, the suddenness of onset, its complete degree, and the absence of rigidity in the neck, and the presence of other symptoms of hysteria will rarely leave any doubt as to its nature." (Gowers).

The bacteriological diagnosis is of some importance. Cultures should be made from the pus of the wound, from the granulation tissues, from the

splinter of wood, or from the earth in the part where the wound was received, or portions may be inoculated into a mouse, which is the animal most susceptible, and which usually dies within a few days of the inoculation.

Treatment. *Immunization.* The present status of this question with reference to tetanus may be thus stated: Animals which are very slightly susceptible, such as the dog and hen, can be rendered immune by the injection of gradually increasing doses of the tetanus virus. The serum of animals so treated has the power of conferring immunity. For more susceptible animals Behring employed the bouillon cultures, diluted with the addition of iodine trichloride, beginning with a culture containing 0.25 per cent., then a percentage of 0.2, then a percentage of 0.15, and ultimately the undiluted culture. The serum of animals immunized in this way may be preserved with 0.6 per cent. of carbolic acid, and may be used for immunizing other animals not previously treated. The material used by Tizzoni and Catani in their observations upon man is the serum of the immunized dog treated with alcohol, by which they obtained a material known as the tetanus antitoxin.

Animals inoculated with fatal doses of tetanus poison treated with the serum of immunized animals have recovered. Up to the early part of 1894 about a dozen cases of tetanus in man had been treated by the Tizzoni-Catani antitoxin. The general expression of opinion by experts in the question of serum-therapy in tetanus is not altogether favorable; thus Klemperer and Levy in their recent works on clinical bacteriology, 1894, question whether a sure and undoubted result has been obtained in any one of the cases, as the healed cases were not so acute that the prognosis was entirely doubtful. On the other hand, Remesoff and Fedoroff, in a recent report of a case supposed to be cured by the serum of an immunized animal, claim in a review of the recorded cases that the duration of the disorder is decidedly diminished by the treatment, that the temperature is reduced, the attacks of spasms are less severe, sleep is promoted, and a very great improvement in the general condition. Recent reports by Gilman Thompson and others are altogether more favorable, and the antitoxin should be used at the earliest appearance of the symptoms.

Surgical measures are usually employed at the site of the lesion, such as burning or excision of the sear. Unless done very promptly experimental evidence, as mentioned above, would indicate that they are not of much importance, and this is borne out by experience. Excision of the nerves at the part and stretching have also been employed. Thorough cleansing and disinfecting of the wound, possibly excision, are the most justifiable remedies. The general management of the case is most important. The patient should be in a darkened room, attended by only one person at a time, and all outside communication should be forbidden. Veterinarians have long appreciated the importance of complete seclusion, and in many of their well-equipped infirmaries there is seen a brick, padded chamber, in which these cases are treated. The question of feeding usually becomes very important, owing to the presence of lockjaw. The diet should be restricted to nourishing broths and milk, which usually can be taken through the teeth even when there is spasm of the jaws. If necessary food can be introduced into the stomach by a catheter passed through the nose. The teeth have sometimes been extracted. In such cases we should trust for a time at least to the nutritive injections.

The drug treatment consists of the administration, in first place, of remedies which relieve the spasm. For this purpose chloroform is the most satisfactory, though unfortunately the attacks recur as the effects pass away.

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Nitrite of amyl may be tried for the same purpose in large doses, and in the severe paroxysms the sudden inhalation sometimes causes relaxation. Morphine may be used for the same purpose, and in some instances has seemed to be actually curative. Chloral hydrate has been largely used. To be effective it must be given in doses of from a drachm to two drachms in the day, and increasing. In the tetanus neonatorum it should be used in proportionately smaller doses. It may be sometimes combined with the bromide of potassium. The Calabar bean has been used successfully in some cases; also curare, which must be employed in large doses, as much as a quarter or half a grain every hour or two. It is not, however, without danger. Among other means which have been recommended are the continuous warm baths, and the application of ice to the spine, and electricity and bleeding. In the severer spasms, leading to stoppage of respiration and cyanosis, artificial respiration should be actively employed.

HYDROPHOBIA (Lyssa—Rabies).

Definition. An acute infectious disease of animals, dependent upon an unknown specific poison communicated to man by inoculation.

In animals the disease, known as rabies, is met with chiefly in the carnivora, particularly dogs and wolves. It is communicated from animal to animal by inoculation; hence, the extreme rarity of the disease in countries such as North Germany, where the muzzling of dogs is rigidly enforced. It is not infrequently communicated by inoculation to cattle, and occasionally to horses and pigs. It is said that in the Western States the skunk is particularly liable, and a number of instances have been reported of the disease following the bite of this animal. In the dog the early symptoms are a change in the disposition; it becomes quiet, dull and heavy, and very irritable toward strangers. The bark may have a peculiar ringing character. The animal does not take its ordinary food, but eats all sorts of articles, such as straw and wood, and dirt. In some instances, the so-called furious rabies, there is very much excitement, but in a majority of cases the symptoms are rather those of the dumb, or so-called paralytic, rabies, in which, after a transient stage of excitement, there is unsteadiness in the legs, with increasing weakness and ultimately paralysis and coma. The poison is present in the salivary glands, in the nervous system, central and peripheral, and in the pancreas, adrenals, and mammae. The disease may be produced in animals by the inoculation of portions of these structures. In rabias, the animals usually employed, inoculation is made beneath the dura, and death follows in from seventeen to nineteen days. The virus prepared for the protective inoculation is obtained by passing through a series of rabbits, when it is found after successive inoculations that the incubation period is reduced to seven days and becomes remarkably uniform.

Hydrophobia is a rare disease in man in the United States. Dulles, from June 1, 1888, to January 1, 1894, collected seventy-eight cases, an average of fourteen per annum. Sixty-two per cent. of the cases were in the Atlantic States. The disease is much more common in Europe, particularly in Russia and in France.

Incubation. There is an extraordinary variability in the time which elapses between the introduction of the virus and the appearance of the symptoms. Horsley states that the variation depends upon the following factors: *a.* Age. The incubation is shorter in children than in adults. For obvious reasons the former are more frequently attacked. *b.* Part infected. The rapidity of onset of the symptoms is greatly determined by the

part of the body which may happen to have been bitten. Wounds about the face and head are especially dangerous; next in order of degrees of mortality come bites on the hands, then injuries on the other parts of the body. This relative order is, no doubt, greatly dependent upon the fact that the face, head, and hands are usually naked, while the other parts are clothed. *c.* The extent and severity of the wound. Puncture wounds are the most dangerous; the lacerations are fatal in proportion to the extent of the surface afforded for absorption of the virus. *d.* The animal conveying the infection. In order of decreasing severity come: first, the wolf; second, the cat; third, the dog; fourth, other animals." The average period is probably from six weeks to two months. It may be prolonged to more than three months, and there are cases in which the incubation has apparently lasted for a year or eighteen months. Of persons bitten by rabid dogs only a certain percentage become infected; according to Horsley not more than 15 per cent. The death-rate of those bitten by wolves is not less than 40 per cent. Bites upon the face are particularly dangerous.

Symptoms. In the premonitory stage there is usually some irritation about the bites, such as pain, numbness, or paresthesia. There is loss of appetite, headache, and depression of spirits. The patient may become very irritable and sleepless, and there is a constant sense of impending danger. Slight fever has been noted at this stage, and the pulse is accelerated. The general sensibility is greatly increased; a bright light or a loud noise is very distressing. Stiffness about the throat muscles, and slight difficulty in swallowing may be expressed, and the voice is a little husky. In the second stage—the period of excitement—there is great restlessness and hyperaesthesia. "Any afferent stimulant—*i. e.*, a sound or a draught of air, or the mere association of a verbal suggestion—will cause a violent reflex spasm. In man this symptom constitutes the most distressing feature of the malady. The spasms, which affect particularly the muscles of the larynx and mouth, are exceedingly painful and are accompanied by an intense sense of dyspnoea, even when the glottis is widely opened or tracheotomy has been performed," (Horsley). Any attempt to take water is associated with painful spasms of the muscles of the pharynx and larynx, and of the elevators of the hyoid bone. This it is which makes the patient dread the very sight of water, and has given the name hydrophobia to the disease. These inspiratory and deglutition convulsions, as they may be called, are sometimes associated with maniacal symptoms. In the intervals between the attacks the patient may be quite quiet and the mind unclouded. Hallucinations and delusions may be present, not infrequently associated with the idea of the presence of a dog in the room. He very rarely makes any attempt to injure the attendant, and indeed may be particularly anxious to avoid hurting anyone. There may be, however, occasional fits of furious mania, and in the contraction of the muscles of the larynx and pharynx odd sounds are occasionally uttered. The saliva is usually abundant and tenacious, and flows from the mouth, owing to the difficulty the patient has in swallowing it. The temperature in this stage is usually elevated, and may reach from 100° to 103°. The course may be afebrile throughout.

In addition to the local spasms of the respiration and deglutition muscles, there may be convulsive seizures of a tetanoid character. After lasting for a day and a half to three days this is succeeded by the paralytic stage, in which the spasms no longer occur. The patient becomes quiet, and unconsciousness gradually supervenes. The heart's action gets more and more feeble, and death occurs by syncope. In animals the preliminary and furious stages are absent as a rule, and the paralytic may be marked from the first, the so-called dumb rabies. In man the paralytic form is extremely uncommon.

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Morbid Anatomy. The chief lesions are in the nervous system. Gowers, who has examined 9 cases, found morbid changes in 7. "These were indications of vascular disturbance; dilatation of small vessels, accumulations of leucocyte-like corpuscles around them and in the tissues, clots in small vessels evidently formed during life, and minute hemorrhages. These changes are met with in various parts, especially in the cortex of the hemispheres, the medulla oblongata, and the spinal cord. They are always most intense in the medulla, between the eminentia teres above and the decussation of the pyramids below, and especially in the neighborhood of the pneumogastric, hypoglossal, and spinal accessory nuclei. The accumulations of leucocytes about the vessels is a very conspicuous change. They surround the outer wall and may be so numerous as to fill up the whole space within the lymphatic sheath; they may extend along the vessel for a considerable distance, and even pass into the adjacent tissue. The nuclei contain a much larger number of corpuscles than normal, and in places they may be aggregated and form dense masses, which, since the corpuscles may be regarded as identical with pus-cells, are to be met, 'miliary abscesses.' . . . In the spinal cord the alterations are usually much slighter, and are confined to encrustation of the vessels with leucocytes and to an increase in the number within the gray matter; in this the changes are usually greater than in the white columns, although they involve these in severe forms. They may, indeed, be so intense as to constitute a condition practically of acute myelitis. Even when a case has run so rapid a course as to be fatal in three days such myelitic changes may be conspicuous. The 'miliary abscesses' are very seldom seen in the cord. On the other hand, the central nervous system may present no other alterations than are common after death from asphyxia, and this even in an animal inoculated with rabies, as well as in man. Outside the nervous system leucocytic infiltration has been seen in the salivary glands and in the kidneys." The mucous membrane of the larynx and pharynx is congested. In the dog the stomach not infrequently contains straw, hay, and foreign matter which the animal has eaten. There are no special changes in the abdominal or thoracic viscera.

Diagnosis. There is rarely any difficulty in distinguishing hydrophobia from other organic affections of the nervous system associated with spasms and cramp. In tetanus, spasms of the deglutition and inspiratory muscles occur occasionally, but the character of the wound, the short time which has elapsed before the symptoms develop, the presence of trismus and opisthotonos, and the absence of any aversion to liquid, render the diagnosis clear.

The greatest liability to error is in the so-called pseudo-hydrophobia, or lysophobia, which is a neurotic or hysterical manifestation, and may closely simulate the true disease. A nervous person bitten by a dog, either rabid or supposed to be so, may display within a few months, or even several years after, symptoms resembling hydrophobia. He becomes irritable, depressed, and moody, constantly speaks of his alarming condition, and insists that he is certain to go mad. There may be hysterical paroxysms, in which he says that he is unable to drink, and shudders at the sight of fluid, grasps convulsively at his throat, and becomes emotional. A few years ago, when the newspapers were full of the details of Pasteur's treatment, a young man consulted me, who had been bitten a year or more previously by a dog which was still alive. Some of his fellow clerks had joked him upon the subject, and he had gradually become very much alarmed. When I saw him he was greatly excited, had pains in the throat, difficulty in swallowing, and in attempting to take a glass of water he would become greatly excited and

alarmed and would have a pseudo-convulsive attack. These symptoms persisted for a couple of weeks, and ultimately yielded to treatment with static electricity. There have been instances published as lycsophobia in which these seizures have become more frequent, and the patient has died exhausted. Gowers holds that the majority of these cases are in reality genuine, and his remarks on this point are worth quoting: "There has more often been a tendency to regard the genuine disease as imaginary than to mistake the spurious for the genuine. This tendency is especially marked among critics who have not seen the case, who do not scruple to cast doubts on the nature of even fatal cases. It is not certain that death has ever occurred from mere lycsophobia." Nowadays the test of the nature of a fatal case can be readily made, as the inoculation experiments are quite conclusive.

Dulles, in particular, has called attention to a number of diseases in which symptoms of hydrophobia may occur, and he has rightly urged a more thorough and systematic examination of patients, and greater caution in pronouncing upon the irregular symptoms, which, in nervous people, are apt to follow the bite of a dog.

Treatment. The local treatment of the wound is important. If on a limb, a ligature should be placed above, and it should then be thoroughly cauterized. A bunch of lighted matches will serve the purpose, if nothing better is at hand. Strong carbolic acid or nitrate of silver may be used. The wound should be encouraged to bleed, and it should be kept open for some time. Excision of the wound is also recommended. When the disease has developed the patient should be kept absolutely quiet in a darkened room, in charge of a couple of nurses. There is rarely any necessity for restraint, and the physician can assure the attendants that there is no risk in their duties. There is not a single instance on record in which the disease has been transmitted from patient to nurse. As a rule, the patient is readily controlled, and does not require to be forcibly held or restrained. No attempts should be made to force the patient to drink or to eat. Sometimes he can swallow readily. It is stated that the local application of cocaine allays the sensitiveness of the throat and enables the patient to swallow. If necessary, nutrient enemata may be given, or, if the patient cannot take water by the mouth, large injections may be given per rectum.

There is no medicinal treatment of any value. In the violent spasm the inhalation of chloroform may be tried. Morphine, chloral, bromide of potassium, and curare have been recommended. The latter may be tried in doses of from a tenth to half a grain, repeated every half-hour until there is muscular weakness.

PREVENTIVE INOCULATION. Pasteur found that the virus in the spinal cords of inoculated rabbits, when preserved with careful antiseptic precautions, gradually diminished in intensity, so that the fourteen-day-old cord was no longer poisonous. Dogs inoculated with portions of cords dried in this way and of increasing intensity acquire immunity, and are in reality vaccinated against the strongest virus, which would otherwise have proved fatal. Relying on these observations and on the fact of the long incubation period, Pasteur began the inoculation in human beings bitten by rabid animals. In what is known as the simple method the individual receives an injection on the first day of a portion of the spinal cord of a rabbit which has been preserved in the dry air for fourteen days; on the second day a bit of the cord of thirteen days old, and so on until the cord of the fifth day is used. In what is called the more intensive method, on the morning of the first day a portion of the cord (rubbed up in sterilized bouillon) of the fourteenth and thirteenth day is used, and in the evening the cord of the twelve and eleventh day. On the second day in the morning the cord of the tenth and ninth day is used.

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An enormous number (from 1886 to January 1, 1894, 14,430 persons) bitten by animals rabid, or supposed to be so, have been treated at the Pasteur Institute. Of these only 72 have died. A great difficulty has been that many persons bitten by animals not rabid have flocked to Paris for the treatment. In the preparation of the statistics these are carefully separated.

While the preventive inoculation is not invariably successful, as, indeed, is only natural, since many persons apply weeks or months after they have been bitten, it cannot be denied that the percentage of mortality in persons bitten by animals undoubtedly rabid is, after the treatment by the inoculation, very greatly lessened, and in some years has been nil; thus, in 1891, of 394 persons treated in whom the nature of the disease in the animal was determined with all possible certainty, not a single one succumbed. The possibility of communicating rabies has, of course, been urged, but it must be extremely slight, though there is one case in which this seems really to have occurred.

TETANY.

Definition. A paroxysmal affection, characterized by bilateral tonic spasms affecting chiefly the extremities.

Etiology. The disease occurs chiefly in young persons, and attacks males rather more frequently than females. Of 150 cases collected by Gowers from different sources, 76 were in males and 66 in females. The following are the most important conditions under which the disease develops:

a. In children associated with the debility of chronic exhausting maladies, such as diarrhoea. The carpopedal spasm, so frequently seen in connection with rickets, is regarded by some as a variety of tetany. It occurs as a sequence of the fevers; many cases have developed after typhoid fever, particularly in certain epidemics. A few typical instances have occurred in connection with pregnancy and lactation. Trousseau called the disease the rheumatic contraction of nurses. It may recur in successive pregnancies.

b. A remarkable association exists between tetany and the removal of the thyroid gland. Thirteen cases followed 78 thyroidectomies in Billroth's clinic, six of which proved fatal. It follows total, not partial extirpation. This is the most serious form of the disease. Removal of the thyroid in animals is also followed by tetany. Tetany and myxœdema may be associated, as in a case reported by James Stewart.¹

c. The disease occurs in epidemic form, particularly on the continent of Europe during the winter months. Extensive epidemics occurred in Paris in 1855 and 1876, and a recent epidemic described by von Jaeksch occurred in young men of the working classes, usually with slight fever. Fatal cases are rare in this form.

And, lastly, tetany has been met with in connection with dilatation of the stomach, particularly in the cases in which lavage has been practised. Death is very apt to occur in coma. A full record of the cases to 1892 will be found in the Paris Thesis by Vautier. In America true tetany is very rare, and it has not occurred in epidemic form. If, however, cases of carpopedal spasm be included the disease is not infrequent, and Griffith has been

¹ Transactions of the Association of American Physicians, vol. iv.

able to collect from the literature 72 cases, but the affection in adults, with all the cardinal symptoms, is rarely seen.

Symptoms. The following brief statement of a case which was in my wards in 1894 will illustrate some of the remarkable characters of the form of tetany which recurs with pregnancy:

Mrs. P., aged thirty-three years; married at eighteen; first child born nineteen months afterward, and a second child two years after the first. While three months pregnant with the second child she noticed that her hands ached and felt tired, and two or three times a day would get quite stiff. These symptoms continued until a short time before her confinement, when she felt much better. She remained free from the cramps until the ninth day after labor, when they returned and were more violent. Not only were the hands closed in cramp, but the feet would also draw together. The attacks were not accompanied by much pain. In the intervals the hands and feet felt as usual. The attacks recurred for five months and then disappeared for two months. In November, 1882, after exposure in the snow, the spasms re-appeared with greater intensity, and early in December she had an unusually severe attack in which the hands were closed, the elbows flexed, and the arms held close to the body. The spasms in the hands did not relax for a week.

In her third pregnancy, which followed in a short time, during the first five months she had no cramps, but in the last four months she had them daily. They again disappeared just before labor. She did not nurse this baby, and the fourth pregnancy followed in four months. She had no cramps for the first four or five months, but they recurred as before during the last four months. While in labor she had a very severe attack lasting four or five hours. She afterward remained free until the ninth day, when she had a very severe attack.

In her fifth pregnancy, which followed in five months, the spasms occurred at intervals throughout the entire period. In her sixth pregnancy, which began eighteen months after the birth of the fifth child, she was free during the first five months, then the cramps returned worse than ever. The hands and legs would get stiff and painful, and she had for the first time spasm of the larynx. During the last month of this pregnancy there were no attacks. They recurred again on the ninth day after labor. From this time until her seventh pregnancy, nearly three years, she was well, except at about the time of the menstrual periods, when she always had the spasms.

In her seventh pregnancy the attacks occurred as usual, but she was better for a longer period before labor.

Since June, 1892, the date of her last confinement, she has had the attacks at intervals, usually about the time of the menstrual period.

The patient is a young-looking woman, well nourished, a little pale. The mechanical excitability of the motor nerves was very great, the slightest tapping in the course of the facial nerve was sufficient to produce contraction of the muscles of the face on that side, and the electrical reactions, to be mentioned hereafter, were present in a typical manner.

The onset of the intermittent spasms may be sudden and unexpected, but as a rule there are slight feelings of numbness or pain in the extremities, or a feeling of lassitude and headache. The hands are usually affected first, and the spasms may be confined to them. The contraction begins in the interossei and the smaller muscles of the hands, which feel stiff and cramped, and gradually assume what has been known as the writing posture. The fingers are closely pressed together, the thumbs adducted and pressed firmly against the index fingers, or, in children, not infrequently flexed tightly beneath the fingers. The hand itself is generally flexed, and the elbow also held in flexion. In children the arms are not infrequently folded over the

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chest. In the lower extremities the flexors of the feet and toes are in tonic spasm; the toes strongly flexed and the feet in the talipes equino-varus position. The thigh muscles are rarely involved. The muscles of the face and neck are less commonly attacked. In severe cases there may be trismus, and the angles of the mouth are drawn out. The trunk muscles are very rarely involved, but there is occasionally a slight degree of episthotonos, and during a severe spasm the thorax may be fixed, and there may be slight difficulty in breathing. The skin of the hands and feet is sometimes tense and oedematous. The spasms are paroxysmal, continuing from a few minutes to an hour or more, occasionally lasting for several days. The contracture is, as a rule, painless, but when the spasms are intense the pain may be severe and cramp-like. The mind is clear, except in the extreme debility of children and in cases associated with dilated stomach, in which coma is a not infrequent accompaniment. The temperature is sometimes elevated during the attack, but it may be sub-normal. The pulse is usually accelerated. In the intervals between the paroxysms there may be a sensation of stiffness in the muscles. There are several important symptoms on the part of the muscles and nerves.

Trousseau found that pressure on the nerve trunks or on the vessels brought on an attack of spasm in the muscles of the limb. "So long as the attack is not over, the paroxysms may be reproduced at will, even though the patient has been free from them for twenty-four, thirty-six, forty-eight, seventy-two hours or more. This is affected by simply compressing the affected parts, either in the direction of their principal nerve-trunks or over their blood-vessels, so as to impede the venous or arterial circulation." (Trousseau.) In characteristic cases tight pressure round the wrist may be sufficient to produce cramp of the muscles of the hand.

There is a remarkable increase in the mechanical excitability of the motor nerves. A very slight tapping in the course of a nerve is sufficient to produce active contraction; if with the percussion hammer the slightest tap he made in the course of the facial nerve on the cheek, the muscles to which it is distributed will be instantly thrown into active contraction. This is known as the facial phenomenon, or Chvostek's symptom. It is not characteristic of tetany, and may occasionally be induced in tuberculosis. A very important sign is the great increase in the electrical excitability of the motor nerves (Erb's symptom). The current from a single cell may be sufficient to cause contraction of the face muscles. "Instead of the normal reaction 1, KCIC; 2, ACIC, KOC; 3, AOC, we have 1, ACIC; 2, AOC; 3, KCIC, or 1, AOC; 2, ACIC, KCIC, AOTe." (Gowers.)

And, lastly, the mechanical and electrical excitability of the sensory nerves is also greatly increased (Hoffmann's symptom), and the slightest pressure on the supra-orbital, the auricularis magnus, or the ulnar nerves (which in a healthy nerve would only produce a slight local sensation) is sufficient to cause paresthesia in the parts to which the filaments are distributed. Other less constant symptoms are profuse sweating, oedematous swelling of the skin, herpes, urticaria, nutritive changes in the nails and hair, pigmentation of the skin, and in rare instances local or general atrophy of the muscles. The reflexes are usually normal, sometimes exaggerated. Psychological disturbances are rare, but epileptic attacks have been described. Though the spasms as a rule are intermittent, they are sometimes remittent, or they may be continuous, often in the same case. It is stated, too, that the spasms may persist sometimes during sleep. There are cases in which paresthesie and stiffness may exist without the spasms. Gowers speaks of a variety met with in adult women in feeble health, who have a feeling of stiffness and tingling in the hands on awakening, which may last for a few minutes or longer. He says that there are instances in which this "sleep tetany" recurs through the day.

The course of the disease is very variable. The patient may have one or two slight attacks and no recurrence, or it may last for many months, and then again, as in the case above mentioned, it may recur throughout a period of years. There are instances in which it has recurred year by year during the winter months. In a few instances the disease proves fatal. Trousseau mentions such a case in which with very violent contractions, particularly of the muscles of the face and neck, asphyxia developed and caused death. More serious are the cases which follow extirpation of the thyroid and those which develop in connection with dilatation of the stomach. Children not infrequently die of the disease causing the exhaustion, rarely of the tetany itself.

The anatomical condition is unknown, nor is its pathology as yet clear. The occurrence in epidemic form has been held to show the infective character of the disease. The occurrence after thyroid extirpation and in dilatation of the stomach suggest its dependence upon some toxic material, to the nature of which, however, we have no clue. Bouveret and Devic in cases of tetany in dilated stomach have extracted from the stomach contents a material which they state produces a tetany-like group of symptoms in animals. Recently Oddo and Sarles have reported a case of tetany in a child aged eighteen months, associated with retention of urine and menses. There was, however, no albumin in the urine, but indican and an excessive quantity of earthy phosphates.

Diagnosis. Typical forms of the disease are very readily recognized. Hysteria may simulate it very closely, but neither Trousseau's phenomenon nor the increased excitability of the muscles and nerves is present. In rare instances the disease might be mistaken for idiopathic tetanus when the spasms are widespread, and in such a case the etiological factor would be most important. Some writers include with tetany all cases of carpopedal spasms in children. This has been done by Griffith in his recent paper. It is true, as he says, that there are numberless gradations between the condition of well-marked, widespread, intermittent contractions and the continuous or intermittent carpopedal spasms. While recognizing that there are instances in rickety children in which more extensive spasms occur than those of the ordinary carpopedal form and with the character of tetany (sometimes with laryngismus), yet I think it is better to limit the name to those cases which with the spasm show marked increase in the mechanical and electrical excitability of the muscles and nerves.

Treatment. When the spasms are severe chloroform inhalations may be used, as recommended by Trousseau. The entire range of antispasmodics may be tried, usually without any benefit. Such tonics as strychnine, arsenic, and zinc are appropriate. Gowers speaks highly of the valerianate of zinc with bromide of potassium, and for the nocturnal tetany a dose of digitalis at bedtime. Ice to the spine and electricity in its various forms may be used.

Where possible the treatment should be directed to the underlying conditions. In the stomach cases, as the contractures very often follow directly upon the use of the tube, this should be restricted as much as possible. When the disease has followed extirpation of the thyroid, the extract of the gland may be given, or a portion of the thyroid may be transplanted.

DIPHThERITIC PARALYSIS.

Nature of the Poison. Roux and Yersin showed by the inoculation of animals with the cultures and with the toxins of the diphtheria bacilli that a peripheral paralysis could be produced similar to that which occurs in

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man. The observations of Sidney Martin on the character and actions of the chemical products of the diphtheria bacillus are most important. He was able to extract from the spleen and blood of persons dead of diphtheria an albumose and an organic acid. The albumose produced in animals, when injected subcutaneously, pyrexia, loss in weight, and paralysis, which anatomically was shown to be due to degeneration and atrophy of the axis-cylinder of the nerves. The loss of weight was a very striking feature in the animal. Very similar results followed the injection of the organic acid, but larger doses were necessary. Martin's conclusions are as follows:

1. "That the bacillus forms in the diphtheria membrane and in culture fluids products, viz.: albumoses and an organic acid identical with those found in the tissues of persons dead from diphtheria.

2. "That the physiological actions of single or repeated doses of these products, viz.: fever, emaciation, and progressive muscular paresis due to degeneration of the peripheral nerves, are the same as those of the corresponding substances obtained from the tissues, and as the phenomena of the disease itself.

3. "That the bacillus is therefore the primary infective agent in diphtheria.

4. "That it liberates in the membrane a ferment which when absorbed digests the proteids of the body, forming albumoses and an organic acid.

5. "That these are the immediate agents in the production of fever, paralysis, emaciation, and death.

6. "That the relatively enormous quantity of these products found in the spleen (in diphtheria as in anthrax) is explicable by the larger proportion of proteids normally present—stagnating, so to say—in the blood of the spleen than in the general circulation."

Anatomical Changes. The central nervous system is not, as a rule, involved. There may be a slight infiltration of the meninges, hemorrhagic foci, and the smaller vessels have been found blocked with micrococci. The diphtheria bacilli are not found in the nervous system. Many observers have described changes in the motor nerve cells of the anterior horns of the spinal cord, but they are not constant.

The nerves show important changes, which were first described by Charcot and Vulpian in those of the palate, by Ruhl in the spinal nerve roots, and in the peripheral nerves by Déjerine. The toxins produce either parenchymatous or interstitial neuritis, sometimes both. The alterations found have usually been in some proportion to the degree of the paralysis. The histological changes present nothing peculiar, being those described under the section of peripheral neuritis.

Hochhaus has called attention to the fact that the muscles are also involved. Granular and fatty degeneration is, of course, common in the muscles of the palate, but in the paralyzed muscles in other parts of the body there may be a very intense interstitial and parenchymatous myositis.

Symptoms. Paralysis follows diphtheria in a very variable number of cases, ranging from ten to twenty per cent. While it may develop as early as the seventh or eighth day, it is more strictly a sequel, not manifest until convalescence from the disease is well established. It may follow diphtheria of any part, and may occur after very slight forms of the disease. Children are very much less apt to suffer than adults.

The onset is usually slow, and not manifested by any recurrence or aggravation of the local throat symptoms, nor is there, as a rule, any fever. An interesting point, to which attention has been specially called by Bernhardt, Buzzard and R. L. MacDonnell, is the loss of the knee-jerk during convalescence from diphtheria. It may be an early feature, while the local disease is still present, but more commonly it is found during convalescence.

It is important to bear in mind that it occurs in about two-thirds of all cases, and that it is not necessarily associated with or followed by paralysis.

Local and general forms of diphtheritic paralysis are recognized.

LOCAL PARALYSIS. (*a*) *Palate, pharynx, and larynx.* By far the most common form is the gradual loss of power in the muscles of the palate, indicated by a nasal tone of the voice and difficulty in swallowing. The change in the voice is due to the fact that in the pronunciation of certain words the cavity of the nose is not shut off. In consequence also of this inability the patient cannot distend the cheeks or blow out a candle unless the nose is held. The difficulty in swallowing, manifest by regurgitation of liquids through the nose, is variable, being much more marked in some instances than in others. The palate is seen to be relaxed, hangs more vertically, and cannot be raised. When touched the sensation is also much impaired. Atrophy of the muscles follows the paralysis, and the reaction of degeneration has been obtained, though with difficulty. This, the slightest and most transient form of diphtheritic paralysis, may disappear spontaneously within two or three weeks. Occasionally unilateral facial paralysis occurs with it.

When the muscles of the pharynx are involved, which is fortunately not so common, the act of swallowing is accomplished with difficulty, or in extreme cases may be impossible, so that the patient has to be fed with a tube.

Involvement of the laryngeal nerves: "Paralysis of the upper part (superior laryngeal nerve) is more frequent than that of the vocal cords (inferior laryngeal nerve). In the former case the epiglottis stands erect against the base of the tongue, and does not descend over the opening during the act of deglutition, in consequence of the weakness of the depressors. The upper part of the larynx is insensitive, although when a foreign body reaches the vocal cords pain is felt. Hence, food is apt to get into the larynx and to cause coughing. The voice is hoarse, probably in consequence of paralysis of the crico-thyroid muscle, but the vocal cords move as usual. In other cases there is paralysis in the region of the inferior laryngeal nerve, and phonation may be impossible. The laryngoscope then shows immobility of the cords and sometimes a preponderant weakness of abduction, so that the cords are not separated during inspiration. In one fatal case, at the end of the first week, swallowing was impossible, and there was complete motor and sensory paralysis of the larynx." (Gowers.)

(*b*) *Special senses.* Paralysis of the eye muscles, intrinsic and extrinsic, is not uncommon. Loss of the power of accommodation, due to affection of the ciliary muscle, and loss of the light reflex may be present. Ptosis and external and internal strabismus are occasionally seen, and in rare instances complete ophthalmoplegia. There may be contraction of the fields of vision.

It is much rarer to have the other special senses involved, but cases are on record of loss of the sense of taste, of smell, and of hearing.

(*c*) *Cardiac nerves.* Various forms of arrhythmia are not uncommon. The heart's action may be slowed to twenty or thirty beats per minute. In other cases there may be tachycardia, or the two conditions may alternate in the same patient. In other cases the pulse is irregular in volume and in rhythm. Fatal syncope may occur, either at the height of the disease or during convalescence. Occurring during the fever the child may, after an exaggeration of the symptoms, present unusual pallor; the pulse may either be weak and rapid or may be not more than forty or fifty; the extremities are cold, the temperature sinks, and death takes place within a few hours with all the features of collapse. More often the fatal event occurs during convalescence, even as late as the sixth or seventh week after apparent recovery. The attack may occur abruptly while the child is in bed, or may follow a sudden exertion; more commonly there have been symptoms pointing to disturbed

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cardiac rhythm, or there have been fainting spells. In some cases vomiting has preceded the attack. There are not often physical signs other than slight increase in the area of dulness and the presence of a gallop rhythm. These serious symptoms are ascribed to a neuritis of the vagi or of the intrinsic heart nerves. Possibly in some of the cases the lesion, as pointed out by Mosler and by Leyden, is an infectious myocarditis.

GENERAL PARALYSIS. The multiple form of diphtheritic paralysis is by no means uncommon. It usually begins with an affection of the palate, or with the loss of a commotation in the eye, and an absence of tendon reflexes. It is, as a rule, bilateral, involving the legs first, and the patient complains that they are heavy and stiff, and that he tires easily. Gradually the weakness progresses, and the paraplegia may become complete, or it may involve chiefly the extensor groups of muscles. The paralysis may extend and involve the arms and face and render the patient completely helpless. The muscles usually waste, and there is a diminution or even complete loss of the faradic irritability. The sphincters may be involved, though they are often spared, even when the paralysis is extensive. Disturbance of sensation in the form of numbness, tingling, and anaesthesia may develop. Anaesthesia may be present as a very special feature; thus Hallager¹ reports an instance in which some paresis of all four extremities occurred with anaesthesia of the distal parts, in the arms not extending above the elbow, and in the legs to the middle of the thighs. The muscles of respiration are usually spared, but the intercostal muscles and the diaphragm muscles are occasionally involved, and the muscles of the neck and back may be so weak that the patient can neither turn over nor hold up his head.

The outlook, of course, in these very severe cases is serious, and yet is not in many cases so bad as some of the symptoms indicate. Of 13 cases of the severer forms of multiple diphtheritic paralysis collected by Cadet de Gassicourt only 6 died.

The duration of these severer forms is very variable, from several months to an entire year. I remember the case of a medical student in whom the peripheral paralysis did not disappear for more than fifteen months.

The prognosis in the local palsies is good, except in the instances in which the pharynx and larynx are seriously involved, and in the cases with affection of the heart. The most dangerous are those in which a rapid and widespread palsy supervenes shortly after the primary disease.

Diagnosis. The diagnosis is rarely doubtful when the history of an attack of diphtheria is clear. In many instances the nature of a throat or nose trouble has been made manifest by the onset of a paralysis having the characters of that which so often follows diphtheria. Rarely could the absence of knee-jerks and the slight inco-ordination lead to a diagnosis of locomotor ataxia, nor is the gait, when the extensors of the feet are chiefly involved, at all like that of true tabes. There are instances on record in which hysteria, complicating the diphtheritic paralysis, has caused anaesthesia, either total or hemiplegic.

Treatment. As in all forms of peripheral neuritis, there is naturally a strong tendency to recovery, and the main indications are to support the patient's strength and to keep up, as far as possible, the nutrition of the muscles by electricity and massage. The special treatment is that of the ordinary forms of peripheral neuritis. We know of no measures which can directly counteract the poison in the system. When the palate is paralyzed there is rarely great difficulty in giving abundant nourishment. It is to be remembered that in this state solid and semi-solid foods are better swallowed

¹ Neurologisches Centralblatt, Bd. ix.

than liquids. When the pharynx is seriously involved the patient must be fed per rectum or with a soft stomach-tube, the greatest care being exercised that particles of food do not get into the larynx.

It is too soon to say how far the new antitoxin treatment (the results of which seem so favorable) will diminish the liability to these most serious sequelae of the disease.

Disorders other than neuritis may follow diphtheria; thus multiple sclerosis may develop in children, as noted particularly by Marie.

Hemiplegia following diphtheria is not usually due to neuritis, but to acute encephalitis or to cerebral embolism from heart-disease. Of 160 cases of infantile hemiplegia in Wollenberg's statistics, three followed diphtheria. Not one of my series of 120 cases followed this disease. Seifert¹ has reported two interesting cases, both in children about the age of ten, who had had the ordinary pulse of the throat following diphtheria. In one hemiplegia developed suddenly; in the other more gradually. He has collected only six cases from the literature of complete hemiplegia after diphtheria, two of which were fatal, both from hemorrhage. As in other instances, the condition is probably due to an acute encephalitis, setting in with convulsions and fever. Caspar Sharples has reported the case² of a boy, aged thirteen years, who during an attack of diphtheria was seized with right hemiplegia and aphasia.

¹ Neurologisches Centralblatt, No. 12.

² Medical News, August 4, 1891.

Studies in Typhoid Fever:—
Five Years' Experience with the Cold Bath
Treatment.

BY

WILLIAM OSLER, M. D.

JOHN MURPHY & CO., PRINTERS,
BALTIMORE.

III.—FIVE YEARS' EXPERIENCE WITH THE COLD-BATH TREATMENT OF TYPHOID FEVER.

BY WILLIAM SLER, M. D.

During the first year of the Hospital service, typhoid fever was treated symptomatically. The number of severe cases admitted was unusually large, and there were eight deaths among thirty-three patients—a percentage of 24.2. For the past five years, ending May 15th, 1895, systematic hydrotherapy has been used—the method of Brand, with certain minor modifications. In the first *Report* (Vol. IV) the plan was given; but I may repeat here that each patient receives a tub-bath of twenty minutes at 70° every third hour, when the rectal temperature is at or above 102.5°. Frictions are applied in the bath, and a warm drink or a stimulant is given afterwards. In a large proportion of the cases no other treatment is employed. If the pulse is feeble whiskey is given, and strychnia. The diet is either wholly milk or in part broths, and egg albumen. It may be noted that all the cases come under my immediate care or, in my absence, that of Dr. Thayer, the Associate in Medicine.

In estimating the value of any plan of treatment, it is important that all circumstances should be taken into account. In the previous report I dealt with the statistics as so many patients admitted, of whom so many died; and this, I think, should be done in all Institutions—give the total number of cases of each disease treated to a conclusion, and the number of deaths, irrespective altogether of the length of stay in the hospital, or the condition on admission. General hospitals are everywhere liable to be repositories of the more severe or troublesome cases, and in typhoid fever more particularly of protracted cases, in which serious symptoms have developed late in the disease. A high rate of mortality in any given acute disease may be an indication of a special usefulness of the institution. As already given, the general statistics of the Hospital in typhoid fever are:—

Cases admitted during the six years ending May	
15th, 1895, - - - - -	389
Number of deaths, - - - - -	34
Percentage of mortality, - - - - -	8.7
Cases admitted before the introduction of hydro-	
therapy, - - - - -	33
Number of deaths, - - - - -	8
Percentage of mortality, - - - - -	24.2
Cases admitted since the introduction of hydro-	
therapy, - - - - -	356
Number of deaths, - - - - -	26
Percentage of mortality, - - - - -	7.3
Number of cases bathed, - - - - -	299
Number of deaths in the bathed cases, - - - - -	20
Percentage of mortality in the bathed cases, - - - - -	6.6

The percentage 7.3 represents the total mortality during the past five years; but as it does not represent the mortality of the cases treated by hydrotherapy, the figures must undergo a further analysis. Many circumstances interfere with the systematic carrying out of the plan, among which the following are the most important.

In the first place, a number of cases are admitted in the second week, and even in the third week, with a falling thermometer, and the fever constantly below 102.5°. Cases, too, are admitted early, which have low temperatures and mild symptoms throughout. Brand and others urge that these should also be bathed; but in a large proportion of all such cases, this appears superfluous. There are exceptions, however,—cases in which the fever is low on admission, and even remains low for a week or ten days, to be followed by active and threatening symptoms. Nos. XXII and XXIX of the fatal cases were of this kind, and in both one could not but regret that the baths had not been used from the outset. In the very mild cases, seen more frequently in private than in hospital practice, the baths are unnecessary. Last year we admitted an unusually large number of such mild cases.

In the second place patients are admitted late in the disease, and are too ill to bathe. A patient brought in at the end of the third week, with high fever, rapid, feeble pulse, meteorism, and diarrhoea,

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stands, I believe, a much better chance, with careful sponging, to reduce the fever, than he does with tubbing every fourth or fifth hour and the disturbance unavoidable in the lifting out of bed. There were five patients admitted in too feeble a condition to bathe, not one of whom died.

Thirdly, there is a group of cases which on admission present serious complications—hemorrhage, signs of perforation, very intense bronchitis, pneumonia, pleurisy or intense meteorism with severe diarrhoea. On account of hemorrhage the baths were postponed on several occasions. There was no instance in which on admission the pulmonary symptoms seemed to contraindicate the treatment.

Fourthly, there are cases which were not bathed at first because the diagnosis seemed doubtful. Two of the fatal cases, to which reference will be made shortly, were not recognized clinically as typhoid fever. Each autumn we have a certain number of cases of malaria which present features closely resembling typhoid fever—so much so that baths have been given. These are instances of the so-called estivo-autumnal fever, in which the organisms may at first be difficult to find. In other instances with a strong suspicion of malaria for a day or two, the symptoms of typhoid fever have developed subsequently, but the temperature meanwhile has fallen below the bathing point. In several cases the condition at first resembled tuberculosis.

And lastly, the baths have been frequently changed to cold sponges, on account of hemorrhage, profound weakness, tenderness and swelling of abdomen, signs of perforation, and in a few cases because of the active protestation of the patient. The sponging, when thoroughly done, is almost as formidable a procedure as the cold bath; indeed, we have had patients ask to have the baths resumed.

The following are among the most important reasons which caused transient suspension of the method: Hemorrhage, 13 cases; perforation, in which condition even the sponging is rarely allowable, but in which the extremities may be bathed without disturbing the patient; on account of great weakness and prostration, 11 cases; on account of active mental symptoms, for one day in one case, for two days in another; for extreme tenderness of the abdomen, for one day, one case; for severe bronchitis, for intense laryngitis, after operation on abscess of parotid, for severe phlebitis, for pleurisy, each one case.

In many of the fatal cases the baths were suspended for twenty-four, sometimes forty-eight hours before death.

There were several instances in which the symptoms of relapse were so slight that the treatment was not rigidly enforced.

Of the 356 cases treated during the five years, 299 were bathed, of these 20 died, a mortality of 6.6 per cent.

Of the 57 cases which were not bathed for various reasons, usually because of the mildness of the disease, six died, a percentage of 10.3. This high ratio of mortality in the unbathed cases is, of course, due entirely to the circumstance that conditions, mentioned below, interfered with the use of the baths in a group of cases of unusual severity. In the six fatal cases, the histories of which are given in full in another place, in two, *Cases XI and XVIII*, the diagnosis was wrong; in the one an old man of 70, with consolidation of the lower lobe, the disease was thought to be lobar pneumonia; and in the other, the patient had been in hospital the year before with entero-colitis, and on re-admission with severe diarrhoea, typhoid fever was not suspected.

In *Case XXVII* the disease was at first thought to be tuberculous cerebro-spinal meningitis—the temperature was low, the nervous symptoms marked, and it was not until parotitis developed that our suspicions were aroused about typhoid fever.

In *Case XXVIII*, after twelve days of moderate fever, severe symptoms developed, with tympany and abdominal tenderness and diarrhoea. It was thought best to use the cold sponges; death was probably due to perforation.

In *Case XXXII* the patient was admitted, bleeding profusely from the bowels, and

In *Case XXXIII* the fever was low, only touching 104° at entrance, and subsequently not rising to bathing point. Death occurred from thrombosis of the middle cerebral arteries.

Two advantages are claimed for hydrotherapy in typhoid fever—a mitigation of the general symptoms of the disease, and a reduction in the mortality. Our experience during the past five years bears out these claims.

In general hospitals, to which cases rarely are admitted before the end of the first week, the full benefits of the cold bath, as described by Brand, cannot be expected; nevertheless, in any large series, the

severer manifestations appear to be less common. As has been urged so often and so ably by many writers, the beneficial action is not so much special and antipyretic as general, tonic, and roborant. The typhoid picture is not so frequently seen, and we may have twenty or more cases under treatment without an instance of dry tongue or of delirium among them. It is a mistake to claim, as do the too ardent advocates of the plan, that severe nervous symptoms are never seen. I have taken the pains to go over carefully our records on this point. There were in the first three years thirteen cases, in the past two years nine cases with delirium. Most of these were protracted cases which had from 75 to 120 baths.

A far more important claim is that the use of the cold bath reduces the mortality from the disease. The comparison of death rates as a measure of the efficacy of any plans of treatment is notoriously uncertain unless *all* the circumstances are taken into account. In our own figures for the past five years, for example, illustrate this—6.2 per cent. in the bathed cases, 10 in the unbathed cases—as the latter group is made up entirely of cases too mild to bathe and six patients in whom either the disease was not recognized or who were too ill on admission to treat.

Statistics have a value in this connection only when the figures on which they are based are numerous enough to neutralize in some measure their notorious mobility. Small groups of cases are useless; 24 per cent. of mortality in our first year in thirty-three cases, and a series of nearly fifty bathed cases without a death, illustrate the liability to error in discussing a few cases. Unfortunately, typhoid fever is a disease in which the cases may be reckoned by hundreds and thousands, and the average mortality in general and special hospitals throughout Europe and America is easily gathered. The rate may be placed between 15 and 20 in each hundred cases. In the Metropolitan Fever Hospitals, London, the death rate, as given in the Report for 1893, was 17 per cent.

The cold-bath treatment, rigidly enforced, appears to save from six to eight in each century of typhoid patients admitted to the care of the Hospital physician.

While I enforce the method for its results, I am not enamoured of the practice. I have been criticized rather sharply for saying harsh words about the Brand system. To-day, when I hear a young girl

say that she enjoys the baths, I accept the criticism and feel it just; but to-morrow, when I hear a poor fellow (who has been dumped, like Falstaff, 'hissing hot' into a cold tub), chattering out malediction upon nurses and doctors, I am inclined to resent it, and to pray for a method which may be, while equally life-saving, to put it mildly, less disagreeable.

Studies in Typhoid Fever:—
General Analysis and Summary of the Cases.
Special Features, Symptoms, and Complications.
A Study of the Fatal Cases.

BY

WILLIAM OSLER, M. D.

JOHN MURPHY & CO., PRINTERS,
BALTIMORE.

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I.—ANALYSIS AND SUMMARY OF THE CASES.

By WILLIAM OSLER, M. D.

In Volume IV of the *Reports* (1894) we dealt with 229 cases of typhoid fever under treatment in the Medical Department for the first four years of the Hospital work. We here deal with 160 cases treated to conclusion during the 5th and 6th years, ending May 15th, 1895.

SEX.—124 were males, 36 females.

For the six years.—311 were males and 78 females.

RACE.—147 were white, 13 were colored.

For the six years.—355 white, 34 colored. The ratio of colored to white in the admissions to the wards is about 1 : 7.

NATIONALITY.—Americans (exclusive of colored), 77; Germans, 44; Poles, 8; Irish, 7; English, 5; Scandinavian, 4; Russian, 3; Bohemian, 3; Welsh, 1.

For the six years.—Americans, 154; Germans, 114; Irish, 25; English, 15; Scotch, 2; Welsh, 1; Scandinavian, 12; Poles, 12; Bohemians, 12; Russian, 3; Italian, 1; Syrian, 1; Finn, 1.

AGE.—Five to fifteen, 9; fifteen to twenty, 22; twenty to thirty, 94; thirty to forty, 23; forty to fifty, 6; fifty to sixty, 4; sixty to seventy, 2.

For the six years.—Five to fifteen, 32; fifteen to twenty, 73; twenty to thirty, 203; thirty to forty, 52; forty to fifty, 16; fifty to sixty, 8; sixty to seventy, 5. More than one-half of the cases occurred between the twentieth and thirtieth years.

SEASON.—The admissions in each month were as follows:—

January, 7; February, 4; March, 2; April, 9; May, 1; June, 5; July, 20; August, 34; September, 31; October, 25; November, 18; December, 3.

For the six years.—January, 16; February, 9; March, 5; April, 14; May, 9; June, 14; July, 42; August, 74; September, 69; October, 65; November, 52; December, 19.

LOCALITY.—*For the six years.*—From the City, 303 cases; from Baltimore county, 50 cases; from Maryland, outside Baltimore county, 14; from outside Maryland, 18; from steamers and doubtful, 4.

MORTALITY.—In the 5th year eighty-one cases were treated, with five deaths—a rate of 6.1. In the 6th year seventy-nine cases were treated, with seven deaths—a rate of 8.8. Of the one hundred and sixty cases considered in this report, twelve died—a rate of 7.5.

For the six years.—Of three hundred and eighty-nine cases treated to May 15th, 1895, thirty-four died—a mortality of 8.7 per cent.

For the five years since the introduction of the Brand method, three hundred and fifty-six cases have been admitted, of which twenty-six have died—a mortality of 7.03 per cent.

Of 299 bathed cases, 20 died—a mortality of 6.6 per cent.

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11.—SPECIAL FEATURES, SYMPTOMS AND COMPLICATIONS.

By WILLIAM OSLER, M. D.

I.—ANALYSIS OF THE GENERAL SYMPTOMS

I.—The Rash.—Rose-spots were noted in 119 cases.
Total for the six years.—318, 81.7 per cent.

PECULIARITIES OF THE RASH.—(a). *Hæmorrhagic.*

James M., aged 22 (Hosp. No. 7728). On admission the rash was profuse on the abdomen and back, and was petechial in the groins. The eruption was abundant throughout. The attack was of moderate severity. Recovery.

G. F., aged 21 (Hosp. No. 9321). The attack was severe.

March 4th, '94.—“Rash is copious on abdomen and back. Just below the right clavicle there are several ecchymotic spots, and there is an area the size of a silver dollar into which superficial hæmorrhage has taken place. In this region nine or ten older ecchymotic rose-spots are seen.”

March 7th.—“Spots are well marked on the neck and as high as the angle of the jaws; there are none on the face; they are very abundant on the arms. The spots described on the 4th have become more hæmorrhagic, and a similar large area has developed below the left costal border in the mid-axillary line. There are scattered petechiæ also upon the posterior axillary folds.”

Michael S., aged 22 (Hosp. No. 11392). The attack was severe, with high fever at the outset. On admission the rash was abundant on trunk and arms; two days subsequently the spots in the flanks and groins had become hæmorrhagic. The patient did well.

Michael U., aged 21 (Hosp. No. 11745), admitted January 4th, 1895, on the 6th day of the fever. The attack was severe and persistent. The rash was profuse upon the trunk, and the spots were particularly

numerous on the upper part of the chest. They were present also on the arms and a few were seen on the thighs. On the 10th spots of simple purpura appeared on the skin of the right shoulder and of upper arm. On the 11th many of the rose-spots on the abdomen were hemorrhagic and did not disappear on pressure.

Jesse T., aged 28 (Hosp. No. 11861), admitted January 19th, 1895. The attack was severe and the fever was high. The eruption was profuse, and on the abdomen the spots became hemorrhagic.

(b). *Rash Persistent while Patient Afebrile.*

John G., aged 21 (Hosp. No. 8461), admitted on 10th day. The temperature was 105° , with unusually abundant rash, of a deep rose-red color. The temperature became normal on the 21st day. On November 5th, the 23rd day, when the temperature had been normal for 36 hours, fresh spots appeared on the abdomen. On November 6th, the 26th day of illness, there were fresh rose-spots. The rectal temperature had, in a two-hourly record, only registered 99.5° once, and once 100° since 12 midnight on November 1st. On November 9th the spots of the 6th had faded.

Charles S., aged 25 (Hosp. No. 8930). Mild primary attack; severe relapse. Rash abundant. During the 3rd week of the relapse, while the temperature gradually fell from 100° to normal, fresh spots appeared on the abdomen, and on the 23rd day of the relapse, when the morning temperature had been normal for five days, the spots were still visible.

(c). *Anomalous Distribution of Rash.*

Angusta A., aged 48 (Hosp. No. 3168), had a very mild attack. The spleen was easily palpable. There were no typical rose-spots on the abdomen, but on the arms and hands there were many slightly raised, red spots looking like those of typhoid fever.

(d). *Exceptionally Profuse Rash.*

August G., aged 26 (Hosp. No. 11119), admitted October 11th, 1894, about the end of the 3rd week of the fever. The temperature was high and all the features of the disease well developed. On admission the rash was exceptionally profuse over the entire trunk and on the shoulders and arms, and very thickly set. On the 15th

the spots had extended down the arms and forearms; a few were seen on the neck, a number could be seen on the thighs, a few on the legs; none appeared on the face.

(c). *Pelionata.*

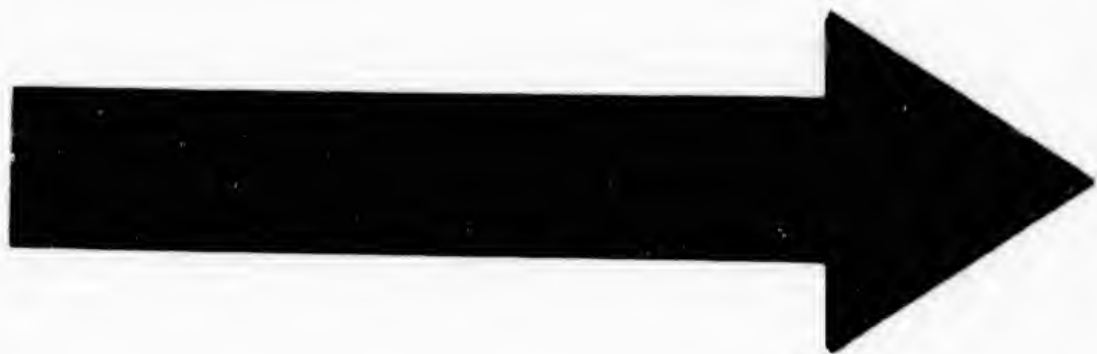
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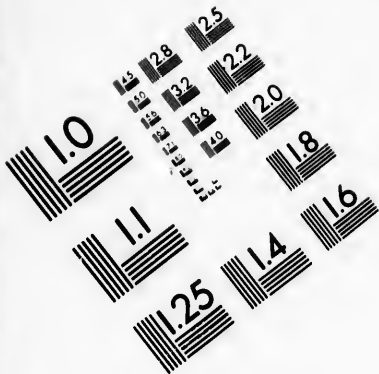
James E., aged 32 (Hosp. No. 3169), admitted the end of the first week. There were well-marked rose-spots, and on the skin of the left flank two steel-gray pelionata.

Carl N., aged 25 (Hosp. No. 9655), had an extensive crop of pelionata which lasted from April 16th, two days after admission, to April 23rd. Pediculi were present on entrance.

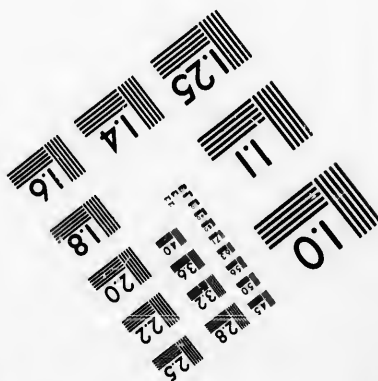
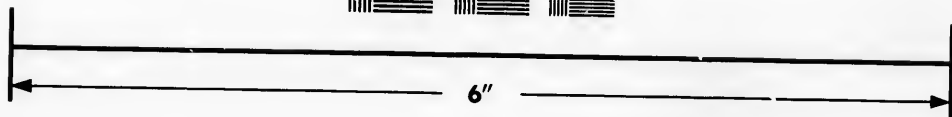
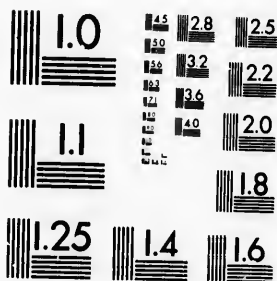
The following note by Dr. Hewetson on Pelionata was read at the Hospital Medical Society (*J. H. II. Bulletin*, Vol. V) on the occasion of demonstrating two cases :—

There exists a considerable difference of opinion as to the diagnostic value of these spots. Many writers, particularly the English, believe that they are often seen in the early stages of typhoid fever, and have laid some stress upon their presence, although they admit their occasional occurrence with pediculi. Other observers, especially the French, claim that they do not exist unless pediculi, and more particularly the pediculi pubis, are present; that when the spots exist, the pediculi or their nits can be found if looked for carefully. Our experience leads us to believe that the latter view is correct, as in the cases of typhoid fever in which the pelionata were present, we were able in each instance to find either the pediculi or their nits. There have been several cases, other than typhoid fever, in which these grayish-blue spots were found, but always associated with pediculi. There are at present two cases in the wards, one with catarrhal jaundice and another admitted for chronic bronchitis and emphysema. In neither case is there any elevation of temperature, but in both there are numerous steel-gray spots scattered over the abdomen, thorax, inner sides of thighs, and here and there on the arms and legs. In both the pediculi are numerous, particularly over the pubes, and also in the hair over the various sites where the *taches bleuâtres* are present. In both cases they are quite plentiful in the axillæ, but in neither have they been found on the hairs of the head or face. They do not appear to have caused much irritation; neither patient complained of





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itching, nor are there marks of much scratching. Indeed, I find that one patient, formerly an Austrian soldier, is quite indignant at the removal of both hair and pediculi. He tells me that they are considered as bringing luck to the bearer, and each sells for from 5 to 10 kreuzers among the soldiers. They had been carefully carried by him for ten years.

Crocker states that "Moursou in 1868 wrote concerning the finger-nail-sized, steel-gray spots of pigmentation (*maculæ cernuleæ*, *taches ombrées*) which are frequently seen deep in the epidermis of the affected areas. Duguet in 1880-82 showed that this pigment was contained in the thorax of the animal, opposite the anterior pair of legs, where there are known to be two pairs of salivary glands, and it is probable that the secretion is conveyed into the tissues through the haustellum. Jamieson thinks that the stains have some anæsthetic effect as far as the itching is concerned." In this patient the *taches bleuâtres* stand out plainly against the somewhat jaundiced skin, and, as can be seen, are most numerous in those positions in which the pediculi were most abundant. The pigmentation seems to disappear after the skin containing it has been pinched for a few seconds.

II.—The Fever.—In 119 cases the thermometer registered 104° and over (rectal temperatures). Six cases only had a temperature of 106°. Forty-nine cases had a temperature between 105° and 106°, and sixty-four cases a temperature between 104° and 105°. In no case did the fever reach 107°.

Of the eleven fatal cases during the 5th and 6th years, the highest temperature recorded was 106.3°. Nine had fever above 105°. Case Susie B., given fully on page 345, had a low temperature during the greater part of her stay of 9 days in the Hospital. The highest record was 103.4°, and there were only a few hours in which the temperature was above 103°. In the case of A. B. (p. 468), the temperature was 104° on admission to the ward, but at no time subsequently did it reach the bathing point, 102.5°, except just before death, when it registered 104°.

For the six years.—Of the 389 cases, there were 271 in which the thermometer registered 104° and over. In only one case was the temperature 107°. In 14 cases the temperature was 106°. In 118 cases the register was between 105° and 106°, and in 147 cases the fever was between 104° and 105°.

III.—The Pulse.—There were 56 cases with a pulse rate of 120 and over; in 7 the rate exceeded 130; in 9 the pulse exceeded 140, and in only 2 was it more than 160 per minute.

IV.—Diarrhœa.—In 41 cases the bowels were loose; in 33 cases there were at some time or other during the attack as many as four movements in the day—moderate diarrhœa; in 8 cases there were six or more movements in the day—excessive diarrhœa.

The condition of the bowels in the fatal cases was as follows:—in seven the diarrhœa was moderate, in three excessive, in two the bowels were regular.

For the six years.—The bowels were loose in 117 cases of the 389—30 per cent. In 56 of these the movements were frequent; in 81 moderate or slight.

V.—The Spleen.—In estimating an increase in the volume of the spleen we trust more to palpation than to percussion. With ordinary relaxation of the abdominal walls, the edge of a moderately enlarged organ can be felt during a deep inspiration. With the left hand on the splenic region, the fingers well behind and pressing forwards, the palm pressing towards the right, then the patient is asked to draw a deep breath, and the fingers of the right hand, just below the costal border, will feel the edge of the spleen, which sometimes tilts visibly over them. When the abdominal walls are very resistant, it is better to palpate just as the muscles relax, and to follow the receding wall quickly, when the edge of the spleen may be touched.

In 97 of the 160 cases the edge of the spleen was felt. In two instances in the 6th year the area of dulness was much increased, and yet the border of the organ could not be felt, owing to the tension of the abdominal walls.

For the six years.—In 244 of the 389 cases the border of the spleen was palpable.

2.—RELAPSE.

There were five cases of relapse in the 5th year and nine cases in the 6th—fourteen cases in the one hundred and sixty, *i. e.*, 8.7 per cent. The total number in the three hundred and eighty-nine cases was thirty-two—8.5 per cent. The doubtful cases are not included.

Theresa H., aged 24 (Hosp. No. 8594), admitted November 9th, 1893, at the end of the third week of fever. The temperature fell gradually after fourteen baths, and was normal on the 17th. There was complete apyrexia from the 17th to the 26th—9 days. On the 26th she had meat for the first time. The fever rose that evening to 100.5° , and on the evening of the 27th to 102° . The fever persisted until December 14th—19 days. The range was 102.5° to 104.3° . There were a few spots, but the spleen was not palpable. The tongue was furred. There was no diarrhoea; no complications.

George S., aged 34 (Hosp. No. 8787), admitted September 29th, 1893, on the 14th day of the fever. The attack was severe, and the temperature did not become normal until October 21st. It remained normal until November 2nd—11 days, with the exception of 10 hours of pyrexia on the 24th. On the 2nd he complained of abdominal pains, and there was some distension. The tongue became furred, and the patient felt badly. From the 2nd to the 15th the fever ranged from 99° to 102.5° ; the spleen again became palpable, but no definite rose-spots were seen. There was slight diarrhoea. From the 15th to the 19th there were oscillations from normal to 101.5° , and after the 19th the fever did not rise again.

Christopher T., aged 32 (Hosp. No. 8049), admitted August 28th, 1893, on the 22nd day of his illness. The fever was intermittent, and we thought it might possibly be malaria, but the blood was negative. The spleen was easily to be felt, but there were no spots. The temperature on admission was 103.5° , and for the first four days ranged from 99° to 103° . From September 1st to the 9th it was normal—10 days. From the morning of September 10th to noon of the 13th there was a gradual rise to 104° . The fever persisted until the 25th. The spleen was readily palpable, and there were doubtful rose-spots on the skin of the abdomen. But for the relapse, we might have been in doubt as to the nature of the original attack, which (in the Hospital) consisted of four days of fever without rose-spots. An interesting point was the existence of a characteristic typhoid odor, which, with the history of three weeks' illness and the enlarged spleen (together with the absence of malarial parasites in the blood), seemed to settle the diagnosis.

Frank S., aged 24 (Hosp. No. 8254), admitted September 25th, 1893, on the 6th day of fever. The attack was severe, and he had 32 baths before the temperature fell below 102.5°. On October 9th and 10th the temperature touched normal, and from the 11th to the 14th there was apyrexia—4 days; then the fever recurred, and on the 15th reached 103.5°. The fever ran high, 104°–105°, and he had 41 baths in the relapse. The fever persisted for 16 days—became normal on the 30th. The spleen was palpable, and there were rose-spots.

Tertia W., aged 22 (?) (Hosp. No. 8488), admitted October 24th, 1893, on the seventh day of the fever. Primary attack severe; seventy-five baths; temperature range from 103°–105.5°. The temperature became normal on the 41st day—November 28th. Apyrexia from the 41st to the 64th day. The patient up and about. On December 20th a slight rise in temperature; on the 22nd and 23rd chills, with fever to 106°. Pyrexia, with enlarged spleen, rose-spots and severe constitutional symptoms from December 20th to January 28th. Apyrexia—complete—from December 29th to March 11th, inclusive—42 days. Pain in abdomen, fever, and a second relapse of fourteen days' duration, the temperature rising to 104°. There were no characteristic spots, but the tongue was furred and the general condition of the patient was that of typhoid fever. The patient left the Hospital on April 23rd, just six months after admission.

John S., aged 21 (Hosp. No. 10071), admitted June 9th, 1894. Duration of illness doubtful; he has been feeling badly for a month. The temperature range was from 103°–104°; the baths had a very marked influence, and each time reduced the temperature to normal or sub-normal. On the evening of the 15th, the 7th day after admission, the fever disappeared. There had been no diarrhoea; the tongue was furred, the spleen was readily palpable, but there were no rose-spots. There was a distinct diazo-reaction in the urine. For eleven days the temperature was normal. The spleen could still be felt. On the 24th he sat up in bed, and on the 26th he had meat. On the 27th and 28th the temperature rose to 102°. The tongue became coated, and the face was flushed. The diazo-reaction, which had disappeared from the urine, returned, and on the 29th he had three soft movements. On the 30th and July 1st the fever rose to 104.5°, and the baths were

resumed. There were no rose-spots. On the 9th day of the relapse the temperature fell to normal, and the convalescence was uninterrupted.

Charles S., aged 18 (Hosp. No. 10517), admitted July 30th, 1894, on the 8th day of the fever. The temperature rose to 106° , and remained high for several days. From August 3rd to 6th he had involuntary movements of the bowels, with blood in moderate amounts. There was no diarrhoea. He improved rapidly, and on August 7th the evening temperature was normal. Then for six days the temperature was between 98° and 99° , on the 8th and 9th reaching on several occasions 100.5° and 101° . On the 10th, 11th, 12th and 13th there was practically no fever. In sixteen hours—from 4 a. m. to 8 p. m.—on the 14th the temperature rose from 98.2° to 105.6° —nearly eight degrees—without a chill. He had had egg that day, and his mother had given him a piece of banana. The fever persisted; the tongue became coated and dry, the spleen enlarged, but no rose-spots appeared. From August 15th to September 3rd the patient had irregular fever, after the first few days of a markedly remittent character; there were daily variations of from three to five degrees. The convalescence was protracted, and he did not leave the Hospital until September 27th.

Ella C., aged 11 (Hosp. No. 10658), admitted August 11th, 1894, on the 7th day of the fever. To August 24th she had thirty baths; the temperature range was 103° – 104° . The spleen was enlarged; no spots. From the 24th to the 28th the temperature fell gradually. For six days there was no fever, except for a few hours on the morning of the 2nd, when the thermometer registered 101.5° . On the 4th, 5th and 6th the fever rose, and on the morning of the 7th reached 104.2° . The baths were resumed. On the 13th the temperature touched normal; then for a week there was an intermittent fever, with excursions from 97.5° and 98° to 100.5° and 101° . From September 23rd to October 3rd there was a daily slight fever to 100° . In the relapse the spleen became palpable, but no rose-spots were noted. The diazo-reaction was well marked in the relapse; it was not present in the original attack.

Maggie W., aged 18 (Hosp. No. 11070), admitted October 7th, 1894, after an illness of one week. The temperature was irregular, ranging for the first three days between 99.5° and 103° . Shortly after admission it rose to 104.5° . After the 10th it fell, and on the

12th touched normal. The spleen was not enlarged; there was no diarrhoea; the diazo-reaction was only found on one day; the spots were doubtful. From the 13th to November 1st—seventeen days—there was apyrexia, and the patient was up and about the ward, having gained in weight and was looking very well. At midnight, November 1st, the temperature rose to 100.5° , and by 8 p. m. on the 2nd was 103.5° . The fever kept between 102° and 103.5° , twice reaching 104° . On the 14th it fell to normal. There was no diarrhoea; the spleen was not enlarged; no spots were seen, and the diazo-reaction was not present. In spite of the absence of these, the character of the first attack, the complete apyrexia, the gradual onset of the fever, its persistence for fourteen days and the complete convalescence give a picture unlike anything but a relapse.

Eva M., aged 25 (Hosp. No. 10836), admitted September 10th, 1894. She was a Lithuanian, and could not be understood; but the persons who left her at the Hospital said that she had been ill in bed for two weeks. From the 10th to the 22nd there was fever only three or four times above the bathing point (102.5°). There was a faint diazo-reaction; doubtful spots were seen; the spleen was not palpable; there were no abdominal symptoms. The appearance was that of typhoid fever, and the tongue at first was coated and dry. There was dulness at the base of the left lung, with rales and blowing breathing; sputa negative. From the 22nd to the 29th there was no fever—seven days; then a rise gradually to 104° and a fever of nine days' duration. There were no spots; the spleen was not palpable; there was a faint diazo-reaction. Fever, increased heart's action and furred tongue were the only symptoms.

Charles W., aged 21 (Hosp. No. 11024), admitted October 2nd, 1894, about the end of the third week of fever. The temperature ranged between 103° and 104° ; the drops after the baths were marked; the spleen was palpable, and on the 10th the temperature was normal. On the 11th, 12th and 13th the temperature was between 97° and 99° . On the 14th, 15th and 16th there was a gradual rise to 103° , and then for a week he had constantly temperature between 102.5° and 103.5° . The fever did not leave until the 30th. There were no fresh rose-spots; the spleen was palpable, and the tongue was coated.

John S., aged 20 (colored) (Hosp. No. 11102), admitted October 9th, 1894. He had been ill for four weeks, but he was so dull and stupid that it was difficult to get any accurate information. Until the morning of the 12th it was not thought that he had a specific fever, as the temperature did not rise above 99.5° . For the next week it ranged from 99° to 103° – 104° . The tongue was furred; there was no diarrhoea, but a diazo-reaction was present. The spleen was not palpable. The fever fell slowly, and by the 31st the temperature was normal. For five days the morning and evening records were below 99° ; then, on the evening of November 4th, the temperature began to rise, for a day or two not reaching beyond 102° , and on the 8th and 9th touching 103° and 104° . The tongue was furred, but the spleen was not palpable. On the 12th the temperature was normal; on the 13th and 14th there were slight rises, and subsequently the temperature remained normal.

This patient may have been admitted in an interval between two febrile periods. He looked as though he had had an illness, and the muscles were weak; but his tongue was quite clean, and there were no abdominal symptoms. Subsequently an interval of five days separated two periods of fever—one of nineteen, the other of seven days.

William H., aged 28 (Hosp. No. 11212), admitted October 23rd, on the 18th day of fever. The tongue was furred, the spleen was enlarged, but there were no spots and no diazo-reaction. The attack was mild, and by November 4th the temperature was normal. On the 5th it rose slightly, and then remained normal until the 13th—eight days. From mid-day on the 13th to the 24th there was fever of slight range, not rising above 102.5° . The tongue was furred, the spleen was enlarged, but there were no spots. There was no diazo-reaction, and the patient had no abdominal symptoms.

Albert G., aged 31 (Hosp. No. —), admitted February 5th, 1895, about the 10th day of the fever. The attack was severe and typical; he had thirty-five baths, and by February 21st the temperature was normal. He sat up in bed on March 2nd; out of bed on the 4th. The temperature remained normal and sub-normal from February 21st to March 13th—twenty-one days. On March 13th, 14th and 15th the temperature rose a fraction of a degree each day, reaching 102.1° at 10 p. m. on the 15th. On the 16th and 17th it once or

twice touched 102.5° and twice registered normal. On the evening of the 17th the temperature was 103.5° , and the fever persisted for just three weeks, rising to 103° and on several occasions to 104° . On the 21st day of the relapse the normal point was reached. The tongue was furred; there were no abdominal symptoms; the spleen, which was felt in the original attack, could not be palpated; there were a few suspicious spots. The convalescence was slow. On April 4th he complained of a general tenderness of the skin, which was moist.

The days of apyrexia were as follows:—9, 11, 10, 4, 23, 11, 4, 17, 7, 3, 5, 8, 21. One case had two well-marked relapses; 23 days' interval separated the original attack from the first relapse and 42 days the first and second relapses.

RELAPSE.—DOUBTFUL CASES.

Charles S., aged 25 (Hosp. No. 8930), admitted January 5th, 1894. For ten days the fever was very slight, and did not reach the bathing point. The spleen was palpable, and there were a few rose-spots. There was no diarrhoea. On the 15th, 16th, 17th and 18th the temperature touched normal and rose in the evening to 100° and once to 101° . Then, from the 19th to the 21st, there was a gradual ascent to 104° , and the patient became much worse. The diazo-reaction was not present until after the 19th. The spleen enlarged and there were successive crops of rose-spots. The temperature did not reach normal until February 5th.

In this case four days of normal morning temperature separated a very mild attack from one of considerable severity.

Henry L., aged 29 (Hosp. No. 9697), admitted April 18th, 1894. Fever moderate— 103° – 104° ; only thirty baths. Fall gradual, and at 2 a. m. on May 7th the temperature was normal. Until 12 midnight it remained normal. On the evening of the 8th it was 101.5° , and on the 9th and 10th it rose gradually, touching once 104° . On the 11th, 12th and 13th there was a gradual fall, but it was not until the 19th that the morning and evening temperatures were normal; so that, after a period of complete apyrexia of thirty-six hours, there was a recurrence of the fever, five days about and above 102° , and then a gradual fall. The spleen was still enlarged; he complained of headache; there were no abdominal symptoms, and on the 16th, when the temperature was not above 100° , two doubtful spots were seen.

Emile G., aged 14 (Hosp. No. 10335), admitted July 9th, 1894. Severe attack; seventy-three baths to July 28th. Enlarged spleen; no definite spots; no diarrhoea. From July 28th to August 1st the temperature was between 100° and 101° , falling once below normal. From August 1st accession of fever— 104° – 104.5° —baths causing drops to 98° and 97° . High and persistent fever of nine days' duration; spleen enlarged; distinct rose-spots *for the first time*. From the 9th to 15th of August gradual fall of fever to normal, followed by uninterrupted convalescence.

Walter J., aged 26 (Hosp. No. 10426), admitted July 19th, 1894. The patient was a soldier, and had been in bed, in hospital at Fortress Monroe, for thirty-two days with headache, fever and weakness, but he had not had diarrhoea. When admitted his temperature was 99° , but in the evening it rose to nearly 103° . The edge of the spleen was palpable, but there were no spots. From the 19th to the 25th the fever only twice rose above 102° . On the 21st there were some suspicious rose-spots. From the 25th to August 11th the fever was higher, 103° – 104° —and he had baths steadily. The spleen was enlarged, but there were no fresh rose-spots. The diazo-reaction, which was not present on admission, became well marked. On August 11th, 12th and part of the 13th the temperature was below 100° most of the time, and the tongue became clean and he felt better. From the 13th to 15th the fever again rose, and until August 2nd kept between 103° and 104° , requiring constant baths, of which he had to the latter date ninety-four. On August 17th typical rose-spots were seen, and they recurred. The tongue became furred, but the general condition kept good. The diazo-reaction was present, and the spleen remained large. From August 2nd to 12th the fever fell slowly to normal. From August 13th to October 3rd the temperature ranged from 99° to 100° and 101° , and twice rose for a few hours to between 103° and 104° , the last time on October 4th, the day on which he sat out of bed.

Counting the time in which the patient was in bed at Fortress Monroe, the fever lasted one hundred and ten days. It is very probable that on admission he was in an interval between two attacks, though we do not know that the fever had been down for any length of time. The three days from August 11th–13th separate clearly two febrile periods in the Hospital, and in the interval the tongue cleared

July 9th, 1894.
Enlarged spleen;
August 1st the
temperature below normal,
ice-baths causing
a nine days' dura-
tion. From the
normal, followed by

July 19th, 1894.
Hospital at Fortress
and weakness, but
temperature was 99°,
enlargement of the spleen
from the 19th to the 25th
there were some
with the fever was
The spleen was
the diazo-reaction,
checked. On August
below 100° most
felt better. From
August 2nd kept
which he had to
all rose-spots were
, but the general
state, and the spleen
never fell slowly to
temperature ranged
hours to between
on which he sat

bed at Fortress
days. It is very
between two attacks,
any length
separate clearly two
the tongue cleared

and he looked much better. The spleen, however, did not reduce in size.

The case belongs to a group of great interest, in which two or three periods of high fever are separated by intervals of mild pyrexia of 99° to 100° and 101°.

Robert H., aged 20 (Hosp. No. 11963), admitted February 3rd, 1895, on the 14th day of his fever. The temperature range was high for a week—104°–105.5°. He had baths and then ice sponges. An acute pleurisy, with effusion, developed shortly after admission, but caused no symptoms and gradually disappeared. From February 3rd to March 11th there was continuous fever. Between the 10th and the 18th the fever fell gradually, and on the morning of the latter date fell below 99°. From the 18th to the morning of the 24th the temperature at some part of the day was below 99°, but rose to 100° or 100.5° in the afternoon. Then followed a period, from the 24th to March 11th, in which there was a mild fever—100° to 102°—only once reaching 102.5°. The spleen did not enlarge; there were no rose-spots, no diazo-reaction in the urine. He had a few sweats. There was no leucocytosis. The pleural effusion gradually disappeared. He had no diarrhoea. He had soreness of the legs, of a very indefinite character, and tenderness of the toes. Was it only a prolonged lysis or did the period from the 18th to the 24th, during which the temperature touched normal, separate the original attack from a relapse?

3.—POST-TYPHOID ELEVATIONS OF TEMPERATURE.

In eleven cases there were well-marked transient elevations of temperature during convalescence. Eighteen instances were given in the first Report.

Case XIX.—Augusta H., aged 42 (Med. No. 3168), admitted August 8th, 1893, in the beginning of the third week. The temperature became normal on the 27th, and remained so until September 7th. She had done very well. On the 6th she had her first meal of meat and potatoes. The tongue was not furred, and she had no abdominal tenderness. The fever rose to nearly 104°, and did not fall to normal until the morning of the 9th. During the 9th and 10th there were again slight elevations. The spleen became palpable, but there were

no rose-spots. She convalesced slowly, and was afebrile from the 11th to the 27th. She sat up on the 17th, and on the 26th had solid food. The bowels had been a little relaxed. The temperature rose on the 27th, and on the three following days remained between 101° and 103° . There was slight abdominal pain, particularly on pressure, in the right iliac fossa. On October 1st, 2nd, 3rd and 4th there were slight oscillations of temperature. The spleen did not enlarge, and there were no rose-spots. The abdominal tenderness disappeared. The convalescence was very slow.

Case XX.—Emil E., aged 19 (Med. No. 3225), admitted at the end of the first week. On the 20th day—September 10th—the temperature was normal, and remained so until the 15th. He had been constipated. He had not had full diet, but had had milk toast on the 13th. On the 15th the temperature rose to 102° , and for five days ranged from 99° to 102.5° . The tongue was clean, the abdomen not tender; the spleen had not increased in size, and there were no spots. On the 21st and 22nd the temperature was normal, and he was given solid food on the morning of the 23rd. In the evening the temperature rose to 105° without a chill, and remained high all night in spite of two cold baths. By 6 p. m. on the 24th the fever had disappeared, and remained normal.

Case XXI.—John R., aged 45 (Med. No. 3484), admitted November 15th, 1893, in the 3rd week of his illness. The temperature for the first few days was not high, but he subsequently had thirty-eight baths, and on December 5th the fever had gone. He sat up on the 17th, and gained in weight rapidly. On January 1st, without a chill, the temperature rose to 104° . He had complained in the evening of pain in the side, but there was no fever. "This morning he complains of a catch on the right side when he takes a deep breath, and on auscultation there are a few fine crackles at the end of inspiration." The fever kept above 102° on the 1st and 2nd. On the morning of the 3rd it was normal, but rose to 103.6° in the evening. After the 4th he had no fever. The local signs at the right base did not extend, and he made a satisfactory recovery.

Case XXII.—Florence M., aged 22 (Med. No. 3406), admitted October 19th, 1893, on the 6th day of the fever. The attack was severe. The temperature fell below 100° on November 6th, and from

the 9th to the 20th was normal. She had meat on the 18th. Between the 20th and 22nd the fever rose gradually to 104° , and remained above 101° until the 25th, becoming normal on the evening of the 28th. The abdomen was tender, and the bowels were a little loose. There were no fresh spots, and there was no increased enlargement of the spleen, and, without these, the fever alone, though of eight days' duration, seemed scarcely to justify the diagnosis of relapse. She developed delusions, and the case is referred to again.

Case XXIII.—George W., aged 22 (colored) (Hosp. No. 7910), admitted August 11th, 1893, in the third week of the fever. The temperature was high and continuous, and he had hæmoglobinuria. The temperature became normal on August 26th, and remained so until September 3rd. He had been given milk toast on the 31st, but had not been sitting up. From the 3rd until the 8th the temperature ranged from 101° to 103° . The tongue was furred, but there was no diarrhoea, and he did not complain of abdominal pain. The spleen was palpable, and had been so through the convalescence. He sat up on the 19th, and the recovery was uninterrupted.

Case XXV.—Emma E., aged 16 (Hosp. No. 8264), admitted September 26th, 1893, with a mild attack of fever. During convalescence she had an attack of severe pain in the right leg, and the temperature for four days ranged from 100° to 102° . The fever was probably associated with the pain in the leg.

Case XXV.—Cecilia S., aged 24 (Hosp. No. 10803), admitted September 6th, 1894. Severe attack; prolonged fever. The temperature fell to normal on September 27th. On October 6th and 7th, after eight days of apyrexia, the temperature rose nearly to 102° , and for forty-eight hours did not fall to normal. The rise followed the eating of fruit, which had been given her by friends.

Case XXVI.—Charles R., aged 27 (Hosp. No. 10854), admitted September 11th, 1894. High fever; severe attack. The temperature fell to normal about October 10th, after having ranged for two weeks between 99.5° and 100.5° . He sat up in bed and ate meat on the 13th, and on the 18th sat up in a chair. He seemed to be doing very well in every way. On the afternoon of the 19th the temperature rose to 102.5° , and remained between 100° and 102° until early on the morning of the 22nd, and then for three days there were slight

fluctuations between normal and 100° . The tongue was clean, the bowels regular, and nothing was found to account for the three days of fever.

Case XXVII.—Harvey S., aged 25 (Hosp. No. 10975), admitted September 26th, 1894, at the end of the first week of fever. For a week the temperature ranged high, once nearly to 106° , but there were no special features, and on October 5th, 6th, 7th and 8th the temperature touched normal each day. On the morning of the 8th the fever rose to 102.5° , and on the 9th to 104° . There were exactly forty-eight hours of fever, after which it disappeared completely.

The case is interesting since a period of four days in which the fever was not continuously normal was followed by what appeared to be a very characteristic post-typhoid recrudescence.

Case XXVIII.—Christopher T., aged 19 (Hosp. No. 11009), admitted October 1st, 1894, in the third week of the fever. The fever fell on the 10th, and he entered upon a satisfactory convalescence. On the 28th the fever rose, and on the 29th reached 103.5° . On the evening of the 30th it fell to normal. The rise was due to a follicular tonsillitis. Streptococci were obtained in pure culture.

Case XXIX.—Michael S., aged 22 (Hosp. No. 11392), admitted November 14th, 1894. The attack was severe, with high fever. The lysis was protracted for about fourteen days—from November 28th to December 11th; the temperature remained between 99° and 102° . On the mornings of the 11th and 12th it was normal. At 8 p. m. on the 12th the temperature was 100.5° . During the morning of the 13th it rose to 103° , and throughout the day kept high. On the 14th it remained about 101° , and fell to normal in the evening. It did not rise subsequently above the normal. There was nothing found to account for the elevation. It is interesting as separated by a very brief interval of apyrexia (scarcely, indeed, for an entire day) from a very prolonged lysis after a severe attack.

4.—TYPHOID FEVER AND MALARIA.

A careful examination is made of the blood in every patient with fever admitted to the wards, without which some of the cases of autumnal malarial fever could not be differentiated. A full analysis of our malaria cases for five years has been given by Drs. Thayer and

Hewetson in Fasciculi 1-5 of this volume of the *Reports*. Typhoid and malaria are the most common fevers of this vicinity and the patients come from the same localities. As mentioned in our first Report on typhoid fever, there was no case in which the two diseases were concurrent. Several cases were given in which typhoid fever followed a few weeks after an acute attack of malaria, in one case in a short enough time to make it probable that the infection with the former had occurred before the latter had disappeared.

In the following remarkable case severe typhoid fever followed a continuous malarial fever:—

Kate L., aged 31 (Hosp. No. 11331), admitted November 6th, 1894. The patient had been discharged from the Hospital October 7th, 1894. The history of her illness at that time is as follows:—

The patient was admitted September 28th, 1894, complaining of pains in the back and sides, and fever. She had malarial fever severely in February, 1894. She has as a rule been very healthy and strong.

Her present illness began on September 23rd with headache and fever, since when she has had a rigor every day, with fever and sweats. She has had nausea, but has only vomited three or four times. The attack came on suddenly when she was in good health, though she has had irregular dull pains about the limbs for some time. The examination of the blood in the dispensary was negative. Temperature on admission was nearly 104°.

She was a large framed, stout woman. Tongue was clean; there were no herpes; pulse soft, not dirotic. There were no rose-spots; the spleen could not be felt. The temperature reached 105° at 6 p. m., fell throughout the morning, and was 100° at 8 a. m. At 7.30 p. m. the blood was again examined and was negative.

On the 29th there was a marked diazo-reaction in the urine, the only occasion on which it was present. The temperature rose at 2 p. m. to 104.6°. In the evening pigmented leucocytes and a hyaline malarial organism were found by Dr. Thayer.

On the 30th and October 1st the temperature ranged from 101° to 103°. She had no chills; the spleen was not enlarged, and she felt very comfortable.

We were still in doubt as to the nature of the attack, though in the morning examination of the blood on the 30th there was a well-

marked intra-cellular amoeboid hyaline body. On October 1st the temperature reached 103°.

On the 2nd there were perfectly characteristic hyaline malarial parasites seen, each containing small fine pigment. Quinine was administered on October 2nd. She felt very well; temperature gradually fell, became normal on the 4th, and on the 7th she felt well enough to leave the Hospital. On the 7th it was noted that the blood has been negative since the 2nd, and that no crescents had developed.

The organisms present were those associated with the irregular autumnal malarial fever.

On admission, November 6th, the temperature was 104°, and rose in the evening to 106°. She was a well nourished woman, a trifle pale; rational; pulse, 120; respirations, 30. There were well marked rose-spots on the abdomen, and the spleen was enlarged and palpable. The blood examination was negative. On the 6th, 7th and 8th the fever was high, rarely falling below 104°. From the history we were in doubt as to the nature of the disease, and baths were not begun until the 7th; they had very little influence. On the 9th she had grs. xv of Quinine, hypodermically. At 4.30 p. m. on the 7th, when the temperature was 105°, she had a chill, not severe, the only one during her stay in hospital. Until November 14th the fever kept continuously high, rarely going below 103°, even after the baths. She was drowsy, the tongue was furred, the rose-spots characteristic, and the spleen enlarged. The blood examination showed no changes. On the 12th and 13th she had slight diarrhoea. From the 14th the fever was less intense, and on the 19th, after the forty-sixth bath, it touched normal for the first time. On the 22d it rose again to 104°. From the 24th to the 27th the temperature was normal; at 8 a. m. on the morning of the 28th, the temperature was 99.4, and during the day rose to 103°. She then had a continuous fever for six days, the maximum temperature, 104.7°. She had no chills, no sweats. The general condition was good. The tongue was clean; the mind clear; there were no abdominal symptoms; the spleen could not be felt and there were no rose-spots. The diazo-reaction was not present. From December 4th to the 7th the temperature was normal; then, until the 27th, there were daily irregular elevations to 101°, 102°, and 103°, usually in the afternoon between 4 and 8 p. m.; the morn-

ing record being below 100°, and after the 20th below 99°. With this the general condition was excellent; her spirits were good; she craved food constantly; there were no features other than the fever. Most careful examinations were made of the blood but no organisms were found. After the 27th the temperature remained normal, and she was discharged well on January 12th.

5.—COMPLICATIONS AND SEQUELÆ.

Digestive System.

(a). PAROTITIS.

The only instance among the 160 cases is given fully at p. 345. It was really the development of this condition which suggested the diagnosis. The clinical diagnosis is as follows:—Illness of two weeks duration before admission; moderate fever; enlarged spleen; rigidity of muscles of neck and of right arm; mental dulness and delirium; cutaneous hyperæsthesia and increase of the reflexes; small amount of blood in the urine; no diazo-reaction; for three days before death normal temperature; parotitis.

In the six years.—Five cases occurred in the previous series of 229 cases, which with one in the present series, makes 1.54 per cent. in the 389 cases.

(b). HÆMORRHAGE FROM THE BOWELS.

In twelve cases hæmorrhage occurred. Three proved fatal, two of them from perforation.

In most of the cases, it will be noted, the bleeding was very slight, and in no case did the fatal result follow directly upon a profuse hæmorrhage.

In the previous series there were eight cases; so that in the 389 cases the percentage with hæmorrhage was 5.1.

Olaf J., aged 24 (Hosp. No. 7992). A severe case with protracted and high fever. He had been constipated. On the 15th day of the fever, at 1.45 a. m., on September 1st, the patient passed 250 cc. of pure blood, and in a short time after there was a second movement containing the same amount. He had no diarrhœa after it. There

was no reduction in the temperature, and the general condition was not aggravated.

Alice C., aged 18 (Hosp. No. 7602), on the 16th day of an attack of moderate severity, after the 32nd bath, passed a stool containing clots, not very abundant and not large. She had not had diarrhœa.

Charles H., aged 31 (Hosp. No. 7955), on the 23d day of a severe attack, after the eighty-second bath, passed a stool in which were about $\frac{3}{4}$ iv of clotted blood. The bowels had been a little loose. The hæmorrhage did not recur.

George S., aged 34 (Hosp. No. 8287), on the 17th day of a very severe attack, had a soft movement containing clots of blood. He had had diarrhœa and much abdominal distension. He had a very prolonged attack with relapse, but there was no further hæmorrhage.

Florence M., aged 22 (Hosp. No. 8448), had on the 13th day a small hæmorrhage, which was found in the draw-sheet. She had had no diarrhœa, but the abdomen had been distended. As the next stool contained no blood, the baths were resumed after a single sponging.

John W., aged 24 (Hosp. No. 9566), admitted April 3rd, on the 8th day of illness. On April 12th he had a soft stool, intimately mixed with blood, with one or two small clots. Shortly after he passed a second stool containing still more blood. The fever did not drop after either stool. He had been having one or two soft movements each day. He was ordered lead and opium pills. No further bleeding occurred. The baths had already been omitted on account of the intense bronchitis.

Charles S., aged 18 (Hosp. No. 10517). The case is given fully among the relapses. The attack began severely; temperature rose to 106°. There was no diarrhœa, and the abdomen was not tense. At 3.30 a. m. on August 2nd he passed an involuntary stool containing blood, with very little fecal matter. On August 3rd he passed another stool containing small clots and dark reddish-brown material. On August 4th he had another small hæmorrhage. The hæmorrhages occurred without diarrhœa and had no injurious influence. After August 4th the temperature fell, and he improved rapidly.

Homer H., aged 20 (Hosp. No. 11074), admitted October 8th, 1894, on the 10th day of the fever. The temperature ranged between 103° and 104°. There was a copious rose rash. On the 11th and 12th the temperature had been below the bathing point. On admission he had slight diarrhoea; then, on the 11th and 12th, one stool each day. At 4 a. m. on the 13th he had a stool consisting of almost pure blood. There was no pain; the temperature only fell one degree. On the 18th the temperature fell to normal, and he made a rapid recovery.

Joseph M., aged 20 (Hosp. No. 11235), admitted October 25th, 1894, on the 6th day of the fever. The onset was with severe vomiting and diarrhoea. The temperature ranged during the first week between 104° and 105°; often the maximum number of baths had to be given in the twenty-four hours. The spleen was large and the rose-spots were abundant. At 11 p. m. on the 29th, after the eighteenth bath, the patient had a hæmorrhage, passing about half a pint of bright blood, not clotted, and mixed but slightly with feces. It did not affect the temperature in the slightest, which remained between 103° and 104.2° until 8 a. m. At 7.30 a. m. he had another slight bleeding. The abdomen was not distended, and the general condition was good, though the tongue was brown and fissured. On the 30th, the stool passed at 7 p. m. contained about 150 cc. of dark, tarry blood. The stool at 3 p. m. on the 31st contained dark fecal matter, but no blood. By November 6th the temperature touched normal, and he made an uninterrupted recovery.

(e). PERFORATION.

In the previous series there were eight deaths from perforation; in this series five, a percentage of 3.1.

For the six years.—389 cases, with thirteen deaths from perforation, 3.3 per cent. The records are given at p. 473 in the study of the fatal cases.

Probable perforation, recovery.—Occasionally the symptoms suggest perforation of the bowel, and for a time the patient is desperately ill; but gradually the serious features disappear, and we are in doubt as to the underlying condition.

H. A. H., aged 23 (Hosp. No. 10449), admitted July 22d, 1894, about the end of the first week of fever. The temperature ranged

from 102.5° to 104.5° ; the spleen was palpable, the rose-spots were distinctive and the general condition very good. There was no diarrhoea, and the abdomen was not distended. At 8 p. m., August 2d, the temperature was 103° , and he had a bath; and for the following forty-eight hours he was distinctly better. At 7 p. m. on the 3d he complained of a sudden pain in the right side, at the lower ribs. The abdomen was held tense, and there was tenderness on pressure in the right hypochondriac and lumbar regions. During the night the patient complained but little of pain, after a hypodermic injection of morphia, but the pulse became very weak and rapid, and the expression of the face was noted by the nurse to have changed, and he seemed dazed.

On the morning of the 5th, Dr. Thayer made the following note: "Patient is lying on his back with the eyes sunken and rolled upwards; the face is pinched and drawn, and the expression very suggestive of peritonitis. The hands are cold and the fingers blue. The abdomen, which was previously relaxed and sunken, is now distended, and the muscles are tense and contracted. The liver flatness is obtained upon the 6th and 7th ribs. The note is the same over the entire abdomen on direct percussion, and on auscultatory percussion the 'tap' is everywhere conveyed directly to the ear. The pulse is 128 and small. The second sound at the base of the heart is reduplicated."

The temperature was 104° at 10 a. m., and through the day did not rise above 102° . There was no diarrhoea. He had profuse sweats. On the 6th the fever was higher, 103° - 105° , and the pain was still severe. At 6 a. m. he had a large soft yellow stool. He was given strychnia hypodermically, and spirits of turpentine by mouth. The facial expression was better, and the pulse stronger. On August 7th the fever was lower and the abdominal pain and distension much less. The perspiration was profuse.

August 8th. He had a comfortable night and was in all respects better. The temperature did not rise above 102° and the abdominal pain had disappeared. On the 9th the serious symptoms had all disappeared, and he made an uninterrupted recovery.

Ambrose B., aged 31 (Hosp. No. 11310), admitted November 4th, at the end of the 2nd week of an attack of fever. The temperature

was high, 104° – 104.5° ; the rose-spots were present and the spleen was palpable. He had diarrhoea on admission; but from the 10th to the 18th there were only one or two movements daily. On the 14th he began to complain of pain in the abdomen, but nothing could be made out beyond slight soreness on pressure. On the 15th there was considerable distension, the soreness was more marked, and the right leg was drawn up. In the evening the temperature rose to 105.5° , and the pulse to 126. He had vomiting through the night, and in the morning (16th) looked badly. The abdomen was distended, extremely sensitive and tense, particularly in the right iliac fossa; so that palpation was very difficult. The liver dulness was not obliterated in the nipple line. There were only three movements in the 24 hours. The patient was extremely nervous, quite rational, and the pulse though rapid was of fair volume. He was ordered turpentine enemata. The vomiting had ceased. For the next three days the abdominal distension continued, he had occasional vomiting, but the pulse did not rise above 120 nor the temperature above 104° . On the 18th he had five stools, and on the 19th six, all fluid, yellow in color, and in one, on the 18th, there was about a drachm of bright blood. The tongue was furred, but not dry. The great distension and soreness prevented any satisfactory examination of the abdomen. There was no increased micturition; the right leg was now not so painful, and could be extended. From the 20th, there was decided improvement. The fever lessened, the diarrhoea checked, and the abdominal pain and distension were relieved. The chief enlargement of the abdomen had been above the navel, and on the 22nd coils, in peristalsis, were seen in this part. Palpation could now be made more readily and the chief region of soreness was in the right iliac fossa. The temperature fell gradually and after a protracted convalescence the patient was discharged January 5th.

The intense abdominal pain, the distension, the vomiting, and the rapid pulse suggested perforation. The general condition, however, the facial expression (which was never Hippocratic), the extremely nervous state of the patient, the absence of a progressive character in the symptoms, made us doubt the existence of a general peritonitis. The tenderness in the right iliac fossa, the flexion of the right leg and the persistent soreness in this region after the symptoms had subsided, make it possible that there had been perforation of the appendix.

Vascular System.**PHLEBITIS.**

Thomas T., aged 36 (Hosp. No. 8667), on the 35th day of a very severe attack, while the temperature was still ranging as high as 103.5° , began to complain of pain in the left groin. The note on December 22nd reads as follows:—"There is tenderness in the left groin, and slight superficial redness. It does not appear to be a glandular enlargement, but there is a fulness in Scarpa's space. The vein is not to be felt. There is œdema and pitting on the left tibia. He cannot flex the left thigh upon the abdomen." Subsequently, a cord developed along the inner aspect of the thigh in the position of the long saphenous vein. On the 24th the superficial redness in Scarpa's space persisted; but the œdema of the leg had disappeared. He had no further trouble from it. This patient had chills at intervals from the 3rd to the 8th weeks. He had none in the 5th week when the symptoms of thrombosis were present.

John E., aged 26 (Hosp. No. 8509), towards the end of a relapse, in the sixth week, had swelling and tenderness in the left groin and an induration just below the saphenous opening. Scarpa's space looked fuller on the left side, but there was no swelling of the leg. Movement of the leg caused pain. A thrombus developed in the long saphenous vein, but did not extend to the femoral. He had a slow, tedious convalescence. There was no aggravation of the fever while the leg was painful.

Theodore B., aged 24 (Hosp. No. 10298), admitted July 5th, 1894, at the end of the second week of fever. From the 12th to the 15th the temperature ranged between 99° and 100° . On the evening of the 15th it rose to 104° . On the 16th he began to complain of pain in the inner part of the left thigh. There was no redness, no swelling, but a well-marked cord could be felt in the course of the internal saphenous vein. On the 16th and 17th the temperature kept up. From the 18th to 22nd it was almost normal. On the morning of the 22nd he had a chill, and on the 26th the temperature rose again to 104° . There was no sign of redness in the course of the saphenous vein, the thrombus in which could be well felt. The general condition was excellent, and he made a good recovery.

H. A. H., aged 23 (Hosp. No. 10449), admitted July 22nd, 1894, at the end of the first week of fever. On August 14th, when the fever was below 102° and he was improving in every way after a severe attack, he had a sudden pain in the left leg. On the 15th the thigh and leg were swollen and tender, and the calf was very hard. The internal saphenous vein could be felt in its entire length. There was no increase in the fever, which remained between 101° and 102° . On the 16th the leg was less swollen, but there was still tenderness along the inner aspect of the thigh. Within a few days this had disappeared, and he recovered completely.

Respiratory System.

PLEURISY.

Onset of Typhoid Fever with Acute Pleurisy—so-called Pleuro-typhoid.

Pleurisy is not a frequent complication of typhoid. There were only two cases in the previous series. In 53 autopsies at the Montreal General Hospital, acute pleurisy was present twice, and empyema once. The complication is usually late, but the first case here given illustrates the form of typhoid fever which sets in with an acute pleurisy,—the pleuro-typhoid of the French.

Julia H., aged 19, admitted to Ward G of the Johns Hopkins Hospital, September 21st, 1893, complaining of a severe pain in the left side. Her family history is good. As a child she had many ailments,—measles, typhoid fever (?), small-pox and pneumonia. Since puberty she has been very well, with the exception of an attack of ague.

Present illness. For nearly a month she has not been feeling very well, and she has had weakness and sometimes nausea. Nine days ago she had a shaking chill, which lasted about ten minutes, and was followed by fever and sweating. Next day she felt well enough to be up and about, but she had nausea and headache. Since that time she has had a slight cough. Yesterday morning she had a very severe pain in the left side (made much worse by taking a deep breath), and fever and cough, for which symptoms she sought relief.

On admission the temperature was 101° ; the pulse, 112° ; respirations, 32. The blood examination was negative; leucocytes, 1500 per c. m.

Present condition. The patient is a healthy looking, well nourished girl. At the time of the examination she was sweating, and cried out a good deal with pain on being moved. The temperature on the morning of the 22d rose to 104° ; the tongue was coated and red at the edges. The thorax was well-shaped; the expansion very much more on the right than on the left side. On drawing a deep breath she complained of great pain in the left axillary region. Percussion was clear in front on the right side; on the left side there was modified resonance at the fourth rib; below the fifth rib, and extending into the axilla, flatness. Behind, there was flatness from about the angle of the scapula. The breath sounds in the infra-scapular region were somewhat distant, not tubular; no râles. In the lower axilla, as she drew a deep breath, there was a loud friction murmur. At the base behind, tactile fremitus was diminished. Only a small amount of gelatinous sputum was obtained; no tubercle bacilli; there were a few encapsulated micrococci. The abdomen was smooth, not distended; spleen not enlarged. Patient was ordered warm applications to the chest and a Dover-powder at night.

On the 23rd and 24th the temperature ranged between 102° and 103.5° ; respirations from 35 to 42, and the movements caused great pain as she drew a deep breath or coughed. There was very little expectoration and it was not blood-stained.

25th. The patient looked very ill—more so, indeed, than is usual in a case of ordinary pleurisy, but there was no evidence of any additional trouble, and every day rose-spots were looked for carefully and the expectoration was examined. The range of temperature was higher and the prostration rather more severe than are common in simple acute pleurisy.

On the 26th the temperature ranged from 103° to 104.5° , and at this morning's visit there were seen for the first time some distinct rose-spots. The area of splenic dulness appeared to be somewhat increased downwards; the edge could not be felt on account of the soreness on pressure at the costal margin. She was ordered baths to-day at 70° F. The condition in the left pleura remains unchanged. The friction rub is still loud in the lower axilla and there is a good deal of pain. For the next week the patient had the well-marked features of severe typhoid fever; the temperature range was between 104° and 105° , and the baths had very little influence, rarely reducing the

temperature more than one or two degrees. She retained consciousness, but the pulse was rapid, constantly above 120 and often very feeble. The spleen was easily palpable on the 30th. On October 5th, after having had 56 baths, she seemed to be so feeble and reacted so badly that it was thought advisable to stop them, and on the 6th and 7th she was sponged. The temperature remained between 103° and 104°, and on the 7th began to fall, and for the first time since her admission reached 101°, and on the 8th 100.5°. From this time on the fever fell rapidly, and on the 13th was normal and remained so. The condition of the left pleura gradually improved.

On October 5th the breathing was noted as still distant, and the friction sound was well heard in the axilla.

On the 6th it was noted that the resonance was still defective below the angle of the scapula. *Fremitus*, however, was more distinct, and in the axilla the friction sound was not nearly so loud. The cough was not so troublesome.

On the 13th it was noted that the dullness at the left base had almost disappeared; the friction sound persisted. After this she made a very satisfactory recovery; had no trouble during convalescence and gained between November 2nd, and November 18th, when she went out, nearly nineteen pounds in weight. The friction persisted until the first of November, when the condition at the left base was practically normal. In addition to the whiskey, which she required freely, she was given while the pulse was very rapid and feeble strychnia in doses of a thirty-second of a grain.

It is interesting to note in this case that in spite of the frequent bathing—56 baths between 10 a. m. on the 26th of September, and 12 noon on the 5th of October, just ten days, an average of five a day—the pleurisy progressively improved and the cough was not aggravated. The condition when we stopped the baths was very critical; thus on the 3rd it was noted after one of the baths that the pulse was 160, respirations 48. The tongue was tremulous and dry; but she took the food and stimulants, and with the sole exception of great tenderness of the toes in consequence of the baths she made an uninterrupted recovery.

Acute Pleurisy at Onset.

Jacob G., aged 35 (Hosp. No. 10139), admitted June 16th. A well-marked friction rub was present in the left axilla. He has had

no particular pain in the chest. There is a diffuse bronchitis. He had a mild attack; the pleurisy disappeared in a few days.

Acute Pleurisy with Effusion in the Third Week.—No Symptoms.

Robert H., aged 20 (Hosp. No. 11963), admitted February 3rd, 1895, on the 14th day of the fever. The attack had begun with a chill and nausea, but he had neither cough nor pain in the side. On February 5th a friction rub was noted in the right lower axillary region. He had no pain, no cough. In a few days there were well-marked signs of effusion. On the 12th the line of dulness behind had reached the angle of the scapula; an exploratory puncture brought away a clear, brownish fluid, which was sterile. He had profuse sweating. For the first week the fever was high— 103° – 105° . The effusion cleared gradually, and by the time he left the Hospital—March 31st—the resonance was only a little defective. There were no symptoms pointing to the pleurisy.

INTENSE BRONCHITIS.

In *Case XXVII* of the fatal cases the bronchitis was so intense and the cyanosis became so extreme that bleeding was employed.

Renal.

URINE.

In *Volume IV*, a very thorough consideration of this secretion in typhoid fever was given by Dr. Hewetson. The examinations are made daily in the severe and at short intervals in the mild cases. An interesting study of Pyuria and its associated micro-organisms, by Dr. Blumer, will be found in another part of this fasciculus.

Albumin was present in 139 cases. In only five of these was it abundant; in a majority there was only a distinct trace with the usual tests, such as is almost invariable in the fevers.

Uric Casts were present in 61 cases, usually only a few and sometimes found only after the use of the centrifuge.

There were no cases of serious nephritis in the series, such as were present in the first.

Diazo-reaction.—This was present in 118 cases—about 74 per cent. Its importance, &c., are fully considered by Dr. Hewetson in Vol. IV.

HEMOGLOBINURIA.

George W., aged 22 (Hosp. No. 7910), admitted August 11th, 1893, complaining of diarrhoea and fever. He had been ill for nearly three weeks with headache, diarrhoea, fever, and a 'weakness' in the belly. He had no hemorrhages, and no bleeding from the nose. The temperature on the evening of admission rose to 104°. The pulse was dirotic 108. The color was good, and his general condition satisfactory. The urine first passed was coffee-colored, sp. gr. 1022, and contained albumin and many granular tube casts. The edge of the spleen was palpable. The abdomen was a little distended, but not tender. The fever for the first ten days ranged from 101° to 105°. On the 12th and 13th he had seven baths, but they were omitted (on account of the condition of the urine) from the 13th to the 17th.

The amount of urine ranged from 800 to 1200 cc. It was reddish brown in color, specific gravity about 1020, and contained much granular débris and many tube casts, but no red blood corpuscles. The urine gave all the usual reactions for blood-coloring matter, but in the numerous examinations made between the 11th and the 17th, no red-blood corpuscles were seen. By the 20th, the urine had cleared, and was yellow brown in color, no longer turbid, and contained only a trace of albumin, but no blood and no tube casts. On the 22nd the color was normal, and there was only a faint trace of albumin. The baths were resumed at noon of the 17th, and he took twenty-six before the temperature fell below 102.5°. He convalesced rapidly, with the exception of a recrudescence of five days duration. The blood examination, made repeatedly during the first few days, showed no malarial organisms. On September 9th the urine still presented a trace of albumin but there were no tube casts.

Cutaneous System.

(a). HERPES LABIALIS.

Theresa H., aged 24 (Hosp. No. 8594), had, on the 25th day of her illness, a well-marked crop of herpes on the lips.

Henry L., aged 29 (Hosp. No. 9697), had on May the 5th, as the fever was declining, an herpetic eruption on the upper lip.

(b). GENERAL ERYTHEMA.

Heinrich W., aged 12 (Hosp. No. 8369), before taking baths had a diffuse erythema on chest and abdomen, which persisted for two days.

Charles S., aged 18 (Hosp. No. 10517), had, on admission, a general erythematous blush upon the trunk; no rose spots.

(c). BOILS.

During the 4th year, throughout the autumn of 1892, there were many examples of boils during convalescence. At one time there were seven or eight cases in Ward F.

During the 5th year there were very few cases. One patient, Evans (Hosp. No. 8029), with a very mild attack, had, late in convalescence, a large boil in each axilla.

Chas. B., aged 17 (Hosp. No. 10563). The attack was severe, with high fever and delirium; twenty-six baths. Crops of boils began to appear before the fever had fallen; there were many small ones on back. Later, a large boil developed on outer aspect of right thigh; cultures showed a pure growth of staphylococcus aureus.

(d). URTICARIA.

Theodore B. (Hosp. No. 10298), during convalescence had an extensive outbreak of urticaria on both forearms, unassociated with any error in diet.

(e). POST-TYPHOID ABSCESS.

William P., aged 22 (Hosp. No. 8145), admitted September 11th, 1893, on the 8th day of the fever. The temperature ranged from 102° to 104°, and fell to normal on the 25th. On the 25th an abscess was opened between the buttocks and a considerable amount of pus escaped. Cover slips showed a coccus as the predominating organism, but in culture both the colon bacillus and the staphylococcus albus were isolated.

Olaf J., aged 24 (Hosp. No. 7992), admitted on the 4th day of the fever. The attack was very severe, and the baths had very little influence on the fever. On the 15th day he had a slight hæmorrhage

from the bowels. The temperature became normal on the 30th day. In the sixth week a large abscess developed on the left side of the sacrum, which was opened and packed with iodoform gauze. The temperature did not rise during the formation of the abscess. Cover slips from the pus showed only a coccus; in culture the staphylococcus albus and *s. aureus*, and also the streptococcus pyogenes, were separated.

Heinrich W., aged 12 (Hosp. No. 8369), admitted October 9th, 1893, on the 7th day of the fever. The temperature did not fall to normal until the 37th day. On November 1st a small area of redness and swelling was noticed in the right iliac region, just at the site of a well-marked rose-spot; by the 3rd it had pointed and there was fluctuation. A small abscess was opened on November 8th. Cultures showed a pure growth of the staphylococcus aureus.

Gaulius F., aged 21 (Hosp. No. 9321), admitted March 2nd, 1894, on the 4th (?) day of the fever. The temperature became normal on the 22nd day. The note on March 13th reads as follows: "For several days the toes in the right foot have been painful, and on the dorsum there is a well-marked blush, and it is tender and hot to the touch." On the 14th the blush persisted, and the plantar surfaces of the toes were very tender. There was some puffiness on the dorsum. The left foot was not affected. We thought at first that the condition was the usual 'tender toes' which so often follow the baths. On the 16th the swelling had extended, and the redness and oedema reached almost to the ankle joint, but they did not extend over the entire width of the dorsum. The toes are very sensitive. By the 19th the swelling was greater and fluctuation was evident. The temperature reached normal on this day. The abscess was opened and about $\frac{5}{8}$ ii of pus removed. The cultures showed a pure growth of the staphylococcus aureus. About the 13th the patient had also pain in the right ear and tenderness over the mastoid process. On the 17th there was a watery discharge from the ear, and he had no further trouble. The fever did not rise again after the 19th.

Thomas T., aged 36 (Hosp. No. 8667), whose case is fully given in the article on *Chills in Typhoid Fever*, p. 452, during convalescence, on the 75th day, more than two weeks after the fever had subsided, had redness and swelling over the inner malleolus of the right leg.

For a day or two it looked as though it was an acute periostitis, going on to suppuration; but it subsided under the use of cold applications, and he had no further trouble.

Nervous System.

(a). THROMBOSIS OF LEFT MIDDLE CEREBRAL ARTERIES.

See *Case XXXIII* of the series of fatal cases.

(b). INSANITY.

Florence M., aged 22 (Hosp. No. 3406), admitted October 19th, 1893; she had no initial delirium. The attack was severe, and the baths did not influence the fever very much. There was a good deal of abdominal distension. The fever disappeared about the 26th day. November 14th.—“Three days ago the patient began to have various delusions; as that she had had money left her; that she had had visitors; and that another patient wished to cut her throat. She sings and talks to herself when left alone.” November 20th.—“She is not in the least melancholic, but is always in a most cheerful mood. She thinks now that she is to be operated upon. Subsequently she became somewhat melancholic. She developed a very tender back, which seemed to improve her mental condition. She gradually got better and left the Hospital well, January 7th, 1894.

(c). CATELEPSY.

Betty G., aged 27 (Hosp. No. 8616), admitted on the 21st day of the illness. The fever for a week ranged from 103° to 105°. She was tremulous, noisy, and was with difficulty kept in bed. The day after her admission, she would not answer questions, but lay with the eyes shut, the eyelids quivering, and the arms and legs remained in any position in which they were placed. The next day she seemed clearer in her mind, and the cateleptic features were not again seen.

(d). EPILEPSY.

Annie M., aged 15 (Hosp. No. 9611), had had for seven years epileptic fits, recurring every few weeks. She was admitted on the 8th day (April 7th), and had a tolerably severe attack, the fever falling about the 20th day. From the onset of the disease to April

30th, she had no fit. On this day, after the temperature had been normal for ten days, she had a severe convulsion.

(c). **HYSTERIA.**

Alice C., aged 18 (Hosp. No. 7602), during convalescence from a severe attack, had on July 12th an hysterical outbreak, with much crying. She had been very well with the exception of the tender toes which had troubled her very much.

(f). **THE PAINFUL BACK OF TYPHOID FEVER (TYPHOID SPINE).**

In the first Report I gave a short account of the condition to which Dr. Gibney gave the name 'Typhoid Spine' and reported several characteristic cases.

The following additional cases are of interest, particularly the second and the third in which the symptoms were milder and less enduring.

M. S., aged about 35, admitted February 19th, 1895. He had been in Ward F. from November 14th to December 15th, with typhoid fever, a very typical attack. He was, however, very restless and nervous, and became so obstreperous in the baths that after the third day cold spongings had to be substituted. Before the patient was discharged, he complained of soreness in the back when stooping and in walking, and for this the Paquelin cautery was applied. He says that this has been persistent, and has become much worse in the past six weeks, so that he has been quite incapacitated. On admission, he looked pretty well, but had a worried expression. There was no fever. He walked very stiffly, the body a little inclined forward, and he hesitated with each step. He was quite unable to stoop; and any jar caused pain. On attempting to straighten the back there was pain of a dull aching character. The examination showed a perfectly straight spinal column, and the spines of the vertebrae were not tender on the firmest pressure. Lateral and dorsal flexion could be made, but ventral flexion could not be made without pain, and the act of twisting was difficult. There was slight soreness in the sacral region, particularly over the sacro-iliac synchondroses. There was no disturbance of sensation; he flushed easily, was very nervous, perspired readily, and the hands and feet were usually cold and moist. He was given the tincture of nux vomica in large doses,

and the Paquelin was applied lightly on the lower dorsal region on several occasions with much benefit. He improved very slowly, and left the Hospital nearly well.

The following cases are of interest as illustrating milder forms of this trouble, and in one the pain began and was for some time localized in the neck.

Florence M. (Hosp. No. 8448), whose case is given under the sections of insanity and post-typhoid elevations, on December 16th, after she had been sitting up for nearly a week, began to complain of severe pain in the back, which was much increased by any sudden jar or after walking about. The examination was negative, and there was no pain on pressure. On the 17th and 18th the pain was too severe to allow her to sit up. It continued to trouble her for more than a week. There was no disturbance of sensation or of motion in the legs. On the 27th she sat up, and after this she improved rapidly; and when she went out—January 7th—the tenderness in the back had almost disappeared.

Christopher T., aged 32 (Med. No. 3228), had sat up on October 4th, when convalescent from a relapse. On October 6th he began to complain of pain in the back of the neck, particularly in the upper part. There was no swelling. The soreness persisted and was very troublesome; the patient could not turn his head from side to side. The Paquelin cautery gave him much relief. Nothing could be felt on examining the cervical vertebræ from the pharynx. Subsequently the soreness extended to the back and down the hips. He held himself very erect and walked stiffly. He said that he was more comfortable while up and moving about. There were no tender points, and the movements of twisting and bending were not painful. The free application of the Paquelin gave great relief, and at the date of his discharge—October 21st—he was very much better.

(g). PAINFUL LEGS.

During convalescence patients are often very weak and 'groggy' in the legs, and it may take months before they feel well and strong in walking. In protracted cases, when the patient first sits up and begins to go about, there may be in addition œdema of the feet and legs. Thus, Thomas T. (whose case is given fully in the article on

chills, p. 452), during the prolonged convalescence, after he got up and moved about, had œdema of the feet and legs and much stiffness in walking.

There is a condition of 'painful leg' after typhoid fever in which there is much soreness in one or both calves, without redness, without evidence of neuritis, and without signs of thrombosis in the veins. Of the six cases here given, the soreness in all developed after the fever had disappeared. In five of the cases the condition was unilateral. In *Case VI* both calves were very tender. The most suggestive feature is the marked soreness of the muscles on pressure and on movement, resembling very much that which is so pronounced in neuritis, and which was present in several of the cases reported in the special article on the subject in this fasciculus. It did not seem to me that the features were sufficiently pronounced to place these cases in that section, the symptoms indeed point rather to a *myositis*, but until we have further knowledge it is best to speak of the condition under the caption above given.

Case I.—Sophie S., aged 24 (Hosp. No. 8090), during convalescence from a mild attack, complained greatly of pain in the left popliteal space, and of stiffness in the leg. There seemed to be a little fulness in the space, but it was not tender on pressure. There was no clot to be felt in either the saphenous or femoral vein, and there was no swelling of the ankle. The soreness and stiffness persisted for ten days or two weeks, but no local features developed to account for it.

Case II.—Emma E., aged 16 (Hosp. No. 8264), in the second week of convalescence from a mild attack, complained a great deal of pain in the calf of the right leg which seemed a little swollen, particularly between the heads of the gastrocnemius muscle, and was very sensitive on pressure. No thrombus could be felt. The ankle was not swollen. With this there was a slight rise in temperature for four days. The leg was wrapped in cotton wool. The extreme sensitiveness persisted for five or six days, and subsided without giving any indication of the nature of the trouble.

Case III.—Annie M., aged 15 (Hosp. No. 9611), admitted April 7th, 1894, at the end of the first week of fever. She had had from

the outset much pain in the left leg, particularly in front, and on motion. It was also tender on pressure, but there was no swelling or redness. The baths were not begun until the 9th. She had much pain in the leg, none in the popliteal space, but entirely in front, and on the 9th she complained of soreness over the dorsum of the foot. There was no tenderness of the toes and no shooting pains or numbness. She had the tubs regularly, and by the 12th the pains had disappeared.

Case IV.—George T., aged 29 (Hosp. No. 8104), admitted on the fifteenth day of a severe attack. He had sixty-one baths. During the first week of convalescence he had much soreness in the calf of the left leg. There was neither redness nor swelling, and the tenderness was in the *muscle*, not in the skin. The knee jerks were slightly increased. The condition persisted for a week or ten days, and at the time of his discharge—a month after its onset—he still felt soreness in the muscles of the left calf.

Case V.—John W., aged 26 (Hosp. No. 9566), sat up May 1st, 1894, on the 35th day of a very severe attack. On May 9th the calf of the right leg was found to be swollen and tender, chiefly in the muscles. He had been complaining for a few days of soreness in the legs. He had also slight tenderness on pressure in the left calf. He kept about, and gradually the swelling and pain disappeared. There was no evidence of thrombosis in the veins.

Case VI.—Thomas A., aged 42 (Hosp. No. —), admitted April 2nd, 1895. The fever was moderately high, and he had forty-eight baths. On April 15th, before the temperature was normal, he began to complain of tenderness of the toes, chiefly in the plantar surfaces, but slightly also on the dorsum and on the under surface of the heels. After he had been up for ten days he began to complain of great soreness in the legs. There was no œdema, nor any redness or swelling; on standing and when moving the muscles felt sore. To the touch the skin was not sensitive, but on pressure upon the calf muscles he winced at once. On May 16th, on attempting to stand, he almost fell; any effort to stand caused severe pain in the calves. There were marked fibrillary tremors in the muscles of the calf of the right leg. He was ordered to bed and to have cold applications. For ten days,

without any loss in muscular power, this painful condition persisted. There was no tenderness of the nerves.

TENDER TOES.*

During the 5th year there were only four cases with great tenderness of the toes,—all had had baths, one case twenty-five, two over fifty, and one sixty-two. In one case the tenderness was more diffuse than usual, and extended to the soles of the feet. In three cases it developed before the temperature had reached normal. During the 6th year there were only three or four cases, all presenting the usual characters.

Special Senses.

OTITIS.

Harris G., aged 24 (Hosp. No. 8600), admitted November 10th, 1893. The temperature was high— 105.5° —and the general symptoms were severe. On November 14th there was a profuse discharge from left ear; the mastoid process was not tender. The submaxillary gland on this side was a little enlarged. The cover-slips from the discharge showed only a lance-shaped diplococcus, occurring in pairs or chains. Cultures in agar showed only one organism which corresponded in all particulars to the micrococcus lanceolatus. The discharge subsided, and gave no further trouble.

Theresa H., aged 24 (Hosp. No. 8594), admitted November 9th, 1893. On November 14th, about the end of the third week, there was a discharge from the left ear. There was slight tenderness. There was not much pain; the discharge continued for more than a week. The note as to cultures was mislaid and not added.

Gaulius F.—Given under post-typhoid abscess.

Charles B., aged 17 (Hosp. No. 10563), admitted August 6th, 1894. Severe attack; high fever, delirium, etc. On the 8th it was noticed that the patient had an offensive discharge from both ears. This he had had from infancy, but it became much aggravated during the early days of his fever.

*See Vol. IV, p. 69, of the *Reports*.

Ambrose B., aged 31 (Hosp. No. 11310), admitted November 5th, 1894. Severe otitis media, with purulent discharge during the height of the fever. Dr. Blumer isolated the bacillus pyocyaneus and two other undetermined organisms.

Locomotor System.

ARTHRITIS.

Frank H., aged 16 (Hosp. No. 11108), admitted October 10th, about the end of the first week. He had in all twenty baths, and by October 24th the temperature was normal. It was a very typical case of moderate severity. On the 26th the note reads as follows: "The temperature was normal on the 24th. Yesterday and to-day there has been a slight rise—this a. m. to 102.5°. The left shoulder is swollen, red and painful, particularly at the very top of the joint. The swelling is general." In the evening the temperature was 104.4°. On the 27th the swelling and redness persisted, and the boy could not use the arm at all. Hot formentations had been applied, which gave a good deal of relief. On the 28th the condition was unchanged, but the temperature had fallen to normal. On the 29th a striking change had taken place, altogether within the twenty-four hours; the swelling had lessened, the pain was better, but there was still redness. The swelling subsequently localized just at the top of the acromion, but it gradually subsided, and after persisting for about ten days, disappeared completely.

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X.—A STUDY OF THE FATAL CASES.*

By WILLIAM OSLER, M. D.

Of the twelve cases which died in this series, four were admitted in the first week, four in the second week, and four in the third week. The deaths in typhoid fever may be grouped under three headings—*progressive asthenia* (the result either of a rapid or slow action of the poison, or a direct sequence of severe diarrhoea), *intercurrent affections and complications*, and *accidents of the lesion*—hemorrhage or perforation.

I.—DEATH BY PROGRESSIVE ASTHENIA.

In only two of the cases in this series, making ten in the total of thirty-four fatal cases in the six years, death occurred by asthenia. In *Case XXXVII* the patient had severe diarrhoea, which was started early in the disease by a dose of castor-oil. In *Case XXVII* there was an intense septicæmia with progressive failure of strength. Clinically this case is of exceptional interest from the existence of symptoms suggestive of cerebro-spinal meningitis,—rigidity with retraction of the muscles of the neck, rigidity of the right arm, increased reflexes, and cutaneous hyperæsthesia. The temperature was low, and for three days before death was normal. The development of a parotitis called our attention to the possibility of a typhoid infection. The case is fully considered by Dr. Flexner in another portion of the fasciculus.

CASE XXXII.—Sudden onset; administration of castor-oil, followed by profuse diarrhoea for several days; moderate fever at first; laryngitis; diarrhoea; progressive asthenia; death; no autopsy.

Harry T. C., aged 20 (Hos. No. 11176), admitted October 19th, 1894, complaining of general pains and headache.

* Continued from Vol. IV of the Reports.

The patient had been at Garrison, Baltimore county, all the summer, in a place where two boys and three girls were ill with typhoid fever. Five days ago his illness began suddenly, with pain in the back. He has been in bed ever since, feeling very weak and tired. He has had no ebills, no nose bleeding. He took castor-oil, and has had six or seven watery stools each day.

On admission the temperature was 101°. The blood examination was negative.

The patient was a well formed, well nourished man; the mind was clear; the tongue was coated in the centre, clean at the edges. The pulse was soft, regular, and dirotic. The abdomen looked natural, was nowhere tender; there were several suspicious looking spots on the skin. The heart and lungs were normal. The temperature range in the first week was from 102° to 104.5°. The baths acted very promptly. He had three or four loose stools each day.

On the 24th he was a little husky from the baths, and they were omitted.

On the 26th and 27th he had some delirium. The pulse was 112, dirotic; the tongue was swollen and dry.

From the 29th to November 2nd he seemed somewhat better. The spleen was readily palpable; there were no fresh rose-spots, and the abdomen was a little distended, and he still had three or four movements each day.

From November 3rd to 6th he became worse; the temperature rose; the diarrhœa still continued, and he was weaker.

On the 6th the temperature rose to 105.3°. He took his nourishment well, and there was no vomiting. He had the lead and opium pill for the diarrhœa, and hypodermics of a twentieth of strychnia.

Throughout the 7th he was extremely feeble, though rational. There was marked fetal heart rhythm. He sank gradually through the day and died at 5 p. m. No autopsy.

CASE XXVII.—Illness of two weeks duration before admission; moderate fever; enlarged spleen; rigidity of muscles of neck and of right arm; mental dulness and delirium; cutaneous hyperæsthesia and increase of the reflexes; small amount of albumin, with red blood corpuscles, in the urine; no diazo-reaction; for three days before death normal temperature; parotitis.

Susan B., aged 18, colored, (Hos. No. 9725).

AUTOPSY.—ANATOMICAL DIAGNOSIS.—Typhoid fever; hæmorrhagic enteritis; acute splenic tumor; multiple abscesses in the kidneys; parenchymatous degeneration of the liver and kidneys; purulent infiltration of the parotid gland; œdema of lungs and glottis.

This extremely interesting case of typhoid septicæmia is given in full by Dr. Flexner at page 345 of this volume.

II.—DEATH FROM INTERCURRENT AFFECTIONS.

(a). *Sudden Death.*

In one instance the patient died suddenly in syncope. She had been very ill, and the temperature had reached 106°. The baths had been omitted on account of the protracted collapse after them. She had been somewhat better for a few days, and then early in the morning the nurse found her gasping for breath, with an imperceptible pulse, and death occurred in a very few minutes. There was no autopsy.

CASE XXIII.—*Nursing woman; mild onset; high fever; diarrhœa; sudden death on the tenth day; no autopsy.*

Lizzie G., aged 21, (Hos. No. 7841), admitted August 1st, 1893, complaining of weakness.

Family history good.

Patient had been always rather delicate; married four years ago; has had two children; the last which is seven months old, she has been nursing.

The present illness began two weeks ago with severe headache, loss of appetite, and pain in the back. She noticed within a few days that the amount of milk was very much lessened.

On admission the patient looked slightly anæmic, but was well nourished; the tongue was moist and furred; the pulse was regular 96; tension increased. The abdomen was natural looking, no spots; the spleen was not enlarged.

Heart.—The apex beat was felt in the fourth space inside the nipple line. There was a soft systolic murmur, which was also heard at the base, but was not transmitted to the axilla. The first and

second sounds were well heard at the base, the second accentuated. The temperature on admission was low, only 100° , and for the first three days we did not suspect that the case was one of typhoid fever.

On the 1st, 2nd and 3rd, the temperature did not once reach 102° . The blood examination was negative; there was moderate leucocytosis (12,000). On the evening of the 3rd the temperature rose above 103° , and she complained of much headache. The face was flushed, the tongue coated; the spleen could not be felt.

On the 5th a number of perfectly typical rose spots were seen.

The temperature had risen to 105° , and she had had baths. There was a trace of albumin in the urine, and a very distinct diazo-reaction. There was no diarrhoea; a stool on the 5th was yellowish, semi-solid.

On the 6th and 7th her condition became more serious and the temperature kept high, touching on several occasions 106° . The pulse, however, was of fair volume and between 112 and 120. There was no diarrhoea; the spleen was not felt, and she had very great tension of the abdominal walls.

On the 8th she seemed to suffer so severely from the baths, and remained so long in an almost collapsed condition, and very blue, that sponges were substituted. She passed about fifty segments of a tape-worm.

On the 9th the temperature was lower than it had been for four days, and for nearly twenty-four hours, to 8 a. m. on the 10th, it was almost continuously below 102° , and she seemed better. She had, however, to-day, for the first time, diarrhoea.

On the 10th the temperature rose again, and at 4 p. m. was 105° ; the diarrhoea continued. On the 10th she was sponged at 7.30, and at 10.30 p. m. At the evening visit nothing special was noticed about her condition. Though very ill, she had been somewhat better for two days.

In the early morning of the 11th, on going to the bedside, the nurse found the patient gasping for breath, with an almost imperceptible pulse, and before a physician could be summoned she was dead. She had taken her nourishment the evening before, and had not made any special complaint. No autopsy.

(b). *Intense and diffuse bronchitis.*

The early bronchitis of typhoid fever is not usually a contra-indication to the use of the baths. On the contrary, we frequently find that in a day or two the cough lessens and the pulmonary symptoms improve. In the following case the bronchitis was unusually diffuse for the second week of the disease. He had the baths for two days, and though he reacted well after them, the lividity was very persistent. The respirations increased in frequency; diffuse râles were heard everywhere; the signs of venous engorgement became more intense, and he was bled without any relief. This is the only instance in which a patient under my care, with typhoid fever, bleeding was resorted to.

CASE XXVI.—*Admitted in second week. High fever; intense bronchitis with cyanosis; venesection; death on the fourth day after admission; autopsy.*

Simon S., aged 27, (Hos. No. 8615), admitted November 13th, 1893, complaining of pain in the abdomen.

He was an oyster dredger; had always been a very healthy man, but at times drank hard.

Ten days ago he returned from a trip on an oyster schooner, went on a spree, and since then has had loss of appetite, nausea and vomiting. The bowels have been constipated. He had bleeding at the nose two days ago. He has felt very stupid and drowsy; mouth has been dry, and for two days the abdomen has been painful and distended. For several days he has had a troublesome cough.

The examination of the blood was negative. Temperature on admission was 104.8°, and at 6 p. m. rose to 105.8°.

Patient was a large framed, healthy-looking man with a dull heavy expression. He did not apparently understand what was said to him. The lips were dry; the tongue dry and glazed; the respirations were 52; pulse 120, soft and remarkably dirotic. The glands on the left side of the neck were enlarged, hard, and there were also many old scars. The abdomen was distended and the skin covered with a profuse crop of rose spots. The spleen could not be felt.

Everywhere over the chest there were numerous coarse râles, wheezing and bubbling; no tubular breathing; no dulness.

The patient had slight diarrhœa; the temperature remained between 104° and 105°.

On the 14th he seemed somewhat better and the baths were begun. He had four loose movements in the twenty-four hours. He reacted pretty well from the baths, though the face was suffused and the hands and feet remained somewhat cyanosed. He was ordered ammonia and stimulants. There was no leucocytosis.

On the 16th the baths were stopped and sponges substituted. The temperature remained high, constantly between 105° and 106°. He took his nourishment and medicine well.

On the morning of the 16th the temperature was 106.2°; respirations 68 per minute; pulse between 140 and 150, of better volume than yesterday, but still dicrotic. The face was cyanosed, and the hands and feet very livid. There were diffuse snoring and bubbling râles over the whole chest. The bronchitis seemed so extreme, and the cyanosis so severe that he was bled from the arm—about twelve ounces. He became much worse through the day; the temperature rose to nearly 106.5°, and he died at 3.30 p. m.

ANATOMICAL DIAGNOSIS.—*Lesions of typhoid fever; fresh ulceration and necrosis in ileum; œdema of the lungs; tuberculosis of cervical lymph glands.*

Peritoneum smooth. Both lungs were bound down by old, firm adhesions. The bronchi contained much frothy serum and moderate emphysema. Congestion and œdema of both lungs without any foci of inflammation. The bronchial glands were caseous.

The first ulceration of the ileum was 262 cm. above the valve. From this point downwards there were ulcers and swollen patches with superficial necrosis. Near the valve the ulcerations were deeper and more crater-like; many had remnants of dirty sloughs adherent to them. Just above the valve there were extensive excavated ulcers penetrating the muscular coat, and in places covered with necrotic sloughs. In a Meckel's diverticulum 7 cm. in length, situated 110 cm. above the valve, the lymph follicles were swollen and superficially necrotic. In both cœcum and colon the solitary follicles were enlarged and ulcerated. The mesenteric glands were large, swollen,

soft, and hæmorrhagic. The spleen weighed 510 grammes. There was extensive parenchymatous degeneration of liver and kidneys. In the former there were numerous small white nodules visible beneath the capsule—lymphomata. The enlarged glands of the neck were caseous.

(c). *Endocarditis in typhoid fever.*

Considering the frequency of lesions due to the invasion of other micro-organisms, it is somewhat remarkable that endocarditis, a typical secondary infection, should occur so rarely in typhoid fever. In the twenty-eight post-mortems which have been made by Dr. Welech or his assistants in the thirty-four fatal cases of typhoid fever from my wards in the Johns Hopkins Hospital, only one case has occurred. No instance was present in the fifty-three post-mortems which I made in typhoid cases at the Montreal General Hospital. One case was under my care in the Philadelphia Hospital, and is of sufficient interest to place on record here.

The extreme rarity of the lesions is shown by the fact that of 2000 autopsies in typhoid fever at the Munich Pathological Institute there were only eleven instances. Hanot in a recent *brochure* on endocarditis states that the cases which have been recorded fall into two categories. Most frequently the lesion results from a secondary infection, favored by the intestinal ulcers, which permit of the entry of micrococci, of which several varieties have been found in the vegetations. In rare instances the endocarditis is caused by the bacillus of Eberth, which has been found by Girode, Carbone and Vincent. In the first case here reported the infection was unusually intense, and the question was raised as to the existence of malignant endocarditis, but the copious and typical rash made the diagnosis clear.

— *Typhoid fever; old sclerosis of the mitral segments; ulcerative endocarditis of wall of left auricle and of the base of the posterior segment of the mitral valve.*

W. L., aged 30, admitted to the Philadelphia Hospital, December 13th, 1886, in a condition of unconsciousness. His friends said that he had only been in bed for three days, but that he had been ailing for several weeks.

Condition on admission.—The patient was a well built, muscular man, was unconscious, could not be roused, muttered frequently, and had much tremor. The tongue was dry and cracked. The abdomen was distended, and the skin presented a copious rash of rose colored spots. The spleen could not be palpated, owing to the abdominal tympany. The patient had diarrhoea. A feeble apex beat could be felt in fifth interspace in the nipple line; the area of transverse dullness was increased. There was a loud systolic murmur in apex region, transmitted to the mid-axilla. The second pulmonic sound was accentuated. The pulse was 117, dirotic; temperature 103°.

December 14th.—The patient is in much the same condition; marked subsultus tendinum; pulse 112; temperature 102°.

December 16th.—For the past two days the condition has been very serious, though the temperature is not high, ranging from 100.5°, to 102°. There are no changes in the cardiac condition. During the afternoon the temperature rose rapidly and he became very feeble. The thermometer before midnight registered 109.6°. He died early on the morning of the 17th, on the fourth day after admission.

Autopsy.—The ileum showed the characteristic lesions of typhoid fever. The Peyer's glands were greatly swollen, infiltrated, and a few near the valve presented small ulcers. In a great majority the sloughs were still adherent. In the caecum and ascending colon the solitary follicles were much involved. The mesenteric glands were greatly swollen and the spleen was enlarged and soft.

Heart.—The pericardium was slightly adherent over the right ventricle. The organ was considerably hypertrophied, particularly the left ventricle. The mitral orifice admitted only two fingers. Both valve segments were sclerotic; the chordae tendineae were short and thick, particularly those of the posterior valve. At the base of the auricular surface of this segment, and extending to the adjacent wall of the auricle, there was a flat, superficial ulcer, circular in outline, nearly 2 cm. in diameter. It was somewhat raised, had a grayish-yellow appearance, and was roughened by the presence of a few vegetations. The aortic segments were healthy; there were no infarcts in spleen or kidneys.

CASE XXVIII.—*Admission in the third week; profuse hemorrhage from the bowels; low temperatures; sudden collapse about forty-eight hours after admission.*

Alberta C., colored, aged 20 (Hos. No. 10131), admitted June 14th, 1894.

The patient was seen at her home by Dr. Oppenheimer about ten days previously. She had then been ill for about a week with headache, loss of appetite, and general weakness. The temperature was 103.5° , and the patient looked dull and heavy. The tongue was dry and brown. The patient was given an admission slip, and said she would enter the Hospital that evening. She has been in bed at home, getting gradually worse, and this afternoon she began to have a hæmorrhage from the bowels, which alarmed her friends, and they brought her to the Hospital. She was bleeding profusely on admission.

The temperature was 102° at 6 p. m.; between 6 and 8 p. m. the patient had five large stools of almost pure blood, with clots. She was dull and heavy, and did not reply intelligently to questions. The pulse was 126, full, soft, of low tension. The apex beat was not palpable, the sounds were clear, but at the apex the long pause was shortened, and there was fetal heart rhythm. The abdomen looked natural, but there was slight tympany; the spleen could not be felt.

The following morning the patient was somewhat better; the temperature had not been above 100° all night; this morning it was 98.6° in the axilla. She had had several stools through the night, containing clots. The urine was of a dark brownish-yellow color, contained bile, and there was a doubtful diazo-reaction.

June 16th.—The temperature continued low; was only 99° this morning. The pulse was 120. The bleeding had lessened, and she passed only a blood-stained mucus. At 5 p. m. she seemed to be doing well; the pulse was of good volume, and regular in force and rhythm. Though she was dull and stupid, she answered when spoken to.

At 8 p. m. the patient was delirious and had a peculiar diffuse hyperæsthesia of the skin, so that she cried out when touched anywhere. The pulse was almost imperceptible at the wrist; the hands

and feet were cold. The heart's action was rapid, feeble and tumultuous. The temperature had risen to 102°. The abdomen was not distended and the liver dulness was not obliterated. At 8.15 p. m. the patient vomited 100 cc. of dark brown fluid, which reacted for blood-coloring matter. She gradually sank and died at 8.40 p. m.

ANATOMICAL DIAGNOSIS.—*Typhoid fever; lesions in the small and large bowel; vegetative endocarditis; acute splenic tumor; extensive necrosis in liver.*

Body was well nourished; rigor mortis marked.

The lungs were dark in color, hyperæmic; there were no distinct areas of broncho-pneumonia. The bronchi contained much frothy mucus.

The pericardium was smooth, and there was no excess of pericardial fluid.

Heart.—The left ventricle was contracted; the right distended with dark clots; the organ was not enlarged. All the valves were normal except the mitral, along the edges of which there were a number of recent vegetations varying in size from the head of a pin to four or five times that bulk. The heart muscle was dark brownish-red in color, slightly mottled. The coronary arteries were normal. The intima of the aorta was smooth.

The spleen weighed 1020 grammes, was soft, of a deep ochre yellow-brown in color, opaque and very cloudy. Scattered throughout the substance were reddish-brown specks the size of a pin's head and smaller, with hyperæmic margins.

The kidneys together weighed 400 grammes, soft and swollen, the cortices pale and grayish-yellow, in color; the striæ were almost absent.

Intestines.—Beginning in the lower part of the ileum there were the usual typhoid lesions. The solitary follicles were enormously swollen, elevated above the surface as much as 4 mm. The swollen Peyer's patches had firm edges which slightly overlapped the base; some of these had undergone necrosis, beginning on the surface; and near the valve were a number of patches in which sloughing had occurred. In the ileum about a foot and a half above the valve there was a small hemorrhage beneath the mucous membrane, projecting as a little blood cyst.

Throughout the entire extent of the large intestine the solitary follicles were uniformly affected, enormously enlarged, and felt like large marrow-fat peas beneath the mucous membrane. The tops of some presented small hæmorrhages and necrosis.

The bacteriological examination was made with great care by Dr. Barker, and typhoid bacilli were isolated from the spleen, from the liver, and from the kidneys. From the latter organs in addition there grew also colonies of staphylococci. The cultures made from the heart blood were negative. In cultures from the vegetations many colonies of staphylococci developed; no typhoid bacilli.

(d). *Thrombosis of branches of the left middle cerebral artery; death in severe convulsions.*

Convulsions in typhoid fever are excessively rare. No previous case has come under my observation.

Murchison (*The Continued Fevers of Great Britain*, Third Edition, p. 541) states that in 2960 cases, convulsions occurred in only six. In one of these the convulsions came on after much delirium on the sixteenth day, and the patient died comatose half an hour afterwards. The kidneys were found to be diseased. A second case, a boy of thirteen, died suddenly in convulsions on the thirtieth day. There was no post-mortem examination. In the third case, general convulsions occurred on the eleventh day; recovery followed. In the fourth instance, the patient recovered after a severe fit of convulsions, lasting a quarter of an hour, which occurred on the fourteenth day. The fifth case, a man aged twenty-three, had on the twelfth day two severe epileptiform convulsions, and recovered. The sixth case, a man of fifty, during convalescence had four epileptiform attacks. He had also thrombosis of the left femoral vein. He made a good recovery.

In Volume XI of the *Transactions of the Academy of Medicine of Ireland*, Dr. J. W. Moore gives the case of a young man admitted on October 26th in an illness of about a week's duration. The temperature was above 105°. On the 27th the temperature fell to 103°. At 6.30 p. m. he became very restless and delirious, and attempted to get out of bed. At 7.30 p. m. a violent epileptiform convulsion occurred with loss of consciousness. The fits recurred twice, and in

the third attack at 9 p. m. he suddenly expired. No clot or any lesion was found in the brain.

CASE XXXIV.—*Very mild typhoid fever; development of severe convulsions on the ninth day; death in a convulsion. Thrombosis of branches of the left middle cerebral artery.*

A. B., aged 22, (Hos. No. 12616), admitted April 24th, 1895, complaining of headache, pain and fever.

When a child he had acute rheumatism; no other serious illness.

On the 21st the patient felt dizzy, had aches and pains all over the body, and felt generally miserable.

On the 22nd the headache persisted, and the next day he had bleeding at the nose. There was no vomiting, no abdominal pain, but he had slight pains in the calves of the leg. For a few days prior to the onset, the bowels had been constipated, the appetite poor, and he had a bad taste in his mouth.

On admission at 10 p. m. on the 24th the temperature was 104°, but sank in the morning to 100.7°.

Patient was a well-nourished, healthy man, with a good color. The tongue was furred and brown over the dorsum. The examination of the heart and lungs was negative. The abdomen was not tender, not distended; there were no rose spots; no diarrhoea; the leucocytes were 5000 per cm.

On the 25th and 26th the temperature remained between 100° and 102.3°, not reaching the bathing point.

On the 27th the temperature only once reached 102°. Spots were visible, and the spleen became palpable.

On the morning of the 28th the temperature was 99.3°, and rose in the evening to 100.1°, and he seemed doing very well. There was no diazo-reaction in the urine; there was no albumin; a few pus cells, and an occasional cast were seen.

As we were making the visit in the ward at noon of the 29th, Dr. Thayer was sent for and found him in some distress, and feeling uneasy in his head. The pupils were dilated, and in a few minutes he had a short, sharp, general, clonic convulsion, beginning almost simultaneously in both arms. The eyes showed marked conjugate deviation to the left and upwards, the head also being drawn somewhat to the left. For about an hour the convulsions were repeated at short intervals.

Morphia was given hypodermically, and chloroform. They then became less intense, and finally ceased altogether for several hours. During the convulsions there was profound unconsciousness, and in the severer ones great embarrassment of the respiration, so that he became quite livid. In the interval the patient appeared to be conscious, and spoke to those about him, and seemed to understand questions, though he had a confused, frightened look. At 5 p. m. the convulsions recurred with great severity, and in spite of inhalations of chloroform, they continued at intervals until ten o'clock in the evening, when in a severe one the patient died. The convulsions were general, but the more intense movements were on the right side.

ANATOMICAL DIAGNOSIS.—*Typhoid fever; superficial ulcers in the lower ileum; thrombosis of branches of left middle cerebral artery; congestion of lungs with œdema.*

The ileum was the seat of a marked hæmorrhagic enteritis, affecting the jejunum to a less extent than the ileum. The mucous membrane was hyperæmic, and actual extravasations of blood had taken place into the substance. Near the valve, and covering an area of 15 cm. in length, there were several ulcers in the Peyer's patches. They were superficial, partly extending beneath the mucosa, the largest not more than 1.5 cm. in length, and above it the mucous membrane was hæmorrhagic. The mesenteric glands were enlarged and softened. The heart valves were normal. The lungs were free from adhesions, much congested and œdematous; on section blood-stained fluid flowed freely from them.

Brain.—There was an area of thrombosis in certain of the convolutions of the left cerebral hemisphere. At the time of the autopsy this was seen to involve the branches springing from the middle cerebral artery; but at that time the dissection was not completed.

Subsequently in the formalin-hardened specimen it was seen that the thrombi were situated in the ascending parietal and parieto-temporal branches of the middle cerebral artery.

The meninges over these vessels contained small hæmorrhages, and the brain substance corresponding to them, while not softened, showed small extravasations of blood, although the surrounding tissue was quite firm. Small, but quite extensive punctiform hæmorrhages could be seen to occupy the cortex and adjacent white substance in

the immediate neighborhood of the thrombosed vessels. These areas extend sometimes for a distance of 2 cm. (usually toward the convexity) from the vessels.

The internal carotid artery was free from thrombosis, as likewise the Sylvian branch. The ascending parietal and parieto-temporal arteries including at the points of their origins in the middle cerebral artery, were occluded by an adherent, partly decolorized, and quite firm thrombus. More recent dark thrombi were traceable into the branches of these arteries; for example into the branches running in the Rolandic fissure, the sulcus between the ascending frontal gyri and the ascending frontal convolutions, and the branches supplying the temporo-parietal region generally. The inferior external frontal artery and the arteries of the anterior perforated spaces were free from thrombi.

On section of the brain there were no gross anatomical lesions. The ventricles were not dilated.

"The cultures from the spleen, mesenteric glands, liver, kidneys, both lungs and heart muscle, showed the typhoid bacillus. From the lungs streptococci were obtained; from the peritoneal cavity the bacterium coli commune. Bile and bone marrow (ribs) were sterile."

III.—ACCIDENTS OF THE LESION.

(a). *Hæmorrhage.*

In the fifth and sixth years there were twelve cases of hæmorrhage, making in all twenty cases in the 389. Of these three died directly from the hæmorrhage, and in three perforations caused death. In this series the following is the only case in which was directly due to the bleeding.

CASE XXXIII.—*Admission in the second week of a severe attack; profuse and repeated hæmorrhages from the bowels; death on the second day after admission.*

Anatomical Diagnosis.—Typhoid ulcers in ileum; hæmorrhagic infiltration of the edges of the ulcers.

The clinical and anatomical details are given in Dr. Blumer's paper, p. 340.

(b) *Perforation.*

Of the twelve deaths in the fifth and sixth years, five were due to perforation; of the thirty-four deaths in the six years thirteen, *i. e.* 38 per cent, were due to perforation. The percentage of deaths from perforation in the series of 389 cases is 3.3, which is only a fraction higher than that which occurred in Murchison's 1580 cases, and is a little less than the percentage in Hare's 1173 cases at the Brisbane Hospital. The percentage of perforation among the deaths is, however, unusually large. Of 1721 autopsies collected by Murchison, the percentage of deaths from perforation was only 11.13.

CASE XXIV.—*Admission in the second week; favorable course at first; moderate diarrhoea on eighth day in hospital; abdominal pain; moderate distension; rapid pulse; death; autopsy.*

Barbara W., aged 21, (Hos. No. 8117), admitted September 5th, 1893, complaining of pain in the neck, chest and abdomen, and of great weakness. Two of her brothers are ill with typhoid fever in Ward F, and several other members of the family have had the disease this summer. She has recently been nursing a brother who died with the disease.

With the exception of pneumonia at thirteen, she has been very healthy.

The present illness began about two weeks ago with headache and loss of appetite; the bowels were constipated and she had at times slight pain in the abdomen. She had also cough and pain in the chest. She had been keeping up in order to help her mother with the nursing at home.

On admission the temperature was 102.5° and rose in the evening to 104°. She had retention of urine, and was catheterized.

The patient was a healthy looking, well-nourished girl; the face a little flushed; the tongue swollen and furred. The abdomen was everywhere soft; there were no rose-spots; the spleen was not palpable. The examination of the lungs and heart was negative. The temperature range was not high, and during the first three days in Hospital she had only six baths. At first the bowels were constipated; then on the eighth she had four stools.

On September 9th and 10th the temperature was higher and more persistent. The pulse was regular, of good volume, and not dicrotic. The abdomen was not distended; the spleen was not palpable, and there were no rose-spots to be seen. She had two or three soft movements each day.

On the 11th and 12th the temperature kept between 103° and 104° . The abdomen was soft, not distended, not painful; the tongue was furred, not dry.

On the 13th she was not so well; pulse was more rapid, and reached 130; the temperature was nearly 105° . She complained of pain in the abdomen, but there was no special swelling. She had three movements on the 13th.

On the 14th the temperature was almost constantly above 104° , and at 2 a. m. reached 105.2° . The abdomen was slightly distended; the diarrhoea had increased very much; the respirations were short and costal. The hands and feet were cold and clammy. The gravity of the general condition contrasted with the comparatively slight local features. The abdomen was not much distended, and painful only on deep pressure. There was fetal heart rhythm.

Throughout the night of the 14th she became much worse; the movements were frequent, and the condition of collapse was marked. She was given subcutaneous injections of salt solution. The pulse was very rapid, almost uncountable. The patient took her nourishment well. The abdomen became more distended, tympanitic and tender. There was 3 cm. of liver dulness in the right nipple line. The patient became much worse throughout the day, and died at 2 p. m. in the afternoon of the tenth day after her admission to hospital, and about the twenty-first day of the disease.

ANATOMICAL DIAGNOSIS.—*Typhoid fever; swelling and necrosis of lymph follicles in small and large intestines; great swelling of mucosa of appendix with perforation; diffuse peritonitis; general infection with the typhoid bacillus.*

Peritoneum.—The intestines were matted together by fresh fibrinous exudate, most abundant in the right iliac region. Some of the coils of small intestine had a dried glazed appearance, but were intensely congested. On separating the ileum from the caecum, to which it was adherent by fresh adhesions, an enlarged and swollen

appendix was seen, passing downwards over the right brim of the pelvis. It was not firmly bound down, and upon lifting it up a perforation was found almost at its extremity. There was no attempt at localization of an abscess.

Intestines; solitary glands and Peyer's patches in the upper ileum and lower jejunum were uniformly enlarged; towards the valve the patches were swollen and stood out from the mucosa for as much as 5 mm. Many were capped with yellow sloughs. The terminal foot of the ileum presented a series of prominent glands in process of sloughing.

CASE XXXI.—High fever; profuse hæmorrhage on the twelfth day after admission; diarrhoea; delirium; sudden abdominal pain; signs of perforation; death on the fifteenth day after admission; autopsy.

Charles K., aged 26 (Hos. No. 10827), admitted September 9th, 1894, complaining of headache.

He has never been ill until the present attack, which has lasted for five weeks. The illness began with pain in the back, headache and dizziness. He has kept about, and only gave up work six days ago. He has not had any bleeding at the nose. He has had diarrhoea, and the appetite has been poor. The blood examination on admission was negative.

The patient was a well-formed, sparsely-nourished man; face a little emaciated; tongue dry and glazed; pulse full, soft and dicrotic. There were a few fine crackling râles at the bases. The heart sounds were clear. The abdomen was natural, symmetrical, soft, tympanitic, nowhere tender. There were several rose-spots. The splenic border could not be felt. The temperature on admission was 101°, and rose at 8 p. m. to 104.5°. The urine contained a few hyaline casts; the diazo-reaction was marked.

During the first week in Hospital the temperature ranged constantly between 103° and 104°, but the baths acted promptly. The spleen was readily palpable; the tongue was dry and brown; there was no diarrhoea. The patient did very well until the 21st, when at 1.35 a. m. he had a profuse hæmorrhage. The blood was bright red and clotted. The hæmorrhage did not influence the temperature. He

was ordered the lead and opium pill, and on the 22nd he had three involuntary movements, none of which contained blood.

On the 22nd and 23rd he seemed better; the temperature was not so high, but he still had slight diarrhoea.

On the evening of the 24th the patient complained of severe abdominal pain; he became much excited, attempted to get out of bed, and refused to allow the nurse to sponge him.

On the morning of the 25th the abdomen was not distended, was symmetrical; there was marked general tenseness of the muscles and tenderness, most severe in the hypogastric region and to the right. On percussion it was tympanitic; the tympany extended as high as the lower border of the sixth rib in the mammillary line. The hepatic flatness was obtained on the sixth rib. In the mid-axillary line the tympany extended as high as the seventh rib. On auscultatory percussion the note was everywhere carried distinctly to the ear.

The patient was very much excited throughout the day, and talked irrationally. In the evening the temperature was 104.3° , and he became quieter. He was sweating profusely, and the extremities were cold. He sank and died early on the morning of the 26th.

ANATOMICAL DIAGNOSIS.—*Typhoid ulceration in ileum; perforation; general peritonitis; parenchymatous degeneration of liver and kidneys.*

Gas escaped on opening the peritoneal cavity. About 1,000 cc. of turbid fluid mixed with feces were in the pelvis. In a loop of the small intestine which lies deep in the pelvis there were two perforations within 2 cm. of each other. The Peyer's patches in the upper part of the bowel were only slightly swollen. Beginning about a metre above the valve the patches showed areas of superficial necrosis, and lower down there were shallow ulcers. About 50 cm. above the valve there was extensive ulceration. One ulcer, measuring 3 by 1.5 cm., with a base to which the sloughs were still adherent, showed a perforation the size of a pin's head; 2 cm. below this was another ulcer with a larger perforation. The mucous membrane just about the valve was irregularly ulcerated. The vermiform appendix was not ulcerated. There were only two shallow ulcers in the caecum.

The spleen weighed 470 grammes. The liver showed numerous yellowish-white opaque areas, varying in size from mere specks to a pin's head. There were no special changes in the heart or lungs.

CASE XXX.—*History of an illness of three or four weeks duration before admission; high fever; delirium; hemorrhage on the fifth day after admission; on the seventh and eighth signs of perforation; collapse; death; autopsy.*

August S., aged 44, (Hos. No. 10,515), admitted July 30th, 1894, complaining of headache and weakness.

He has always been a healthy man. He has been ill for eleven days; there have been headache and deafness from the beginning of the illness. His wife reports that he was in bed for two weeks, and then got up and worked for a week, and was then in bed for four days before coming into hospital. He said also that he had only been deaf for four days before coming into hospital, and that he had vomited frequently.

On admission the temperature was 104°, and rose at 6 p. m. nearly to 105°. The blood examination was negative.

He was a well-formed, well-nourished man; the face was flushed; the tongue was coated in the centre. The pulse was soft and regular, dirotic. There were no rose-spots; the abdomen looked natural; edge of the spleen was not palpable. The urine was voided involuntarily, and he had a little wandering delirium.

For the first week the temperature ranged between 103° and 104°. He took the baths well, and though at times restless and delirious, he seemed doing nicely.

On August 3rd he passed nearly a pint of clotted blood *per rectum*; he had had no diarrhoea. The abdomen was distended and tense. The hemorrhage did not reduce the fever. On the 3rd it was constantly about 104°. There was no diarrhoea.

On the 4th the fever kept up. He was quieter, but very weak. The pulse was 112, irregular and intermittent. He was tremulous and very dull mentally. The abdomen was full and held very tense, and the patient winced a little on pressure. He had no diarrhoea.

On the 5th the temperature was in the neighborhood of 104°. The patient seemed much worse. The abdomen was distended and hard; the tenderness most marked on the right side. The face was pinched

and he looked collapsed; the pulse was rapid and feeble. He had two loose movements in the day. He sank and died at 4.30 p. m.

ANATOMICAL DIAGNOSIS.—*Perforation of typhoid ulcer of ileum; general fibrino-purulent peritonitis; acute nephritis; chronic tuberculosis of lungs; lymphomata in the liver.*

The abdomen was distended; the peritoneal cavity contained gas. The general surface of peritoneum was covered with a fibrinous exudate. Between the coils of intestines a small amount of fluid welled up. The loops of the ileum, occupying the iliac fossa, were glued together and the layer of fibrin between them was much thicker than in other places. There were about 30 cc. of tolerably thick pus between the loops of the ileum, and there were collections of turbid pus near the flexures of the colon on both sides. Thirty-nine centimetres above the valve was a circular perforation, 3 mm. in diameter, from which faecal matter escaped.

The first ulcer was 100 cm. above the valve. From this point there were numerous ulcers with clear centres and undermined edges. In many of them the muscular tissue was exposed. The ulcer which had perforated resembled the others in all respects, and was clean-cut, with undermined edges. In the caecum the ulcers were larger in superficial area. The appendix was free from ulceration. The mesenteric glands were swollen and soft. The spleen weighed 270 grammes.

There were old tuberculous lesions in both lungs. In the left a focus the size of a walnut, indurated and surrounded with gray miliary tubercles. A smaller, retracted, pigmented area existed in the right lung. The kidneys were swollen and cloudy and presented punctuate extravasations of blood.

CASE XXIX.—*Mild fever for the first ten days, then persistent high temperature for nine days; diarrhoea; probably perforation; death; no autopsy.*

Mrs. N., aged 28 (Nos. No. 10307), admitted July 6th, 1894, complaining of headache and general weakness. She has been a very healthy woman, and has had no serious illness since an attack of diphtheria at fourteen. She has had two children; no miscarriages. She has been nursing her husband, who has had a serious attack of

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gall-stones, and is in the Hospital now for treatment. She brought him here from Tennessee five days ago.

The present illness began three days ago with two or three slight chills, followed by sweating. She had then headache and pains in the chest and back ; no cough, no nose bleeding. The bowels have been costive. To-day, the 6th, at one o'clock she had a chill, followed by sweating. She has not been in a malarious region, and she does not know of any cases of fever in the place where she has been stay-
ing in Tennessee.

The blood examination was negative. The temperature on admis-
sion was 103°. She looked healthy and well. The spleen was not palpable, and there were no rose-spots.

During the first ten days in Hospital we were in doubt whether or not she had typhoid fever. The temperature on the 8th, 9th and 10th was 99° in the morning and only between 100° and 101° in the evening.

From the 11th to the 15th it touched normal every day, and on the 16th and 17th it was between 99° and 100°, rising on the evening of the 17th to 101.5°. The blood was examined repeatedly ; there were no malarial organisms. There was no eruption on the abdomen, but there were one or two suspicious spots on the back. The diazo-reaction, which was present on the ninth day, disappeared. She had no baths ; her tongue was clean ; there was no diarrhoea, and, as I mentioned, Dr. Thayer, under whose care she came after July 11th, was in doubt as to the existence of typhoid fever.

On the 18th the temperature rose to 103°, and on the 19th and 20th continued to rise, reaching 105°. On the 21st there was a marked diazo-reaction, and an increase in the splenic dulness.

On the morning of the 21st the abdomen was distended, and she began to have diarrhoea. From 6 p. m. on the 20th to 8 p. m. on the 28th this patient's temperature remained constant, varying one degree only in the twenty-four hours, between either 104° and 105°, or 104.5° and 105.5°. I do not ever remember to have seen a temper-
ature chart in a case of typhoid fever in the fourth week, showing a fever of such extraordinary persistency. She had ice sponges every third hour, but they had no influence whatever on the fever. The pulse was rapid, between 130 and 140. She had from three to six

stools in the twenty-four hours. A characteristic rose rash developed; the tongue became dry and brown, and there was slight delirium.

On the 25th the abdomen became slightly distended.

On the 29th Dr. Thayer's note reads as follows: "The patient has been extremely weak for the past two days. The pulse has been rapid and feeble, the abdomen much distended and hard. There has been constant diarrhœa. She lies with her eyes half closed and mutters at times to herself. There is subsultus; also tremor of the tongue. To-day the patient seems better; the pulse is slower; the temperature, which has been persistently high, is falling, and at noon was 100°. The abdomen is, however, much distended."

On the 30th the patient looked extremely pinched; the pulse was feeble; the abdomen greatly distended. At 2 p. m. the patient suddenly collapsed; the face was pinched and the eyes sunken; she sweated profusely; the hands and feet were cold and blue; the pulse was extremely feeble and rapid. She could not be roused; the abdomen was distended and tense, and the liver dulness was almost obliterated. She sank and died at 7 p. m.

CASE XXV.—*Protracted high fever; onset of diarrhœa at the end of the fifth week; symptoms of perforation; no autopsy.*

George H. W., aged 27 (Hos. No. 8295), admitted October 1st, 1893, complaining of headache and chilly feelings.

Patient had been night orderly in Ward F for twenty-three days, and had charge of the bed-pans. He thinks that he has caught the disease in this way, as he confesses to have been very careless with the pans and frequently got his hands soiled. He had been ailing for about a week before he went to bed in the ward; had cough, headache and pain in the back. The bowels were constipated, and three days ago he took a dose of salts. Last evening he had a shivering chill. He was seen three days before admission and was then not thought to have much fever.

On admission the blood examination was negative. The temperature was 104°, and at midnight reached 105°. The tongue was red, glazed and dry; the pulse was 104, soft and dirotic; the edge of the spleen was just palpable, and there were a few rose-spots on the skin of the abdomen.

For the first week the patient did very well; the temperature was high— 104° , occasionally 105° —but the baths acted well; he had no diarrhoea; he had a profuse crop of rose-spots.

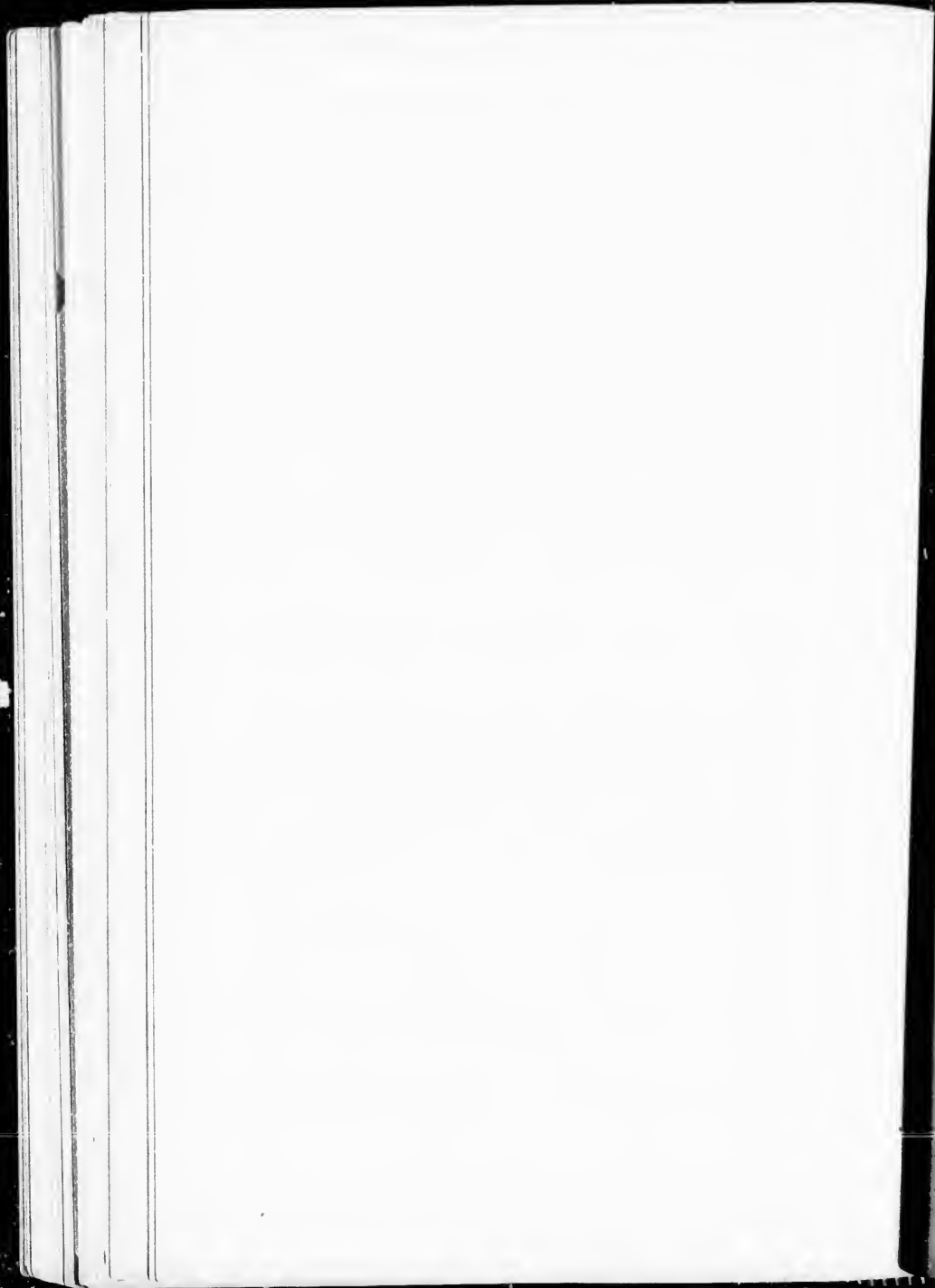
During the second week the temperature ranged from 103° to 104° , and he did very well. He had no diarrhoea.

In the third week the temperature was not so high, and from October 16th to the 21st he had only ten baths. The condition was very good, although the attack was prolonged.

On October 25th the patient had a formed stool, in which there was a little blood, and the baths were stopped and cold sponges substituted; but he complained so bitterly of the sponges that the baths were resumed.

On the 23rd he began to have diarrhoea, and was ordered the lead and opium pill. He had a bath at 10 a. m. on the 28th, when the temperature was 105° , and at 12 m. his temperature was normal. It rose again by 4 p. m. to 105° . The baths were stopped and starch and opium enemata ordered.

On the 29th the patient did not seem so well. He complained of pain in the abdomen, chiefly in the lower part on the left side. His appearance had altered a good deal in the past twenty-four hours. The pulse was between 150 and 160; the eyes were sunken, and he was sweating. The temperature at 8 a. m. was 102.5° . I saw him at 2 p. m. on the 28th, and his temperature was 104° . He was rational and complained of pain in the abdomen, low down in the left side, which had become worse through the night; the abdomen, however, was quite flat. On the morning of the 29th the abdomen was swollen. The following night he was not so well, though the temperature did not rise above 104° . The pulse had become very rapid and he was bathed in perspiration. When I saw him at 3 p. m. the face was pinched, the hands and feet cyanosed, pulse 160, very feeble; the liver dulness was completely obliterated. Salt solution was infused subcutaneously, which improved the heart's action very much. The question of laparotomy was discussed, but negatived. He died at 10 p. m. No autopsy.



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NEURITIS DURING AND AFTER TYPHOID FEVER.

BY

WILLIAM OSLER, M. D.

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VII.—NEURITIS DURING AND AFTER TYPHOID FEVER.*

By WILLIAM OSLER, M. D.

Any reference to the literature of paralysis in typhoid fever is superfluous since the appearance of the treatise by Ross and Bury on *Peripheral Neuritis* (London, 1893), in which the last named author has given a very full account of the subject, with a copious bibliography. He states, however, that "the conviction has indeed been forced upon our minds that the material for the induction of positive conclusions with regard to the relation between typhoid fever and the continued fevers generally and multiple neuritis does not at present exist, and that the doctrine can only be placed on a secure basis by new and carefully recorded observations."

I propose in this paper to give an account of the cases which have come under observation during the six years (to May 15th, 1895) in which the Johns Hopkins Hospital has been open.

They may be grouped into instances of local neuritis and of widespread, diffuse, multiple neuritis.

LOCAL NEURITIS.

Among 389 cases under treatment there have been four with well-defined symptoms of local neuritis, and there is a dispensary case which was not treated for the fever in the Hospital.

Before describing these, I would like to call attention to a very interesting and distressing affection which must also, I think, be classed as a neuritis—namely, the *tender toes* of typhoid fever.

When in the Report on Typhoid Fever, issued in 1894 (Vol. IV), I called attention to this symptom, I had not seen any mention of the subject in the literature; but in Ross and Bury's monograph there is a reference to a paper by Handford, which I had overlooked,

* Read before the Neurological Society of Philadelphia.

in which this feature is accurately described. His words are: "For some weeks past there has been tenderness of the toes of both feet, so that the toe-nails could not be cut on account of the pain it caused in the nail-bed and in the pulp at the end of the toes. In three other cases recently," he says, "I have met with this condition of pain in the toes, and in one of them in the arms also. In one instance the tenderness of the feet was so great that they had to be protected from the pressure of the bed-clothes by a cradle. But in none of them was it followed by muscular wasting or definite loss of sensation so far as I could detect."

Not having met with the condition before using the baths, I was inclined to regard it as an effect of the cold water; but in a personal communication from Dr. Handford I gather that his cases were not treated by the Brand method, so that it is evidently one of these coincidences which are so apt to be misleading in medicine. Before July, 1890, when the Brand method was introduced into my wards, I had never seen an instance. Since then we have had twenty or more cases, all of which have been bathed.

Though not serious, the condition is very distressing, and a cause of much suffering. It usually develops in the latter half of the disease; sometimes, indeed, after the temperature has reached normal; thus, in a patient at present in ward C, the tender toes were not noticed until early last week, the fourth of the fever, and when the temperature had already begun to fall. The patients usually complain first of the pressure of the bed-clothes, and as Dr. Handford mentions the sensitiveness is so great that the toes have to be protected by the use of a cradle. The area involved has been in all of my cases the toes, with occasionally the pad of the sole of the foot; never the dorsum, and rarely extending as far back as the heel. The tenderness has always seemed greatest at the tips and on the plantar surface of the toes. Even the slightest pressure on the nail causes pain. I have never seen any redness or swelling, though of course in the reaction following the cold baths it is not uncommon to see the feet extremely red. In a few instances there has been sweating confined to the feet and toes.

At first I thought that the pain might be caused by the pressure on the sensitive corium of dry and hard layers of the cuticle macerated by repeated immersions, but the skin has always looked natural,

and several of the worst cases have been those which have had only a few baths.

The pain persists for a variable period, from a few days to ten days. In no instance has there been any motor disturbance, and in no case has there appeared to be any loss of power in the muscles of the toes after convalescence was established. The cases have all recovered, and we have been led gradually to regard the condition as one of *aero-paresthesia* possibly due to neuritis.

The treatment is not very satisfactory. We have used all sorts of applications; the one which seems to give most relief is a hot cocaine solution on cotton wool.

Local neuritis in typhoid fever may occur either at the height of the disease or after convalescence has been established. It may prove serious and lead to great wasting of the muscles, or it may pass away rapidly after an acute attack.

The two following cases are the only ones I have met with in which the neuritis developed during the height of the fever:

CASE I.—In second week severe neuralgic pains in arms; great tenderness of the muscles; numbness of hands; no arthritis; no sensitiveness of nerve trunks. Recovery without wasting.

C. W., aged 25, admitted October 8, 1890. Patient had a moderately severe attack, and the temperature did not reach normal until the 27th day. On October 18th, that is on the 14th day of the fever and while the temperature ranged between 102° and 103°, she began to complain of pains in the arms. She had not had a cold bath since the tenth day, October 14th. The pains were neuralgic in character. On the 19th the note reads: "This morning pain is very much worse, she can scarcely lift the arms. There is no swelling of the joints or any tenderness about them on the firmest pressure. The soreness is particularly in the muscles. She winces at once when they are grasped. The biceps is particularly tender. There is no swelling of the ulnar nerves, no soreness in the brachial plexuses in the axilla or above the clavicles. The pain to-day is not shooting in character, but it extends down to the fingers. There is no numbness. The pain is so severe that the arms are kept on a pillow and she is quite unable to move them." On the 20th the note reads: "Soreness persists. Cannot lift the arms; fingers can

be moved. The pain is continuous. There is no disturbance of sensation, no pins and needles, no swelling of the joints; the legs are not painful." On the 22nd the note reads: "The hot applications have relieved the pain somewhat. Yesterday the hands were quite numb. She says the hands ache like toothache. Joints not swollen; arms and forearms still very sore to touch." From the 18th to the 30th this condition persisted with very little change. She had lead and opium applications and antipyrin internally. The temperature meanwhile gradually fell and her general condition improved. On November 2nd the note is: "Arms very much better; pains still in the left arm and she can move the arms well; no wasting of the muscles." Within the next two weeks she improved very rapidly; the pains in the arms gradually disappeared, and she recovered completely without any wasting of the muscles. The pain in this case was of a most aggravated character, sometimes causing the patient to cry out.

CASE II.—*In third week onset of severe pains in right arm and leg; rapid improvement in arm; agonizing pain in leg; great sensitiveness of muscles; erythema nodosum; recovery after ten days.*

Mary McG., aged 13 (Hos. No. 6405), admitted December 4, 1892, about the end of the second week of what proved to be a very severe attack of typhoid fever. The temperature kept up for an unusually long time, and she became so feeble that after the 44th bath they were discontinued. It was not until the end of the 5th and throughout the 6th week that the temperature fell to normal. On December 14th, while the temperature was still high, having been constantly for several days in the vicinity of 105° , and after she had been sponged with ice-water for two days, she began to complain of very great pain in the right arm and in the right leg, of such severity that she cried out constantly and she had to have morphia. These attacks continued between the 14th and the 20th with great severity. In the right arm the pain soon subsided; there was no involvement of the joints; no pain along the nerve trunks. She screamed out if any attempt was made to move the right leg. There was no tenderness about the hip, no swelling of the knees, and repeated examinations seemed definitely to exclude any articular trouble. Grasping the leg at any place seemed to cause extreme pain. The leg was not swollen.

On the 18th three patches, like erythema nodosum, appeared on the right foot, one at the metatarsal joint of the small toe, one midway between the heel and toes, and one on the outer and back part of the heel. They looked like large chilblains, and around one there was a distinct bluish discoloration. The two smaller ones disappeared within a day or two. The larger one on the heel remained red for some days. There was no superficial necrosis. She never seemed able to localize the pain accurately. It was never definitely in the situation of the sciatic nerve. It was quite uncontrolable by anything but morphia. After causing great anxiety to us, and distress to the patient, for nearly ten days, the pain subsided and had disappeared by the 25th or 26th, two weeks at least before the temperature became normal.

In these cases pain was the dominant symptom, and there was extreme sensitiveness on pressure, particularly over the muscles. There was neither arthritis nor thrombosis, and in *Case I*, as there was numbness and tingling in the fingers and hands, it seems more reasonable to refer the condition to a neuritis than to myositis. The second case presented the peculiar lesion of an erythema nodosum, which I have seen also in a case of alcoholic neuritis.

There are cases in which the patient, when convalescent, complains of soreness of the muscles and of exquisite tenderness when they are touched. So far as this latter feature is concerned, it is, of course, very common in peripheral neuritis, particularly in the alcoholic form; but the muscle soreness may be present without any trace of involvement of the nerves. (See note on *tender legs* at page 316.)

CASE III.—*Pain in left leg; sensitiveness in nerve trunks; soreness in tibialis anticus; rapid recovery.*

John M., aged 27 (Hos. No. 4171), admitted November 4th, 1891, on the 10th day of a mild attack. On the 25th of November, when he had been already convalescent more than 10 days, he complained of very severe pain in the front and back of the left leg, which came on suddenly. There was distinct sensitiveness over the nerve trunks, the posterior tibial, and the peroneal, and also along the tibialis anticus muscle. The toes were also sensitive and there was a dulling of sensation in them. Throughout the 26th this condition persisted and it seemed probable the patient was going to have a severe post-typhoid neuritis, but on the 27th he was very much better. There was no

tenderness, and the sensitiveness in the anterior tibial muscles had disappeared.

CASE IV.—With onset of convalescence soreness and pains in limbs, particularly the arms; 'pins and needles' in left foot; swelling and tenderness of left arm; gradual improvement and recovery without atrophy.

Wm. McM., aged 32 (Hos. No. 6329), admitted November 19th, 1892, at about the second week. The attack was of moderate severity, the temperature ranging between 103° and 104.5° , and not falling to normal until the fifth week. Just about the time the temperature became normal, that is on the 12th of December, the patient complained of general soreness and pains in the limbs, particularly in the arms, and he winced on pressure upon the forearms and arms. He had been in very good condition and convalescence seemed well established. The grasp of both hands seemed weak, but particularly the left, and he complained of a sensation of pins and needles in the left foot. There was no tenderness along the nerve trunks; no pain on pressure on the muscles of the calves; he winced a little when the muscles on the right thigh were pressed. On the 17th of December the note reads: "Left arm looks somewhat swollen and feels tense. It is not red; the temperature is not elevated. He moves the muscles with difficulty and says the arm is very sore. On the inner part of the upper arm there is very great tenderness along the course of the brachial artery and of the nerve trunks. The ulnar nerve is also somewhat tender at the elbow. There is tenderness of the muscles, particularly of the biceps and of the extensors of the upper arm. There is no anaesthesia; no sensation of pins and needles. All movements in the limb cause him pain. There are flying pains in the legs, but no swelling; no tenderness; knee jerks were increased; no ankle clonus." The swelling and tenderness in the left arm gradually disappeared within ten days and there was no wasting of the muscles.

In both of these cases there was great sensitiveness of the nerve trunks, and in Case IV it seemed for a time as though the patient were about to have an attack of multiple neuritis, but the symptoms became localized in the left arm, which became swollen and exquisitely tender.

CASE V.—*Severe fever five months ago; pain in the right foot during convalescence; gradual atrophy of the leg muscles; foot-drop; gradual recovery.*

Michael E., aged six years, applied at the Neurological Department of the Dispensary on January 19th, 1895, complaining of difficulty in walking and pain in the right leg. He is the sixth of six children. The family history is good.

He has always been a very active and strong child. He has had measles and mumps.

Five months ago the patient was taken ill with fever, and evidently had a very severe attack, as the father said, "he was expected to die every day." He was delirious, but had no diarrhoea. An elder brother had the disease about the same time, said to be typhoid, and died.

After persisting for about six weeks the fever left and he began to improve. He had some difficulty in speaking during convalescence. Nothing further was noticed until he got well enough to sit up, when he complained very much of the right foot, saying that it was painful, and he could not put on his shoes. The foot felt cold and was evidently very sensitive. He would not let anybody touch it, and he could not walk upon it. This gradually improved, and has been able to get about on it with a limp.

Present Condition.—The child is pale, but fairly well-nourished. The intelligence is good. The muscles of face, arms, and of the body seem perfectly normal. In walking the right leg is flexed at the knee. The foot is held limp, the toes bending down, and the foot is slapped on the floor. The act of walking does not seem to give any pain. On examination the right leg below the knee is decidedly smaller than the left. He has foot-drop and no voluntary power in any of the muscles below the knee. It is difficult to make a proper examination, as he cried out, and scarcely will allow the leg to be touched, but this is apparently more due to nervousness than to actual pain. There is well-marked reaction of degeneration in the muscles of the lower leg.

Instances of local paralysis of this kind following typhoid fever are not very uncommon, and a number of references are to be seen in Bury's article.

This localized atrophic paralysis after typhoid may be due to poliomyelitis, and the distinction between the central and peripheral nature of some of the cases is often very obscure. Sudden onset, sensory disturbance, and permanent disability in certain of the muscles of the affected limb, speak for a central lesion. The case reported by Shore (St. Bartholomew's Hospital Reports, Vol. XXIII), is perhaps the most satisfactory on record, as showing conclusively the existence of acute poliomyelitis in connection with the atrophic paralysis following typhoid fever. In Case V, while the general appearance of the limb, as the boy stands, is highly suggestive of spinal paralysis, yet the gradual onset and the extreme sensitiveness are in favor of neuritis. The reaction of degeneration and the absence of the reflexes are symptoms common to both central and peripheral lesions. For the third and most important diagnostic criterion; viz.: the complete recovery or permanent disability in certain muscles, the time which has elapsed has not been sufficient.

MULTIPLE NEURITIS.

The most serious forms of paralysis following typhoid fever are those in which there is a rapid or gradual development of paralysis of the legs or of both arms and legs. Cases of the paraplegic type are not infrequent in the literature. In my own practice I have, however, never met with an instance. Widespread loss of power in all four extremities is, if one may judge from the recorded cases, very much less common; but within the past two years the following cases have been under my observation.

CASE VI.—*Severe fever of three weeks' duration; during convalescence weakness of arms and legs, with finally complete paralysis; foot-drop and wrist-drop; great soreness of the muscles; progressive improvement; complete recovery, after persisting for more than a year.*

D. S., male, aged 9, applied at the Neurological Department of the Dispensary November 1st, 1893, with paralysis of arms and legs.

There is nothing of any moment in his family history.

He was always healthy as a child. He went to school last winter and developed well in every way. Last July he was in bed three

weeks with a fever, said to be malaria, but from the mother's description and from the length of time he was in bed there can be but little question that it was typhoid fever. During convalescence from the illness it was noticed that he did not use his arms and legs freely. The mother thinks that this came on gradually, and she thought at first that it was due entirely to weakness from the prolonged illness. He has not walked since he was put to bed with the fever. The arms have been gradually growing weaker, and two weeks ago he lost power in them altogether. He has never complained of any pain. The speech has not been affected. From the statements of the mother there was evidently a progressive loss of power in both arms and legs. The notes which Dr. H. M. Thomas took at his first visit are briefly as follows:—

The boy is bright and intelligent-looking. The eyes are steady, freely movable, react to light and on accommodation. The muscles of the face and tongue act normally. The muscles moving the head act well. The shoulder-girdle muscles act voluntarily with a fair amount of strength. The deltoids act well. Flexion and extension at elbow-joint are somewhat weak on both sides. The supinator longus does not act on either side. Below the elbows there is scarcely any power. The hands are in typical wrist-drop position and cannot be extended in the least. He is just able to flex the two middle fingers on the right side and the fore and middle fingers on the left. There are no movements of the smaller muscles of the hands. The whole arm and fore-arm are very thin. The sensation is quite normal. The skin over the last phalanges is a little smooth. When sitting on the edge of the table the back is bowed and he cannot sit straight. When on the back the patient can flex both legs on the body to an angle of about 45°; the left slightly stronger than the right. He has some power in extensors and abductors. He can rotate the legs in and out. The extensor muscles of the knee are weak on both sides; the flexors are the weaker. Below the knees there is almost complete paralysis. He can slightly flex the toes. Both legs are markedly atrophied. In grasping the calf muscles the patient shows signs of pain, also winces on pressure over the sciatic. The muscles of the forearm also are slightly painful on pressure. The knee jerks cannot be obtained. The muscles do not react to faradism, and react very slightly to the galvanic current. The patient was ordered the

syrup of the iodide of iron, m. xv three times a day, and massage with electricity.

On January 12th, 1894, the note reads: "He has been given electricity three times a week, and has improved. He can now walk a little alone. He has a very typical 'steppage' gait. There is still complete foot-drop. The muscle groups are still sensitive on firm pressure. There is still the reaction of degeneration in the muscles below the knees. The muscular strength in the arms has improved very much. He can flex the wrists with a fair amount of power."

Throughout the early part of the year the boy did very well, and there was a progressive improvement.

He came to the Dispensary on the 24th of August, when it was noted that, though he still drags the toes somewhat, the gait has lost its typical character. He can move all the muscles of both arms and legs, and has considerable power. All the muscles respond quickly to the electrical tests.

On December 1st Dr. Thomas made the following note: "Legs are well-nourished, and he moves them in every direction; he can flex the legs and thighs flat to the body, and resist extension very well. The flexors of the knee are strong, but not so strong as the extensors. When the foot is extended it cannot be dorsally flexed; when raised, however, it can be easily extended. In the arms all the muscles act normally, but the flexors are stronger than the extensors. This is especially true of the wrist. The muscles of the legs respond to the faradic current; the flexors respond to a third higher current than the extensors. They also respond to the galvanic. The extensor and flexor muscles of the arm respond promptly. Sitting the boy still has a tendency to bowing of the back and to toe-drop."

I showed this boy at one of my clinics in January, 1895, when he seemed well in every respect, and the only abnormality to be detected was an inability to raise himself readily on his heel and his toes.

CASE VII.—Severe attack of typhoid fever; during convalescence progressive loss of power in arms and legs; recovery in arms; atrophy of leg muscles with foot-drop; great improvement.

Wm. E. K., aged 24, admitted October 16th, 1893, complaining of inability to walk.

The family history is good. The father and mother, and one brother and three sisters are living and well.

He has had the usual diseases of childhood; he has not used alcohol to excess; and has never had venereal disease. In August, 1892, he had a very severe attack of typhoid fever of eight weeks' duration, with much delirium, and with a pulmonary complication; and I am indebted to Dr. A. O. Scott, of Fairfield, Pa., for a description of the original disease. During convalescence it was noticed that the limbs became gradually weak and there was a progressive loss of power in the hands and in the legs. The double wrist-drop persisted for some months, and gradually disappeared. He was for a long time bed-ridden, and it was not until May of this year (1893) that he was able to get up, and begin to use crutches. He did not remember that he had had much pain with the attack, but there was some swelling of the feet. During the present year the power has been improving slowly in the legs, but it has been interrupted by the development of severe paronychia in both big toes. The hands and arms recovered power completely.

Condition on admission.—The patient is a healthy looking man; walks with crutches. He has no fever. The mental condition is good and he gives a very clear account of the history of his case. He looks a little pale; the pupils are equal and react to light and on accommodation.

The examination of the abdominal and thoracic organs is entirely negative. A point of interest, however, is the fact that his peripheral arteries are readily palpable.

The muscles of the face acted normally; there was slight wasting in the arms, but all the movements were readily made. The deltoids appeared to be weaker than the other muscles, and the extensors in the arms were weaker than the flexors. The extensors of the left hand were not quite as strong as those of the right. There was marked wasting in the muscles of the lower extremities, with bilateral foot-drop. Corresponding to this there is general loss of muscular power. The legs could be flexed and extended upon the thighs, and the thighs flexed upon the abdomen quite readily, and this even when the patient was trying to resist. The greatest atrophy and the most marked loss of power is in the extensors of the feet. He cannot flex the foot at the ankle at all, nor are the movements of inversion and eversion possible. Sensation does not appear to be impaired in any way. He distinguishes readily everywhere the head from the

point of the pin, with the exception, perhaps, in the left leg, where there seems to be a little dulness; he distinguishes heat from cold. The knee jerks could not be obtained; ankle clonus was not present. The reflexes in the arms are present, and are active. There was no reaction of degeneration in the atrophied muscles. There is no involvement of the bladder or of the rectum. The patient was given persistent massage and a strychnia tonic. The big toes were first operated upon for the condition of paronychia, and they healed readily. The patient remained under observation nearly six months and improved in every way. By the middle of December the power seemed fully restored in the arms and hands. The deep reflexes were still a little increased. The patellar reflexes had not returned. The extensor muscles of the feet had not yet regained their full power, but both feet could be flexed somewhat. The patient had a typical steppage gait of foot-drop. Throughout the early part of the year he did remarkably well, gained in strength and could get about readily without crutches. He left the hospital May 9th very greatly improved in every way. I heard of the patient through Dr. Scott, on January 16th, 1895, who said that the progress continued satisfactorily.

CASE VIII.—Fever of four weeks' duration; numbness in legs; sudden onset of paralysis in arms and legs; gradual improvement in arms; slight in legs, in which the paralysis recurred; marked improvement under treatment.

Stephen T. McK., aged 25, admitted November 4th, 1894, complaining of loss of power in both legs, weakness in the hands, and pain in the lower part of the back.

His parents are dead; the father of bilious colic; the mother of pneumonia. He has two brothers and one sister living and well; there have been no nervous troubles in his family.

The patient had measles and whooping cough as a child, and pneumonia when thirteen. In June, 1892, he had typhoid fever, and was confined to the house for seven weeks. He had gonorrhœa three years ago.

Present illness.—In February, 1894, the patient had a protracted fever, which lasted four weeks. He had vomiting; no diarrhœa; no convulsions. He had some sweating; no chills. He had pain

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in the back and legs. It was thought by his physicians to be typhoid fever or typho-malarial fever.

Early in the disease he had numb feelings in his legs, but the trouble from which he is now suffering did not begin until convalescence. He had been up and about, and sitting in a chair for a while each day when he suddenly lost power in the upper and lower extremities, below the elbows and knees. He had a sensation of pins and needles. There was no paralysis of the tongue, or of the facial muscles, and no trouble with the sphincters. He is quite positive that the feeling of numbness preceded the loss of power which he insists came on in the course of a day.

After the onset of the paralysis the patient continued to sit up in a chair each day, and he noticed that his feet would swell after they had been hanging down for any length of time. There was also, he says, loss of sensation.

In May he began to notice some improvement in the condition of the arms. The sensation gradually returned and then the muscular power. About the latter part of May he was able to feed himself.

The sensation in the feet recovered first, and then gradually the muscular power. Through the months of June and July he was under treatment in Washington, and was able to get about with the use of the stick. He went home, and about four weeks later lost again the power of using the legs, but had no disturbance of sensation. Since then he has begun to recover; he can move the feet slightly, but is still unable to walk.

Present condition.—The patient is a poorly nourished man; looks a little pale; the tongue is clean. The intelligence is good; he talks clearly and well. There is no involvement of the facial muscles; the pupils are equal and the iris reflexes are present.

The examination of the abdominal and thoracic organs is negative. There is no enlargement of the spleen. The trunk muscles look well-nourished; the spine is straight, and there is no tenderness. The hands look thin, but there is no special wasting of interossei or thumb muscles. All the movements are perfect, and the power in the fingers and the grasp of the hands are good. These muscles seem to have recovered completely, though he says he is not nearly so strong as he was.

The legs are very thin, particularly below the knees. All of the muscles are here very much wasted. The legs can be moved freely at the hips and at the knees. There is complete foot-drop. The patient can neither move the feet nor the toes. The knee jerks are absent; there is no ankle clonus; no œdema; the feet feel cold. There are no fibrillary twitchings. The sensation is everywhere perfect to heat and cold. The electrical tests show the reaction of degeneration in the peroneal nerves; the extensors cannot be made to act at all. The gastrocnemius and soleus show marked reaction of degeneration. The arm muscles react well to weak currents.

Patient was ordered strychnia and massage to the legs twice daily.

Throughout November and December the patient improved rapidly. He was soon able to walk with a stick. The feet have perspired a great deal, and they get very red after he has walked about on them. The gait had the typical steppage character of extensor paralysis.

By the first of January he could walk without a cane. On November 18th he weighed 102 pounds; he gained rapidly, and on December 10th he weighed 118 pounds, and on his discharge, January 28th, 135 pounds. His improvement was satisfactory and progressive.

On December 4th the electrical reactions were as follows: (Dr. Oppenheimer.)

Arms.—All muscles and nerves react well to moderate currents.

Legs.—The peroneal nerve of right leg reacts well to moderately high faradic current; contraction slow, but does not give the typical reaction of degeneration which it did on previous occasions. Muscles of the right leg do not react. In the left leg the contraction of the peroneal is slower and lazier than that of the right. The muscles do not react.

To the galvanic current the peroneal nerve and the muscles react, and there is a sharp contraction, not particularly slow.

At the time of discharge he had gained 33 pounds; he still had the characteristic gait of extensor paralysis. He had not regained much power over the muscles of the toes. He could flex and extend the great toe of the right foot only. On the left side he could move the toes a little better. He could flex and extend both feet, and abduct and adduct, but not to the full extent. The legs at the middle of the calf had gained greatly in circumference.

CASE IX.—*Severe attack of typhoid fever; in third week soreness in legs; gradual paralysis of arms and legs; on admission feebleness of arm muscles; foot-drop; wasting of muscles of legs; great muscular soreness; improvement.*

George R., aged 10, admitted November 19th, 1894, complaining of weakness in the arms and legs, and tingling sensations in the fingers.

Family history.—Father and mother, and one sister living, and healthy.

The patient had measles when he was five years old; since then he has been very healthy up to the onset of the present illness.

On September 26th he was attacked with typhoid fever; and was in bed for seven weeks. It was evidently, from his father's statement, a very severe attack, as he was delirious and had high fever. About the end of the third week of his illness he began to complain of stiffness and soreness in the thighs and calves, which was noticed by his father in moving him about in bed. The feet felt cold, but there was no complaint of numbness, or of feelings of pins and needles. A week after the beginning of these symptoms the patient was unable to support himself, and on attempting to walk would throw the foot forward and bring it down heavily on the floor. At this time he could not move the feet or toes.

Two weeks after the legs were affected, the arms and hands became weak. It was at first noticed that he could not feed himself properly. He had sensations of pins and needles in the hands and fingers. At no time had he typical wrist-drop. He had no severe pains which caused him to cry out, but he was very tender and would wince when moved. The sphincters were never involved. The condition gradually grew worse until the time of his admission to the hospital.

In the Dispensary, November 13th, the electrical examination showed no reaction of degeneration in the arm muscles, but a well-marked reaction of degeneration in the leg muscles.

Present condition.—On admission the patient is a fairly well-grown lad, but poorly nourished; the lips and mucous membranes are of good color; the pupils are of medium size, equal; the reflexes are normal; the movements of the facial muscles are well performed.

The examination of the abdominal and thoracic organs is negative. The spleen is not enlarged. Both arms and legs look atrophied.

There is no wrist-drop. All movements of the fingers, hands and arms are perfect. The grasp, however, is extremely feeble. There is no sensitiveness along the course of the nerve trunks, but the muscles themselves are very tender. He cries out if the arm is grasped above the wrist. The muscles of the legs look wasted. There is complete foot-drop. He cannot move the toes or the feet. He can flex and extend the legs; he can get out of bed, but stands with a little difficulty, and walks with the aid of a cane, drags the toes, and has a typical steppage gait. The sensation seems perfect, and he no longer complains of pins and needles; there is no tenderness along the course of the sciatic; the sensitiveness of the muscles is very marked. He winces if the thighs or calf muscles are pressed. There has been no trouble with the sphincter muscles.

The patient was under observation until February 4th, 1895; the general condition improved rapidly. On admission he weighed 56 pounds, and at the time of his discharge weighed 65. He recovered power in the hands completely, so that the grasp was quite good. The foot-drop persisted, and he still could not move the toes. There was no power whatever to flex or extend the foot, or to abduct or adduct. The tenderness on pressure had almost completely disappeared. The electrical condition remained about the same; no reaction to the faradic current in the muscles or nerves of the legs.

With the galvanic current there is a typical slow, lazy contraction of the tibialis anticus of both legs.

DIAGNOSIS.—These cases of multiple neuritis were not under observation during the primary illness, and the diagnosis of typhoid fever rests upon the statement either of the physician or of the relatives. The only doubt really is *Case VIII*, as this patient is stated to have had typhoid fever in June of 1892. I have not been able to get any information from the physician who attended him, but his illness was evidently very severe, as he had fever of four weeks' duration, without diarrhoea and without chills, and the paralysis did not come on until convalescence was established. In *Case IX*, in the third week of the illness the father noticed the soreness in the legs.

The mode of the onset is of some importance in the diagnosis, since there are cases of multiple neuritis which set in with fever and in

which the symptoms develop with great rapidity, as in *Case VIII*. In illustration, and for the purpose of comparison, I may mention the following instance of multiple neuritis following exposure to cold: A. B., *ret.* 10, one day about the middle of September, 1894, was exposed to wet and cold, and on the following morning, soon after breakfast, he complained of weakness in the arms and hands. Towards the afternoon his legs became weak, and by night he could not walk. He was put to bed, and had a prolonged illness of a month's duration, with fever and delirium. He became perfectly helpless, but there were never at any time symptoms of typhoid fever. The sphincters were not involved. There was rapid wasting of the extremities. Throughout November and December he improved, and was gradually able to get about.

When admitted on January 2nd, 1895, the condition was as follows: He is a pale, delicate-looking lad; walks with a very distinct steppage gait, flopping the feet down. The muscles of the eyes and of the face act normally. There is no involvement of the pharyngeal muscles. The muscles of the head and neck act well. The shoulders are easily shrugged and resist forcible depression. The depressors of the shoulders also act well. Of the arms the pectoral muscles are strong on both sides. Flexion and extension at the elbows are good on both sides. The muscles of the upper arm and shoulder girdle are feebly developed. In the hands dorsal flexion at the wrist is weak; palmar flexion is also weak, but better than the dorsal flexion. He is entirely unable to extend the fingers at the metacarpo-phalangeal joints. If these joints be passively extended, the patient can slightly extend the terminal phalanges. The grasp of the hand when the wrist is held and flexed dorsally, is poor; better on the right side. The small muscles of both hands are very weak. The patient is not able to oppose the thumb and little finger. The hands are moist and clammy, but there are trophic changes. The legs are thin, particularly below the knees. He can flex and extend the thighs on the abdomen, and the legs on the thighs. There is typical foot-drop. He cannot flex or extend the feet at the ankles, and abduction and adduction of the feet are impossible. There is no power to move the toes. The knee jerks are absent. There is no special sensitiveness anywhere of the nerve trunks, or of the muscles when grasped. There is no reaction of degeneration in the muscles of the shoulder

girdle or of the upper arm, or in the supinator in the muscles of the palmar side of the forearm. On the dorsal surface the muscles do not react even with the high faradic current; there is a slow, lazy contraction with the galvanic. The reaction of degeneration is present in the tibialis anticus and the peroneal group of muscles in the legs.

The boy remained under treatment for two months, and improved very much in walking and in the muscular power of the hands, but he still has foot and wrist-drop.

The differential diagnosis is between peripheral neuritis and anterior polio-myelitis, but, as Gowers says, the distinction of a central from a peripheral lesion is often very difficult. The points of importance are as follows:

First. The mode of onset, which in myelitis is very much more rapid. It will be noted that only in Case VIII was the onset stated to be sudden, yet in this very case the complete recovery of the hands, the very striking improvement in the condition of the legs, and particularly the fact of a well-marked relapse leave very little question as to the peripheral nature of the disease.

An additional difficulty in the matter of onset is the fact that there are cases of polio-myelitis anterior which set in sub-acutely, and on the other hand cases of polyneuritis which have really an abrupt onset.

Second. In polio-myelitis the sensory symptoms are quite subsidiary, whereas in polyneuritis there is more or less pain, or sensations of numbness and tingling. It will have been noticed in the report that the muscles themselves were in several cases extremely sensitive to pressure, a point to which Wilks and others have called attention as specially characteristic of neuritis.

Third. The atrophy is certainly more rapid in the central lesion, but it may reach quite as high a grade in neuritis. In *Case VIII* the wasting of the leg muscles when he first came under observation was very pronounced.

Fourth. According to most authors the electrical tests afford very little assistance in the diagnosis, since the reaction of degeneration is present in both, but there is this important difference; a muscle which has lost its faradic contractility in consequence of destruction of the motor cells is permanently damaged, whereas the loss of faradic

contractility in the muscles in polyn neuritis does not by any means indicate that the lesion is a permanent one, so that always the gradual recovery of the faradic contractility of the muscles is a point which favors the diagnosis of neuritis. Loss of reflexes, trophic changes, girdle sensation, disturbances of the centres in the lumbar region of the cord offer, as a rule, no special points of differentiation. In not one of the four cases of multiple neuritis were there any special psychical changes, which are so common in the alcoholic form, and which, when present, afford really an important aid in diagnosis.

Fifth, and perhaps most important of all, is the subsequent history. Complete recovery is almost the rule in multiple neuritis. In *Case V*, which came under observation November 1st, 1893, with typical wrist and foot-drop, the patient appeared at my clinic a few weeks ago without a trace of paralysis apparent, and the only remnant was shown in an inability to raise himself on his heels or toes. *Case VII*, in which the paralysis and atrophy were very extensive in both arms and legs, I heard of last on January 16th of this year, and it is stated that the paralysis has almost completely disappeared. The other two cases have recovered power in the arms, but still have foot-drop; but the improvement which has been made warrants the belief that they will recover completely. No such complete recovery ever follows an extensive polio-myelitis. Certain muscle groups are sure to remain permanently damaged.

It is important to remember that after typhoid fever there may be a certain amount of weakness of the legs, which never in reality amounts to paraplegia. Sometimes there is with it slight œdema. This usually is a transient affair, which passes off in a few weeks with the full establishment of health. A few months ago I saw a case of typhoid fever with severe hæmorrhage, and during convalescence there was for a time a difficulty in walking which seemed quite out of proportion to the degree of weakness or atrophy of the legs.

PROGNOSIS.—Upon the diagnosis rests entirely the opinion which we can give to the friends as to the future outlook. Death, however, we may say, from polyn neuritis, or from any form of paralysis, indeed, after typhoid fever, seems to be excessively rare. As in

other forms of multiple neuritis, so in this, the outlook for complete recovery is good; the histories I have given show how favorable is the course, even in very severe cases.

In *treatment* persistent massage is very important; electricity is of less value; medicines are of doubtful utility; from twelve to eighteen months time is the essential factor.

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CLXI

CHILLS IN TYPHOID FEVER.

BY

WILLIAM OSLER, M. D.

[Reprinted from *The Johns Hopkins Hospital Reports*, Vol. V.]



CHILLS IN TYPHOID FEVER

BY

WILLIAM OSLER, M. D.

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IX.—CHILLS IN TYPHOID FEVER.

By WILLIAM OSLER, M. D.

In the systematic writers on typhoid fever scarcely a reference is found to chills, except as a symptom of the onset of the disease. Now and again in the journals a case is reported in which chills have been a special feature, and the complication is spoken of as a manifestation of ague. (Short, *Lancet*, 1891, I.) An important contribution to the subject was made at the Association of American Physicians, in 1894 (*Transactions*, Vol. IX), in the discussion which followed the reading of Gilman Thompson's paper upon the concurrence of malaria and typhoid fever. Peabody stated that he had twice seen chills in connection with pyæmic abscesses in the kidneys. He had also seen "severe chills followed by elevation of temperature as a symptom of typhoid fever, which did not affect the subsequent course of the disease; the patient getting well without the administration of quinine, and getting well apparently as other patients do who have not these symptoms." Janeway remarked that the chills were not necessarily due to the development of an intercurrent disease. He held that they were often caused by treatment. "If we give the modern antipyretics in large doses chills will occur, which are due simply to the fact that the temperature has been depressed, and then it rises and this rise is accompanied by mild and sometimes by severe chills. Drop your antipyretics and the chills disappear." Bonveret,* who has reported four interesting cases, regards the chills as due to an irregular or disturbed elimination of the poison, a large volume of which, thrown into the blood in a short period, may cause a rigor.

(a). *At the Onset of the Disease.*

Of 79 cases treated to conclusion during the sixth year of the Hospital work there were thirteen in which the disease began with

**Lyon Médical*, 1892.

shaking chills. In two cases there were several severe rigors, in three cases there were two, while in eight the rigor was single.

(b). *At the Onset of the Relapse.* (Chart I.)

CASE I.—*Severe primary attack; no chill at onset; normal temperature on the forty-first day; apyrexia for twenty-three days; severe chills at onset of relapse; fever for forty-two days; apyrexia for forty-two days; second relapse, without chills, of fourteen days duration.* (Chart I.)

Tertia C. W., aged 22 (?) (Hos. No. 8488) admitted October 24th, 1893, on the seventh day of the fever. There were no chills at the onset. The fever was high 103° – 105.5° , and she had seventy-five baths. The temperature fell to normal on the forty-first day. For twenty-three days there was no fever. On December 20th the fever of the first relapse began, and rose to 103.5° by 10 a. m. of the 21st, when she had the first chill, not a severe one. At 2 p. m. there was a second chill, in which the temperature rose to 106° . A third one occurred on the morning of the 23d, and at 11 a. m. the temperature was 106° . By sponging it was reduced to normal. On the 24th at 3.30 a. m. she had a fourth chill, in which the temperature rose to 104° . The three last chills were severe and she sweated profusely after them. On the 25th there was no chill; on the 26th there was a slight chill at 2 p. m. These five chills initiated a relapse of great severity, which persisted for forty-two days. There was then a period of apyrexia of six weeks, which was followed by a second relapse of two weeks duration. There was nothing in the mode of onset of the first relapse to account for the development of the chills.

CASE II.—*Severe primary attack; severe single chill at onset of relapse.*

Edith T., aged 13, (Hos. No. 6487), admitted December 24th, about the end of the second week of a very severe attack. On January 2nd the temperature for the first time reached normal, and remained throughout the day between 98° and 99° . On January 3rd she had a severe chill in which the fever rose to 105° and fell in the evening to 99° . Throughout the 4th the fever ranged between 104° and 105° . On the 5th it fell to 102° , and on the 6th the

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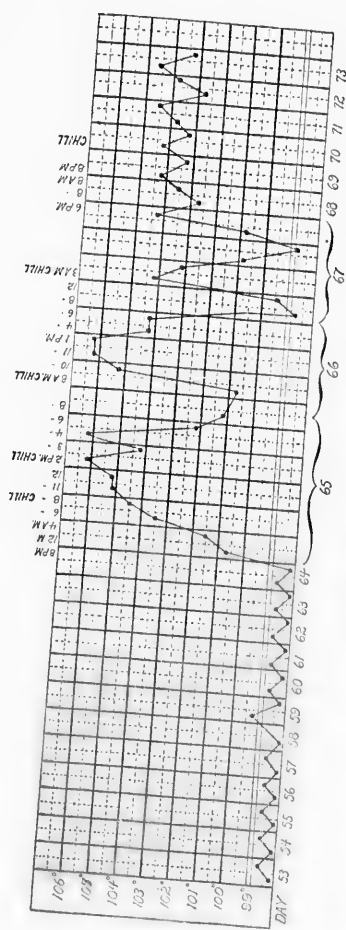


CHART I.—Chills at Onset of Relapse.

temperature was normal. After three or four days of irregular fever, there was continuous high fever from the 11th to the 18th, with rose-spots and enlarged spleen.

(c). *Chills as a Result of Treatment.*

Perhaps the most common cause of chills in typhoid fever is the use of medicine, particularly antipyretics. Following a dose of 5 or 10 grains of antipyrin a chill is not infrequent. Last year I saw in consultation a patient who had had chills for ten days and had become very anæmic. The physician thought the chills were septic, and was surprised when I suggested that the antipyrin, which had been given in full doses, was the cause. The chills ceased with the last dose of the medicine.

In one of the following cases a chill followed the injection of a sterilized culture of typhoid bacilli, in two the external application of guaiacol.

CASE III.—*Chill following a hypodermic injection of sterilized culture of typhoid bacilli.*

Bettie G., aged 27, (Hos. No. 8616), admitted November 12th, 1893. The attack was of moderate severity. On November 15th, 17th and 19th, there were given injections of sterilized cultures of typhoid bacilli. The temperature rose only one or two degrees without rigor or sweating. On the 20th, at noon, when the temperature was 102°, she was given another injection. The temperature rose gradually, and at 1.40 p. m. she had a chill, in which the temperature was 105.8°. It was quickly reduced by sponging. Another injection on the 23rd was not followed by a chill.

CASE IV.—*Chill following the application of guaiacol to the skin.*

Evelyn H., aged 24, (Hos. No. 9075), admitted January 24th, 1894. The temperature ranged about 104°, and was very little influenced by the baths. For the first week in hospital she was much nauseated, and vomited nearly everything that was given. On the 29th at 4 p. m. guaiacol was painted on the skin, as an antipyretic, and again on the 31st and February 1st. After one application she had a slight chill, and on February 1st m xxx of guaiacol were

painted on the skin of the abdomen at 11.40 p. m. The temperature was 102.2°. At 2 a. m. it had fallen to normal. From 3 to 3.30 a. m. she had a heavy chill, followed by a profuse sweat. The temperature rose very slowly and by 6 a. m. was 102°.

CASE V.—*Chill following the external use of guaiacol.*

Elizabeth M., aged 19, (Hos. No. 9158), admitted February 5th, 1894. For the first three days the fever ranged from 102° to 104°. On the 6th, at 8.30 p. m., the temperature was 103.5°; 3 i of guaiacol was painted on skin of abdomen. By midnight the temperature was 97.5° and she had a severe chill, after which the fever rose rapidly, and by 2 a. m. reached 104.2°.

(d.) *Chills with the Onset of Complications.*

During the height of the fever, or after convalescence has begun, a rigor may precede the development of pneumonia, pleurisy, acute otitis, suppuration in the mesenteric veins, pyæmic abscesses of the kidneys, perforation of ileum or appendix, or an acute periostitis. It sometimes occurs with thrombosis of the femoral or saphenous veins. In rare cases it may precede the development of acute and fatal hyperpyrexia. On the whole, however, rigors are rare in the complications of typhoid fever, as will be noticed in the full analysis which I have given of our cases.

In thrombosis a chill may occur at the onset or recurring rigors may be associated later with suppuration in the clot and with the development of pyæmia.

CASE VI.—*Severe chill with onset of thrombosis of internal saphenous vein.* (Chart II.)

Theodore B., aged 24 (Hos. No. 10298), admitted July 5th, 1894, about the 15th day of the fever. The temperature range was from 103°–104°, and from the 13th to the 15th was almost normal. On the 16th thrombosis of the right internal saphenous vein occurred, with moderate pain in the thigh, but no swelling. The temperature rose, without a chill, to 103°, persisted throughout the 16th, and did not fall to 100° until the morning of the 18th. Then it remained between 99° and 100° until the morning of the 22nd, when, at 6.45

a. m., he had a severe chill, and by 8 a. m. the temperature was 105.5° . The paroxysm lasted for 24 hours, and was followed by heavy sweats. From 8 a. m. on the 23rd the temperature remained normal until the evening of the 26th, when there was a rise to 104.2° without a chill. From this time there was no further fever. There was a marked leucocytosis at the time of development of the thrombus in the left saphenous 21,250 per cm. Four days later the leucocytes had fallen to 5,750 per cm. Subsequently the leucocytes rose during convalescence to above 10,000 per cm., and the patient became a little anemic.

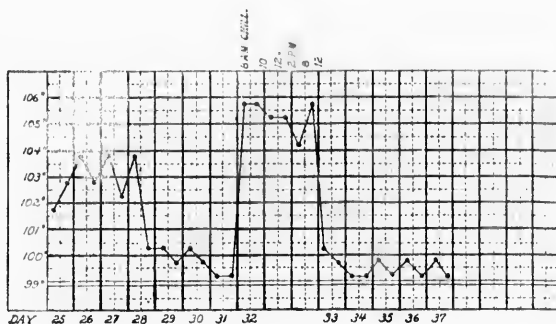


CHART II.—Chill at Onset of Thrombosis.

CASE VII.—Severe attack of fever; thrombosis of the femoral vein; eight days later a severe rigor.

September 23rd, 1895.—While making rounds in Ward F, my attention was called to the patient in Bed 18, whom we found in a severe rigor. He had been very ill for ten days. On the 15th of September a thrombus had developed in the left femoral vein, and the foot and leg were swollen. He had a very dry tongue and was delirious. This morning at 8 a. m. the temperature was 102° . At ten o'clock the chill began, and he shook for twenty-five minutes. The temperature rose during the paroxysm to 105° . He was very cold and blue during the chill, but half an hour later, when I left the ward, he was feeling very comfortable. No further chills occurred.

He became very emaciated, but the temperature fell to normal on September 30th.

In the following case the chill preceded a rapid and fatal rise in the fever:

CASE VIII.—*Admission in the third week, much bronchitis, suffusion of the face, delirium; a severe rigor followed by cyanosis, hyperpyrexia and death.*

While revising this paper, September 21st, 1895, Dr. Parsons came in to tell me that a private patient in Ward C had died suddenly, in a state of hyperpyrexia, after a severe rigor.

The patient, W. W., aged 40, was admitted September 14th. About August 15th, at Ocean City, he first began to feel wretched and miserable. Thinking that the sea did not agree with him, he went to Blue Ridge Summit. About September 1st he became very much worse. The gastric symptoms were very aggravated, and he vomited almost everything he took. He had been treated for malaria. He had had headache and a good deal of prostration, and has taken very large doses of quinine. The temperature at first was moderate, not reaching 104°. He took the baths very badly, was very livid and blue after them, and on September 19th, there was so much bronchitis that it was thought better to substitute the sponges. His pulse was good and the heart sounds clear; but he had constantly a suffused, somewhat ashy appearance of the face. The abdomen was distended and soft. There were no characteristic rose-spots; a few pigmented spots looking like faded roseola. His mental condition was not satisfactory. He was excessively frightened about himself, and on September 17th and 18th tried to get out of bed.

On September 20th and 21st he seemed somewhat better. The temperature had not been high, the morning and evening record for forty-eight hours not above 103.5°. There was a slight trace of albumin in the urine, and a few granular and hyaline casts. A musty, very characteristic odor was exhaled from the skin. I saw him at half-past eleven on September 21st. The bronchitis was better, and I ordered the baths to be resumed. The morning temperature was 102.5°; at 10 a. m. it had risen to 104.3°. At the visit he was sweating profusely, but he seemed better and was rational.

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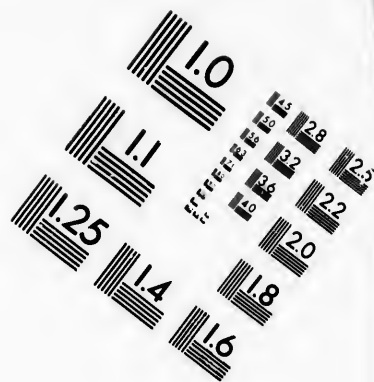
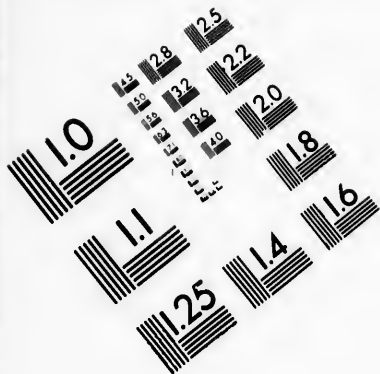


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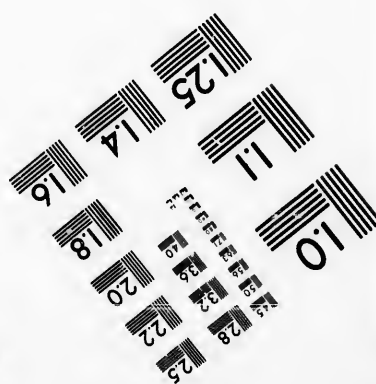
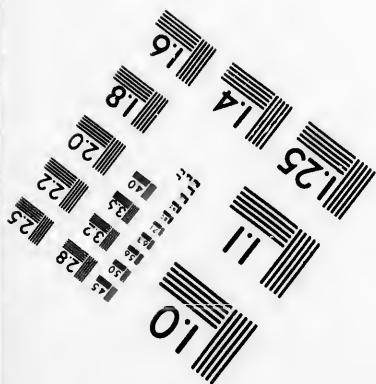
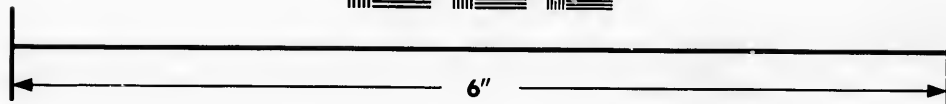
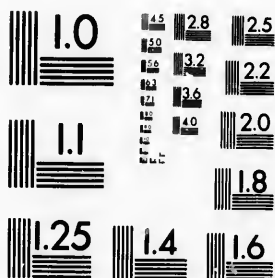
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He had taken his nourishment very well. At one o'clock he had a very severe chill, shaking violently. The respirations were hurried with loud expiratory blowing. The expression of the face was that of fright, and he constantly talked of someone trying to kill him, and called out for help. The pupils were widely dilated and equal; he sweated profusely. At noon the temperature was 104.2° ; at 1.45 p. m. it had risen to 106.2° . At this time the chill had almost disappeared. He had become, however, quite cyanosed, the hands purple, the lips blue and the face very dusky; the pulse could scarcely be felt. There was from this time slight twitching of the left side of the face, but no regular convulsion. The cyanosis became more marked, and he became progressively weaker. The temperature rose to 107.5° at 2 p. m., the highest recorded temperature in any case in typhoid fever treated in the Hospital. He died at 2.45 p. m.

(e). *Chills (septic?) during convalescence in severe and protracted cases.*

In a few instances rigors occur throughout the course of the fever, without any local symptoms to account for them. The following cases are of great interest in as much as the chills were not associated, so far as could be ascertained, with any complication, and, though very alarming, they gradually subsided with complete recovery of both patients.

CASE IX.—*Severe and protracted fever; in the seventh and eighth week of illness recurring chills with higher fever; no local signs; recovery. (Chart III.)*

Thomas W. T., aged 36, (Hos. No. 8667), admitted November 21st, 1893, on about the eighth day of the fever. The temperature range was high and the constitutional symptoms severe. He was given during the first week injections of sterile cultures of typhoid bacilli in thymus gland bouillon, without any influence. On November 28th an injection was given at 2 p. m. The temperature did not rise more than a degree. At 12 midnight he had a shaking chill of twenty minutes duration, followed by profuse sweating. The injections were omitted and he was ordered baths. He had another chill on the 30th at 6 a. m. The temperature rose to 105° . The patient did well with the baths and sponges, though he had delirium

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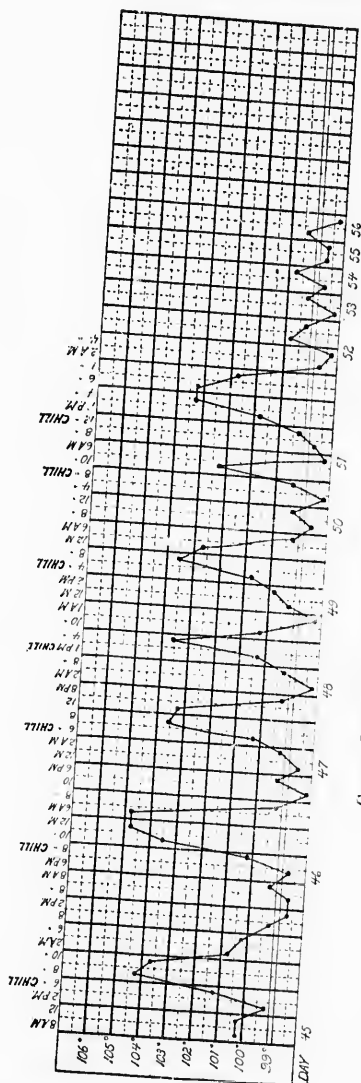


CHART III.—Showing Recurring Rigors in the 7th and 8th Weeks.

remor, a dry tongue and a slightly distended abdomen. On December 11th the temperature rose to 103.5° and he had a sponge bath after which he had a chill. Then, about the forty-fourth day of the illness the temperature reached normal. He had been very ill and had a slight phlebitis of the long saphenous vein. From the 13th to the 28th of December he had an irregular fever, touching normal, or 99° each day and rising to 103° or 104° . On the 25th with this rise he had a profuse sweating, on other days the sweats were less marked. As the fever subsided he looked much emaciated and the abdomen was scaphoid. There was no diarrhoea, and he had a good appetite.

On December 29th-31st there was irregular fever, but lower than before, and it seemed as if convalescence had begun. Though he felt well, the general condition was not very favorable: he had two, sometimes three, soft movements daily; the pulse ranged from 90° to 108° , and he had become very much emaciated. During the first ten days of January he had a series of severe chills. The temperature rose to 103.5° and 105° , and in the intervals was normal or sub-normal. There were seven chills during the ten days. The paroxysms lasted from twelve to fifteen hours.

The most careful examination failed to show any local lesions to account for the chills. The examination of the blood was negative. There was a systolic murmur at the base. The spleen was still palpable. After January 14th the temperature remained normal. The recovery was slow on account of the great wasting. On sitting up February 1st, he weighed 123 pounds; on March 3rd he weighed 143 pounds, and at the time of his discharge, March 15th, nearly 150 pounds.

CASE X.—*Attack of moderate severity; in the 5th, 6th, 7th and 8th weeks chills of great intensity; recovery.* (Chart IV.)

November 6th, 1894, I saw at Charlottesville, with Dr. Hugh T. Nelson—V. S., aged about 20, a student, who had been ill with fever since October 1st. He had come from Charleston, September 15th, and shortly before, while shooting, had been exposed in a very unhealthy region. The attack was one of moderate severity; the temperature ranged between 104° and 105° , without many serious symptoms; but in the fourth and fifth weeks his temperature did not

decline. On November 1st he had a chill, and complained of pain in the right side. It was noticed that there was some fulness over the region of the liver, with tenderness on pressure. On the following day he had two very heavy rigors, and on November 3rd Dr. Nelson, fearing that suppuration had occurred in the liver, aspirated in four different places without finding any pus. The patient had another chill on the 4th. When I saw him the condition was as follows:

Considerable emaciation; dorsal decubitus, but he can lie comfortably on either side. Pulse 120, moderate volume. The temperature at 11 a. m. was 100° (he had had a chill at 2 a. m.) The skin was moist and he had been sweating profusely. The abdomen was a little swollen, nowhere tender, no spots visible. The edge of the spleen was not palpable; the vertical splenic dulness seemed somewhat increased. The right hypochondriac region looked a little full, but the intercostal spaces were not obliterated, nor on pressure was there special tenderness in the region of the liver. The liver dulness began at the seventh rib in the nipple line, and extended to the costal border. In the mid-axillary line the area of vertical dulness seemed somewhat increased. Behind there was flatness to three fingers' breadth below the angle of the scapula. Over the infra-scapular region there was feeble breathing, and on deep inspiration a few fine, crackling râles, and the tactile fremitus was diminished. The heart sounds were clear. There was no pus in the urine. There was no otitis media.

Taking into consideration the facts of a swelling in the right hypochondriac region and the existence of dulness in the right infra-scapular region, I thought it possible there might be an effusion or a collection of pus high in the right lobe, projecting into the pleura; and I inserted an exploring needle in two places, in the dull area, in the infra-scapular region, but obtained nothing.

Altogether it did not seem to me likely that there had been suppuration in the liver, and I thought it more probable that the case was one of septicæmia occurring late in typhoid. The subsequent course of the case is as follows: From the 6th to the 12th he had no chill; on the latter date he had a slight one, lasting twenty minutes. The temperature range was from 100° to 103° . On the 16th, 17th and 18th he had slight chills. The temperature range was not quite so high—from 99° to 103° . From the 20th to the 26th the temperature

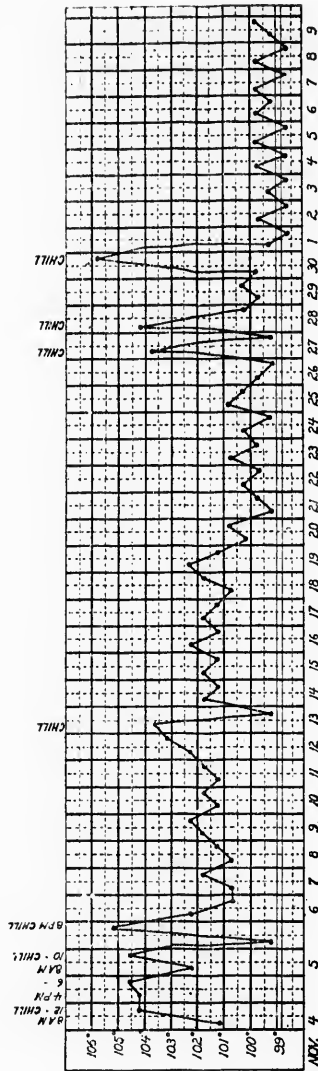


CHART IV.—Recurring Chills in the 5th, 6th, 7th and 8th Weeks.

was lower, only reaching 101° . On the 27th and 28th he again had chills, and on the 30th a very severe chill, the temperature rising nearly to 106° in the evening. From December 1st to the 11th he has not had any chills, and the temperature has been nearly normal. He has also been improving, though slowly.

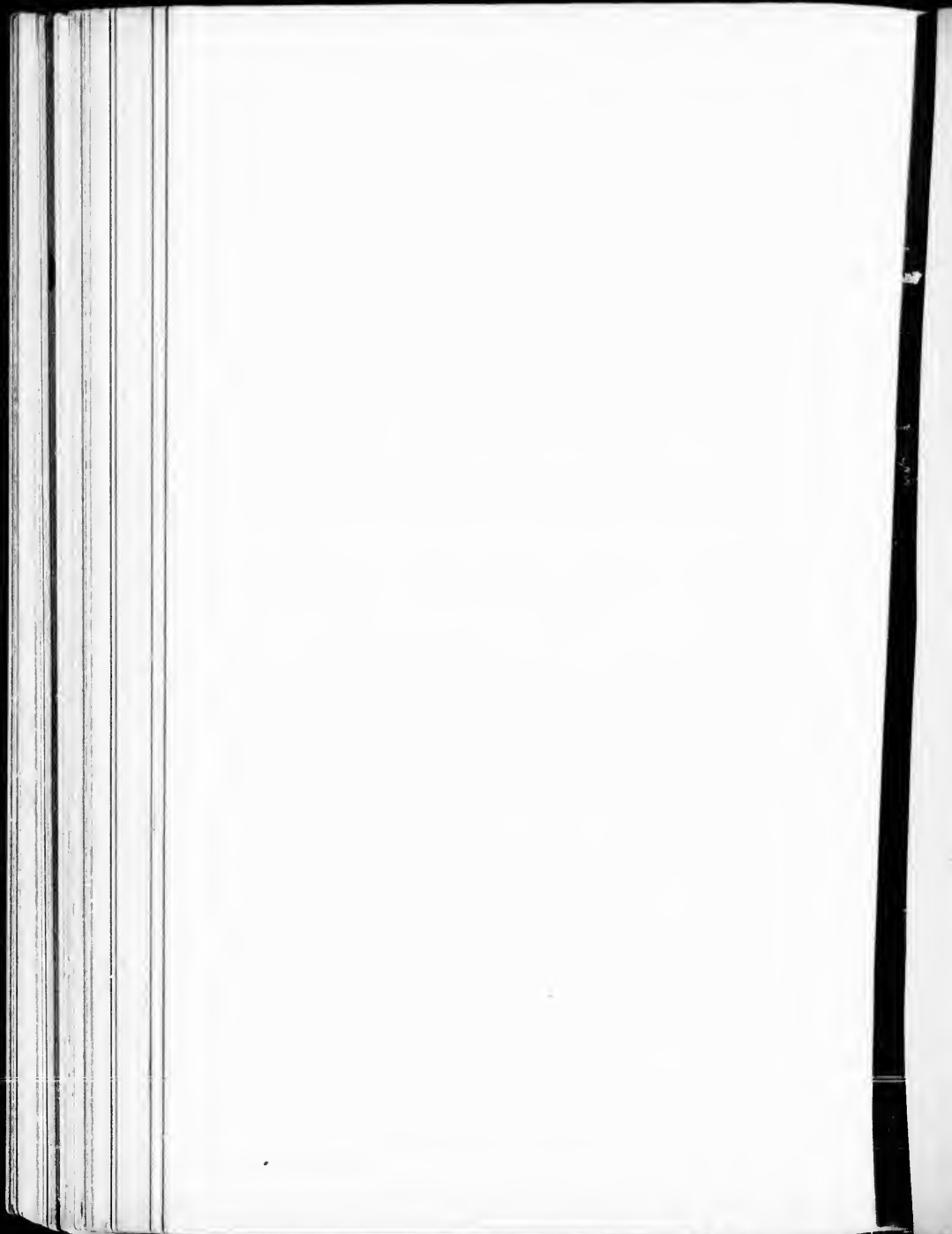
Subsequently the patient was removed to his home in Charleston, and made a very satisfactory recovery, with the exception of a slight periostitis of both tibiae, which developed late in convalescence and did not go on to suppuration.

(f). *Chills Due to the Concurrent Malaria.*

While attributed, as a rule, to malaria, chills occurring in the course of typhoid fever are very rarely due to this cause. In the cases already given the blood examination was negative. Among 333 cases of malaria and 389 cases of typhoid fever treated in the wards in no instance have the diseases been concurrent. The cases reported by Gilman Thompson, in the paper already referred to, appear quite conclusive, as the parasites were found during the chills. We have had several instances in which the typhoid fever followed malaria (see Vol. IV of the Reports). A case of great interest is given at p. 298 of this report, in which a chill occurred in the height of an attack of typhoid fever which followed a continuous malarial fever.

CASE XI.—*Continuous malarial fever of eleven days duration; repeated chills; convalescence; severe typhoid fever with characteristic symptoms; chill at the height of the fever.*

Kate I., aged 31 (Hos. No. 11331), admitted November 6th, 1894. The history is given in full at page 299. The attack followed one of malaria, which lasted from September 23rd to October 7th. She had frequent chills at the outset, and organisms were found in her blood. On admission, November 6th, she had all the symptoms of typhoid fever. The blood examination was negative. On the 7th, at 4.30 p. m., when the temperature had been continuously between 104° and 105° for twenty-four hours, she had a chill of moderate severity, not followed by any rise in temperature. Unfortunately, the blood was not examined during the chill, but repeated examinations were made in her case throughout a prolonged illness and always with negative result.



CLXII

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THE PRACTICAL VALUE OF LAVERAN'S
DISCOVERIES.

BY

WILLIAM OSLER, M.D.,

OF BALTIMORE, MD.;

PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY.

FROM

THE MEDICAL NEWS,

November 23, 1895



[Reprinted from THE MEDICAL NEWS, November 23, 1895.]

**THE PRACTICAL VALUE OF LAVERAN'S
DISCOVERIES.¹**

BY WILLIAM OSLER, M.D.,
OF BALTIMORE, MD.;
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY.

EVEN in well-known affections advances are made from time to time that render necessary a revision of our accumulated knowledge, a readjustment of old positions, a removal even of the old landmarks. Perhaps the most remarkable illustration of this is offered by the discovery of the tubercle-bacillus. What a *volte face* for those of us who were teachers before 1881! Happy those who had agility and wit sufficient for the somersault! Scarcely less important has been the revolution in our knowledge of malaria since the researches of Laveran, in 1881, on the parasite of the disease. His discovery attracted for a time little attention, chiefly because the workers in pathology, the world over, had not opportunities for studying the disease. The verification of his work came slowly, while the conception of its far-reaching consequences has not yet filtered from the laboratories and clinics into the wide field of every-day practical medicine.

There are several aspects in which Laveran's studies may be considered as of immense value:

THE RELATION OF THE PROTOZOA TO THE ACUTE
INFECTIONS.

A stimulus has been given to research that has already borne fruit in observations upon amebic dysentery, Texas cattle-fever, and certain skin-affections. The question of the protozoal origin of carcinoma has been revived, and prosecuted with an

¹ Read before the Medical Society of the District of Columbia.

energy that must result in a valuable addition to our knowledge of the structure, and possibly, too, of the etiology of malignant growths. Although the life-history of the parasite is as yet imperfectly known, sufficient details are available to furnish one of the most interesting chapters in pathology, and at last we have revealed the meaning of that periodicity, so mysterious a feature in the malarial fevers, which has puzzled generations of physicians since Hippocrates. As a direct outcome of the study of the protozoal parasites of paludism may be mentioned the really brilliant discovery by Theobald Smith of the parasite of Texas fever, also a hematozoon, connected in its life-history with the cattle-tick (*Boophilus bovis*). No more interesting problem in comparative pathology has been solved of late years, and the life-history of the parasite is better known than that of any other pathogenic protozoon.

THE DIAGNOSIS OF MALARIAL FEVER.

The best guarantee of a truth, as some one has said, is the wisest men's acceptance of it. There has been an extraordinary unanimity in the verification of Laveran's main facts by every competent worker who has had suitable opportunities for the study. The extensive and complete bibliography—the most complete yet published—in the monograph by my assistants, Drs. Thayer and Hewetson,¹ gives some idea of the widespread interest which the question has aroused. It is not too much to say that Laveran's work has revolutionized the study of fevers, as now a trained observer can determine whether any given case of fever depends upon a malarial infection. The parasites are present in all forms of the disease, and constitute a diagnostic criterion of unflinching accuracy in uncinchonized subjects. A certain technic and training are required, which a season in any malarial center can

¹ "The Malarial Fevers of Baltimore." Johns Hopkins Hospital Reports, 1895. Vol. v.

give, but which is not so easy to get in other localities. I shall refer shortly to the extraordinary abuse of the term malaria, which is used as a cloak to cover our ignorance of the nature of obscure fevers. A more extended knowledge of the fact that the malarial fevers are readily and quickly recognizable will give the physician pause in a hasty diagnosis, and will in time obviate one of the most glaring inaccuracies in the mortality returns of certain towns.

But it is in the study of the fevers in the tropics that Laveran's discovery will prove of the greatest service, and as shown by the work of Vandyke Carter, in India, and Dock, in Galveston, the differentiation of malarial from other fevers is quickly made. It is most important that men who desire to study this problem should be equipped with the necessary technic. Several recent reports on malaria in the tropics have been sadly defective, and show that valuable opportunities have been wasted from lack of proper training on the part of the observer. Accurate information on the subject, in English, has not been until recently available. My article in the *British Medical Journal* (1887, I), remained for several years the only one which had a wide circulation, and the letters which I have received from practitioners in distant parts of the world indicate that, with the imperfect literature, there coexisted as a rule imperfect training and faulty apparatus. Now, however, the publication by the New Sydenham Society of Laveran's monograph, and of the works of Marchiafava and Big-nami, of Mannaberg, and the monograph of Thayer and Hewetson, already referred to, gives access to all the available literature, and should prove a great stimulus to the study of tropical fevers from the new standpoint.

For so many generations the paroxysm of intermittent fever has stood for the type and representative of the class of fevers associated with chill that it has been, and still is, very difficult, particularly in

this latitude, to avoid the suspicion of paludism in any disease associated with recurring rigors; and yet one may safely say that, in the cities of the Atlantic seaboard, the instances of chills and fever due to the malarial parasite are greatly exceeded by those of various other affections. The idea seems firmly ingrained in the mind, and I scarcely pass a week without seeing some instances in which the diagnosis of malaria has been made, simply because the patient has had recurrent chills. The error would not be so unfortunate were it not for the fact that it often causes delay in the adoption of suitable treatment, and may completely blind the physician to the true nature of the case. Perhaps the most frequent mistake is in the chills and fever of tuberculosis. As is well known, these occur at the two extremes of the disease. It is more particularly in the early stages that the mistake is serious, and I have on many occasions known a patient treated persistently for malarial fever without a suspicion having arisen that the trouble depended upon tuberculosis. In all varieties of septicemia the mistake is most frequent. Malaria postpartum, of which one hears not a little, is very often septicemia, and I rarely see a case of abscess of the liver that has not been drenched with quinin, in some instances for months, in the belief that it was a chronic malaria. Frequently pyelitis, pyelonephritis, gall-stones, and empyema are in the same way overlooked, and, even when the diagnosis has been demonstrated, I have often heard from physicians expressions which indicated a lingering idea that after all the septic trouble was only a consequence or a complication.

The profession at large has not yet laid to heart the following rules:

1. *That the diagnosis of the malarial fevers can be made with certainty by the blood-examination.*
2. *That an intermittent fever which resists quinin is not of malarial origin.*

A rich experience during the past nine years warrants the expression of these positive statements.

In the differentiation of the fevers of the South, about which so much discussion has taken place during the past ten years, the study of the changes in the blood must in the future play a most important rôle. The question of the existence of a third type of continued fever, which has been advocated by Guitéras, Baumgarten, and others, cannot be determined without a more complete study than has yet been given to the cases.

When one reads the report of the Proceedings of the Orleans Parish Medical Society, in which for many years the nature of the long-continued fevers of Louisiana has been discussed, the condition really seems to be similar to that in which the profession labored before the differentiation of typhus and typhoid fever. It is interesting to note that in New Orleans at least physicians seem to be coming gradually to the conviction that the long-continued fever which resists quinin is in reality typhoid, a view strongly advocated by Dr. Matas in a short paper in *THE MEDICAL NEWS* of December 15, 1894.

MALARIA AND VITAL STATISTICS.

The U. S. Census Report for 1890, recently issued, which covers the six years ending May 31, 1890, gives the following number of deaths from malaria, to which I add for comparison those of typhoid fever:

Washington—	Malarial fever,	500;	Typhoid fever,	850.
Baltimore—	“ “	934;	“ “	904
New York—	“ “	2060;	“ “	2031
Brooklyn—	“ “	1413;	“ “	1002

That in Baltimore, New York, and Brooklyn the deaths from malarial fever exceeded those from typhoid will, no doubt, be read with astonishment, particularly by those familiar with the conditions of practice in those cities. Any reasonable physician in Philadelphia or Baltimore will at once acknowledge that a death from malarial fever is a great rarity, while deaths from typhoid fever are only too

common. Taking the reports of the large New York hospitals as a basis, one can estimate the degree of reliability of the figures on which the mortuary statistics are prepared. In the last-issued report of the Department of Public Charities and Correction of New York (1894) for the year 1891, the comparative rarity of malarial fever is well indicated by the fact that, of above 15,000 patients admitted to Bellevue Hospital during the year, there were only 15 instances of intermittent malarial fever. It is true that there were 76 cases of typhomalarial fever and only 16 of typhoid in the figures, which is surprising, considering the little stress that has been laid of late years upon typhomalarial fever; but when one turns to the list of deaths and finds that all the cases of typhoid fever died, 16 in number, it looks as if the diagnosis rested a good deal upon whether the patient recovered or not. In the total number of deaths, 1547, malaria does not appear as accounting for a single one. So also at the Charity Hospital, of 619 deaths not one was caused by malaria.

At the Roosevelt Hospital in the year 1893 there were treated in the medical division 1436 cases, and, so far as one can gather from the report, there does not appear to have been a single case of malaria treated in the wards. Dr. Roosevelt, to whom I wrote on the subject, kindly informs me that from January 1, 1883, to December 31, 1893, inclusive, there have been but two deaths from malaria, both cases of the pernicious form. The total number of deaths in medical cases during this period was 2024, so that the proportion of deaths from malaria to all deaths from disease in the medical division of that hospital during the 11 years was about 1 to 1000.

In the New York Hospital, for 1893, of 1482 medical cases, there were in all 38 cases of malaria, with one death from pernicious fever.

Through the kindness of Dr. Browning I am able to give more extended figures for Brooklyn, a city

in which the prevalence of malaria has engaged the attention of the profession for some years. The figures and tables sent to me were prepared by the direction of the Committee of Health, under the supervision of the secretary, Dr. G. S. West. Dr. Browning writes: "One peculiar general feature is that in the last 14 years, while the malaria cases have diminished pretty steadily down to less than one-half, the typhoid cases have fully doubled. During the same period the population has increased fully one-half, and by a small extent by increase in the city's area. Even then the typhoid cases have increased about twice as fast as the population."

He gives the figures for the ten years from 1884 to 1893, inclusive: deaths from typhoid fever, 1543; deaths from malarial fever, 1224. It will be noticed that there is a serious discrepancy between these figures and those in the Government Census for 1890, which deals with the six years ending May 31, 1890, during which time the deaths from malarial fever are stated to be 1413.

Carefully prepared tables of the deaths from typhoid fever, malarial diseases, and typhomalarial fever from 1880 to 1893 inclusive, have also been furnished. The totals for the 14 years are as follows: Typhoid fever, 1898; typhomalarial fever, 1104; and malarial diseases, 2006. In the Transactions and also in the Proceedings of the Medical Society of the County of Kings there are interesting discussions and reports on the prevalence of malaria. With reference to the occurrence of fatal malaria, it is worthy of note that in the reports on malarial fever on Long Island by Dr. Baker and by Dr. W. H. Thayer,¹ while it was acknowledged that intermittents occurred in many parts of Long Island, yet none of the physicians, whose correspondence is given in the papers, mentions, so far as I can gather, a single case of fatal malarial fever, nor

¹ N. Y. Med. Journ., 1885.

do I see one mentioned in the discussion following the reading of the reports. In September, 1893, the members of the Society of the County of Kings again discussed at length the question of malaria in Brooklyn.¹ I have looked carefully through all of the papers there read, and it is certainly a very significant fact that not one of the authors of the papers, and not a physician who discussed the question raised, mentioned the occurrence of fatal forms of malarial fever. In the article by Dr. Hall on types of malaria seen in Brooklyn, in which he quotes the observations of a number of physicians, no mention is made by any of them of fatal forms, and this is a city credited in the bills of mortality with as many deaths from malaria as from typhoid fever! Certain of the writers of the papers seem to have themselves been a little suspicious; thus Dr. Hall remarks that "Carelessness of diagnosis probably affects our ideas of the prevalence of malaria to a considerable extent;" and Dr. Law, in the methods of treatment of malaria in Brooklyn, states that it seems to him a good practice in cases of the remittent type of the disease to give quinin in large doses for two or three days, and then, if the fever is not broken up, to stop and take bearings and search for some inflammatory lesions, or reconsider the possibility of typhoid.

The report from the Brooklyn Hospital gives the following: In 1890, of 608 medical cases admitted there were 18 cases of malaria and no deaths. In 1892, of 742 medical cases admitted there were 27 cases of malaria and one death. In 1893, of 683 medical cases admitted there were 20 cases of malaria and no deaths.

In the report from the Kings County Hospital for the year 1892 there were no deaths from malarial fever in a total of nearly 3000 patients treated with 310 deaths. In the report for the year ending July

¹ Brooklyn Med. Journ., Jan. 1893.

31, 1893, there was one death from pernicious malarial fever in a total of 3258 patients treated, with 425 deaths.

In dealing with the statistics of malaria, Brooklyn may be taken as a model, and I have dealt with it partly because of the reputed large death-rate, and partly because the activity of the members of the Medical Society of the County of Kings has furnished most suggestive material, which has been supplemented by the kindness and energy of Dr. Browning.

In localities frequented by the disease, malarial fever kills in such a way that the diagnosis is rarely in doubt. In the acute cases death follows within a few days. In other cases the hemorrhagic features prevail, while the malarial cachexia or the acute exacerbations in the malarial cachexia less frequently prove fatal. The simple intermittents rarely kill, even when protracted. Taking into consideration the statements of physicians in Brooklyn and Long Island, as given in the reports referred to, together with the striking absence of all reference to fatal forms, also the distinctive and readily recognized character of the fatal forms of malaria, one cannot help feeling that in these localities and elsewhere the diagnosis is put down carelessly, and does not represent in any way the incidence of malarial fevers. In the oft-quoted and oft-printed chart of the Michigan State Board of Health, showing the comparative mortality from typhoid fever in sewered and unsewered towns, Brooklyn figures almost at the bottom of the list, having a mortality of 1.5 per 10,000 inhabitants, a mortality which is much more than doubled if we add, as it seems should be done, the deaths due to typhomalarial fever and those due to malarial diseases.

The conclusion of the whole matter may be thus briefly expressed—the mortuary bills dealing with malaria are false, due either to ignorance or to wilful deception on the part of those who make the returns. Malaria is a disease that now rarely kills in

the large towns on the Atlantic seaboard, and it behooves the profession to abandon the practice of making a careless diagnosis of the disease in every case of obscure fever which proves fatal, and the Medical Boards should refuse to receive a death-certificate signed malarial fever without more specific details than have heretofore been demanded.

*On the Visceral Complications of Erythema
Exudativum Multifforme.*

BY

WILLIAM OSLER, M.D., F.R.C.P. LOND.,
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

FROM

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES,
DECEMBER, 1895.



1895.

1. Marlborough Street

Boston December 27

1895.

Dear Dr. Miller

I write to thank
 you for sending me the
 first of your articles on the
 "Evolution of the
 Nervous System."
 I have read it with the
 greatest interest and pro-
 fit and consider it a
 distinct contribution to our
 knowledge of these obscure
 and probably complicated
 processes. For several
 years my attention has been
 directed to this
 subject,

directed to the class of cases described by Ansoch and Cortey, nevering had two instances. But as a rule this class is less likely to come to the notice of the dermatologist, who is constantly seeing cases of pure Erythema multiforme without internal or arthritic symptoms. I confess that a proper grouping of the various forms seems to me well nigh hopeless at present as the symptoms are so curiously varied and mixed up. I was a little confused when I began to read your article, by the use of the term Eryth. exudat. multiforme. How

1895.
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of no importance whatever what
we call these forms but the
name introduced by Kohn
to designate the pure type of
Erythema multiforme, has not
usually been made to embrace
the whole group, which has
usually been referred to as
exudative erythema; while
Eryth. exudat. ^{simplex} multiforme,
Erythema nodosum, Pellagra,
rheumatism etc, are convenient
names for the clinical types
that predominated. The
course is only a question of time
and I understand your use
of the term embraces these forms
in a generic sense. I hope you
will be able to go still further
in your studies
Sincerely yours
John T. Moore

259 MARLBOROUGH STREET, BOSTON.

JAMES C. WHITE, M.D.

OFFICE HOURS 12 TO 3.

CHARLES J. WHITE, M.D.

OFFICE HOURS 11 TO 12.

December 24, 1895.

Dear Doctor Sir,

Please accept my
thanks for your very
interesting and valuable
paper. Such complications
as you describe are very
common in true typical
mythema multiforme, as
our association interprets
that title, restricted to
papular and tubercular,
partially bullous, lesions
on hands, forearms and
face. Of that more generalized
and mysterious dermatitis,

more or less haemorrhagic
I am willing to believe
anything bad, but I think
it is a wholly different
process, for which no
proper title has been
created -

My truly yours

James C. White

ON THE VISCERAL COMPLICATIONS OF ERYTHEMA
EXUDATIVUM MULTIFORME.

By WILLIAM OSLER, M.D., F.R.C.P. LOND.,
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

By exudative erythema is understood a disease of unknown etiology with polymorphic skin lesions—hyperæmia, œdema, and hemorrhage—arthritis occasionally, and a variable number of visceral manifestations, of which the most important are gastro-intestinal crises, endocarditis, pericarditis, acute nephritis, and hemorrhage from the mucous surfaces. Recurrence is a special feature of the disease, and attacks may come on month after month, or even throughout a long period of years. Variability in the skin lesions is the rule, and a case may present in one attack the features of an angio-neurotic œdema, in a second of a multi-form or nodose erythema, and in a third those of peliosis rheumatica. The attacks may not be characterized by skin manifestations; the visceral symptoms alone may be present, and to the outward view the patient may have no indications whatever of erythema exudativum. Of the eleven cases here reported the visceral manifestations were as follows: In all gastro-intestinal crises—colic, usually with vomiting and diarrhœa—five had acute nephritis, which in two cases was followed by general anasarca and death; hæmaturia was present in three cases; hemorrhage occurred from the bowels in three cases, from the stomach in two cases, from the lungs in two cases, from the nose in three cases; one patient had spongy and bleeding gums; two cases presented enlargement of the spleen; in one case there were recurring attacks of cough and bronchitis without fever; in one case there was a heart murmur. Five of the cases had swelling about and pain in the joints.

The skin lesions were polymorphic, ranging from simple purpura to extensive local œdema, and from urticaria in all grades and forms to large infiltrating hemorrhages of the skin and subcutaneous tissues. In individual cases the cutaneous eruptions were often of the most varied character.

The remarkable tendency to recur is a feature of all forms of exudative erythema. It will be noted that of the cases here reported in only one was the attack single. In the others there were multiple outbreaks distributed over periods ranging from two months to eight years.

A majority of the cases would be described under the heading of purpura or peliosis, since hemorrhage was the most constant lesion, but the

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variable character of the eruption, and its interchangeable nature in individual cases, make a wider definition of exudative erythema the more acceptable. A remarkable circumstance, which I have not seen mentioned in the literature (though it is not likely to have been overlooked), is the recurrence of severe attacks without cutaneous manifestations. In the first two cases—which are at present under observation—one would not for a moment suspect the true nature of the disease from the existing manifestations, which are entirely visceral.

I will first give a detailed report of the cases which have come under my observation.

CASE I. For six years recurring gastro-intestinal crises—colic, vomiting, and diarrhœa—with fever, delirium and erythema multiforme; for two years no skin lesions with the attacks; enlargement of the spleen.—Benjamin L., aged twenty-seven years, Norfolk, Va., consulted me October 11th, complaining of attacks of gripes and cold feet, which have recurred very frequently during the past eight years. For a time the attacks were thought to be severe indigestion with colic. They recurred at first every two or three months; he once passed six months without an attack, but for nearly three years he does not think that he has ever been free for so long as two months. He gives an account (corroborated by that which his wife has written) of a very remarkable series of events. He is always, for a day or two, warned of the attack by the occurrence of

Cold feet, an unerring premonitory feature. They are also cold to the touch, sometimes for as long as forty-eight hours. Frequently, too, he has had at this period uneasiness in the stomach. Independent of food or of the time of the day, he then begins to feel pain in the abdomen, and has severe

Gripes, as he calls them; sharp recurring attacks of colicky pains in the central portion of the abdomen. Formerly the pain was severe enough to double him up, but of late years it has not been so intense, and he gets more relief by straightening himself out to the full extent. He often vomits, and in the early attacks always did so. Of late years he has had more belching, which seems to relieve the pain. In some attacks he has had diarrhœa, but of late he has been constipated during and after them. With the abdominal symptoms, sometimes preceding them, there is

Fever. He gets burning hot everywhere but in his feet. Within a few hours he becomes delirious; as his wife expresses it, he talks "out of his head." He himself says that he talks much nonsense, just as in a fever, and imagines all sorts of things. One of his favorite fancies is that in an attack, during the colic, he has twenty-six throats and twenty-six stomachs, which are all in a row, and he cannot pick out the one which belongs to him, and which is causing the pain.

I had obtained this much of the history from him, and was beginning to be very interested, as it seemed an unusual sort of affection, when he voluntarily expressed the information that in the attacks "great big liver spots came out all over him." In several of the first attacks he thought he had been poisoned by eating something that had disagreed with him. The spots came out on the trunk and arms, not so often on the legs, and they were sometimes so large that they took days to dis-

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appear. Some have been as large as the palm of his hand. They are always red, sometimes raised, but never itch. During the first few years almost every attack was characterized by them. For nearly two years he has not had any of the blotches on the skin. The entire duration of the attack is from six to ten hours. After them he feels very sore in the abdomen, particularly the right side. He is irritable and has lack of energy. He has never had pain or swelling in the joints. The urine is sometimes high colored, but not more, he thinks, than is common in fever. There is no similar disorder in his family. He has always been a healthy, strong man, and is actively engaged in business. This disease has always been a great trouble to him, as he never knows at what time it may attack him.

The patient is a medium-sized man; looks healthy, though a little pale; the tongue is clean; the gums are not swollen; the pulse is quiet; the examination of heart and lungs is negative.

The abdomen looks natural; is not swollen. On deep inspiration the edge of the spleen is distinctly palpable; area of vertical dullness five fingers' breadth. The stomach is not enlarged; liver normal, no increase in size. The urine is not albuminous. There are no spots now on the skin; no swelling of the legs; no swelling of the joints. The retinæ are normal.

CASE II. *Attacks of colic for a year, with bleeding at the nose, anemia, and one outbreak of urticaria; recurring attacks of cough. Subsequently attacks with arthritis and lesions of erythema exudativum; enlargement of the spleen.*—The following case is of great interest because of the persistence of the abdominal symptoms with ill health and anemia for such a long period before the appearance of arthritis and erythema exudativum.

W. E. B., aged eleven years, was seen first March 10, 1894. Family history excellent. He is a well-grown boy, very active and intelligent. About a year ago he began to have attacks of severe pain in the abdomen, coming on very abruptly, not associated with any errors in diet, and often of such severity that he would roll upon the floor in great pain. After the attack passed off he would be quite comfortable. At this time he had several attacks of bleeding at the nose, and got pale. His appetite kept good and he has never had any vomiting. During the latter part of the summer he had a very "brazen" cough, which was suspected to be pertussis. Once during last summer he had an attack of hives below the knee. He has never had any rheumatism; never complained of any pain about the joints, but he has had pains low down under the left ribs.

The appetite for the past year has not been very good, and he has been very particular about his food. The bowels have been regular, and the attacks of colic have never been followed by diarrhœa.

During the winter he remained pale and had occasional attacks of colic, and the cough recurred at intervals. He has been able, however, to go to school, but has not been at all strong.

Present condition. A fairly well-nourished boy, a little pale in the face, but the lips and tongue are of good color. The muscles are feebly developed; the skin is clear; there is no purpura, no staining.

The abdomen looks a little large, is soft, nowhere painful on deep pressure. The edge of the liver can be readily felt at the costal margin. The spleen is enlarged and extends in the parasternal line nearly

to the level of the navel; the edge and its notch are to be felt very plainly. The upper limit of dulness is at the lower margin of the seventh rib.

The heart-sounds are clear, and there is no enlargement of the organ. The lungs are everywhere clear on percussion, but at the right apex and right upper axillary region there are a few medium-sized moist râles.

The blood presented no special changes; the leucocytes were not increased. There was a moderate grade of anemia, about 80 per cent. of red blood-corpuscles, and about the same of hemoglobin. The urine was clear, and contained neither albumin nor tube-casts.

I confess to have been quite puzzled by the case. The history of protracted colic with cough and the moderate anemia with enlargement of the spleen formed a symptom-group which did not seem to come into the category of any recognized affection. There had been no articular troubles, and the occurrence of the urticarial rash last summer seemed to be an accident.

On April 9th his mother said that he had complained several times of pain in the left shoulder, but there was nothing to be seen on inspection.

Under the free administration of arsenic and iron he improved a great deal, and the spleen reduced considerably in size. In the middle of April he had an attack in which the cough was much aggravated, and he had slight fever, the temperature reaching nearly to 102°. There was no dulness, but at the apex of the left lung there were many moist râles before and behind. It was with great difficulty that any expectoration could be obtained; it was bronchial and contained large numbers of alveolar cells. He improved very much toward the end of the month.

Friday, May 18. He has been doing very well. The spleen is only just palpable beneath the edge of the ribs. He has complained since last Sunday of pains about the legs and knees. I noticed to-day one or two bluish stains as if there had been purpura.

22d. The patient came again to-day. Last Friday evening when he went home the ankles were swollen and red, and blotches of urticaria and purpura came out over the instep and first phalanges of the toes. They extended along the outer surface of the left leg and there were a few on the right, but there was not so much swelling in the feet. This is the first occasion on which he has had an outbreak of purpura; with it he had an attack of severe colic, the first for several weeks. The legs and feet to day present the fading stains of the purpura. There is no swelling and no soreness, and he feels quite well. The trouble in the lung seems to have almost disappeared, and he has very little cough.

June 6. Since the last note the boy has been very well, with the exception of an attack of oedematous swelling on the back of the left hand. To-day he has had a good deal of itching and an acute attack in both ankles. The condition is as follows: On the back of the left hand there are three or four scattered patches of erythema with exudation. Over the knuckle of the little finger there is considerable swelling, but no ecchymosis. The right ankle is swollen, and the swelling extends over the dorsum of the foot and about half-way up the ankle. There is some heat, and extending for about two inches above the malleoli on either side there are mottled ecchymoses. The same extend half

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way down the dorsum of the foot. The left ankle is a little puffy, and the entire leg is covered with the remnants of purpuric urticaria. Though the ankles are swollen and look very sore, yet he was able to walk to the house, and could take off his shoes and stockings alone. Temperature, 99.2°.

27th. Patient has been at Atlantic City and has not been materially benefited. He looks thin and pale; the spleen is still palpable, and the edge can be felt two fingers' breadth below the costal margin. He has had no skin trouble since the last note.

October 30. He has been much better until to-day, when he had an attack of colic. He looks pretty well, and has no blotches, no purpura since spring. The spleen is decidedly smaller; the edge only just palpable. The liver is not enlarged. The piping and moist râles have all disappeared. He took the Fowler's solution in full doses at intervals to the 15th of August.

December 7. He has had no arthritis since May, and no spots, but there have been many attacks of pain in the abdomen, which last only five or ten minutes. The edge of the spleen can still be felt. The liver is not enlarged. His color is good; his tongue is clean. I ordered the syrup of the iodide of iron. He has been taking the Fowler's solution at intervals since last May and cod-liver oil since the 15th of August.

March 9, 1895. He has kept very well through the winter and has been at school. Yesterday his father allowed him to play hockey. Last night he had very severe attacks of colic. He has had them also at intervals through this morning. I saw him at 5 o'clock; he seemed better. There was no arthritis; no skin eruption. He had had one tender point on his right shoulder. He had had some cough, and there were numerous piping râles, chiefly at the right apex. Examination of the abdomen was negative; the spleen was smaller than it had been on any previous occasion. The liver was not enlarged; no tenderness anywhere on palpation.

June 5. He has been much better; no attacks of colic; no spots. He began to cough about three weeks ago, and now coughs "terribly" at night. The spleen is a full hand-breadth below costal margin. There is a remarkable condition of right apex again; the note is higher in pitch than normal as low as the fourth rib and behind to the spine of scapula. There are many large moist râles over whole infra-clavicular, mammary and upper axillary regions. The breathing is not tubular, but is a little harsh.

19. The cough has been better. The spleen is not so large as at last examination, only just two fingers' breadth below the costal margin. The resonance is still a little high pitched at the right apex; numerous crackling râles from the clavicle, extending through the mammary region into the axilla.

October 21. He has had a good summer. The spleen is only just palpable; no colic; no spots. Recently the cough has returned, and there are now crackling râles at the left lower mammary region and right lower axilla; a few, too, at the apex.

CASE III. *Joint pains; colic with diarrhoea; urticaria; purpura urticaria, appearing in crops; melæna; acute nephritis; death.* (Abstract.)
—A boy, aged six years, seen with Drs. Duntun and Agnew. There was

¹ Reported in full in New York Medical Journal, December 22, 1888.

a rheumatic history in the family, and the child of an aunt on the father's side died of purpura hemorrhagica. The onset was with pains in the ankles, followed by colic and an urticaria-like eruption. Hemorrhage from the bowels followed in about ten days. The recurring attacks of colic were most distressing. About the fifth week after the onset the urine became scanty and albuminous, and showed a few blood-corpuseles and numerous tube casts. After the development of the dropsy the attacks of purpura ceased, and he died of the acute nephritis within three months of the onset of the illness.

CASE IV. *Second attack; arthritis; cutaneous hemorrhages and urticaria; colic; vomiting; albuminuria; recovery.* (Abstract.)—The patient, a man aged forty-six years, was admitted to the Philadelphia Hospital, under my care, with diarrhœa and extensive purpuric rash and polyarthritis. About eighteen months before he had had a similar very severe attack, which had lasted three weeks. In the present one he had recurring colic, swelling, and tenderness of both elbows, of the right knee, and of the right ankle. There were numerous purpuric spots on arms and legs. The vomiting was a very distressing feature. Three days after admission a fresh eruption occurred of urticaria and purpura. The gums were not spongy. The urine contained much albumin and many hyaline and epithelial casts. The patient improved rapidly, and within a month from the time of admission seemed quite well, though on his discharge there was still albumin in the urine.

CASE V. *Gonorrhœa; acute arthritis and synovitis, with purpura; severe colic and vomiting, with successive outbreaks of purpura, urticaria, and larger extravasations; hamaturia. Recovery after an illness of two months' duration.*—Jas. McD., aged eighteen years, was admitted to the Johns Hopkins Hospital March 16, 1890, complaining of pain and swelling in the wrist-joints and fever. The patient knows very little of his family history, other than that his father died of pneumonia.

He has always been healthy, and can only recall having measles when seven years old. He has never had rheumatism. He contracted gonorrhœa a month ago and still has a slight discharge.

Present illness began March 9th with fever, pain, and swelling in the knees and in the calves of the legs. He did not go to bed, but attended a dispensary in the city and was ordered an ointment. On March 12th the wrists became swollen and the fever increased, and he had much pain in the back. Two or three red spots came out on the skin.

Present condition. The patient is a well-nourished young man. The temperature is 99.5°. The face is flushed; lips red; tongue coated on the dorsum, red at the edges. There is now no swelling of the knees. Both wrists and the backs of the hands and of the fingers are swollen and tender, and are reddened and pit on pressure. The swelling over the wrists is chiefly subcutaneous. Movement of the joint is not painful. On both legs, on the ankles and on the feet there are numerous ecchymoses, varying in size from a half to five or six millimetres. They are also present on the inner surface of the thighs, and a few are scattered on the back and buttocks. About the ankles there are some larger, confluent ones, which are capped with vesicles. The heart's action was regular and there were no murmurs. The urine was yellowish in color, a little smoky, acid, sp. gr. 1025, and microscopically it presented many

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blood corpuseles, with some hyaline and a few epithelial casts. The meatus of the penis is red and moist, but no discharge can be squeezed out. A bacteriological examination was made of the material from the vesicles on the legs. Esmarch's tubes were made, but nothing grew. At first we regarded the case as one of gonorrhoeal synovitis with purpura, but the subsequent history of the case shows that it must be grouped as erythema exudativum.

March 17. A large, swollen, hemorrhagic wheal developed on the inner malleolus of the right leg. In the evening the patient complained of much deep-seated pain in the abdomen, and vomited.

18th. The temperature has ranged from 99° to 101°. He vomited again this morning and complains a good deal of pain in the back.

20th. The urine contains much less blood, but hyaline and epithelial casts are still present. For the first time a murmur was noticed to-day in the pulmonary area.

22d. The hands are very much better. The left biceps to-day about its middle is swollen and tender, and it pains him to move it.

23d. The patient complains of a great deal of pain in the abdomen below the navel. He has had no further vomiting. Fresh purpuric spots are present to-day over the clavicles. The swelling of the left biceps has increased; extension of the arm is particularly painful. There is no discharge to-day from the urethra.

24th. A group of ecchymoses has extended about the neck. The biceps to-day is very tender. He complains much of pain in the abdomen, and for this in the evening he had to be given a hypodermic of morphine. The urine still contains a moderate amount of albumin, red blood-corpuseles, and numerous hyaline casts. It has a distinct cherry color.

25th. A small, raised erythematous area has appeared over the right instep, capped with a distinct bleb. Cultures from this were made, which subsequently showed the presence of the ordinary pus organisms.

26th. Albumin and casts persist.

27th. Urine is lighter in color, no blood noted to-day. Patient has improved somewhat; the biceps is better.

29th. Within the past twenty-four hours a large patch of purpuric spots has developed on the outer side of the left forearm, and on the right buttocks there has come out a crop of ordinary urticaria with somewhat injected margins.

31st. No casts noted in the urine. Patient has had no abdominal pain for some time.

April 1. New crop of purpura on the dorsum of the right foot. No fresh articular trouble. The temperature has ranged from 99° to 100° and 100.5°. The heart-sounds at the apex are clear. Daily notes were made on the urine, and albumin and hyaline casts were present. He improved a good deal, though at times he had sweats. On the 15th he had a recurrence of vomiting and of the abdominal pain, and a fresh crop of petechiae came out on the right side of the neck and chest. Pain in the abdomen was so severe that he required morphine hypodermically. Blood did not appear in the urine. On the 16th he was better. On the 17th the vomiting was very severe and the abdominal pain most intense in the region of the stomach. The tongue was clean and moist; he has no fever, and he slept well after the morphine. There were a few ecchymoses also on the right elbow.

18th. The pain in the abdomen is better. The tongue is to-day coated; the urine is turbid, smoky, and dense, an unusually large number of tube casts, some of which are pale, others made up of leucocytes and a few blood-corpuscles.

19th. The blood persists in the urine; the casts are not so numerous.

From the 20th to the 22d he was better, no fever. On the 23d a fresh crop of purpura came out on the right instep. He has no fever, and has been better; appetite good. He has gained in weight. He improved quite rapidly early in May and left the hospital on the 12th. At the time of discharge the urine had a specific gravity of 1013, contained a trace of albumin and a few hyaline casts.

CASE VI. *Third attack. Purpura, colic, and melena; vomiting; recurring attacks; albuminuria; death from pneumonia.*—Wm. L., aged nine years, admitted to the Johns Hopkins Hospital October 18, 1892, complaining of spots on the arms and legs. The family history is good; the father and mother, two brothers, and one sister are living and healthy. The mother had rheumatism in right hand fourteen years ago.

The patient has always been a delicate child. He had pneumonia when three years old, and measles when six. No other illness. Sixteen months ago he had the first attack of the affection with which he suffers at present, namely, spots on the skin, which recurred frequently with pain in the bowels and blood in the stools. The present illness began about two months ago; the spots first appeared. He lost his appetite and got pale. Five weeks ago he had the first attack of pain in the abdomen, with nausea and vomiting. It lasted all day and he had several bloody movements, and there was a little blood in the vomitus. In a week or ten days he improved and remained better until two weeks ago, when an attack began in the same way, with little pain in the abdomen, nausea and vomiting, and bloody stools. On several occasions his knees have been a little stiff in the evening, but there has been no swelling and no pain. In one of the attacks his mother states that he coughed up a little blood, and one day his nose bled. With each attack a fresh crop of spots appeared on the skin.

Present condition. He is a healthy-looking boy; the lips and mucous membrane are perhaps a little pale; the pulse is of good volume, 104; the temperature is 100°. When asked what is the matter with him he places his hand on the abdomen and says he has pain and soreness. Over the arms and legs there is a copious purpuric rash. The spots on the legs are fading; those on the arms are fresh. On the afternoon and evening of the 19th he vomited a great deal, and was unable to retain anything, and had a good deal of pain in the shoulders. No blood appeared in the vomitus or in the stools. On the morning of the 20th a fresh crop of spots was noticed, particularly over the shoulders and back. The joints were neither enlarged nor tender. The apex beat was inside the nipple line; the sounds were loud and clear. The abdomen looked natural; the spleen could not be palpated; the area of dulness was not increased; the liver was not enlarged. The urine was turbid, yellow, sp. gr. 1020, and presented a trace of albumin. On the 22d, after the attacks of vomiting and pain and the fresh crop, the specific gravity was 1020, the amount of albumin had increased, and a few finely granular tube casts were found and a few red blood-corpuscles.

The patient improved very much on the 21st and 22d, the vomiting ceased, and on October 23d his mother removed him.

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At home he got somewhat better, and the purpura did not develop so long as he stayed in bed. There was no return of the pains in the stomach or of the vomiting. He remained pretty well until about the 16th of November, when he had a chill, which was followed by pneumonia, of which he died on the 28th of November. During the illness the temperature was high; no purpura developed.

CASE VII. *Hip disease; subcutaneous hemorrhages; purpura urticaria; colic; vomiting; arthritis; great oedema of forehead; albuminuria; recovery.*—Mary R., aged four years, seen November 15, 1890, with Dr. Finney. The child had always been healthy and strong until June of this year, when she began to have symptoms of hip disease. She was seen by Dr. Halsted and Dr. Finney toward the end of October, and two injections of iodoform into the joint were made.

On Thursday, November 6th, she had been restless all day, and in the evening the mother noticed that her hands were swollen and covered with bluish spots. Dr. Finney saw her that evening, when she had slight fever, temperature about 101°, and the hands presented a swollen appearance due to subcutaneous localized infiltrations with blood, giving a curious patchy blueness. These were seen on the palmar as well as the dorsal surfaces. The following day there was a very extensive purpuric urticaria about the elbows, ankles and knees, and irregularly scattered over the limbs. There was no special swelling or soreness of any of the joints.

On the 8th she began to have pains in the abdomen of a cramp-like character, coming on at intervals with vomiting. The urine was clear and free from albumin; the bowels were not loose. From the 8th to the 15th, when I saw her, she had in brief the following symptoms: 1. Successive crops of most extensive cutaneous hemorrhages, chiefly in the form of urticaria, but many were deep, subcutaneous, and presented through the skin only a bluish diffuse color. There were also many smaller purpuric spots not raised above the surface of the skin. 2. The feet were swollen and the ankle-joints enlarged and tender. The other joints did not seem to be affected. 3. On the 12th the forehead became greatly oedematous, and the swelling extended to the eyelids, closing them completely. This swelling was not associated with hemorrhage. There were several spots on the face and ears. 4. Extreme general sensitiveness so that the slightest touch seemed painful. 5. Abdominal symptoms, consisting of paroxysmal attacks of colic of great severity and of obstinate vomiting. At the time of my visit the child was better than she had been for four days. She was sitting up in bed, and the face looked bright. The left cheek was swollen, tender, and presented on the mucous surface a patchy, whitish appearance. The arms were covered with fading ecchymoses. Those about the elbow were still raised from infiltration of the skin, and on the hand on both sides there were bluish subcutaneous infiltrations. The spots were not numerous on the thorax, but were tolerably abundant upon the abdomen and very numerous over the buttocks, where they presented the appearance of ordinary urticaria. The patches almost covered the skin of the face, and about the extensor surfaces of the knees. The ankles looked large, rather it seemed from subcutaneous infiltration than from involvement of the joints themselves. They were, however, painful on pressure. The feet were swollen, the skin tense, due largely to a diffuse subcutaneous infiltration with blood. The abdomen was not tender, there was no enlargement of

the liver or spleen, the heart-sounds were normal. The blood was examined by Dr. Thayer, and showed nothing special except a slight increase in the number of leucocytes. The bowels were constipated. The urine seemed normal in quantity and contained a trace of albumin, but no blood.

Dr. Finney had given various remedies without special influence. Ergot was employed without success. The solution of morphine seemed to be most effectual, allaying the pain and giving the child sleep. The child recovered completely.

CASE VIII. *Slight trauma; crops of purpura; no arthritis; severe colic with diarrhoea; acute nephritis; general anasarca; uræmia; death.*—Olive L., aged five years, referred to me by Dr. Goldsborough, of Cambridge, Md., July 11, 1891, with general anasarca.

The father has suffered much at times with rheumatism; the mother and three other children are well.

This was the first child; she had always been strong and robust.

On June 14th, just a month ago, while playing under a cherry-tree, she struck her foot against a chair, and complained very much to her mother that it hurt her. Very soon she could not move the leg, and by nightfall, it is stated, that she could not move either leg. A small congested spot was seen on one ankle, and it was thought possible that something had bitten her. The next day a rash came out on the skin of the legs, irregular patches of a bright red color, which within twelve hours turned to a dark purple. For two weeks they came out in crops, and as they disappeared œdema of the feet was noticed, and the urine became scanty. There was no hæmaturia. The bowels were regular; her appetite was poor, but she had at times severe pains in the abdomen.

Present condition. The child presents general anasarca and is very anæmic. The tongue is moist; pulse 100; no increase in tension; the temperature is normal. Upon the skin of the legs to the middle of the thighs, and upon the arms to the elbows, there are irregular brownish stains from 5 to 30 millimetres in diameter. The examination of the heart and lungs is negative; apex beat is in normal position. The abdomen is large, and there is dullness at the flanks, but the chief distention seems to be due to tympany. The spleen is not palpable, and the liver is not enlarged. The anasarca extends to the back, and is, of course, most marked on the legs and thighs. The urine was not examined at the hospital, but Dr. Goldsborough, who had made frequent tests, stated that it presented both albumin and tube casts, but no blood.

Dr. Goldsborough wrote subsequently that the condition of the patient did not improve in any way. No further attacks of purpura occurred, but she had frequently colicky pains and diarrhoea. The anasarca continued in spite of all measures, and she died with uræmic coma and convulsions.

CASE IX. *Arthritis; purpura urticans; colic and vomiting; recovery.*—Lewis J., aged twelve years, admitted January 2, 1895, with œdema of the legs, pain, and purpura.

The family is healthy; there is no history of hæmophilia. One brother has been treated in the hospital for rheumatism.

The patient has had measles, varicella, and mumps.

Present illness began December 16, 1894, with pains in the legs. The left ankle was swollen on the 21st and remained swollen up to the

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date of his visit on the 26th. It was painful only on motion. Red blotches came out on the 20th and 21st. He had no other swelling and no abdominal pain at this attack.

I saw him on the 26th in the dispensary, and noted that he was a healthy-looking boy; gums not spongy; tongue clean. Both legs are swollen and are œdematous, and the skin shows remnants of a copious rash of purpura urticæans. The tissues about the left ankle are much swollen and œdematous and the joint is stiff. He is not able to walk on it. The purpuric rash extends up the trunk as far as the chest. The heart-sounds are clear. This day when we saw him the rash was fading. On the same day after returning home he had a very severe attack, which began with vomiting, and was associated with great pain in the abdomen. This persisted on and off for three days. The pain was griping, recurring in spells, getting very much worse at intervals, and caused him to twist and squirm about in bed. A fresh crop of purpura came out with this attack. He has been getting better, but his legs have remained swollen.

On admission he had a fairly good color. The gums are a little swollen, but not spongy. The legs show numbers of small, fading purpuric spots. There is a little puffiness, but the ankles are no longer swollen. The edge of the spleen could not be felt.

The boy did very well, the swelling disappeared from the legs, and he has been up and about.

On the 15th he had a fresh eruption on the legs and thighs, most of them cutaneous and purpuric in character; others deep in the subcutaneous tissues, looking like *tache bleuetée*. The legs became somewhat swollen. He had no colic. There was no albumin in the urine.

CASE X. *Repeated attacks of epistaxis and bleeding from the gums, with purpura. Subsequently attacks characterized by chills, colic, and purpura urticæans; recovery.*—B. W., about thirty years, Alexandria, seen February 1, 1892, complaining of swelling of the gums and a tendency to bleed.

The patient comes of a perfectly healthy family, in which there is no special tendency to bleeding.

In October, 1889, he had his first attack of bleeding from the nose and gums. It began on Monday and continued until Friday. Dr. Hamilton, then of Washington, plugged the nostrils. He was in bed at this time for two weeks.

A second attack began two weeks subsequently, with nose-bleeding, swelling of the gums, and numerous purple blotches appeared on his skin. In this attack the bleeding stopped spontaneously. He was well then until December, 1890, when he had severe bleeding from the gums, and three weeks subsequently another attack, in which he bled also from the nose. He was ill for two days, and at this time he went to New York to consult Dr. Jacobi. He then remained well for some months. In a recurrence he went to Germany and consulted Professor Baümle, who very kindly referred him to me.

During the past year the attacks have changed entirely in character; there have been at least half a dozen, the last one four weeks ago. They now invariably begin with severe pains in the abdomen and vomiting. This is followed by or associated with a chill. On one occasion it lasted an hour; then within the day bleeding begins from the gums, and within from twenty-four to thirty-six hours the skin of the

legs and arms (and once of the face) become covered with raised bluish spots. The chill comes first, as a rule, and is not always very severe. Lately he has had no epistaxis, only the bleeding from the gums. The pains in the abdomen are of great intensity and are like ordinary colic. They rarely last more than half an hour to an hour. The vomiting has sometimes been severe; he never brought up any blood; never passed blood in the stools or with the urine. He has never had any pains in the joints.

The patient looks pale, but he is not profoundly anæmic; the pulse is good, a little jerky; the gums are swollen, spongy, but are not bleeding. The skin of the arms and legs is covered with remnants of the attack of four weeks ago; some of the stains are large, as if the rash had been purpura urticans.

The heart-sounds were clear. The spleen was not enlarged.

Patient sought direction with reference to the possible prevention of the attacks. He was ordered Fowler's solution and the juice of half a lemon twice daily.

I heard of this patient on the 13th of February, 1895. Dr. O'Brien tells me that, with the exception of one slight attack shortly after he saw me, he has had no outbreak. He took the Fowler's solution at intervals for a long time, and attributes his recovery to it.

CASE XI. *For four years recurring attacks of colic with hæmatemesis, melæna, purpura, and arthritis.*—Annie R., aged eighteen years, seen at the Dermatological Dispensary with Dr. Gilchrist, June 29, 1895, complaining of an extensive hemorrhagic eruption on the arms and legs.

In July, 1891, when she was fourteen years old, she had the first attack, which began with vomiting and cramps in the abdomen. From her mother's description it must have been of great severity, as the stomach symptoms persisted for five or six weeks. The cramps were of such severity that she went off into spasms. At first the vomitus was not colored; subsequently she vomited blood, and she passed blood from the bowels and in the urine, and once coughed up blood. About eight weeks after her illness began, before she had recovered her strength, blotches appeared on the arms and legs, and she had pain and swelling in the knees, elbows, and fingers. In this attack she was in bed very ill, and crops of purpura recurred on and off until January. Then she got better and remained well until the following August, when she had a second attack, which was not so severe, as she had not to go to bed, but it had the same characters of cramp in the abdomen, much vomiting, and the skin eruption. She has had no arthritis since, and no bleeding from the mucous membranes. During the past two years the attacks have recurred with great frequency, and she no sooner recovers from one attack than another begins to develop. She has not, however, had cramps for two years.

Present condition. She is a healthy-looking, well-nourished girl; color is good; tongue is clean. The gums are not spongy (her mother says they never have been swollen); the tonsils are not enlarged. None of the joints are swollen. There is an extensive hemorrhagic eruption on the arms and legs, chiefly on the extensor surfaces of the arms and about the elbows. The rash does not extend to the chest and back and there are no spots on the hands or on the face. The skin of the lower extremities is extensively involved; the ankles are a

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little swollen and puffy and the skin over them shows many fading spots. The eruption is very abundant about the knees, where the hemorrhages in places are confluent. Some of the patches are a little raised. The eruption is somewhat symmetrically distributed on the knees. It is also very abundant on the thighs.

Patient seen again October 7, 1895. She has been taking Fowler's solution, and has been in many ways much better. Through the summer she has had four attacks, one with vomiting and colic. The vomiting began in the evening about six o'clock and lasted until 1 A.M. The spots came out with great rapidity and were very extensive over the arms and legs. In one of the attacks the knees and ankles were swollen and tender. In one of the attacks Dr. Gilchrist removed a small spot of the purpura and found, as his sections show beautifully, that the hemorrhage was chiefly about the hair follicles.

At the time of the present visit the skin is almost entirely clear.

The visceral lesions of the various types of erythema have been carefully studied by many observers. In erythema nodosum, endocarditis and pericarditis have been frequently described. Lexin¹ in 58 cases met with heart complication six times, and Stephen Mackenzie² found ten instances of heart affection in 108 cases of erythema nodosum. In the type of erythema characterized by hemorrhages and oedema with pains in the joints—the affection known as purpura, or peliosis, rheumatica—the visceral complications are, as Kaposi remarks, much more frequent than in erythema nodosum. They are chiefly albuminuria with nephritis and acute endocarditis.

Ever since Willan (1808) described a case of purpura associated with violent vomiting, excruciating pains in the bowels, and anasarcaous swelling of the legs, thighs, and hands, cases have been reported with this remarkable symptom-complex. One of the earliest cases by Ollivier³ is of especial interest inasmuch as with the ecchymoses there was also simple oedema of the eyelids and of the hands.

Henoeh⁴ in 1874, and also in the various editions of his *Vorlesungen ueber Kinderkrankheiten*, called attention to this combination of symptoms.

Couty⁵ described the condition as a special form of purpura of nervous origin.

Of late years an attempt has been made to separate these cases as examples of an independent disease, which has been called *Henoeh's Purpura*. v. Dusch and Hoche, in Henoeh's *Festschrift* for 1890, have given an exhaustive description of the cases, and a tabulated list of seventeen cases in children, and twenty-two in adults. They conclude that the clinical picture presents differences from the forms of purpura heretofore recognized, which are sufficient to establish an independent and well-defined type of disease.

¹ Charité Annalen, Bd. III.
Berliner klin. Wochenschrift, 1871.
Gazette Hebdomadaire, 1876.

² Clinical Society's Transactions, vol. xix.
³ Archives de Med., 1827.

Though Willan gave a graphic description of a case, this symptom-group has not attracted special attention from English and American writers. Among the 54 references in the article by v. Dusch and Hoche there were only three English and no American cases. Of the recent text-books, that of McCull Anderson¹ makes, as far as I can see, no mention of it. Crocker² refers to two cases with gastro-intestinal symptoms. Malcolm Morris³ is silent on the subject, with the exception of a brief reference to cardiac complications in peliosis rheumatica. Kaposi⁴ lays much stress on the internal complications, among which, under erythema multiforme, he mentions hemorrhage into and gangrene of the pharyngeal mucosa, hemorrhage from the kidneys, severe arthritis, endo- and pericarditis, and pneumonia; in erythema nodosum, besides the colic, acute nephritis; and in purpura or peliosis rheumatica, hæmaturia, and endocarditis. In the works on skin diseases by American authors the special symptom-group to which I refer is scarcely mentioned.

In addition to those collected by v. Dusch and Hoche there are cases reported by Russell,⁵ McKay,⁶ Dutt,⁷ Collie,⁸ Monillot,⁹ Prentiss,¹⁰ and two cases by Musser.¹¹ Other cases are reported by Silbermann.¹²

When one considers how benign, as a rule, in all its types, is the course of exudative erythema, the mortality of the cases with severe visceral complications is remarkable. Of sixty-one cases (including those in v. Dusch and Hoche's table, the additional ones which I have collected, the 11 cases here reported), there were thirteen deaths, a percentage of 21.3.

Of the visceral manifestations by far the most common are the

Gastro-intestinal crises, which are claimed as the distinguishing characteristic of Henoch's purpura. The features are very varied. There may be simple colic of all grades of intensity, from a transient, readily borne belly-ache to an attack of such agony and duration that repeated hypodermics of morphine have to be given. Vomiting and diarrhoea are frequent, but not necessary, accompaniments of the attack. In some cases the vomiting occurs without the colic, or a severe attack of vomiting and diarrhoea may accompany the outbreak of the purpura. The attack bears no relation whatever to food, and may come on abruptly in a person in excellent health, and in *Case II.* (in which the colic occurred alone so frequently) the boy's mother could never notice any circumstances which increased the liability to the trouble. An identical form of colic is described in the so-called angio-neurotic œdema, many cases

¹ Diseases of the Skin.

² Diseases of the Skin, 1891.

³ Pathologie und Therapie der Hautkrankheiten, Vierte Auflage, 1893.

⁴ British Medical Journal, 1883, ii.

⁵ Ibid., 1888, ii.

⁶ Ibid., 1888, ii.

⁷ Transactions of the Academy of Medicine, Ireland, vol. v.

⁸ Ibid., 1888, ii.

⁹ Ibid., 1888, ii.

¹⁰ Ibid., 1888, ii.

¹¹ Ibid., 1888, ii.

¹² Ibid., 1888, ii.

² Diseases of the Skin, 2d edition, p. 115.

⁶ Ibid., 1886, ii.

⁸ Lancet, 1891, i.

⁹ Ibid., 1886, ii.

¹⁰ Ibid., 1886, ii.

¹² Henoch's Festschrift.

of which should doubtless be reckoned with this type of erythema exudativum. In fact, in one of the attacks in *Case II.*, oedematous swellings occurred without purpura. In the remarkable family which I described a few years ago,¹ in which acute circumscribed oedema had occurred in five generations, the gastro-intestinal crises formed a special feature of the attacks. Of great interest in this connection is the patient whose history is given under *Case I.*, in whom for more than two years the attacks have been characterized by fever, delirium, and gastro-intestinal crises of great intensity, but without skin lesions.

It is possible that among the cases of recurring gastro-intestinal crises of unknown etiology, such as have been reported by Leyden, some belong in this category.

Nephritis, the most serious complication, was present in five of my cases. In the total number (61) already referred to there were fourteen cases, of which four died. In the mildest grade there is only a trace of albumin, with a few tube casts, as in *Case VII.*; while the more aggravated cases present all the symptoms of an acute hemorrhagic nephritis. Recurring hemorrhages may take place from the kidneys, as in *Case XI.*, without ensuing nephritis. In other instances, as in *Case VIII.*, the nephritis dominates the scene almost from the outset, and may prove fatal within a few months. The amount of albumin present varies from a well-marked trace, as in *Case VII.*, to large quantities, as in *Cases III., IV., and VIII.* The tube casts were hyaline and epithelial, and often contained blood-corpuscles. Dropsy was present in two of my cases. In a majority of the cases the recovery is complete, but in rare instances the nephritis becomes chronic. The only case, so far as I know, in the literature has been reported by Dr. Prentiss, of Washington. At the Association of American Physicians in May, 1890, he showed a patient aged thirteen years, who in March, 1889, had his first attack, with pain in the abdomen, vomiting, arthritis, and purpura. A second attack followed in September and a third attack in November of the same year, in which, in addition to the pain in the abdomen, there were hemorrhages from the bowels and bladder. In this attack he was delirious, and had dyspnoea and swelling of the forehead. On December 17, 1889, and on February 27, 1890, he had relapses. After this, to the date of reporting, he had recurring attacks at intervals of a month or six weeks. The urine contained blood, and on one occasion it was diminished in amount and had much albumin. A point of particular interest in this case was the fact that he had large hemorrhages into the skin, which became gangrenous and sloughed. At our meeting this year—May, 1895—Dr. Prentiss brought the patient before us again. The boy has now chronic nephritis, with dropsy, albuminuric retinitis, increased tension, and stiff

¹ American Journal of Medical Sciences, April, 1888.

arteries. In this instance the acute nephritis of 1889, associated with the extensive erythema exudativum, laid the foundation of the present chronic nephritis.

Next in order of serious import is the hemorrhage from the various mucous membranes, which were present in five of my cases. There was bleeding from the nose in three, in one of which the nostrils had to be plugged on several occasions. Case XI. had hemorrhages from the stomach and bowels, and coughed up blood. Slight hemoptysis occurred in another case. In three there were hemorrhages from the kidneys. In Case X. the gums were swollen and spongy and bled profusely in many of the attacks. Hemorrhage from the bowels is the most common, and occurred in thirty of the thirty-nine in v. Dusch and Hoche's tables, and in thirty-nine of the total sixty-one cases. In one case only of their list did the gums bleed, and in three the sputa were bloody; in no instance, I believe, did death occur directly as a result of hemorrhage from the mucous membranes.

Cardiac complications were not present in my cases; the murmur in one case quickly disappeared. Endocarditis is rare, having occurred in only two cases in the total series. Pericarditis occurred in three cases. This is a much smaller percentage of heart complications than in the cases of erythema nodosum collected by Stephen Mackenzie. I have only once seen cardiac complications in peliosis rheumatica. The case has been reported by Dr. Musser¹ who very kindly took me one day to see the case. The patient had extensive peliosis rheumatica with pericarditis and a gangrenous slough on the uvula.

The respiratory organs are less frequently involved. In Case II. the recurring attacks of cough with bronchitis are, I believe, part of the affection. The sputa always indicated bronchitis, and at times the cells of the alveolar epithelium have been unusually abundant. The cough was often dry, very annoying and persistent, and there was once or twice sneezing. In v. Dusch and Hoche's list of thirty-nine cases pleurisy is mentioned twice, bronchitis once, and pneumonia twice, both fatal cases. In Case IX. of my series pneumonia followed the disease and proved fatal. In this connection it is interesting to note the statement of Lewin, who found among seventy cases of erythema nodosum in the literature four deaths from pneumonia.

The onset of the attack may be with a chill, as in Case X.; more frequently the skin lesions are preceded by feelings of indisposition and slight gastric disturbance. The curious prodrome, which has recurred during so many years in Case I., great coldness of the feet, I have not seen mentioned. Fever is a frequent accompaniment of the attack. In cases which have the type of peliosis rheumatica the temperature may

¹ Transactions of the Association of American Physicians, vol. vi. p. 281.

range from 101° to 103° , or even higher, for several days; there may, however, be the most extensive skin lesion without pyrexia. At the height of the attack delirium may occur.

Perhaps the most extraordinary and distressing feature of the disease is the tendency to recur, which is so noticeable in all types of exudative erythema. In Case XI., in which the disease has persisted for four years, during the first two years the girl no sooner recovered from one attack than another began. In Case I., the patient's life is, as he says, a burden, owing to the recurrence every month or two of the severe colic.

Arthritis was present in five cases of my series, and in thirty-two of the collected cases. The periarticular more often than the intra-articular tissues are affected, and the chief part of the swelling is often due to effusion in the tendon sheaths about the joints, and, as in Case II., the patient may be able to walk quite well with the ankles much swollen.

The anatomical conditions associated with the visceral symptoms are not well understood, but the changes in the gastro-intestinal canal, at least, are probably the counterpart of those which occur in the skin, namely, exudation of serum, swelling, hemorrhages, and in rare instances necrosis. At autopsy hemorrhages have been found in the internal organs. A remarkable case is given by Silbermann in Henoch's *Festschrift* for 1890. A child, aged ten years, was attacked on December 15, 1887, with fever and pain in the knees. On the 16th there was an outbreak of purpura, with colic, hæmatemesis, and melæna. After persisting for three days the symptoms disappeared. The attack recurred in January with great severity, and on the 20th, 21st, and 22d there were signs of an acute peritonitis. The autopsy showed an acute purulent peritonitis, which had resulted from a perforation at the fundus of the stomach. There was no ulceration in the bowels, but the mucosa was swollen and congested. There were necrotic foci in the stomach and intestines, and thrombi were found in some of the bloodvessels. In a few instances necrosis and gangrene have occurred on the skin, as mentioned in connection with Dr. Prentiss's case.

The outbreak of this type of erythema multiforme during gonorrhœa, as in Case V. of my series, is interesting in connection with the etiology, since this is one of the infections with which a severe type of true purpura hæmorrhagica occurs, and of which a fatal instance has been recorded by Patterson.¹

I purposely refrain from discussing the relation of these conditions to rheumatism, and the question of the infective character of some forms

¹ British Medical Journal, 1886, i.

of erythema exudativum. I have nothing to say which would help to clear the existing confusion or which is not already better said in journals and monographs easy of access. My purpose in this paper has been to call attention to the importance of the visceral manifestations of the disease.

In Cases II. and X., arsenic appears to have been beneficial ; in other instances it did not seem to do good.

CLXIV

*Johns Hopkins Hospital Historical Club,
October 29, 1897.*

JOHN KEATS

THE APOTHECARY POET

BY

WILLIAM OSLER

BALTIMORE
THE FRIEDENWALD COMPANY
1896

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JOHN KEATS—THE APOTHECARY POET.

We have the very highest authority for the statement that "the lunatic, the lover, and the poet, are of imagination all compact." In a more comprehensive division, with a keener discernment, Plato recognizes a madness which is not an evil, but a divine gift, and the source of the chiefest blessings granted to men. Of this divine madness poetry occupies one of the fourfold partitions. Here is his definition: "The third kind is the madness of those who are possessed by the Muses; which, taking hold of a delicate and virgin soul, and there inspiring frenzy, awakens lyrical and all other numbers; with these adorning the myriad actions of ancient heroes for the instruction of posterity. But he who, having no touch of the Muses' madness in his soul, comes to the door and thinks that he will get into the temple by the help of art—he, I say, and his poetry are not admitted; the sane man disappears and is nowhere when he enters into rivalry with the madman."

Here, in a few words, we have expressed the very pith and marrow of the nature of poetry, and a clearer distinction than is drawn by many modern writers of the relation of the art to the spirit, of the form to the thought. By the help of art, without the Muses' madness, no man enters the temple. The poet is a "light and winged and holy thing," whose inspiration, genius, faculty, whatever we may choose to call it, is allied to madness—he is possessed or inspired. Oliver Wendell Holmes has expressed this very charmingly in more modern terms, speaking of his own condition when composing

the Chambered Nautilus. "In writing the poem I was filled with a better feeling, the highest state of mental exaltation and the most crystalline clairvoyance that had ever been granted to me—I mean that lucid vision of one's thought and all forms of expression which will be at once precise and musical, which is the poet's special gift, however large or small in amount or value."* To the base mechanical of the working-day world, this lucid vision, this crystalline clairvoyance and mental exaltation is indeed a madness working in the brain, a state which he cannot understand, a Holy of Holies into which he cannot enter.

I.

When all the circumstances are taken into account, the English Parnassus affords no parallel to the career of Keats—Adonais, as we love to call him—whose birthday, one hundred years ago, we celebrate to-day.

Born at the sign of the "Swan and Hoop," Moorgate Pavement, the son of the head ostler, his parentage and the social atmosphere of his early years conspired to produce an ordinary beer-loving, pugnacious cockney; but instead there was fashioned one of the clearest, sweetest, and strongest singers of the century, whose advent sets at naught all laws of heredity, as his development transcends all laws of environment.

Keats' father succeeded to "Mine Host of the Swan and Hoop," but died when the poet was only eight years old. His grandmother was in comfortable circumstances, and Keats was sent to a school at Enfield, kept by the father of Charles Cowden Clarke. Here among other accomplishments he developed his knuckles, and received a second-hand introduction to the Greek Pantheon. He is described by one of his schoolfellows as "the pet prize-fighter with terrier courage," but in the last two years at school he studied hard and took

* In a private letter which is published in a notice of Dr. Holmes, J. H. H. BULLETIN, October, 1894.

all the prizes. The influence of the Clarkes upon Keats was strong and formative, particularly that of the younger one, Charles Cowden, who was an usher in the school. In the poem addressed to him he frankly acknowledges this great debt, "you first taught me all the sweets of song."

In 1810 his mother died of consumption, and during a long illness Keats nursed her with incessant devotion.

On the completion of his fifteenth year he was removed from school and apprenticed to Mr. Hammond, a surgeon at Edmonton. The terms of the old indenture as surgeon's apprentice are quaint enough. I have one of my uncle, Edward Osler, dated 1811. The surgeon, for a consideration of £40, without board, undertook the care and education for five years of the apprentices, of whom there were often four or five. The number of specific negatives in the ordinary indenture indicates the rough and ready character of the Tom Sawyers of that date. The young apprentice promised not "to haunt taverns or playhouses, not to play at dice or cards, nor absent himself from his said master's service day or night unlawfully, but in all things as a faithful apprentice he shall behave himself towards his said master and all his during the said term."

We know but little of the days of Keats' apprenticeship. A brother student said, "he was an idle, loafing fellow, always writing poetry." In 1814, in the fourth year of his indenture, the pupil and master had a serious quarrel, and the contract was broken by mutual consent. It would appear from the following sentence in a letter to his brother, that more than words passed between them: "I daresay you have altered also—every man does—our bodies every seven years are completely fresh material'd. Seven years ago it was not this hand that clinch'd itself against Hammond."*

At the end of the apprenticeship the student "walked" one

*The extracts are taken from the new edition of the *Letters* by Forman. Reeves & Turner, London, 1895.

of the hospitals for a time before presenting himself at the College of Surgeons or the Apothecary's Hall. Keats went to the, at that time, United Hospitals of Guy's and St. Thomas, where he studied during the sessions of 1814-15 and 1815-16. He became a dresser at Guy's in the latter year under Mr. Lucas, and on July 25, 1816, he passed the Apothecary's Hall. The details of Keats' life as a medical student are very scanty. In after years one or two of his fellow-students placed on record their impressions of him. He doesn't seem to have been a very brilliant student. Poetry rather than surgery was followed as a vocation; one of his fellow-students says, "all other pursuits were to his mind mean and tame." Yet he acquired some degree of technical skill, and performed with credit the minor operations which fell to the hand of a dresser. He must have been a fairly diligent student to have obtained even the minimum qualifications of the "Hall" before the completion of his twenty-first year. In the *Biographical History of Guy's Hospital* Dr. Wilks states that Sir Astley Cooper took a special interest in Keats.

What attraction could the career of an apothecary offer to a man already much "travelled in the realms of gold," and who was capable at twenty of writing such a sonnet as that on Chapman's Homer? So far as we know he never practiced or made any effort to get established; and in 1817 he abandoned the profession, apparently not without opposition. In a letter to his friend Brown, dated September 23d, 1819, he says, "In no period of my life have I acted with any self-will but in throwing up the apothecary profession."

During the next four years he led, to use his own words, "a fitful life, here and there, no anchor." While a student he had made friends in a literary circle, of which Leigh Hunt and Haydon, the artist, were members, and he had a number of intimates—Brown, Taylor, Bailey, Dilke, and others—among the coming men in art and science. From his letters to them, to his brother George (who had emigrated with his wife to America), and to his sister Fanny, we glean glimpses

of his life at this period. His correspondence reveals, too, so far as it can, the man as he was, his aspirations, thoughts, and hopes.

II.

The spirit of *negative capability* dominated these years—the capability, as he expresses it, “of being in uncertainties, mysteries, doubts, without any irritable searching after fact and reason.” The native hue of any resolution which he may have entertained—and we shall learn that he had such—was soon sicklied o’er, and he lapsed into idleness so far as any remunerative work was concerned. A practical woman like Mrs. Abey, the wife of the trustee of his mother’s estate, condoned his conduct with the words “the Keatses were ever indolent, that they would ever be so, and that it was born in them.” In a letter to his brother he uses the right word. Here is his confession: “This morning I am in a sort of temper, indolent and supremely careless—I long after a stanza or two of Thomson’s ‘Castle of Indolence’—my passions are all asleep from my having slumbered till nearly eleven and weakened the animal fibre all over me to a delightful sensation about three degrees this side of faintness. If I had teeth of pearl and the breath of lilies, I should call it languor; but as I am* I must call it laziness. . . . This is the only happiness and is a rare instance of the advantage of the body overpowering the mind.”

The gospel of “living” as against that of “doing,” which Milton preached in the celebrated sonnet on his blindness, found in Keats a warm advocate. “Let us not, therefore,” he says, “go hurrying about and collecting honey, bee-like buzzing here and there for a knowledge of what is not to be arrived at, but let us open our leaves like a flower, and be passive and receptive, budding patiently under the eye of Apollo, and taking truths from every noble insect that favors

* Especially as I have a black-eye.

us with a visit." Fatal to encourage in an active man of affairs, this dreamy state, this passive existence, favors in "bards of passion and of mirth" the development of a fruitful mental attitude. The dreamer spins from his "own inwards his own airy citadel"; and as the spider needs but few points of leaves and twigs from which to begin his airy circuit, so, Keats says, "man should be content with as few points to tip with the fine web of his soul, and weave a tapestry empyrean, full of symbols for his spiritual eye, of softness for his spiritual touch, of space for his wanderings, of distinctness for his luxury." All the while Keats was "budding patiently," feeling his powers expand, and with the "viewless wings Poesy" taking ever larger flights. An absorption in ideals, a yearning passion for the beautiful, was, he says, his master-passion. Matthew Arnold remarks it was with him "an intellectual and spiritual passion. It is 'connected and made one' as Keats declares that in his case it was 'with the ambition of the intellect.' It is, as he again says, the mighty abstract Idea of Beauty in all things." Listen to one or two striking passages from his letters: "This morning Poetry has conquered,—I have relapsed into those abstractions which are my only life." "I feel more and more every day, as my imagination strengthens, that I do not live in this world alone, but in a thousand worlds. No sooner am I alone than shapes of epic greatness are stationed round me, and serve my spirit the office which is equivalent to a King's body-guard. Then 'Tragedy with scepter'd pall comes sweeping by.'" "What the imagination seizes as beauty must be truth," the expression in prose of his ever memorable lines,

"Beauty is truth, truth beauty,—that is all
Ye know on Earth, and all ye need to know."

III.

Keats' first published work, a small volume of poems issued in 1817, contained the verses written while he was a student

and before he had abandoned the profession. With the exception of one or two small pieces it contained nothing of note. The sonnet on Chapman's Homer, written while he was a pupil at Guy's, was the most remarkable poem of the collection. In 1818 appeared *Endymion*, a poetic romance, an ambitious work, which, in the autumn of the year, was mercifully "cut up" in the *Quarterly* and in *Blackwood*. Popularly these reviews are believed to have caused Keats' early death—a belief fostered by the jaunty rhyme of Byron:

"'Tis strange the mind, that very fiery particle,
Should let itself be snuffed out by an article."

The truth is, no event in Keats' life so warmly commends him to us, or shows more clearly the genuine robustness of his mind than his attitude in this much discussed episode. In the first place, he had a clear, for so young a man an extraordinarily clear, perception of the limitation of his own powers and the value of his work. The preface to *Endymion*, one of the most remarkable ever written, contains his own lucid judgment. He felt that his foundations were "too sandy," that the poem was an immature, feverish attempt, in which he had moved, as he says, from the leading-strings to the go-cart. Did any critic ever sketch with firmer hand the mental condition of a young man in transition? "The imagination of a boy is healthy, and the mature imagination of a man is healthy; but there is a space of life between, in which the soul is in a ferment, the character undecided, the way of life uncertain, the ambition thick-sighted; thence proceeds mawkishness, and all the thousand bitters which those men I speak of must necessarily taste in going over the following pages." It cannot be denied that there are in *Endymion*, as the *Quarterly Review* puts it, "the most incongruous ideas in the most uncouth language," but the poem has lines of splendid merit, some indeed which have passed into the daily life of the people.

Naturally the criticism of the *Quarterly* and of *Blackwood* rankled deeply in his over-sensitive heart, but after the first

pangs he appears to have accepted the castigation in a truly philosophic way. In a letter to his friend Hersey, dated Oct. 9th, 1818, he writes, "Praise or blame has but a momentary effect on the man whose love of beauty in the abstract makes him a severe critic in his own works. My own domestic criticism has given me pain without comparison beyond what *Blackwood* or the *Quarterly* could possibly inflict,—and also when I feel I am right, no external praise can give me such a glow as my own solitary re-perception and ratification of what is fine. J. S. is perfectly right in regard to the slipshod Endymion. That it is so is no fault of mine. No!—though it may sound a little paradoxical, it is as good as I had power to make it—by myself." And he adds, "I will write independently,—I have written independently *without judgment*. I may write independently, and *with judgment* hereafter. The Genius of Poetry must work out its own salvation in a man." A young man of twenty-three who could write this, whatever else he possessed, had the *mens sana*, and could not be killed by a dozen reviews.

In June 1820 appeared Keats' third work, "*Lamia, Isabella, The Eve of St. Agnes, and other poems*," which placed him in the first rank of English writers. I will quote briefly the criticisms of two masters.

"No one else in English poetry save Shakespeare," says Matthew Arnold, "has in expression quite the fascinating facility of Keats, his perfection of loveliness. 'I think,' he said humbly, 'I shall be among the English poets after my death.' He is; he is with Shakespeare."

Lowell, speaking of his wonderful power in the choice of words, says, "Men's thoughts and opinions are in a great degree the vassals of him who invents a new phrase or reapplies an old one. The thought or feeling a thousand times repeated becomes his at last who utters it best. . . . As soon as we have discovered the word for our joy or our sorrow we are no longer its serfs, but its lords. We reward the discoverer of an anæsthetic for the body and make him a member of all the

societies, but him who finds a nepenthe for the soul we elect into the small Academy of the Immortals."

And I will add a criticism on the letters by Edward Fitzgerald: "Talking of Keats, do not forget to read Lord Houghton's *Life and Letters of him*; in which you will find what you may not have guessed from his poetry (though almost unfathomably deep in that also) the strong masculine sense and humor, etc., of the man; more akin to Shakespeare, I am tempted to think, in a perfect circle of poetic faculties, than any poet since."

IV.

Very few indications of his professional training are to be found in Keats' letters; fewer still in the poems. Referring to his studies, he says, in one of the early poems (the epistle to George Felton Mathew), "far different cares beckon me sternly from soft Lydian airs." During the four years from 1817 to 1820 he made fitful efforts to bestir himself into action, and on several occasions his thoughts turned toward his calling. In a letter to his brother, written in February, 1819, he says, "I have been at different times turning it in my head whether I should go to Edinburgh and study for a physician; I am afraid I should not take kindly to it; I am sure I could not take fees—and yet I should like to do so; it is not worse than writing poems and hanging them up to be fly-blown on the Review shambles." In 1818 he wrote to his friend Reynolds, "Were I to study physic, or rather medicine, again, I feel it would not make the least difference in my poetry; when the mind is in its infancy a bias is in reality a bias, but when we acquire more strength, a bias becomes no bias," adding that he is glad he had not given away his medical books, "which I shall again look over, to keep alive the little I know thitherwards." In May, 1820, when convalescent from the first attack of hæmoptysis, he wrote to Dilke, "I have my choice of three things—or at least two—South America or surgeon to an Indiaman, which last will be my fate." A year before,

at
 in a letter to Miss Jeffreys, he spoke of voyaging to and from India for a few years, but in June, 1819, he tells his sister that he has given up the idea of an Indiaman, and that he "was preparing to enquire for a situation with an apothecary." Allusions to or analogies drawn from medical subjects are rare in his letters. In one place, in writing from Devonshire, he says, "When I think of Wordsworth's sonnet, 'Vanguard of Liberty! Ye men of Keats!' the degraded race about me are *pulvis ipecac simplex*—a strong dose."

He played a medical prank on his friend Brown, who had let his house to a man named Nathan Benjamin. The water which furnished the house was in a tank lined with lime, which impregnated the water unpleasantly. Keats wrote the following short note to Brown:

Sir:—By drinking your damn'd tank water I have got the gravel. What reparation can you make to me and my family?

NATHAN BENJAMIN.

Brown accordingly surprised his tenant with the following answer:

Sir:—I cannot offer you any remuneration until your gravel shall have formed itself into a stone, when I will cut you with pleasure.
 C. BROWN.

In a letter to James Rice he tells one of the best maternal impression stories extant: "Would you like a true story? There was a man and his wife who, being to go a long journey on foot, in the course of their travels came to a river which rolled knee-deep over the pebbles. In these cases the man generally pulls off his shoes and stockings and carries the woman over on his back. This man did so. And his wife being pregnant, and troubled, as in such cases is very common, with strange longings, took the strangest that ever was heard of. Seeing her husband's foot, a handsome one enough, looked very clean and tempting in the clear water, on their arrival at the other bank she earnestly demanded a bit of it. He being an affectionate fellow, and fearing for

the comeliness of his child, gave her a bit which he cut off with his clasp-knife. Not satisfied, she asked for another morsel. Supposing there might be twins, he gave her a slice more. Not yet contented, she craved another piece. 'You wretch,' cries the man, 'would you wish me to kill myself? Take that,' upon which he stabbed her with the knife, cut her open, and found three children in her belly: two of them very comfortable with their mouths shut, the third with its eyes and mouth stark staring wide open. 'Who would have thought it!' cried the widower, and pursued his journey."

The estate of Keats' mother was greatly involved, and it does not appear that he received much from the trustee, Mr. Abbey. His books were not successful, and having no love for the ordinary hack work in literature, he was largely dependent upon the bounty of his friends, from whom in several of the letters the receipt of money is acknowledged. Who could resist a charming borrower who could thus write: "I am your debtor; I must ever remain so; nor do I wish to be clear of my rational debt; there is a comfort in throwing oneself on the charity of one's friends—'tis like the albatross sleeping on its wings. I will be to you wine in the cellar, and the more modestly, or rather, indolently I retire into the backward bin, the more Falerne will I be at the drinking." We must remember, however, that Keats had reasonable expectations. He says to Haydon, December 23d, 1818, "I have a little money, which may enable me to study and to travel for three or four years." He had enough wisdom to try to be "correct in money matters and to have in my desk," as he says, "the chronicles of them to refer to and to know my worldly non-estate."

To the worries of uncertain health and greatly embarrassed affairs there were added, in the summer of 1819, the pangs, one can hardly say of disprized, but certainly of hopeless love. Writing to his friend Reynolds, May 3d, 1818, in comparing life to a large mansion of many apartments, he says patheticallly that he could only describe two; the first, Infant or

Thoughtless Chamber, in which we remain as long as we do not think; and the second, the Chamber of Maiden-Thought, in which at first we become intoxicated with the light and atmosphere, until it gradually darkens and we see not well the exit and we feel the "burden of the mystery." For his friends he hopes the third Chamber of Life may be filled with the wine of love and the bread of friendship. Poor fellow! Within a year the younger Aphrodite, in the shape of Fanny Brawne, beckoned to him from the door of this third chamber. Through her came no peace to his soul, and the Muses' inspiration was displaced by a passion which rocked him as "the winds rock the ravens on high"—by Plato's fourth variety of madness, which brought him sorrow and "leadened despair." The publication of Keats' letters to Fanny Brawne can be justified; it must also be regretted. While there are some letters which we should be loth to miss, there are others the publication of which have wronged his memory. Whether of a young poet as Keats, or of an old philosopher as Swift, such maudlin cooings and despairing wails should be ruled out of court with the writings of paranoiacs.

V.

Keats' mother died of consumption in 1810. In the winter of 1817-18 he nursed his brother Tom with the same disease. In the spring they spent several months together in Devonshire, which Keats compares to Lydia Languish, "very entertaining when it smiles, but cursedly subject to sympathetic moisture." In the summer he took a trip through Scotland, and in the Island of Mull caught a cold, which settled in his throat. In a letter dated Inverness, August 6th, he speaks of his throat as in "a fair way of getting quite well." On his return to Hampstead we hear of it again; and in September he writes "I am confined by Sawrey's mandate in the house now, and have as yet only gone out in fear of the damp night." During the last three months of the year he again nursed his brother Tom, who died in December. From this time the

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continual references to the sore throat are ominous. On December 31st he complains to Fanny Keats that a sore throat keeps him in the house, and he speaks of it again in January letters. In a February letter to his sister he says that the sore throat has haunted him at intervals for nearly a twelvemonth. In June and July he speaks of it again, but the summer spent in the Isle of Wight and at Winchester did him good, and in September he writes to one of his friends that he had got rid of his "haunting sore throat." I have laid stress upon this particular feature, as there can be but little question that the tuberculosis of which he died began, as is common enough, with this localization. For more than a year there had been constant exposure while nursing his brother, and under conditions, in Devonshire at least, most favorable to infection. The depression of the Review attacks in the autumn of 1818 must also be taken into account. Through the summer of 1818 there are occasional references to an irritable state of health apart from the throat trouble—unfitting him for mental exertion. "I think if I had a free and healthy and lasting organization of heart and lungs as strong as an ox's, so as to bear unhurt the shock of an extreme thought and sensation without weariness, I could pass my life very nearly alone, though it should last eighty years. But I feel my body too weak to support me to the height, I am obliged continually to check myself and be nothing." If we may judge by the absence of any references in the letters, the autumn of the year was passed in good health, but on December 20th he wrote that he was "fearful lest the weather should affect my throat, which on exertion or cold continually threatens me."

On February 3d the smouldering fires broke out, after he had been exposed in a stage ride, in an attack of hæmoptysis. From this date we can trace in the letters the melancholy progress of the disease. In April and May the lung symptoms became less pronounced, but in spite of much nervous irritability and weakness, he was able to direct the publication of

his third little volume of poems. On June 22d he had a return of the spitting of blood, which lasted several days. The serious nature of the disease was by this time evident to both the patient and his physicians. He acknowledges that it will be a long, tedious affair, and that a winter in Italy may be necessary. "'Tis not yet consumption," he writes Fanny Keats, "but it would be were I to remain in this climate all the winter." This, too, was a time of terrible mental distress, as he became madly jealous of his best friend, C. A. Brown. The letters of this period to Fanny Brawne tell of the "damned moments" of one who "dotes yet doubts, suspects, yet fondly loves."

Preparations were made for his journey to Italy, which he speaks of "as marching up to a battery." He sailed for Naples, which was reached after a tedious voyage about the end of October. Severn, the artist, accompanied him, and has given (*Atlantic Monthly*, April, 1863) a touching account of the last months of his friend's life. Realizing fully the hopelessness of his condition, like many a brave man in a similar plight, he wished to take his life. Severn states, "In a little basket of medicines I had bought at Gravesend at his request there was a bottle of landanum, and this I afterwards found was destined by him 'to close his mortal career,' when no hope was left, and prevent a long, lingering death, for my poor sake. When the dismal time came, and Sir James Clark was unable to encounter Keats' penetrating look and eager demand, he insisted on having the bottle, which I had already put away. Then came the most touching scenes. He now explained to me the exact procedure of his gradual dissolution, enumerated my deprivations and toils, and dwelt upon the danger to my life, and certainly to my fortunes, from my continued attendance upon him. One whole day was spent in earnest representations of this sort, to which, at the same time that they wrung my heart to hear and his to utter, I was obliged to oppose a firm resistance. On the second day, his

tender appeal turned to despair, in all the power of his ardent imagination and bursting heart." *

In Rome, Keats was under the care of Dr. (afterwards Sir James) Clark, who, with Severn, watched him with assiduous care throughout the winter months. Unlike so many consumptives, Keats had none of the *spes phthisica*, which carries them hopefully to the very gates of the grave. He knew how desperate was his state. "I feel," he said, "the flowers growing over me." "When will this posthumous life come to an end?" On February 14th he requested Severn to have inscribed on his grave-stone the words,

"Here lies one whose name was writ in water."

On February 27th he passed away quietly in Severn's arms.

All lovers of poetry cherish Keats' memory for the splendor of the verse with which he has enriched our literature. There is also that deep pathos in a life cut off in the promise of such rich fruit. He is numbered among "the inheritors of unfulfilled renown," with Catullus and Marlowe, with Chatterton and Shelley, whom we mourn as doubly dead in that they died so young.

It was with true prophetic insight that he wrote in 1818 to his brother George,

"What though I leave this dull and earthly mould,
Yet shall my spirit lofty converse hold
With after times."

* Under similar circumstances one of the gentlest and most loving of men whom it has been my lot to attend was more successful, and when he realized fully that a slow, lingering death awaited him, took the laudanum with which for months he had been provided. In such a case, whose heart will not echo the kindly words with which Burton closes his celebrated section on suicide? "Who knows how he may be tempted? It is his case; it may be thine. *Quae sunt sors hodie est, cras fore vestra potest.* We ought not to be so rash and rigorous in our censures as some are; charity will judge and hope the best; God be merciful unto us all!"

Shelley, who was so soon to join this "gentle band," and find with Keats "a grave among the eternal," has expressed the world's sorrow in his noble elegy. I quote in conclusion his less well-known fragment:

"Here lieth one whose name was writ on water."

But, ere the breath that could erase it blew,
Death, in remorse for that fell slaughter,
Death, the immortalizing winter, flew
Athwart the stream,—and time's printless torrent grew
A scroll of crystal, blazoning the name
Of Adonais. . . .

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go to the surgeries of the medical officers. Printing, stationery, and salary of clerk are alone taken out of the doctor's fund.

Such a scheme as this will give the poor all the advantages of an ordinary private patient. The scheme is sufficiently comprehensive to provide for the medical relief of all the working classes between those who are in receipt of parochial relief and those who are able to pay the lowest private fees in any district.

There are undoubtedly a large number of the struggling working classes in which the weekly payment of subscriptions to a medical benefit is the only method by which the doctor gets paid at all. A certain class of these people are not to be trusted for a private account of even a few shillings. The provident scheme is, therefore, favourable to the profession.

It is the well-to-do working man who has been trained up in the custom of getting the doctor's aid for next to nothing, and who has yet to be taught that he will be expected to contribute according to his means.

A comparatively simple organisation of easy supervision—with an attractive scheme—should enable the medical profession in each town and district to remedy the present abuses of the club system. It is necessary, however, for each section of the profession—be it in town or country—to show a united front, and make a determined stand, otherwise a few weak-kneed individuals might cause the whole profession to lose the advantages of combined action.

ARCHÆOLOGICA MEDICA.

LXXVII.—“DOVER'S ANCIENT PHYSICIANS' LEGACY.”

In the *Bulletin of the Johns Hopkins Hospital*, vol. vii, p. 1, Dr. Osler has given an interesting account of “Thomas Dover (of Dover's Powder), Physician and Buccaneer.” In this paper Dr. Osler speaks of the confusion that exists as regards the various editions of *Dover's Ancient Physicians' Legacy*. The *Dictionary of National Biography* states that the first edition of this book was published in 1733. Dr. Osler points out that this is an error, and states “that it is due to the fact that in this year appeared an edition of the *Legacy* not stated on the title-page to be a second edition. This is the earliest copy in the library of the Royal Medical and Chirurgical Society and in the Radcliffe Library.” Dr. Osler probably was unable to examine both these copies and so clear up the difficulty. The 1733 edition in the Royal Medical and Chirurgical Society's Library bears internal evidence that it is not the first edition, as on p. 181 there is a heading “Addenda: The substance of several letters sent to the Author since the publication of the last edition; with further remarks.” There is a copy of this book also in the library of the Royal College of Surgeons. The Radcliffe 1733 book is different from that of the Royal Medical and Chirurgical Society, and is evidently the second edition, as it does not contain the addenda referred to above, but leaves off at the end of the “Hospital Surgeon.” This clears up the chief difficulty as regards the early editions. The second and third have nothing on their title pages to show the edition; the fourth and fifth, also published in 1733, are so called on their titles.

Dover took his M.B. at Cambridge, but did not proceed to the degree of M.D. Dr. Osler states that “on the title page of the first edition, however, the letters M.D. occur after his name.” This is a mistake; the 1732 edition has M.B., the second and third have Thomas Dover, M.D. The two last-named editions are both “printed for the relief of the late R. Brady, F.R.S.” and the D is in all probability a misprint. From the fourth to the eighth editions the author's name is spelt Dover.

Although additional matter was incorporated in the later editions, Dover does not seem to have remodelled his book. In the first edition there is a postscript headed, “Having omitted the following letter from *Anthony Balam Esq. in Great Russell Street*, which I designed to have inserted when I was speaking of *Quicksilver*, I shall give it my Readers in this place.” This matter appears in the same form in all the subsequent editions, and was never incorporated in its proper place.

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ARCHÆOLOGICA MEDICA.

ANXVII.—“DOVER'S ANCIENT PHYSICIANS' LEGACY.” In the *Bulletin of the Johns Hopkins Hospital*, vol. vii, p. 1, Dr. Osler has given an interesting account of “Thomas Dover (of Dover's Powder), Physician and Buccaneer.” In this paper Dr. Osler speaks of the confusion that exists as to the true identity of the Dover's Ancient Physicians' (1st Class) of the Order of Vasa.

The King of Sweden has appointed Mr. P. Michell, Secretary of the Seamen's Hospital, Greenwich, to be a Knight of the Order of Vasa.

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The 1732 book is dedicated to John Tracy, Esq., of Sturway. The reprint of the late R. Brady has no dedication to the second and third editions. In the latest editions the name “John” is altered to “Robert,” but the wording of the dedication remains the same.

It is rather curious that the two unnumbered editions should have been issued by a different publisher from the first edition, and that for the later ones Dover should have gone back to the original publishers, Jettsworth and Mitchell. At first sight it looks as if the reprint of the late R. Brady had printed the book; but this is hardly likely, as her editions just fit in for the second and third.

or two sets of title pages to the same edition.

C. L. XV

*Johns Hopkins Hospital Historical Club,
January, 1895.*

THOMAS DOVER

(OF DOVER'S POWDER)

PHYSICIAN AND BUCCANEER

BY

WILLIAM OSLER

BALTIMORE
THE FRIEDENWALD COMPANY
1896

In the Opera omnia of Ballouin
Edited by Prof Tronchin of Geneva
(Geneva 1762) there is most interesting
Nederlandsche Bijl.

THOMAS DOVER, M. B. (OF DOVER'S POWDER)
PHYSICIAN AND BUCCANEER.

As Sir Thomas Browne remarks in the *Hydriotaphia*: "The iniquity of oblivion blindly scattereth her poppy, and deals with the memory of men without distinction to merit of perpetuity." Thus it happens that Thomas Dover, the Doctor, has drifted into our modern life on a powder label (to which way of entering the company of posterity, though sanctified by Mithridates, many would prefer oblivion, even to continuous immortality on a powder so potent and palatable as the *Pulvis Ipecacuanhæ compositus*); while Thomas Dover, the Buccaneer, third in command, one of the principal owners, and president of the Council of the *Duke and Duchess*,—privateers of the ancient and honorable city of Bristol,—discoverer of Alexander Selkirk (the original Robinson Crusoe), in spite of more enduring claims on our gratitude, has been forgotten.

Of the facts of Dover's life very little is known. Munk (*Roll of the Royal College of Physicians*, Vol. II) states that he was born in Warwickshire about 1660, that he was a Bachelor of medicine of Cambridge, on the authority of the author of the *Athenæ Cantabrigenses*, but that his name does not occur on the roll of the graduates. After taking his degree he settled in Bristol, and having made money, joined with some merchants in a privateering expedition. "On Dover's return to England he resumed practice at Bristol, and from the number of patients he says he visited each day during an

epidemic of the fever, he must have obtained the confidence of the inhabitants of that city." In 1721 he settled in London and was admitted a Licentiate of the Royal College of Physicians. He resided in Cecil Street, Strand, but in the latter part of 1728 he removed to Gloucestershire, where he lived for four or five years, when he finally settled in London, at first in Lombard Street, and afterwards in Arundel Street, Strand, where he died probably in the latter part of 1741 or the beginning of 1742. Essentially the same details are given by Dr. Norman Moore in the Dictionary of National Biography.

In his work "The Ancient Physician's Legacy" he often speaks with veneration of Sydenham as his Master; and in his description of the small-pox he says, "whilst I lived with Dr. Sydenham," so that he was probably a house pupil of the great physician, who was at the height of his fame at the very time we may suppose Dover to have been a student of medicine. On the title-page of the first edition of the "Legacy," 1732, he speaks of forty-nine years of practice, so that he probably took his degree in 1683. Apparently he never proceeded to a doctor's degree, since he speaks of himself as a "poor Bachelor of physie." On the title-page of the first edition, however, the letters M. D. occur after his name.

We know really nothing of Dover's life until he appears as one of the promoters of a privateering expedition to the South Seas in 1708. In this he was associated with a group of Bristol merchants, among whom were Alderman Bachelor and Sir John Hawkins. Two ships, the *Duke* and the *Duchess*, were fitted out with great care. Dover went as third in command, being styled Captain Dover, and as owner of a very considerable share of both vessels, he was president of the Council, and had a double voice in the deliberations. The days of the buccaneers were almost numbered, but there was in Bristol at this time one of the last and one of the most famous of the old South Sea captains, William Dampier, a man who knew more of the Spanish Main and of the Pacific than any one living. He had returned recently from a disas-

trous voyage and agreed to accompany Captain Woodes Rogers as pilot of the expedition. In October, 1708, the ships

"... sailed against the Spaniard with his hoard of plate and gold, Which he wrung with cruel torture from the Indian folk of old"—

in which words Charles Kingsley well expresses the feelings which animated these highwaymen of the sea. The narrative of the voyage is told by Captain Woodes Rogers in *A Cruising Voyage Round the World*, 1708-1711, London, 1712.

The expedition was rendered memorable by the discovery of "Robinson Crusoe," which is thus told in the words of Captain Rogers:

"We arrived at the Island of Juan Fernandez on the first of February, 1710, and having a good observation the day before when we found our latitude $34^{\circ} 10' S$. In the afternoon we hoisted out our pinnace, in which Capt. Dover set off to go on shore, though not less than four leagues from the ship. As it grew dark we observed a light on shore, which some were of the opinion was from our boat, but it was evidently too large for that, and we hung up a light to direct our boat, firing our quarter gun, and showing lights in our mizen and fore shrouds, that our boat might find us, as we had fallen to leeward of the island. Our boat came aboard again about two in the morning, having turned back on seeing the light ashore when within a league, and we were glad they had got off so well, as it now began to blow. We were all convinced that the light which we had seen was from the shore, and therefore prepared our ships for an engagement, supposing it might proceed from some French ships at anchor, which we must either fight or want water. All this stir and apprehension, as we afterwards found, arose from one poor man, who passed in our imagination for a Spanish Garrison, a body of Frenchmen, or a crew of pirates, and it is incredible what strange notions some of our people entertained about this light; yet it served to show their tempers and spirits, and enabled us to guess how our men would behave in case there really were enemies on the island."

“While under these apprehensions we stood to the back of the island in order to fall in with the southerly wind till we were past the island; then we stood back for it again, and ran close aboard the land that begins to form its N. E. side. The flaws came heavily off the land, and we were forced to reef our top-sails when we opened the middle bay, where we expected to find our enemy, but all was clear and no ships either there or in the other bay near the N. E. end. These are the only bays in which ships can ride that come here for refreshments, the middle one being the best. We now conjectured that there had been ships here, but that they had gone away on seeing us.”

“About noon of the 2nd of February we sent our yawl on shore, in which was Captain Dover, Mr. Fry, and six men, all armed; and in the meantime we and the Duchess kept turning in, and such heavy squalls came off the land that we had to let fly our top-sail sheets, keeping all hands to stand by our sails, lest the winds should blow them away. These flaws proceed from the land, which is very high in the middle of the island; but when they passed by we had little or no wind. As our yawl did not return, we sent the pinnace well armed to see what had occasioned the yawl to stay, being afraid there might be a Spanish garrison on the island, who might have seized her and our men. Even the pinnace delayed returning, on which we put up the signal for her to come back, when she soon came off with abundance of cray-fish, bringing also a man clothed in goat skins, who seemed wilder than the original owners of his apparel. His name was *Alexander Selkirk*, a Scotsman, who had been left here by Captain Stradling of the *Cinque-Ports*, and had lived alone on the island for four years and four months. Capt. Dampier* told me he had

*Selkirk had been sailing master under Captain Dampier in his expedition which left in May, 1703, and had been put ashore on the island at his own request. Dampier's expedition was unsuccessful, and “the merchants were so sensible of his want of conduct, that they resolved never to trust him any more with a command.”

been Master of the *Cinque-Ports*, and was the best man in that vessel; so I immediately agreed with him to serve as a mate on the Duke. During his stay he had seen several ships pass by, but only two came to anchor at the island, which he found to be Spanish, and therefore retired from them, on which they fired at him, but he escaped into the woods. Had they been French he would have surrendered to them; but they chose rather to run the risk of dying alone on the island than fall into the hands of the Spaniards, as he suspected they would either put him to death, or make him a slave in their mines. The Spaniards had landed before he knew what they were, and came so near him that he had much ado to escape; for they not only shot at him, but pursued him into the woods, where he climbed up a tree, at the foot of which some of them made water and killed several goats, yet went away without discovering him."

"He told us he was born in Largo, in the county of Fife, Scotland, and was bred a sailor from his youth. The reason of his being left there was a difference with Captain Stradling, which, together with the ship being leaky, made him at first rather willing to stay here than to continue in the ship; and when at last he was inclined to have gone, the captain would not receive him. He had been at the island before to wood and water, when two of the men were left upon it for six months, the ship being chased away by two French South Sea ships; but the *Cinque-Ports* returned and took them off, at which time he was left. He had with him his clothes and bedding, with a firelock and some powder and bullets, some tobacco, a knife, a kettle, a bible, with some other books, and his mathematical instruments. He diverted himself and provided for his sustenance as well as he could; but had much ado to bear up against melancholy for the first eight months, and was sore distressed at being left alone in such a desolate place. He built himself two huts of pimento trees, thatched with long grass and lined with goat skins, killing goats as he needed them with his gun so long as his powder lasted, which

was only about a pound at first. When all this was spent he procured fire by rubbing two sticks of pimento wood together. He slept in his larger hut and cooked his victuals in the smaller, which was at some distance, and employed himself in reading, praying, and singing psalms, so that he said he was a better Christian during his solitude than he ever had been before, and than, as he was afraid, he would ever be again."

"At first he never ate but when restrained by hunger, partly from grief, and partly for want of bread and salt. Neither did he then go to bed till he could watch no longer, the pimento wood serving him both for fire and candle, as it burned very clear and refreshed him by its fragrant smell. He might have had fish enough, but would not eat them for want of salt, as they occasioned a looseness; except crayfish, which are as large as lobsters and are very good. These he sometimes boiled, and at other times broiled, as he did his goat's flesh, of which he made good broth, for they are not so rank as our goats. Having kept an account, he said he had killed 500 goats while on the island, besides having caught as many more, which he marked on the ear and let them go. When his powder failed he ran down the goats by speed of foot: for his mode of living with continual exercise of walking and running cleared him of all gross humours, so that he could run with wonderful swiftness through the woods and up the hills and rocks, as we experienced in catching goats for us. We had a bull-dog, which we sent along with several of our nimblest runners to help in catching the goats, but he outstripped our dog and men, caught the goats, and brought them to us on his back. On one occasion his agility in pursuing a goat nearly cost him his life; as while pursuing it with great eagerness he caught hold of it on the brink of a precipice, of which he was not aware, being concealed by bushes, so that he fell with the goat down the precipice to a great depth, and was so bruised and stunned by the fall that he lay senseless, as he supposed, for twenty-four hours, and when he recovered his senses found the goat dead under him.

He was then scarcely able to crawl to his hut about a mile distant, and could not stir out again for ten days."

"He came at length to relish his meat well enough without bread and salt. In the proper season he had plenty of good turnips, which had been sowed there by Captain Dampier's men, and had now spread over several acres of ground. He had also abundance of cabbage from the cabbage-palms, and seasoned his food with the fruit of the pimento, which is the same with Jamaica pepper, and has a fine flavor. He found also a species of black pepper called *malayeta*, which was good for expelling wind and curing gripes."

"He soon wore out his shoes and other clothes by running in the woods, and being forced to shift without them, his feet became so hard that he ran about everywhere without inconvenience, and it was some time after he came to us before he could wear shoes, as his feet swelled when he first began to wear them."

"After he had got better of his melancholy he sometimes amused himself with carving his name on the trees, together with the date of his being there, and the time of his solitary residence."

"At first he was much distressed with cats and rats, which had bred there in great numbers from some of each species which had got on shore from ships that had wooded and watered at the island. The rats gnawed his feet and clothes when he was asleep, which obliged him to cherish the cats by feeding them with goat's flesh, so that many of them became so tame that they used to lie beside him in hundreds, and soon delivered him from the rats. He also tamed some kids, and for his diversion would at times sing and dance with them and his cats; so that by the favor of Providence and the vigor of his youth—for he was now only thirty years of age—he came at length to conquer all the inconveniences of his solitude and to be quite easy in his mind."

"When his clothes were worn out he made himself a coat and a cap of goat skin, which he stitched together with thongs of the same, cut out with his knife."

Subsequently the expedition sacked the two cities of Guayaquil, in the assault on which Dover led the van. They took several prizes and cruised about the coast from Peru to California waiting for treasure ships. Of one of the largest prizes, which they named the *Bachelor*, after the Bristol alderman doubtless, Dover took command as chief captain. They then sailed across the Pacific to Batavia, where they refitted, and in October, 1710, sailed for England, which was reached in 1711.

Captain Thomas Dover returned from the South Seas a wealthy man; the expedition had been unusually successful, having realized the enormous sum of £170,000. To Dover, who is stated to have been the owner of a very considerable part of both ships, fell a considerable share of the spoils. Alexander Selkirk as mate received £800 prize money.

Harris (*Voyages*, etc.) makes the following comments on the voyage: "It has been universally allowed by such as are proper judges of such expeditions that there never was any voyage of this nature so happily adjusted, so well provided in all respects, or in which the accidents that usually happen in Privateers were so effectually guarded against." This he attributes to the abilities of the gentlemen of Bristol, and remarks that it was owing to this expedition that the spirit of privateering in the South Seas was not totally lost in England. The large sums realized had evidently made an enduring impression, and Harris adds, "I might, perhaps, go too far should I assert that this voyage gave rise to the South Sea Company, but this much I can safely say, that the success of this voyage was what the patrons of that Company chiefly insisted upon in their defence, when the plan of it was attacked as insufficient and chimerical."

In 1712 Dover must have been fifty years of age, and quite ready to enjoy a period of leisure. Where he settled or what he did we do not know, but it is certain that three years such as he had spent at sea were no preparation for practice. Possibly he travelled, and in the introduction to the *Ancient*

Physician's Legacy he scoffs at the doctors who have travelled "far at home"; "Let them take a trip to Hungary and see the mines," speaking, and describing scenes, as though he had been there himself. He refers not infrequently to his wide knowledge of the globe, and in one place says, "if travelling be necessary to make an accomplished physician, I am very sure that I have travelled more than all the physicians of Great Britain put together."

In 1721, as mentioned by Munk, he was admitted Licentiate of the Royal College of Physicians, a qualification which enabled a man at that time to practice in and six miles round Westminster. It is doubtful how long he remained at this time in London; at any rate he states (*A. P. L.*) that he lived in Gloucestershire in the years 1728 and 1729. None of the cases which he mentions in his book are of this period. His permanent settlement dates from about 1731. In a 1733 edition of the *A. P. L.*, in replying to certain strictures on the use of quicksilver, he says, "I challenge you to shew when I have lost three patients for the past five years, when I was first called either in acute or chronic cases, (though I have settled in town about eighteen months." At this time Dover was well on in years, about or above seventy, a late age at which to begin practice in London.

To abet his laudable endeavors he resorted to the time-honored plan of writing a book. Of the popular or semi-popular treatises on medical subjects so common in those days, a few were by very able men. George Cheyne's *Essay on Health and Long Life* forms an exception to Latham's sweeping criticism on books of this class (quoted by W. A. Greenhill), "They are all bad, and many dishonest." A favorite plan was to write a treatise on some mineral water, lauding the virtues of a particular spa. Smollett, who knew so well the trials, vexations and disappointments incident to beginning medical life in London, has sketched in strong lines the condition of the profession in the fourth and fifth decades of the century. He, too, had made an unsuccessful attempt to introduce him-

self in an *Essay on the External Use of Cold Water*, etc. Dr. L—— with his “hotch-potch of erudition and extravagance,” and the pedantic doctor in *Peregrine Pickle*, in whom he satirized the learned Dr. Akenside, were well-known types; while in Dr. Fathom the “mystery of the sons of Paean, as he terms them, is mercilessly exposed. Among the “means used to force a trade” * Smollett mentions “the insertion of cures by way of news in the daily papers,” the erection of a “hospital, lock or infirmary, by the voluntary subscription of his friends; a scheme which had succeeded to a miracle with many of the profession, who had raised themselves into notice on the carcasses of the poor.” To understand Dover’s relations with the apothecaries (to which subsequent reference will be made) the reader must know that they were the general practitioners of that day, and dispensed their own medicines, but in serious cases always called in a physician or a surgeon. Smollett’s account of the practice “parcelled out into small enclosures, occupied by different groups of personages,” who tossed the ball (the patient) from one to another, would almost fit modern usage, in which a patient is sometimes tossed in a circle from specialist to specialist, until he returns with an inventory of his local woes to the consultant from whom he started. In Smollett’s days the patient had to be content with three, except in the cases requiring a midwife. “The apothecary being summoned, finds her ladyship in such a delicate situation that he declines prescribing, and advises her to send for a physician without delay. The nomination of course falls to him, and the doctor being called, declares the necessity of immediate venesection, which is accordingly performed by the surgeon of the association.”

While meriting the general criticism of Latham, the work with which Dover trusted to reach practice had many important qualifications for success. It appealed directly to the

* This seems to have been a stock phrase; Cheyne uses it in his *English Malady*, in an autobiographical note.

public in a taking way, not alone in the main title, *The Ancient Physician's Legacy to His Country, being what he has collected himself in Forty-nine Years of Practice*, but in asserting that the diseases incident to mankind are described in so plain a manner "that any person may know the nature of his own diseases; together with the several Remedies for each Disorder faithfully set down." It is expressly issued as a popular work on medicine, *Designed for the Use of all Private Families*.

The author's name is given, Thomas Dover, M. D., and the work was printed for the author and sold by A. Bellesworth and C. Hitch in Pater-Noster Row, etc. (giving the names of two other booksellers), 1732. Price, stitched, Five Shillings.

This is the title-page, date, etc., of the first edition, a copy of which is in the British Museum. In the Dictionary of National Biography the date of the first edition is given as 1733. The mistake is due to the fact that in this year appeared an edition of the "Legacy" not stated on the title-page to be a second edition. This is the earliest copy in the Library of the Royal Medical and Chirurgical Society, and in the Radcliffe Library. The name is spelt *Dovar*, and the title-page is different. Forty-nine years of practice are still claimed (not fifty), and it is stated that "the extraordinary effects of mercury are more particularly considered." After the author's name, Thomas Dover, M. D., are the words, "with remarks on the whole by a learned physician." There is also a translation of a treatise on mercury "by the learned Belloste." It was printed for the relict of the late R. Bradley, F. R. S. The second and third editions I have not seen; this was probably one of them. The fourth and fifth editions also appeared in 1733; the sixth in 1742; the seventh in 1762, and the eighth, the last so far as I know, in 1771.

The *Ancient Physician's Legacy*, in the language of one of Dover's correspondents, "made a great noise in London, and was the subject of almost every Coffee-house."

It contains a description in plain language of about forty-two disorders, illustrated by cases, the majority of which are made to attest in some way to the author's skill. The later editions abound in letters from grateful patients, extolling his virtues. The pictures of disease are scarcely such as might have been expected from a pupil of Sydenham. The account of consumption or "phtisis," as he spells it, is very meagre from the hand of a contemporary, possibly a friend, of the author of the *Phthisiologia*. There are evidences throughout that the book was written "for revenue purposes only," and the spirit of the buccaneer was not dead in the old man, as no occasion is missed either to blow his own trumpet, or to tilt a lance at his colleagues. "Let me but come to People as early in this Distemper (dropsy) as they generally apply for relief from other Physicians, and it shall be cured," etc.

On page 18, in the section on gout is given the formula of his famous powder. "Take Opium one ounce, Salt-Petre and Tartar vitriolated each four ounces, Ipecacuanua one ounce. Put the Salt-Petre and Tartar into a red hot mortar, stirring them with a spoon until they have done flaming. Then powder them very fine; after that slice in your opium, grind them to a powder, and then mix the other powders with these. Dose from forty to sixty or seventy grains in a glass of white wine Posset going to bed; covering up warm and drinking a quart or three pints of the Posset—Drink while sweating." The same formula is repeated in all the editions. He says that some apothecaries have desired their patients to make their wills and settle their affairs before they venture upon so large a dose as from forty to seventy grains. "As monstrous as they may represent this, I can produce undeniable proofs where a patient of mine has taken no less a quantity than an hundred grains, and yet has appeared abroad the next day."

In the treatment of fevers he follows the practice of the "good Dr. Sydenham," for whose memory he professes "the greatest veneration." "In this Distemper as in all other

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Fevers, I prescribe the cool Regimen, which must be followed in case Mankind prefer *Life to Death*; *Ease to Pain*; a short Fit of Illness to a long and tedious one; a good to a broken and shattered constitution, laying aside Blisters and all heating and poisonous Powders." In another place he says, "I would have cold bathing grow as universal as inoculation." He waxes furious against the "Unhuman Method of Blistering," and invokes the authority of Radeliffe and "the honest Dr. Sydenham" against it. When living with Dr. Sydenham, Dover had smallpox. In the beginning he lost twenty-two ounces of blood and had a vomit. He went abroad until he was blind, and then took to bed. "I had no fire allowed in my room, my windows were constantly open, my bed-clothes were ordered to be laid no higher than my waist. He made me take twelve bottles of small beer acidulated with spirit of vitriol every twenty-four hours." The experiences of his travels are referred to frequently, and he mentions Asia, the East and West Indies, and Hungary, in connection with special points in practice. There is an account of the plague among the sailors of the *Duke* and *Duchess*, "when I took by storm the two cities of Guaiquil, under the line, in the South Seas."

The Ancient Physician's chief legacy to his country was quicksilver, which was his specific in almost every disease, and the use of which is vaunted in a most forcible manner in letters from patients. He ordered an ounce or an ounce and a quarter of crude mercury daily, believing that it freed the patient from all venereal diseases, opened all obstructions, and made a pure balsam of the blood. A Captain Harry Coit, who had lived by the doctor's direction "on Asses milk, Syrup of Snails and such stuff," took for his cough and shortness of breath an ounce a day, and took altogether an hundred and twenty pounds weight. Dover says that he was called in derision, *The Quicksilver Doctor*. The "Legacy" stirred up an active pamphlet war, and for twenty years or more the merits of crude mercury were much discussed.

If Dover's object in writing the work was to gain publicity, he could not have taken a better way than in his sharp comments on the physicians and apothecaries. The latter he assaults in terms which must have tickled the frequenters of the coffee-houses, among whom we are told the book made such a noise. "I never affronted any Apothecary, unless in ordering too little Physic; and curing a patient too soon, is, in their Way of Thinking, an unpardonable Crime. I must confess, I never could bring an Apothecary's Bill to three pounds in a fever; whereas I have known some of their bills in this disease amount to forty, fifty, and sixty Pounds. If they can't cure with less charges, I can't forbear saying, That I have the same opinion of their Integrity as I have of their Understanding." The doctrine of the apothecary was that, "*'Tis your Writing-Physician only who has a Title to a Fee.*" Dover takes strong and most reasonable ground against the constant varying of prescriptions when there is no occasion for it. The hostility of the apothecaries to him, according to his own account, arose from his being "always inviolably attached to the Interest and Welfare of my Patient and entirely regardless of these Gentlemen's unwarrantable Gains." These attacks did not pass unnoticed, and in 1733 H. Bradley, Surgeon, criticises the Ancient Physician's Legacy, and makes some "animadversions on his scurrilous Treatment of the Professors of Physic in general; with a word or two on the uselessness of his Legacy to all Private Families."

Daniel Turner, "of the College of Physicians," who in the same year, "impartially surveys the Ancient Physician's Legacy," refers to the Guaiacum incident in the following terms: "I think the Doctor had much better have left out his Bravado of having taken two cities by storm, unless he thinks it an honour to a Physician to kill and slay, and after to plunder the Innocent, those who never wronged him, and to carry off the spoil; a good prelude, this, to the blood shed after among his own men." (Dover had had them bled

copiously for the plague.) Turner hints that Dr. D—v's quicksilver did not a little to hasten the end of the celebrated tragedian, Barton Booth, to whom he had given between May 3d and 8th, within two ounces of two pounds of mercury.

Like his master, Dover's only affiliation with the Royal College of Physicians was through the minimum qualification of the license. Sydenham and Morton, the two most distinguished English clinical physicians of the 17th century, were regarded as innovators and "sectaries" by the heads of the College, who, as Sydenham remarks, took fire at his attempts to reduce practice to greater easiness and plainness. The coolness and moderation of the Master were not imitated by the "Ancient Physician," who in the sixth edition attacks the gentlemen of the faculty, and warns unwary people "not to take every Graduate for a Physician, nor a clan of prejudiced Gentlemen for Oracles." He added to his Legacy the *Statuta Moralia*, or as he terms it on the title-page, "the moral conversation of the College of Physic, in Latin and English, by way of appendix, together with a Digression." Dover affirms boldly that the whole purport of the "Conversation" is to conceal their ignorance and to deceive their miserable patients, but he avers his desire is "more to do justice to Mankind than to irritate and provoke a Set of Gentlemen who, like moles, work underground, lest their Practices should be discovered to the Populace." He again refers to the relations of the apothecaries with the physicians in the following terms: "The Apothecaries, generally speaking, have it in their Power to recommend the Physician, which is the wrongest Step the Patient can possibly take: The Physician, to gratify the Apothecary, thinks himself obliged to order ten times more Physic than the Patient really wants, by which means he often ruins his Constitution, and too often his Life; otherwise how is it possible an Apothecary's Bill in a Fever, should amount to Forty or Fifty, or more Pounds? Nay, I have been creditably inform'd that several of those Apothecaries have declared they would never call in a Physician, but what should put Fifteen or Twenty

Shilling a Day into their Pockets: What must the Conscience of such Physicians be, that would forfeit their Reputation and every thing that is dear to them, by cheating for others? I would venture to say, Neither Sydenham's nor Radcliff's Bills did ever amount to Forty Shillings in a Fever, and yet they recover'd their Patients without the Rule, at present prescribed, of Vomiting, Bleeding, and multiplying Blisters in all Cases whatsoever; so since this is to be their Rule of Practice, they are very indifferent in their Enquiries what the Patient's Disease is."

Dover continued to practice in London, and in the seventh edition of the *A. P. L.* there is a letter to him from Catherine Hood, dated November 6, 1738, in which she speaks of having consulted him in 1737.

In 1742 appeared the sixth edition of the *Legacy*, which must have been issued by the author, as he speaks on the title-page of fifty-eight years of practice. He is stated by Munk to have died in 1741 or 1742, probably the latter, but his name does not appear in the register of deaths in the *Gentleman's Magazine* in either of those years.

Doubtless the old buccaneer, described "as a man of rough temper, who could not easily agree with those about him," was a striking figure as he passed along the Strand to the Jerusalem Coffee House, where he saw his patients. A good fighter, a good hater, as alas! so many physicians have been, his weaknesses and evil behavior we may forget, but Captain Thomas Dover, who on the 2nd of February, 1710, found "Robinson Crusoe," the world should not forget; and we also of his craft have cause daily to remember with gratitude the student and friend of the great Sydenham, who had the wit, in devising a powder, to remember his master's injunction: *Sine papaveribus, sine opiatibus et medicamentis, ex iis confectis, manca et clauda, esset medicina.*

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CLXVI

*Johns Hopkins Hospital Historical Club,
January, 1895.*

AN ALABAMA STUDENT

BY

WILLIAM OSLER

BALTIMORE
THE FRIEDENWALD COMPANY
1896



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AN ALABAMA STUDENT.

Chief among the hard sayings of the Gospels is the declaration, He that loveth father or mother or son or daughter more than me is not worthy of me. Yet the spirit that made possible its acceptance, and which is responsible for Christianity as it is—or rather, perhaps, as it was—is the same which in all ages has compelled men to follow ideals, even at the sacrifice of the near and the dear ones at home. In varied tones, to all, at one time or another, the call comes: to one, to forsake *all* and follow Him; to another, to scorn delights and live the laborious days of a student; to the third, to renounce all in the life of a *Sunnyasi*. Many are the wand-bearers, few are the mystics, as the old Greek has it, or, in the words which we know better, Many are called, but few are chosen. The gifts were diversified, but the same spirit animated the “flaming heart of St. Theresa,” the patient soul of Palissy the potter, and the mighty intellect of John Hunter.

We honor those who respond to the call; we love to tell the story of their lives: and while feeling, perhaps, that we could not have been, with them, faithful unto death, yet we recognize in the power of their example the leaven which leavens the mass of selfishness about us. These “mystics” and “chosen” are often not happy men, often not the successful men. They see of the travail of their souls and are not satisfied, and, in the bitterness of the thought that they are not better than their fathers, are ready, with Elijah, to lie down and die.

To-night I wish to tell you the story of a man of whom you have never heard, whose name is not written on the scroll of fame, but of one who heard the call and forsook all and followed his ideal.

When looking over the literature of malarial fevers in the South, chance threw in my way Fenner's *Southern Medical Reports*, Vols. I and II, which were issued in 1849-50 and 1850-51. Among many articles of interest I was particularly impressed with two by Dr. John Y. Bassett, of Huntsville, Ala., in whom I seemed to recognize a "likeness to the wise below," a "kindred with the great of old." I wrote to Huntsville to ascertain what had become of Dr. Bassett, and my correspondent referred me to his daughter, from whom I received a packet of letters written from Paris in 1836. I have her permission to make the extracts which are here given.

By temperament or conviction there are a few men in every community who cannot bow to the Buals of the society about them, and who stand aloof, in thought at least, from the common herd. Such men in small circles tread a steep and thorny road, and of such in all ages has the race delighted to make its martyrs. The letters indicate in Dr. Bassett a restless, non-conforming spirit, which turned aside from the hollowness and deceit of much of the life about him. As a student he had doubtless felt a glow of enthusiasm at the rapid development of the science of medicine, and amid the worries and vexations of a country practice his heart burned with the hope of some time visiting the great centres of learning. As the years passed, the impulse grew more and more urgent to go forth and see the great minds which had controlled his hours of study. All students flocked to Paris in the fourth decade. Nowhere else was the pool so deeply stirred, and Laennec, Broussais, Louis, Andral, Velpeau, and others dominated the thoughts of the profession. One can imagine how carefully the plan was laid, and how for years the little surplus earnings were hoarded for the purpose. But the trial which demanded the greatest

courage was the leaving of wife and children, and there are passages in the letters which indicate that the struggle was hard, not indeed without bitterness. He apologizes frequently for an apparent cruelty in leaving them for the sake of his profession; and the neighbors did not make it easier for the poor wife, whose desertion they could not understand. In one of the letters he says, "So people say I have left you? Well, so I have, and you ought always to put the most charitable construction on such remarks; the same people when I come back will possibly say I have returned. Sometimes remarks of this sort are made carelessly, as men tramp upon worms; sometimes from wantonness, as boys pull off the wings of flies and pierce them with pins; sometimes for sport, as hunters shoot inoffensive creatures that are of no service; sometimes for spite, as we kill fleas; sometimes for experiment, as philosophers torture dogs; but seldom from wickedness, as pagans skin saints, and as Christians skin one another." And in another he says, "My expressions put me in mind of a sinner's repentance. I know, Isaphaena, you have borne much for and from me, and you will have to do so again, and I hope you may do it pleasantly; and if it is any gratification to you to know, you have a husband who appreciates your conduct."

The letters begin from Baltimore in the last week of December, 1835. He had lost his diploma, for he applied to Dr. James H. Miller, the President and Professor of Anatomy of the Washington Medical College, for a certificate, which is found among the papers, stating that he is a regular graduate of that institution, but not mentioning the year.

He took passage by the *Roscoe*, Capt. Delano in command, bound for Liverpool. He sailed on Jan. 6th, and in an interesting letter an account is given of the voyage. They reached the English Channel on the 26th. A glowing description is given of the fine way in which the passengers lived on these packet-ships. He entreats his wife to feel sure that all would go well, though she might not hear from him very regularly, and he begs her in all matters to remember his motto, "Peace

on earth and good will towards men." He expresses great anxiety about the training of his two children, and bids her not to spare the rod if necessary, saying, "as the twig is bent the tree inclines."

The first long letter, descriptive of Manchester, York, and Edinburgh, is illustrated by very neat little sketches. He was very much impressed with York, and says that "if ever I was to be born again I would like it to be at York."

In Edinburgh he visited everything, from the fifteen-story hovels to the one-story palaces. He gives a description of some graves at Leith covered with iron grates and locked to keep the surgeons out, and over which a watch was kept the entire night. He was enchanted with Edinburgh in all matters except one. He says, "O Scotland! thou land o' cakes! O Edinburgh! thou city of learning, thou cluster of palaces, thou city with suburbs in the centre and precincts fit for the residences of princes, thou modern Athens! whose candles seem to emulate the stars in height, if not in lustre!!! Could you not invent any other method of getting your coal out of the mine save on the backs of females!!!! It is a fact that there are women whom they call bearers, whose business it is to carry coal out of the pit."

He was very enthusiastic about the museum of the College of Surgeons, and the Infirmary, where he witnessed in the presence of Mr. Syme, an operation by "Mr. Ferguson, a young surgeon."

From Edinburgh he proceeded to Glasgow, then to Belfast and Dublin, and then on to London, where he spent two weeks, apparently of great misery, as the weather was atrocious. He shook the mud of England from his feet at Dover, and departed, hoping never to be soiled with it again.

He took a through passage from London to Paris for £1 18s., and he gives an amusing description of the additional payments. He asked the master of the hotel to give him some information regarding French traveling, and got, he says, a regular English account, Johnsonian without his wit. "They

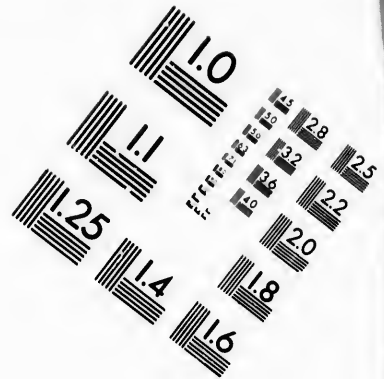
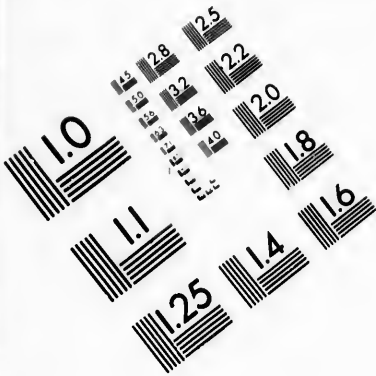
will cheat you at every step; they will rob you; they will poison you with dirt; everything is filthy; you will get no mutton or beef, and nothing but sour wine." Then he says, "Though I paid everything in London, I will give you a list of the little extra charges on the road, and in eight cases paid." He gives an itemized bill of twenty extra charges in the two days and one night which he spent in the diligence. One of his items was for walking down a ladder, one shilling. He told this fellow to go to h— and jumped over his ladder. "To the commissioner of one of the hotels, for seeing that nobody cheated you but himself, six shillings." "The commissioner of the diligence, the most useless of all damned rascals, for pestering you and telling lies, 1 shilling and sixpence."

He reached Paris and took lodgings in the Place Pantheon. He writes, "I am now in the very region of Voltaire and Rousseau; and the Pantheon, in which one set of bigots deposited their bodies, from whence another set tore their bones, raises its classic front before my window. I look on it and feel I am not so much of an infidel as when surrounded by Christians."

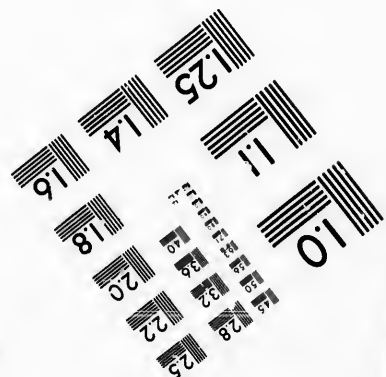
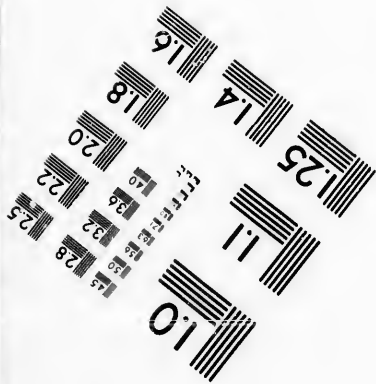
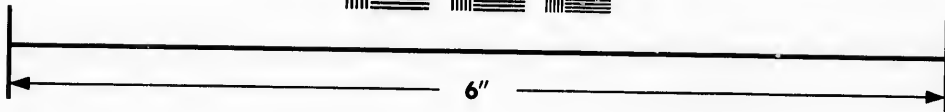
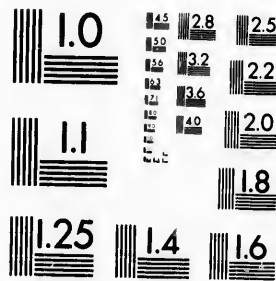
He attached himself at once to the clinic of Velpeau at La Charité. On his first day he says he did not understand more than half he said, but he understood his operations. He says there was a gentleman from Mobile, Mr. Jewett, who had been there for three years. Americans were not scarce; there were four or five from New York, two from Baltimore, and several from Boston and Philadelphia. He does not mention their names, but it is pleasant to think he may have attended classes at La Pitié with Bowditch, Holmes, Shattuck, Gerhard and Stillé. He began dissections at once; subjects were cheap—six francs apiece—and he secured a child on the first day for forty sous.

Some of the lectures were in the evening, at seven o'clock, and he went to hear M. Helmagrande on midwifery. He says, "The hospitals here are conducted on the most liberal terms; there is nothing to pay but for the private courses, and the fee



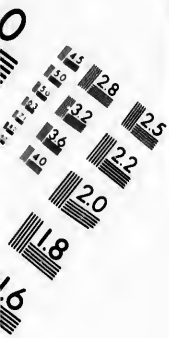


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is small for them. The facilities for the study of midwifery are astonishing; there are plenty of cases always on hand, and this I determined to profit by." In a letter of March 16th he mentions his daily routine: "I get up in the morning at six o'clock and am at La Charité by seven, follow Velpeau until eight, see him operate and lecture until half after nine, breakfast at ten at a café. At eleven I am at a school of practical anatomy, where I dissect until two. Then I attend a class of practical surgery until three; then hear Bronssais and Andral until five; then dine. At seven I attend Helmagrande's class of midwifery, which lasts until nine; then I come to my room and read or write until eleven, when I retire."

He was much impressed by the opportunities for dissection. In his letter of the third of July he says: "There is a dissecting school at Clamart for the summer on a most extensive scale. There is room and material for 200 or upwards, though there is but few there at present; this place was provided for the inscribed students of the school, and they get their subjects for a mere trifle. There is not the least prejudice existing here against dissections; even the subjects do not seem to mind it, though they are aware of their fate, for more than two-thirds of the dead are carried to the l'Ecole Pratique or Clamart. I have private instruction in the use of the stethoscope for heart complaints in La Pitié. The other day an old woman bade me adieu as we passed her bed without calling, and I stopped to ask if she was going out. Then she said she was going to Clamart, and that we might meet again."

He had evidently occupied his time to good advantage, as early in July he received from Velpeau the appointment of *externe* at La Charité. He says in his letter of the 10th of July: "I have a piece of news to communicate that I know will gratify you; at least I feel very much gratified myself. This morning I received the appointment of *externe* in La Charité under Velpeau. The duties of an *externe* require him to be at the hospital at six o'clock, answer to his name, follow the surgeon round a certain number of beds, attend to

his prescriptions, and to dress the patients. For this service we receive nothing, and for this privilege we pay nothing; you ought to be gratified at this, because it will convince you I have not been wasting my time. I was on the eve of starting for Switzerland, and was only waiting to witness the celebrations on the 27th, 28th and 29th; but when this offer was made me I did what I have been doing all my life—made another sacrifice for my profession, and determined to remain and take the service. I have not been more gratified since I have been in Europe; it is a real benefit and came unsolicited.”

He was very much impressed by the incessant industry of the French physicians. He says: “When I look at some of the medical men by whom I am surrounded, it makes me blush for shame; old men daily may be seen mixing their white locks with boys, and pursuing their profession with the ardor of youth. There is not a solitary great man in France that is idle, for if he was, that moment he would be outstripped; it is a race, and there are none so far ahead that they are not pressed by others; many are distanced, it is true, but there are none allowed to walk over the course. Witness Broussais, lecturing and laboring daily to sustain himself, after having elevated himself to the pinnacle; Lisfranc, an old bachelor with thousands, who after making his daily visit and *leçon* for ten months *for duty*, during the vacation of two months he from choice gives a course of operations; and old Rollier may be seen daily supporting himself from bed-post to bed-post as jolly as if he were not far over sixty. Velpeau, from a poor boy without money, time, education or friends, has by industry made himself one of the first surgeons in Europe.”

In one of his last letters there is this interesting note about Broussais, who had just finished his course on phrenology: “The pupils of '36 have struck off his head. It is in bronze, a little less than our old Washington and Franklin in wax. Broussais is a genius, and when he entered life he saw that something was to be done, or rather that *he* must do some-

thing, and he seized the science of medicine as a good old doctor would a bottle of lotion, and shook it manfully; France, Germany, all Europe, parts of Asia, and America have felt the agitation. But younger men also feel the necessity of doing something, and they are now endeavoring to quiet the commotion he has raised, and in France they have measurably succeeded. When the giant dies I doubt if he will find a successor—his conquests, like Alexander's, will be divided and then fall into insignificance. He fights well while in the ring against awful odds, for the truth is against him, but some of her brightest geniuses he has put to rout or silence. Time is now about to enter the field, and I have no doubt will place a splendid monument over him, to—prevent him from being forgotten."

"I am glad I know what great men are. I am glad I know of what they are made, and how they made themselves great, though this knowledge has broken the last of my household gods; yet it has taken away the flaming swords that stood before the gates of this Paradise, where may still be seen the track of the serpent and of the devil himself, so I will keep out of bad company."

Scattered through his long, often closely-crossed letters, there are here and there some choice bits which indicate the character of the man. For months he did not hear word from home; then letters came at long intervals. I apparently had been re-reading some of his wife's letters, in one of which she had been reproaching him for using strong language. He says: "Isaphaena, you tell me to break myself of swearing, and not to spend my time about different professions of religion; that it will make enemies, etc. Now listen to me while I speak the truth, for on this subject you know that I always do speak what I think is true. I never did swear much, and I have quit it *almost* entirely, for nobody would understand me, and it would be useless to waste breath when I know I can put it to a better use. As to religion, there is not much here of any kind, and I assure you I have not said

ten words on the subject since I left, nor do I expect to; and here, where Voltaire, Rousseau, and the whole constellation of mighty-minded men lived and wrote and died, I feel—Isaphaena—not so much an infidel as when at home surrounded by church-going people. Why is this? I have never for a moment doubted the sincerity of my immediate friends, but at home I looked into the evil more closely than the good effects—there I saw ignorance, bigotry and deceit ever foremost; they were the most prominent, therefore the most likely to be seen. Here I still look on the evil side and find it terrible. *God save me from a country without religion, and from a government with it*—I know you will say Amen also to the next sentence—and return me safe to a country with religion and a government without it. I am convinced that the evils of infidelity are worse—ay, much worse—than any religion whatever.”

“Had I the talents of the above-mentioned men I would not spend it as they did, nor would they, could they see the effect produced. Their object was good—to correct the evils of a corrupt priesthood—out their works were like edged tools given to children. Human nature is not perfect, and their refined and perfected systems of morals will not apply, and if we were perfect we would not need them. I speak the words of truth and soberness.”

He evidently was of St. Paul's opinion with reference to the subjection of the wife. He says in one place: “What if I have spoken cross to you, scolded at you; if it was not my duty it was at least my privilege, and I expect to have the pleasure of doing it again. Are we not told, if our right hand offends to cut it off, etc.; then surely if our better-half offends we ought to have the liberty of swearing a little.”

His last letter is from Paris, dated October 16th, and he speaks in it of his approaching departure.

I have no information as to the date of his return, but his intention was, he states frequently in his letters, to be back by the first of the year, so that after this date he probably resumed practice at Huntsville.

The two papers in Fenner's Southern Medical Reports are the only ones I see credited to him. They are charmingly written and display in every page the wise physician; wise not only with the wisdom of the schools, but with that deeper knowledge of the even-balanced soul "who saw life steadily and saw it whole."

The Report in Vol. I deals with the topography, climate, and diseases of Madison County. Dr. Fenner states that it was accompanied by a beautiful map drawn by the author, and a large number of valuable statistics.

In an historical sketch of the settlement he thus depicts the early border life: "The most of those who did not procure homes at that time, belonged to a class who, from taste or compulsion, had separated themselves from the whites, to live on the trail of the Indians; and who, like tigers, and Judases, were not without their use in the mysterious economy of nature. They surpassed the natives in physical force and in genius, and equalled them in ferocity. They had the piratical appetite for gain natural to the English race, which they had cultivated among the whites, and they readily acquired the Indian taste for blood."

"Thus, without any particular standard of morals of their own, and having fallen out with that which restrained their Christian brethren, they found their interest in adopting the ancient one of Moses and of the savages among whom they resided—'An eye for an eye,' and 'blood for blood'."

"These men, like the fabulous Behemoth that lay in the reedy fens of the early world, drinking up the abundant waters and eating down the luxuriant forests, to make way for civilization, have left little more than a vague tradition of their existence and exploits, the latter of which has been so embellished that the former already begins to be doubted."

"Such a race leave but short records of their diseases. Where bloodshed is always epidemic and every man his own surgeon, the few that recover feel grateful to none, and hang no 'votive tablets' on the natural columns of their forests;

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and when a missionary or a novelist is the only historian, it would puzzle Hippocrates himself to collate the cases; but, as most things, as well as lions, track the earth in some manner as they pass over it, these early squatters have also made their mark."

The good example of Dr. Thomas Fearn, who in the early days of the regular settlement was the leader of the profession, is well drawn. "The influence of this gentleman's reputation upon the profession was favorable to the residence of thoroughbred physicians in the neighborhood, many of whom he had been directly instrumental in educating; another consequence followed: quackery and empiricism abated. Although quackery is indigenous in the human heart, like thieving and lying, and always will exist, yet it flourishes in the indirect ratio of the science and general qualifications of the regular part of the profession. When regular, and extensively patronized physicians, armed with all requisite diplomas and the experience of years, suffer themselves to grow so dull in diagnosis as to bleed a typhoid patient half an hour before death in the evening, that they had been stimulating through the day; or so far forget, or compromise the dignity of their high calling, as to practice 'Mesmerism,' or prescribe 'Mother's Relief' to a parturient woman, men of smaller pretensions, and more professional pride, or better information, should not, and do not wonder at quackery springing up around such like mushrooms in a spring morning, where a fat cow has lain over night and warmed the soil for their reception."

Dr. Fearn is credited with the practice of giving enormous doses of quinine in the malarial fevers. Dr. Bassett mentions five or six cases of night blindness caused by these large doses. Very full accounts are given of epidemics of scarlet fever and of smallpox, and a discussion on the cold water treatment of the former disease. Dr. Bassett must have had a well-equipped library, and his references to authors both old and new are not only very full, but most appropriate. "In the

spring of 1833 we were visited by the scarlet fever in its most malignant form; during the prevalence of this epidemic more than fifty infants perished in Huntsville, at the only age they are not an annoyance here. I treated nine bad cases, and four terminated fatally; I lost nearly half in almost every instance. An older practitioner was called in, but I am not certain that in their own proper practice they were more fortunate. In more than one instance there lay more than one dead child in the same house at the same time. I feel certain that this was a most malignant disease; but I do not feel certain that in every case our best physicians remembered the united counsel of Hippocrates and Ovid, that 'nothing does good but what may also hurt,' and which should never be lost sight of by the man of medicine."

The following is an extract from the account of the small-pox epidemic of 1835: "My treatment was pretty much that laid down by Dr. Meade: bleeding, gentle aperients, cool air, sub-acid drinks, mild anodynes and vitriolic infusion of barks. Although the purgative part of this treatment embroiled the faculty of the early part of the 18th century to such a degree that the like has not been heard since the days of Guy Patin and Antimony—shaking the authority even of the celebrated triumvirate, Mead, Friend and Radcliffe, and who, on their part, embalmed one Dr. Woodward in their gall and handed him down to posterity, like a 'dried preparation,' as a specimen of the folly of small men who attempt to run against 'the throned opinions of the world'—and a proof that 'polite literature does not always polish its possessors'—yet we of Huntsville were too willing that our brethren should have our cases, to question each other's practice."

Dr. Bassett states that among the 30,000 inhabitants of the county, thirty physicians practiced who were paid about \$30,000 a year, "which," he says, "is but *bread*, and scarce at that"; and when we contemplate the 50 lbs. calomel and 1000 ozs. quinine which they swallow, it reminds one of Falstaff's bill of fare: "But one half-penny worth of bread to this intolerable deal of sack."

There is a very clever discussion on the, at that time, much debated question of the use of anaesthetics in labor. The following is a good extract: "It is truly humiliating to science to have to stop and rest upon her course until the dullness of the clergy can frame an excuse for an obvious truth—to see such a man as Dr. Simpson, of Edinburgh, stopping in the midst of his *labor*, to chop logic by the way-side, like a monk of the fifteenth century, to endeavor to prove a truth at midday, by argument, which he had proven by practice in the morning, and thereby running at least a risk of losing by night what he had earned through the day. Let us examine in plain English his new translation of the Hebrew authority for the use of chloroform and see if in getting one dent out of his turtle's egg, he does not put another in."

At the head of the article by Dr. Bassett in the second volume of Fenner's Reports stands the quotation, "Celsus thought it better, in doubtful cases, to try a doubtful remedy, than none at all"; which he quotes only to condemn in the following vigorous style: "In giving my individual experience and opinions, I desire to censure none. In such cases the best informed fear the most, and experience but renders us charitable. I will therefore only say that I have been fortunate, in my own practice, in reversing the aphorism at the head of this article. That rule of practice has found favor in the eyes of every generation of both doctors and patients, and it is not wonderful that the few able men of every age that have opposed it have warred in vain,—that the science of French expectancy, and the quackery of German homeopathy, have alike failed; dying men will have pills and parsons."

"When physicians were required, by public opinion, to follow the dictates of Hippocrates, and his immediate successors, as closely as Christians now profess to follow the commandments of Moses and the prophets, they claimed a right to act boldly their faith in these authorities, and public opinion sustained them; and however difficult the task, they

found it much easier to understand the written language of Hippocrates than the yet more obscure teachings of Nature, between which and his followers he stood an infallible interpreter, making her mysteries so plain that wayfaring men, though fools, could not err therein. Hippocrates was but our fellow-servant, and we are but ministers of Nature; our whole art consists in understanding her language and laws; our whole practice, in obeying her mandates: if we do not understand them, it is either our fault or misfortune; to act as though we did is quackery. Celsus says, this bold practice of old, *ferè quos ratio non restituit temeritas adjurat*; but shrewdly remarks, that 'Physicians of this sort diet other men's patients more happily than their own.' I doubt, however, if, in the present state of medicine, a thorough physician is ever, in any stage of any disease, so completely without rational education as to be thus nonplussed, and driven to the necessity of dealing a blow in the dark; where there are no intelligible indications, it is clear there should be no action."

"Then, if I have not followed the advice of this master, it has not been lightly laid aside; nor, as I have stated, without precedent; and if I have, in a measure, adopted another of his rules, to make food physic (*optimum vero medicamentum est, cibus datus*), it has not been upon his mere authority. I revere authority, believing with the royal preacher, that 'whoso breaketh a hedge, a serpent shall bite'; yet I rejoice that its fetters are broken in medicine—that we no longer are hedged with the eternal cry of 'Hippocrates and reason.' But if, in getting rid of the authority of the Ancients, we have discarded the example of their labor and learning, and turned a deaf ear to their opinions, it is easier to be lamented than corrected. If the unthinking part of the profession of old, that followed authority, and 'on the first day of a fever loosened the belly, on the next opened a vein, on the third gave a bolus,' etc., are now represented by those who follow fashion, and give calomel, quinine and cod-liver oil every day, we have but changed authority for fashion, and are yet in

bondage; but fashion, though indomitable, changes with the wind, and if for a time it carries the small craft, the weak or designing in its current, it soon leaves them stranded, as landmarks, at which we can at least laugh, without fear of professional martyrdom."

Rarely has the *credo* of a zealous physician been more beautifully expressed than in the following words: "I do not say that the study of nature, human and comparative, as far as it relates to medicine, is an easy task; let any one undertake a foreign language, and when he thinks he has mastered it, let him go into its native country and attempt to use it among the polite and well-informed; if he succeed, let him go among the illiterate and rude, where *slang* is current; into the lunatic asylum, where the vernacular is babbled in broken sentences through the mouth of an idiot, and attempt to understand this; should he again succeed he may safely say that he knows that language. Let him then set down and calculate the cost, in labor, time and talent; then square this amount and go boldly into the study of physiology; and when he has exhausted his programme, he will find himself humbly knocking at the door of the temple, and it will be opened; for diligence, like the vinegar of Hannibal, will make a way through frozen Alps; it is the '*open sesame*' of our profession. When he is satisfied with the beautiful proportions of the interior, its vast and varied dimensions, the intricate and astounding action of its machinery, obeying laws of a singular stability, whose very conflict produces harmony under the government of secondary laws—if there be anything secondary in nature!—when he is satisfied (and such are not satisfied until informed), he will be led to his ultimate object, to take his last lessons from the poor and suffering, the fevered and phrenzied, from the Jobs and Lazaruses,—into the pest-houses and prisons, and here, in these magazines of misery and contagion, these Babels of disease and sin, he must not only take up his abode, but following the example of his Divine Master, he must love to dwell there;—this is Pathology."

"When such an one reënters the world, he is a physician; his vast labors have not only taught him how little he knows, but that he knows this little well. Conscions of this virtue, he feels no necessity of trumpeting his professional acquirements abroad, but with becoming modesty and true dignity, which constitute genuine professional pride, he leaves this to the good sense of his fellow-citizens to discover."

Dr. Bassett developed tuberculosis, and the last letter in the budget sent to me was dated April 16th, 1851, from Florida, whither he had gone in search of health. He died November 2d of the same year, aged 46.

To a friend he writes on the date of April 5th: "This world has never occupied a very large share of my attention or love. I have asked but little of it, and got but little of what I asked. It has for many years been growing less and less in my view, like a receding object in space; but no better land has appeared to my longing vision; what lies behind me has become insignificant, before me is a vast interminable void, but not a cheerless one, as it is full of pleasant dreams and visions and glorious hopes. I have covered it with the landscapes of Claude, and peopled it with the martyrs of science, the pioneers of truth, the hound-hunted and crucified of this world, that have earned and then asked for bread and received a serpent—all who have suffered for the truth. How glorious it is to contemplate in the future these time-buffed at rest, with their lacerated feelings soothed as mine have been this day by the tender regard your wife has manifested for my future well-being."

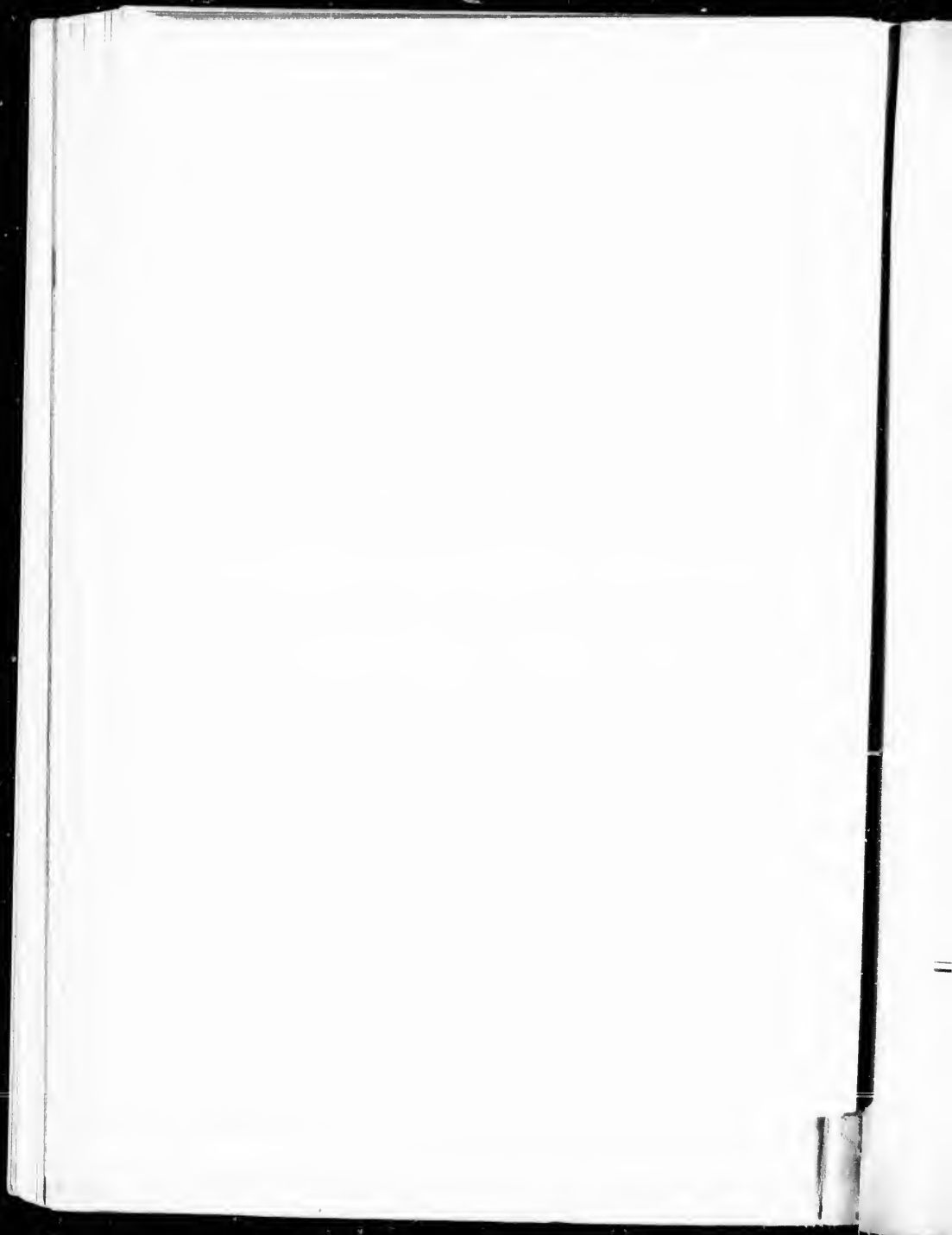
The saddest lament in Oliver Wendell Holmes' poems is for the voiceless,

"for those who never sing,
But die with all their music in them."

The extracts which I have read show Dr. Bassett to have been a man of more than ordinary gifts, but he was among the voiceless of the profession. Nowadays environment, the

opportunity for work, the skirts of happy chance carry men to the summit. To those restless spirits who have had ambition without opportunities, and ideals not realizable in the world in which they move, the story of his life may be a solace. I began by saying that I would tell you of a man of whom you had never heard, of a humble student from a little town in Alabama. What of the men whom he revered, and for whom in 1836 he left wife and children? Are they better known to us? To-day scarcely one of those whom he mentions touches us with any firmness from the past. Of a majority of them it may be said, they are as though they had not been. Velpeau, Andral, Broussais, the great teachers whom Bassett followed, are shadowy forms (almost as indistinct as the pupil), dragged out to the daylight by some *laudator temporis acti*, who would learn philosophy in history. To have striven, to have made an effort, to have been true to certain ideals—these alone are worth the struggle. Now and again in a generation, one or two snatch something from dull oblivion; but for the rest of us, sixty years—we, too, are with Bassett and his teachers—and

"no one asks
Who or what we have been,
More than he asks what waves,
In the moonlit solitudes mild
Of the midmost ocean, have swelled,
Foam'd for a moment, and gone."



ON SIX CASES OF ADDISON'S DISEASE,

WITH THE

REPORT OF A CASE GREATLY BENEFITED
BY THE USE OF THE SUPRA-
RENAL EXTRACT.

BY

WILLIAM OSLER, M.D., F.R.C.P. (LOND.),
Professor of Medicine, Johns Hopkins University.

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ON SIX CASES OF ADDISON'S DISEASE, WITH THE
REPORT OF A CASE GREATLY BENEFITED
BY THE USE OF THE SUPRA-
RENAL EXTRACT.

NINE cases of this rare affection have fallen under my observation. In two of these I made the dissection of the nerves and capsules.¹ A third case I reported in conjunction with Dr. J. C. Wilson in volume xiii. of the *Transactions of the Philadelphia Pathological Society*. The additional six cases, which I here give, have not been previously recorded.

Recent studies render it very probable that the original view of Addison is correct,—namely, that the symptoms of the disease are caused by loss of function of the adrenals. The evidence on which this is based is readily available in the elaborate Gonlstonian Lectures of Rolleston,² in the address of Professor Schäfer³ on Internal Secretions, and in a paper by Dr. Oliver.⁴ On this view the disease is analogous in all respects to myxœdema, and is caused directly by the loss of the internal secretion of the glands. The comparison between these two diseases has frequently been drawn. As far back as 1885, in an article on Addison's disease in Pepper's "System of Medicine,"⁵ I used the following words:

"The relation of affections of the thyroid gland to myxœdema and cretinism, and the experimental production of these conditions by the removal of the thyroid, have widened our view of the importance of the ductless glands. It is interesting to note the analogy between myxœdema and Addison's disease. In both there are distinct histological changes in the tissues—in one an increase in the mucin, in the other an increase in the pigment—and in both marked nervous phenomena: mental dulness, a progressive dementia in myxœdema, a profound asthenia in Addison's disease. We regarded the thyroid as unimportant to life until the experience of surgeons and extirpation in monkeys by Horsley demonstrated that abolition of its function was followed by a serious train of symptoms; and perhaps the experimental removal of the suprarenals in monkeys—so much more closely allied to man than the animals hitherto experimented upon—may demonstrate that these little bodies are also not without their influence upon health.

"Although the view of disturbed innervation consequent upon involve-

¹ Ross, *Transactions of the Canadian Medical Association*, vol. i., 1877, and Pepper, *Transactions of the College of Physicians, Philadelphia*, Series iii., vol. viii.

² *British Medical Journal*, 1895, vol. i.

³ *Lancet*, 1895, vol. ii.

⁴ *British Medical Journal*, 1895, vol. ii.

⁵ Vol. iii. p. 947.

ment of the abdominal sympathetic meets the case, theoretically, better than any other, and is at present widely held, yet there are signs of a return to the old view of Addison."

The analogy will be complete if it be found that in suitable cases the use of the suprarenal extract cures Addison's disease in the same remarkable way that the thyroid extract relieves myxœdema. Clinical workers may now contribute their share by carefully studying the effects of the extract in selected cases. Addison's disease is so rare that every opportunity should be seized. At the same time the greatest caution should be exercised, on the one hand, to select only well-characterized cases, and, on the other hand, to exclude cases in which the condition is a concomitant of widespread tuberculosis.

CASE I.—Failing health for a year; attacks of faintness; bronzing of face and hands; sudden death. (Abstract.)

A. J., aged about forty, lawyer, consulted me in the spring of 1885, complaining of weakness and attacks of faintness. He was a healthy-looking, well-nourished man, of good family history. For about a year he had been overworked and worried, and had had at times dyspepsia. On one occasion, in court, he felt very faint and almost fell. On two or three other occasions he felt very weak and prostrated without any obvious cause. For nearly a year he had noticed a gradual darkening of the skin of the face and of the hands. At the suggestion of his physician he sought an opinion as to the existence of Addison's disease. The patient's general condition was so good, without anæmia, loss of flesh, or any signs of tuberculosis, and the pigmentation was so slight and limited, that doubt seemed reasonable. Dr. Pepper saw the case with me, and we agreed that the pigmentation and causeless fainting spells were, to say the least, suggestive, and we advised him to give up business for a year and live quietly abroad. He went home prepared to follow our advice, arranged his affairs, and made preparations for his trip, when one morning he dropped dead in a railway station. There was no autopsy.

CASE II.—Gradual asthenia; progressive bronzing of the skin; attack of syncope; nausea and vomiting. Autopsy: cheesy foci at apex of left lung and in bronchial glands; tuberculosis of the adrenals; very slight matting of the semilunar ganglia and nerves.

Nellie R., aged forty-one; admitted to the Philadelphia Hospital July 2, 1886, with great weakness and bronzing of the skin. Her father and mother both died of heart-disease, one sister of dropsy, and one of heart-disease. She had small-pox when a child; otherwise she has been a very healthy woman until a year ago, when she was attacked suddenly with great pain in the region of the heart and with dyspnoea. The distress lasted for at least three days. Until April of this year she has been in fairly good health, except that she seemed more languid than formerly and felt indisposed to work.

Last November her friends noticed that she was changing in color, and throughout the winter her normally fair complexion has been replaced gradually by a dark bronze. Three weeks before admission she had a sudden attack of syncope, preceded by dizziness in the head. Shortly afterwards she began to vomit after meals, and has done so almost every day since. She has had no pain anywhere.

Present Condition.—Small, somewhat emaciated woman. Face, neck, and hands deeply, general surface of the trunk slightly, pigmented. The bronzing of the face is extreme; it is interesting to note that on the forehead the deep small-pox scars

are unpigmented. The skin of the abdomen is much darker than that of the thorax; the fingers are not clubbed; the nails are incurved; the pulse is 96, small and thready; the heart-sounds are clear and loud; there is slight flattening beneath the clavicles at both apices, and the percussion note is a little high pitched, and there are a few râles on deep inspiration. The abdomen is soft; no pain on deep pressure in the epigastrium; no tenderness on either side in the renal regions. There is no pigmentation of the mucous membrane of the mouth. The color of the lips is fairly good; no anemia; temperature 98° F.

The patient had most profound anorexia with great prostration, and once or twice vomited small quantities of blood. She gradually sank and died on the 13th.

Autopsy.—Body not emaciated; skin of face, neck, hands, and arms of a light bronze color; marked pigmentation of abdomen. On the inner surfaces of cheeks a dark patch on either side. Vaginal mucosa not pigmented; panniculus over abdomen three-fourths of an inch in thickness.

Peritoneum.—Adhesions between the surface of the liver and the diaphragm. The omentum is adherent to the wall of the pelvis. In thorax there are adhesions at the right apex and general adhesions at the left side. The heart contains fluid blood and clots. The valves are normal; the muscle substance is a little pale.

Lungs.—The left is crepitant except at extreme apex, and in two or three small areas of anterior margin, which show cheesy foci surrounded by gelatinous infiltration. The right lung is everywhere crepitant. The pleura is thickened, particularly at the apex. The bronchial glands are caseous.

Stomach.—Everywhere throughout the mucosa are small white bodies about two millimetres in diameter. There is pigmentation towards the pylorus; no erosions and no other special changes.

The *spleen* is of average size, closely adherent to the diaphragm, and the pulp looks normal.

The *liver* is small, united closely to the diaphragm. There are no tubercles, but in the adhesions on the right border is a small caseous body the size of a pea.

The *intestines* show no special changes except a slight enlargement of Peyer's patches and the solitary glands.

The suprarenals and sympathetic ganglia were dissected *in situ*.

The right splanchnic nerve is large, and a ganglion existed on it opposite the tenth dorsal vertebra. The left nerve is not so large and presents a smaller ganglion. The right nerve enters the semilunar ganglion, which is readily dissected, as it is not specially involved in cicatricial tissue. On the left side the ganglion is large, but also readily separated from the adjacent tissue. The nerves joining the two ganglia and those about the celiac axis are less distinct than usual, owing to the slight matting of the tissue. The nerves passing to the suprarenals are free.

The capsules are not much enlarged. The right is six centimetres long, very firmly adherent to the liver and to the inferior cava. The left, six centimetres in length, is closely united to the kidney and to the spleen. On section the right capsule presents no trace of normal gland tissue. The lower half is occupied by a large cheesy mass, the central portion of which presents a grayish translucent, fibrous tissue. The remainder of the organ is made up of a similar tissue in which are small cheesy nodules. Behind the *vena cava* there is also a solid caseous mass. The left capsule presents a firm, cheesy nodule just where its main vein emerges. The organ is flat and made up of a gray, translucent, fibrous tissue.

The kidneys are of average size. The left presents numerous small tubercles and one or two caseous masses which are in close proximity to the suprarenal capsules. In the pelvis the broad ligaments, ovaries, and tubes are closely matted together by old peritoneal adhesions.

The dissection of the nerves and adrenals is in the Mütter Museum of the College of Physicians in Philadelphia.

CASE III.—Dyspepsia and occasional attacks of vomiting for two or three years; for some months gradual pigmentation of the skin and mucous membrane of the mouth; attacks of dizziness; extreme prostration and anemia; profuse diarrhœa; urgent vomiting; death; no autopsy.

William S., aged fifty-nine, longshoreman; admitted June 30, 1887, to the Philadelphia Hospital, complaining of vomiting and great prostration. With the exception of yellow fever, in 1864, he had enjoyed very good health until three years ago, when he began to have dyspepsia and occasional attacks of vomiting. He has, however, kept at work.

For many months past (he does not know the exact time) he has himself noticed, and his friends have remarked, that he was becoming very dark in color. Eight days before admission he had an attack of dizziness, in which he fell but did not lose consciousness. Since then he has been extremely prostrated and the attacks of vertigo have become more frequent.

Condition on Admission.—Large, well-nourished man; slight œdema of the feet. Skin of the face, neck, and hands of deep mahogany brown. General surface of the body very much darker than ordinary; sclerotics are pearly. The lips are pale, and there is evidently marked anemia. Mucous membrane of the lips and inner side of the cheeks deeply pigmented, and a large patch can also be seen on the soft palate.

The lungs are entirely negative: no râles at the apices; no dulness; no sign of old tuberculous disease. The apex-beat is in the fifth interspace. Pulse 96, small. There is a venous hum in the vessels of the neck; no hæmic murmur at the base of the heart.

There is marked pain on pressure over the tenth and twelfth ribs on the left side; none on the right. The blood showed the characteristic features of an extreme anemia, and the blood drop looked very watery. The count gave one million red corpuscles per cubic millimetre. Proportion of white to red one to four hundred.

The patient sank rapidly after admission; had profuse diarrhœa and urgent vomiting, and died July 6. The temperature ranged from 98.2° to 101.4° F. So far as could be ascertained from the patient himself and his friends, there had been no tuberculous disease in his family.

This is the only case of Addison's disease which I have seen with profound anemia, a symptom on which Addison laid a good deal of stress. In a majority of the cases the blood count does not fall below fifty or sixty per cent. A difficulty sometimes arises in the diagnosis of the disease in cases of severe anemia of the progressive pernicious type which have irregularly mottled pigmentation. I have recently seen a case in which, with the progressive anemia, there was a degree of asthenia and gradual pigmentation highly suggestive of Addison's disease.

CASE IV.—Gradually developing languor and asthenia; frequent attacks of causeless vomiting; progressive pigmentation of the skin; convulsions; toxemia; death. Autopsy: sclerosis and atrophy of the adrenals; no tuberculous.

David A., aged fifteen and a half, a patient of Dr. Mullin's, of Hamilton, Ontario, who consulted me by letter about him, and who very kindly sent me the suprarenal capsules for examination.

The patient's father died at forty-five from pulmonary tuberculosis of four years' duration. The mother is a healthy woman; the brothers and sisters are healthy.

The boy had suffered from no serious illness in early life, and had good health until the onset of the present illness. In March he had a slight febrile attack, in which he was confined to bed for two days. Early in April his mother noticed that he appeared to be sunburned, and she thought it was due to wearing his Scotch cap too long in the spring. He seemed also languid and listless, and did not seem able to apply himself to study. Early in the summer he was taken from school, as he fretted and cried frequently on account of the scoldings. Ever since the attack in March he has had at intervals of three or four weeks attacks of vomiting, in which he brought up greenish and yellow matter, after which he felt better. In the summer the mother noticed that the skin became much more discolored. He was very indolent and took but little exercise and did not engage in any sports. His complexion was fair and his hair of a light color and thin, so that his discoloration, which deepened through the summer, was very marked. He had at times very severe headache, and sometimes acted strangely, as if silly.

His final illness is so graphically described by Dr. Mullin that I give his statement in full.

"On Monday of this week he complained of sickness and headache. On Wednesday he did not rise from bed; that night he slept and did not complain. On Thursday he was languid and stayed in bed; vomited a little green matter; said he had no headache, but had a bad taste; he was dull and heavy; his eyes appeared strange, and he acted as if he did not wish to be disturbed. About 2 p.m. he took a little oyster-soup; this was taken quickly, and he then turned to the back of the bed; later he vomited slightly. About 5 p.m. he would not answer questions; turned to the wall as if he wished to sleep. A little before 6 p.m. a convulsion occurred, not violent; the limbs were fixed; he was quite unconscious, face a little drawn, and slight frothing; the hands jerked slightly. After this he did not speak, except to say 'yes,' 'yes'; he would put out his tongue and open his mouth, and then turned away and moved to the back of the bed. A few minutes after the convulsion he was seen by a physician, who said that the movements were very similar to those of an hysterical patient. I saw him at nine o'clock the same evening. He was not unconscious, but did not seem able to fully understand. He moved to the front of the bed at my request, but soon turned and moved to the wall. The pulse was feeble and could not be counted at the wrist; the hands were cold; temperature in axilla, 100° F.; it had fallen one degree since taken after the convulsion. The tongue was a little furred, yellow; the breath seemed foul. During the night he was very restless, tossing from side to side and pulling the bedclothes. He passed urine once; at this time he asked for the vessel. The next morning I visited him at ten. The hands were cold, bluish, nails blue; pulse so feeble that it could not be counted at the wrist; heart-impulses, 132 per minute. Occasionally he made a deep sighing inspiration.

"The brownish discoloration of the skin very marked on the face, the shoulders, and anterior part of the thorax; the surfaces of the extremities discolored, but not so deeply; the integuments of penis and scrotum much darker than elsewhere, and the areola around each nipple was discolored as in pregnancy. Along the spinous processes from the level of the scapular spines to the sacrum was a row of ten spots about the size of a quarter of a dollar more deeply discolored than the surrounding skin. No pigmentation of the mucous membrane of the mouth; the breath was offensive; urine free from albumin and sugar.

"Until the afternoon he was very restless, pulling the bedclothes, and tossing about from side to side, and at 4 p.m. one-third grain of morphine was given hypodermically. After this he became more quiet, and when I visited him at 9 p.m. he was sleeping. He continued quiet during the night, and died the following morning about nine o'clock."

Dr. Mullin was kind enough to give me the opportunity of examining the suprarenals, sections of which I showed one evening at the Pathological Society of Phila-

delphia. Unfortunately, the specimens and sections of both this and the following case have been mislaid. Both capsules were extremely small, not half the normal size, and surrounded by much fat. They were firm, and on section showed no distinction between the medullary and cortical portions. Microscopically, there was a condition of diffuse sclerosis, with here and there areas of fatty degeneration. There was no tuberculosis of the organs.

CASE V.—Attacks of vomiting and indigestion for eight months; gradual pigmentation of the skin; intense prostration; death. Autopsy: tuberculosis of both adrenals; no involvement of other organs.

William B., aged nine, a patient of Dr. William E. Parke, of Philadelphia, Pa. The boy was at Girard College, and according to the doctor's statement he had seen him, on and off, for about eight months, during which time he had been repeatedly admitted to the infirmary with attacks of vomiting and indigestion, occasionally with a mild tonsillitis. His color had changed and he had become very much bronzed, but this was suggested to have been due to a dark ancestor. His last illness was characterized by most intense prostration and weakness, and obstinate vomiting. There was no elevation of temperature; the pulse had been rapid, but on the morning of his death it came down to forty.

I made the autopsy on the 28th of March, 1888. Unfortunately, the notes which I dictated to Dr. Parke at the time were mislaid. The skin was uniformly pigmented and about the color of a mulatto's. There was no enlargement of the lymph-glands; the heart and lungs were normal; no tuberculosis; no involvement of the lymph-glands in the abdomen; no changes in the stomach or intestine. The suprarenal glands alone were diseased. Both looked small; the right was larger than the left, and presented a flattened tuberculous mass about the size of an almond, the left a smaller mass in the upper part of the gland. There was no thickening or adhesion about the semilunar ganglion in the nerves passing to the glands.

CASE VI.—Pulmonary tuberculosis; injury two years ago; dyspepsia; gradual asthenia; pigmentation, deepening for nearly two years; treatment for eight months with suprarenal extract; rapid disappearance of the serious symptoms; marked and persistent improvement in general condition; no change in the pigmentation.

William H., aged forty-six, sail-maker, admitted to the Johns Hopkins Hospital May 3, 1895, complaining of cough, shortness of breath, great weakness, and a change in the color of his skin.

Family History.—His father died of cholera morbus and his mother from the effects of a stone in the bladder. He had three brothers and two sisters, all of whom are dead. He does not know of what the brothers died. One sister died in confinement; the other from poisoning by mercury. He knows of no tuberculosis in his family, and none of his relatives have had discoloration of the skin.

Personal History.—When a child he had measles, diphtheria, chicken-pox, and mumps, and when about seventeen years of age, varioloid. In his sixteenth year he served on board a man-of-war at Panama, where he had a protracted fever of nearly four months' duration. Shortly after this he had jaundice for a month, since when he has never had a very healthy or natural-looking color of the skin. Ten years ago he had two attacks of severe pain in the hypochondriac and epigastric regions, lasting about five hours. He was doubled up with the pain and had to have morphine. The attack was not followed by either jaundice or chills. In July, 1893, the patient was run over by a wagon, the wheels passing over his abdomen just below the navel. He was laid up for two months, and suffered a great deal of pain in the abdomen. There was no paralysis afterwards, but he has not been very strong since. For two years the

skin has been growing darker in color, and his friends have noticed that within the past five or six months the pigmentation has become much more intense. He has had at intervals throughout his life attacks of indigestion, and at times belching, but no vomiting. Twelve years ago he had an attack of diarrhoea, which lasted for a week. During the past two years he has lost very much both in flesh and strength, and for some months has had no ambition whatever for his work.

He is uncertain how long he has had a cough, but five weeks ago he began to have a great deal of cough with much muco-purulent expectoration. He has not had any pain, but he has suffered a great deal with shortness of breath on the slightest exertion, and he has the dyspnoea even when resting quietly in bed. There have been profuse night-sweats. He has been losing flesh rapidly, and has become very weak. The appetite is poor, but he has had no nausea and no vomiting. He has had no palpitation of the heart.

Present Condition.—The patient is a small-framed, poorly-nourished man; height about five feet, eight inches; present weight ninety-nine pounds. Temperature on admission was 101° F.; pulse, 136; respiration, 40. The eyes are sunken, and he looks very apathetic. One's attention is immediately attracted by the intense pigmentation of the skin, particularly of the face and forehead, which is of a uniform deep brown with irregular patches of a darker color. The lips and mucous membranes are not anæmic. On the roof of the mouth there are two patches of pigmentation; on the velum there is slight pigmentation; no spots on the lips, cheeks, or gums. The skin of the hands and wrists is of a very deep bronze color. The pigmentation is more marked in the axillæ and at the bends of the elbow. The areole of the nipples and the genitals are dark brownish-black in color. The general surface of the body shows a marked bronzing. There are areas of very deep pigmentation on the shins, and there is accentuation of the bronzing on either side of the great toes. The superficial glands are not enlarged. The epididymes and testes are normal. The pulse is regular, of medium volume, tension normal, the vessel wall slightly thickened.

The thorax is symmetrical, expansion slight, both clavicles prominent. The percussion-note is slightly impaired in the right front, and here from the second space there is a well-marked friction rub, heard throughout the mammary and axillary regions and around to the back, throughout the infrascapular area. At both apices behind there are a few fine moist râles. On the left side auscultation is negative. The sputum the day after admission was very abundant and frothy, containing a considerable quantity of greenish muco-pus, but tubercle bacilli were not found.

The apex-beat of the heart is in fifth interspace, just outside the nipple line. The sounds are everywhere clear.

The abdomen is somewhat retracted, nowhere tender; the border of the liver is not easily palpable; no increase in the area of liver flatness. The spleen is not palpable; neither kidney can be felt.

There is no enlargement of the thyroid or of the lymphatic glands; no nodes or lesions of the bones.

From the date of admission to May 16, the patient's temperature ranged from normal to about 101° F. The pulse-range was from 120 to 130; respirations from 25 to 35. He expectorated about two hundred and fifty cubic centimetres of sputum, which was examined every other day for tubercle bacilli, but without result; and no elastic tissue was found. The patient has been in bed, and the general prostration and the rapidity of the heart-action have been out of all proportion to the amount of local disease of the lung.

On May 16 the treatment with suprarenal extract began. Thirty-six pigs' suprarenals were obtained at the time of slaughtering, cut up finely, thoroughly powdered with pestle and mortar, and to this mass about six ounces of pure glycerin

were added, and the whole allowed to macerate for thirty-six hours in a refrigerator. The mixture was then filtered several times through fine-meshed gauze. The filtrate consisted of a reddish-brown syrupy fluid of a rather disagreeable odor. After filtering there were thirty-eight drachms of the extract, so that one drachm corresponded to a capsule. The patient began with half a drachm of the extract three times a day.

The patient's blood-count when he began the treatment was: red corpuscles, 4,564,000; leucocytes, 6600; hemoglobin, eighty-five per cent.

On May 20 tubercle bacilli were found in the expectoration for the first time. The cough and shortness of breath had been very much better. Prior to the treatment with the suprarenal extract the patient had gained one pound. The note by Dr. Thayer on May 24, eight days after beginning the use of the extract, was: The patient looks brighter and says he feels better. The pulse, which had ranged from 120 to 140, is now 100. He has gained three pounds in weight.

On June 6 the amount of the extract was increased so that he took the equivalent of three glands daily. Numerous careful blood-counts were made, and a differential count of the leucocytes. There was moderate leucocytosis; there were no nucleated corpuscles. The number of reds on June 6 was about 4,000,000 per cubic millimetre; leucocytes, 8900.

After May 20 the patient's temperature remained normal.

During the week ending June 16 the patient gained five and a half pounds,—a gain of nine and a half pounds since the use of the extract was begun. The patient continued to take the equivalent of three glands daily. A note by Dr. Thayer on June 19 is as follows: Temperature has been quite normal for more than a month. The pulse, which had ranged between 120 and 140 to the date of beginning the extract, has gradually fallen until during the last week the range was between 84 and 104. The amount of sputa has diminished to less than forty cubic centimetres in the day. The patient says he feels much better; his appetite is good, and he looks a great deal brighter. The condition of the lung has improved, and the friction murmur is no longer heard.

On June 28 tubercle bacilli were found. The treatment was continued throughout July and August, and in spite of the hot weather he improved progressively. The gain in weight was remarkable. In July his weight increased from one hundred and ten and a half to one hundred and fifteen pounds. In August, during the very hot weather, he lost again slightly in weight.

He left the hospital on September 10. The change in his condition had been very remarkable. When admitted he could scarcely walk to the bed, and was profoundly asthenic and emaciated. The general appearance had improved wonderfully; he was bright and active, and said he felt vigorous. His weight on discharge was one hundred and eighteen pounds, a gain of nineteen pounds. The pigmentation was unaltered.

Since his discharge he has been at work, and has reported at the hospital occasionally. He felt so well that throughout the latter part of November and December he remained without any of the suprarenal extract, and he lost three pounds in weight in that time. His condition to-day—January 15, 1896—is as follows:

The color is good. To me his face looks a little less pigmented, but Dr. Thayer, who had the patient in charge during the summer, while he was in the ward, does not think that there is any material change in the face, but thinks the discoloration is less intense on the trunk. It is still of a very advanced grade, such as is seen only in the most typical cases of the disease. The small patches of pigmentation on the palms have disappeared. The local condition in the lung has cleared, and there are now only a few râles to be heard occasionally on coughing. The friction is still audible just outside the right nipple. The change in the patient's general vigor is remarkable. He walks briskly, is active, energetic, in very good spirits, and says that he is as well as he ever was in his life.

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INTERNATIONAL MEDICAL MAGAZINE.

AN
ILLUSTRATED MONTHLY
DEVOTED TO
MEDICAL AND SURGICAL
SCIENCE.

EDITED, UNDER THE SUPERVISION OF

JOHN ASHHURST, JR., M.D., AND JAS. T. WHITTAKER, M.D., LL.D.,

BY

HENRY W. CATTELL, A.M., M.D.

THE development of medical science is proceeding at such a rapid rate that a medical journal is an absolute necessity to every practising physician. The INTERNATIONAL MEDICAL MAGAZINE supplies this need by giving, as it does, authoritative expression to the results of the experience and investigations of the foremost physicians, surgeons, and lecturers of the leading medical schools of the United States and Canada, together with those of the great medical centres abroad, such as London, Paris, Berlin, and Vienna.

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ADDISON'S DISEASE.

BY

WILLIAM OSLER, M.D.,

Professor of Medicine in the Johns Hopkins University of Baltimore

An address delivered before the classes of the Medico-Chirurgical College of Philadelphia
on January 24, 1896.

Reprinted from THE MEDICAL BULLETIN.

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ADDISON'S

By WILLIAM O

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The glands of the body, you are aware, are divided into different classes; certain of them, as the salivary glands and the kidneys, elaborate materials from the blood, which are poured out externally and which either serve some useful purpose or are excrementitious. Other glands have a double secretion, one of which is discharged by a duct and the other is passed into the blood either directly or through the medium of the lymphatics, and hence is termed an internal secretion. To this group belong the liver, which forms both bile and glycogen, and the pancreas, which secretes a powerful digestive fluid and an internal secretion with a remarkable glycolytic function. Then there is a third group of glands, comprising the spleen, thyroid, thymus, pituitary, and suprarenal bodies, which have no ducts or orifices of discharge; hence, the term "ductless glands." These bodies elaborate an internal secretion which is poured back into the blood and which, in the case of some of the glands, at any rate, has been shown to have most important functions. The progress of our knowledge of the physiology of these glands has been very rapid of late years. Let me first call your attention to the functions of the thyroid gland and to the manner in which they have been determined. In the first place, it has long been known that in regions in which goitre is endemic many of the children present a peculiar impairment in physical and mental development. The subjects, known as cretins, are strangely malformed, and either completely idiotic or feeble-minded. They are found par-

Schiff had demonstrated a series of changes in the thyroid gland. His observations were confirmed by many observers, whose experiments were performed on monkeys. It was invariably found that the thyroid gland, and in most cases the parathyroid glands, were not removed, and that the thyroid gland was not operated upon. In the experimental studies of the thyroid gland, the prime function of the thyroid gland for the normal animal was demonstrated.

Then came the discovery of the thyroid gland, which has been a striking therapeutic agent in modern times. Inasmuch as the symptoms of cretinism in the animal did not occur, the symptoms in the animal were transitory. The suggestion was made by Murray—a pupil of I. C. Murray—that a procedure in case of cretinism was a transplantation of the thyroid gland. It was found that feeding the animal with thyroid gland was an advantageous or useful substitute for Murray's shrewd suggestion. One of the most important features of the history of thyroid feeding in cretinism has been before the public long enough in weight and importance, and it may be said that the history of thyroid feeding in cretinism is a part of the history of medical medicine. In 1881, a lady, who was about 40 months ago, who was changing gradually from a healthy child to a flabby, and the face puffy, and the features were great cushioned tissue about the face, and there was a peculiar dryness. She had a peculiarly bright, active, intelligent, and taking charge of a listless apathetic child. It was to be let alone, and advanced case of cretinism, and pres-

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By WILLIAM OSLER, M.D.,

Professor of Medicine in the Johns Hopkins University of Baltimore.

The glands of the body, you are aware, are divided into different classes; certain of them, as the salivary glands and the kidneys, elaborate materials from the blood, which are poured out externally and which either serve some useful purpose or are excretitious. Other glands have a double secretion, one of which is discharged by a duct and the other is passed into the blood either directly or through the medium of the lymphatics, and hence is termed an internal secretion. To this group belong the liver, which forms both bile and glycogen, and the pancreas, which secretes a powerful digestive fluid and an internal secretion with a remarkable glycolytic function. Then there is a third group of glands, comprising the spleen, thyroid, thymus, pituitary, and suprarenal bodies, which have no ducts or offices of discharge; hence, the term "ductless glands." These bodies elaborate an internal secretion which is poured back into the blood and which, in the case of some of the glands, at any rate, has been shown to be one of the most important functions. The progress of our knowledge of the physiology of these glands has been very rapid of late years. Let me first call your attention to the functions of the thyroid gland and to the manner in which they have been determined. In the first place, it has long been known that in regions in which goitre is endemic many of the children present a peculiar impairment in physical and mental development. The subjects, known as cretins, are largely malformed, and either completely idiotic or feeble-minded. They are found par-

ticularly in certain European countries, and in some of the Cantons of Switzerland they occur by hundreds. It has long been recognized that the condition is in some way connected with disease or atrophy of the thyroid gland. While the affection is endemic in certain regions, it also occurs sporadically, and cretins are occasionally met with in this country.

In the second place, the observations of Sir William Gull and Dr. Ord showed that in adults a remarkable physical and mental change was liable to supervene in certain forms of disease of the thyroid gland. The subjects of the affection presented a great thickening of the subcutaneous tissues, marked change in the nutrition of the skin, and a gradual impairment of the brain-function, leading ultimately to dementia. So similar was this condition to that of the cretin that Sir William Gull called it the "cretinoid state," and Dr. Ord gave it the name of "myxedema," owing to the large amount of mucoïd material in the subcutaneous tissues.

A further step was the discovery by surgeons, particularly by Kocher and by Reverdin, that total extirpation of the thyroid, as is so often practiced in goitre, was followed in a certain number of cases by a condition identical with that of myxedema. The patients grew listless and apathetic and the cutaneous tissues underwent the same remarkable change already referred to.

These were the clinical contributions to the question. Then the experimental physiologists added their all-important studies.

* An address delivered before the classes of the Medico-Chirurgical College of Philadelphia on January 24, 1896.

Schiff had demonstrated that a remarkable series of changes followed complete extirpation of the thyroid in animals, and his observations were confirmed and extended by many observers, particularly by Horsley, whose experiments were conducted upon monkeys. It was shown that these changes invariably followed total extirpation of the gland, and in monkeys a condition was noticed very similar indeed to myxedema in men. If, on the other hand, a supernumerary thyroid gland existed, the change did not occur, or even if a small fragment of the gland were left, or if, indeed, a portion of the thyroid were transplanted into the animal operated upon. The clinical and experimental studies demonstrated conclusively the prime functional importance of the thyroid for the normal metabolism of the body.

Then came the all-important practical deduction which has proved one of the most striking therapeutical discoveries of modern times. Inasmuch as the peculiar train of symptoms following thyroidectomy in an animal did not occur if a gland from another animal were transplanted, it was a very natural suggestion which occurred to Dr. Murray—a pupil of Horsley's—to try the same procedure in cases of myxedema. Transplantation was at first used; then it was found that feeding by the mouth was equally advantageous or the extract of the gland used subcutaneously. The consequences of Murray's shrewd suggestion have opened one of the most interesting chapters in the history of therapeutics. The treatment has been before the profession now for a period long enough in which to form a clear judgment, and it may be said that the results of thyroid feeding in myxedema and in cases of early cretinism are without parallel in practical medicine. Let me give you an illustration. A lady came under my care some months ago, who for six years had been changing gradually, both mentally and bodily. She had become heavy, bloated, and flabby, and the skin exceedingly dry, the face puffy, and the eyelids baggy, and there were great cushions of swollen, subcutaneous tissue about the neck. The hair was dry, and there was a condition of patchy alopecia. She had changed mentally from a bright, active, intelligent woman, capable of taking charge of a large household, to a dull, listless apathetic creature whose only wish was to be let alone. In short, she was an advanced case of myxedema, scarcely able to walk, and presenting in many respects a

pitiful caricature of the human form and face. Within three months under the use of the thyroid extract she had lost all her bloated appearance; physically she had become active and energetic, and mentally she took an interest in everything. She returned to her home, resumed her domestic duties, and has been practically rescued from a condition of hopeless fatuity, and she is again happy and intelligent member of society. This is not an isolated instance, but such cases are now numbered by scores; both the infantile and adult myxedema this remarkable change has been effected. This is a brilliant triumph, too, for experimental medicine.

The facts which I have mentioned indicate clearly that the thyroid gland secretes some important substance which, poured back into the circulation, is of vital importance in maintaining the metabolism of the brain and of the subcutaneous tissues.

How stands the case now of Addison's disease? Eleven years ago in Pepper's "System of Medicine" I wrote as follows: "The relation of affections of the thyroid gland to myxedema and cretinism and the experimental production of these conditions by removal of the thyroid have widened our view of the importance of the ductless glands. In both there are distinct histological changes in the tissues—in one, an increase in the mucin; in the other, an increase in the pigment—and in both marked nervous phenomena; mental dullness, a progressive dementia in myxedema, a profound thymia in Addison's disease. We regard the thyroid as unimportant to life until the experience of surgeons and extirpation of monkeys by Horsley demonstrated that abolition of its function was followed by a serious train of symptoms; and perhaps the experimental removal of the suprarenals in monkeys—so much more closely allied to man than the animals hitherto experimented upon—may demonstrate that these bodies are also not without their influence upon health."

We may divide the steps in our knowledge, as we did in the thyroid, into the clinical, experimental, and therapeutical. Addison in 1854 described the disease very thoroughly and recognized the three important symptoms—namely, gradual deepening of the pigmentation of the skin; profound thymia, both muscular and mental, and gastro-intestinal disturbances. Anatomical Addison found that these clinical symptoms

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were associated with changes in the suprarenal bodies, usually a fibrocaseous alteration, which was subsequently shown to be tuberculous. While this is the common alteration, in other instances atrophy of the glands has been met with, in others again cancer, and in a few sclerosis. There has not been much added to our clinical and anatomical knowledge of Addison's disease. You will find the whole question very thoroughly and critically considered in Rolleston's Goulstonian Lectures at the Royal College of Physicians, published in the *Lancet* and *British Medical Journal*, Vol. I, of last year.

The experimental steps in our knowledge are by no means so complete or so satisfactory as in the case of the thyroid. Brown-Séquard, whose work was stimulated directly by Addison's paper, concluded that the glands were necessary to life and that they influenced in some way the elaboration of the pigment. I must refer you to Rolleston's Lectures for full details of the subsequent experiments. Recently Schaefer and Oliver have found that an extract prepared from the medullary portion of the suprarenal gland contains an organic principle of extraordinary power which acts especially upon the muscular fibres of the heart and the peripheral arteries and also upon the voluntary muscles. They were not able to obtain this substance from the glands in two cases of Addison's disease. The experimental work is by no means complete, and I present the most that we can say is that the balance of evidence is strongly in favor of the view that the adrenals are functional glands which contribute an important internal secretion, the nature of which is as yet undetermined, but which probably has an important influence on the normal metabolism of the skin and muscles.

The third step, which in the case of the thyroid has so brilliantly clinched and harmonized the clinical and experimental data, has been taken in connection with Addison's disease by the administration of the extract of the gland to patients. The disease is so rare that only a few cases have as yet been treated, and the results are not as yet in any means assured. I have had, for the first eight months, a case under my observation which has improved in a very remarkable manner. The following is an abstract of his history: Wm. H., aged 46, sail-maker, was admitted to the Johns Hopkins Hospital, May 3, 1895, suffering from cough,

weakness, and an increasing pigmentation of the skin. Nothing special in his family history. He did not know of any members having had tuberculosis. At the age of 16, when on board a man-of-war at Panama, he had an attack of jaundice, and he says his skin has never been of a perfectly good color since that time. In July of 1893 he was run over by a wagon, the wheel passing across the body at the level of the navel. He has had indigestion for several years. For two years he has been losing strength and energy and has noticed an increasing pigmentation of the skin. Within the past six months he has had a good deal of cough and mucopurulent expectoration. On admission he was very feeble, his eyes were sunken, and he was apathetic. The pigmentation of the skin was very intense, particularly on the face, forehead, hands, axillae, elbows, areolae of nipples, and genitalia. The skin of the trunk was not so much discolored. There was slight pigmentation on the roof of the mouth and upon the velum of the palate. The pulse was of fair tension and the wall of the artery not thickened. There were well-marked signs of softening at the right apex and a pleuritic friction-rub in the right mammary and axillary regions. There was no enlargement of the spleen or of the liver, no special tenderness over the region of the suprarenals. The sputum was greenish yellow, but did not contain either elastic tissue or tubercle bacilli.

From the date of admission to May 16th the temperature ranged from normal to 101 degrees F. On May 16th he began to take a glycerine extract of the pig's suprarenal, the dose being, at first, half a gland three times a day.

On May 20th tubercle bacilli were found in the sputum for the first time. During the first week the patient improved and gained three pounds. The temperature was normal from about the 20th. No unpleasant effects whatever were noted from the use of the extract. During the week ending June 16th he gained five pounds—an increase of nine and a half pounds since the treatment was begun. The pulse gradually fell from 104 to 84, the sputum decreased to 40 cubic centimetres daily, the appetite improved, and the patient looked very much better. During July and August the treatment was continued and the patient gained in strength and in weight. He lost entirely the dull, apathetic appearance, and his bodily vigor improved greatly.

On September 10th he left the hospital, the change in his condition being in every way remarkable. He had gained nineteen pounds, was bright mentally, and very active and vigorous. There was no change whatever in the pigmentation.

I showed this patient at my clinic exactly eight months after the beginning of the treatment. He continues well and strong. He has no longer any cough, he attends to his business, and says he feels perfectly well. There is no essential change in the pigmentation.

Time alone will tell whether we can obtain by this method of treatment the brilliant results such as we have in myxedema with the use of the thyroid extract. It is not at all probable that the results will be uniformly good. In the first place, the lesion of the adrenals associated with Addison's disease is often only a part of a general tuberculosis. In advanced cases, therefore, the suprarenal extract is not likely to be of use. In cases associated with malignant disease the treat-

ment will, of course, be fruitless. In a few instances, however, it is quite possible that the progress may be checked or that the disease may be permanently cured. I have emphasized the fact that the question is still in the tentative stage. The experimental evidence has not that strong and powerful unanimity such as we have noted in the case of the thyroid gland; still, it is extremely suggestive of the view that the adrenals are important functional glands, furnishing an internal secretion. If the symptoms of the disease are directly dependent upon the absence of this internal secretion, then in suitable cases the extract of the gland may supply this defect, and, as in the case of myxedema, arrest the progress or even cure the disease. The cases treated so far number only eight or ten, and I think it may be said that in a majority of these the condition has been improved, as in the case I have mentioned, but I do not know of any instance in which all the symptoms of the disease have permanently disappeared.

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ON THE ASSOCIATION OF ENORMOUS HEART
HYPERTROPHY, CHRONIC PROLIFERA-
TIVE PERITONITIS, AND RECURRING
ASCITES, WITH ADHERENT PERICAR-
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BY WILLIAM OSTER, M.D.,

Professor of Medicine, Johns Hopkins University; Physician-in-Chief,
Johns Hopkins Hospital, Baltimore.

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ON THE ASSOCIATION OF ENORMOUS HEART HYPERTROPHY, CHRONIC PROLIFERATIVE PERITONITIS, AND RECURRING ASCITES, WITH ADHERENT PERICARDIUM.*

BY WILLIAM OSLER, M.D.,

Professor of Medicine, Johns Hopkins University; Physician-in-Chief, Johns Hopkins Hospital, Baltimore.

Recurring ascites is a not very uncommon incident in the chronic heart disease of children and adults. It is seen most frequently in mitral valve lesion with consecutive changes in the liver, due either to the atrophy, consequent upon the cyanotic induration, or in adults to an associated alcoholic cirrhosis. There are instances also in children, in which the ascites is due to another cause; namely, a chronic proliferative peritonitis with extensive peri-hepatitis and peri-splenitis.

Some eight years ago there was admitted to my wards at the University Hospital, Philadelphia, a boy aged thirteen, with a history of recurring attacks of ascites. He had a very greatly enlarged heart, and a loud apex systolic murmur. He was under observation for a long time, and was tapped repeatedly. The dropsy was limited to the peritoneum, and we regarded the case as one of old mitral disease, with secondary cirrhosis of the liver.

The autopsy showed, somewhat to our surprise, an adherent pericardium, an enormously enlarged heart without valve lesion, a chronic proliferative peritonitis, with peri-hepatitis and peri-splenitis. The case was unique in my experience, and remained so until a second case came under my observation, the notes of which I give here in more detail. The patient, with the exception of a few months during the summer of 1891 and 1892, was in

*Read before the American Pediatric Society, Virginia Hot Springs, May 28, 1895.

Ward G of the Johns Hopkins Hospital from May 14, 1891, to December 8, 1894, a period of more than three and a half years, her age on first admission being eleven years; at the time of her death, fourteen.

Previous History.—There was no history of acute rheumatism or of St. Vitus's dance. She had had measles, scarlet fever, and whooping-cough. On questioning the mother closely about rheumatism, she says that Louisa had at one time growing pains in the legs, and the muscles of the right arm were once so stiff that she could scarcely use it. The joints, however, were never swollen or tender.

Onset of Illness.—About May 1, 1891, she began to have shortness of breath, with swelling of the feet and of the abdomen. Nothing abnormal had been noted before this time. On her first admission there was orthopnoea, general anasarca, cyanosis, and extreme ascites, so that she was tapped at once, and over three litres of clear fluid were withdrawn. There was enormous hypertrophy of the heart, with great bulging of the præcordia. There was no thrill, but there was a very loud blowing systolic murmur at the apex, rough in quality, and transmitted to the spine. The murmur was heard also at the lower sternum and at its left margin. The pulmonary second sound was accentuated.

The child improved a good deal, and the œdema of the feet disappeared, but the swelling of the abdomen persisted. The spleen could be felt below the costal margin; the liver was enlarged, the edge only one inch from the transverse navel line.

The case was regarded as one of mitral valve disease with secondary enlargement of the liver. On the first admission she remained until August 29th, and improved very much. A few days before leaving the note reads that "the ascites has disappeared, the heart's action is regular, the pulse 72, and of medium volume. The apex beat is in the sixth space in anterior axillary line; there is a wide area of heaving impulse as high as the third rib. There is a systolic thrill at the apex, and a loud, musical, systolic murmur which is transmitted to the back, and the pulmonary second sound is intensely accentuated."

We had no other idea about the case than that it was one of mitral insufficiency, though the question came up on several occasions whether or not she had in addition adherent pericardium.

She was readmitted October 8, 1891, with great shortness of breath and ascites. She was tapped, and nearly three litres

again removed. She was very much cyanosed, particularly in the hands and feet. The cardiac physical signs were the same—a loud, rough, apex systolic murmur transmitted well to the spine. In diastole at the apex there was a soft rumble, but no definite murmur. There was a systolic murmur in the lower sternal region, but no special difference could be determined between it and the murmur in the apex area. The urine always contained a small amount of albumin, and at times granular and hyaline casts. Very full notes were made of the case at intervals, particularly with reference to the condition of the heart. The apex beat seemed to have lowered, and could be felt in the seventh space, 7 c. m. outside the nipple.

Throughout the summer of 1892 she was tapped on several occasions, and the condition remained very much the same. There was no general anasarca, but much cyanosis of the hands and feet.

Before her second discharge on the 16th of June, 1892, it was noted that the first sound at the apex was sharp, followed by a loud, musical, systolic murmur, which was heard throughout the axilla and back, having at the scapula an intense blowing character. Passing upwards and inwards from the apex, the murmur lost its musical character. The second sound, which was heard feebly at the apex, was intensely accentuated in the third left interspace. The sounds in the aortic region were clear. For the first time, just before her discharge, on the fourth cartilage to the left of the sternum, a double murmur was heard, a soft diastolic, behind, as it were, the accentuated second sound. Passing down the left sternal border the murmur became lost.

After tapping the liver could now be felt very plainly. The border was about three fingers breadth above the navel.

She was readmitted on September 21, 1892, and remained continuously in the hospital until her death, December 8, 1894. During this entire period ascites was the marked and prominent feature. Prior to this admission she had been tapped only three or four times. To December 7th, the day before her death, she was tapped 121 times, and from three to five litres were removed on each occasion. We thought that in all probability there was adherent pericardium as well as extreme mitral insufficiency. There was systolic retraction in the apex region, marked bulging of the præcordia, and the upper limit of pulmonary resonance seemed very fixed.

During these last two years, the condition of the liver interested us very greatly. When the abdomen was empty the organ formed a visible and actively pulsating tumor midway between the navel and the costal border; and it is well figured in my lectures on the diagnosis of abdominal tumors.* It was smooth, descended with inspiration, and expanded visibly. Its edge was rounded and the whole mass could be grasped in the hand, feeling like a large spleen. The edge passed beneath the right costal margin about the nipple line, and far over on the left costal margin the enlarged spleen could be felt. Grasped in the hand, the pulsation was expansile and forcible, a little later than the cardiac impulse.

Early after her admission on this occasion, there was felt for the first time also a distinct peritoneal friction rub just below the edge of the liver. The condition of the heart did not materially change, except that the area of dullness increased. The loud, intense, apex systolic murmur persisted, and was heard all over the right side of the chest. In the sixth space a little above the nipple, there was a rumbling, echoing sound occupying the entire diastole, and in a limited area this had almost the characters of a presystolic murmur. The first sound was always well heard. Along the left sternal margin the soft diastolic murmur already mentioned was well heard. It was not audible at the aortic cartilage, but in the third, fourth, and fifth interspaces on the left side. She never had general anasarca after her first admission.

There were two additional features of great interest in her case. It was noticed on her first admission that the cyanosis of the hands and feet was extreme. This persisted with but little change, no matter what her general condition might be, whether she was suffering with great dyspnoea or whether she was wheeling herself about the ward in a chair, the hands and feet were permanently cyanotic. She became very thin, but the extreme lividity without any œdema was a remarkable feature in her case.

Then, shortly after her last admission, it was noticed that subcutaneous fibroid nodules were developing, and a series of these appeared about the knuckles, the wrists, and the elbows.

As I have already mentioned, the primary lesion in this case

*D. Appleton & Co., New York, 1894.

was thought to be mitral sclerosis with moderate narrowing of the valve, and enormous secondary hypertrophy and dilatation of the right chambers. The evidence also pointed to adherent pericardium, and as the patient had evidently a shrunken, cake-like liver, with recurring ascites, and a well-marked peritoneal "reibe-gerüsch," and remembering my former case at the University Hospital, Philadelphia, I made a diagnosis of proliferative peritonitis with peri-hepatitis and peri-splenitis, secondary possibly to the adherent pericardium.

The child died on December 8, 1894, the day after her 121st tapping; the respirations became very much embarrassed, the heart's action extremely rapid, and she sank and died in coma.

Autopsy by Dr. Flexner. Anatomical Diagnosis—*Chronic adhesive pericarditis—pericarditis affecting especially the right ventricle—chronic adhesions between pericardium, diaphragm, and lung—enormous hypertrophy and dilatation of heart, particularly of the chambers on the right side—hypertrophy of left ventricle—dilatation of cardiac orifices; normal valve segments—chronic proliferative peritonitis with peri-hepatitis and peri-splenitis—cirrhosis of the liver—chronic passive congestion of the spleen, intestines, stomach, and kidney—fibrous nodules about the elbows and hands.*

The body was much emaciated; the legs were a little œdematous; the veins were prominent, but the extreme lividity of the arms and legs had disappeared. The abdomen was distended and there was a prominence between the recti muscles. The superficial, abdominal and thoracic veins were prominent. There were subcutaneous fibroid nodules, ranging in size from a split pea to a bean, attached to the subcutaneous fascia.

There were about 2000 cc. of clear fluid in the peritoneum.

The omentum was rolled up, thickened, perforated in many places, adherent to the abdominal wall and to the transverse colon. The parietal peritoneum over its entire extent was opaque, in many places covered with nodular thickenings and threads of fibrous tissue. The mesentery was shrunken, and its serosa opaque and thickened. The lymph glands in general were not enlarged. The spleen was adherent to the diaphragm, capsule irregularly thickened, and its edges and posterior part was dense in consistence, and dark in color. It was moderately enlarged.

The liver was firmly bound by old adhesions to the diaphragm.

It was much deformed; without clear separation between the right and left lobes, but the whole organ was enveloped in a thickened, pearly white membrane of from two to five mm. in thickness. The gastro-hepatic omentum was also thickened. From the hilus of the liver thickened bands of fibrous tissue passed with the portal vessels, and in some places the Glissonian sheath was greatly thickened. The liver tissue itself was greatly altered in appearance; the cut surface was dark, almost black, with here and there light areas apparently of fat tissue. The central veins of the lobules were dilated. The length of the liver was 15 c. m.; thickness 6 c. m.; width 10 c. m. The consistence was greatly increased. The hepatic veins were enormously enlarged, and even in the middle of the organ they easily admitted the little finger.

The kidneys presented a markedly cyanotic appearance; on section there was much congestion, the consistence was much increased, almost of stony hardness. The mucous membrane of the stomach and intestines was greatly congested. Otherwise it showed no special changes.

Thorax.—The heart occupied an enormous space in the front of the chest. The intercostal spaces were dissected out so as to get accurately the limits of the heart *in situ*. From the mid-sternal line the following were the measurements: In the second interspace to the right, 6 c. m.; to the left, 8 c. m.; third interspace to the right, 8 c. m.; to the left, 11 c. m.; fourth interspace to the right, 11 c. m.; to the left 15 c. m., so that the total transverse measurement of the heart in the fourth interspace was 26 c. m. (10½ in.). In the sixth interspace the right border of the right auricle is 11 c. m. from the median line, and the apex was 14 c. m. (6 in.). The right auricle was enormously large, and (before removal of the heart) measured, in an oblique direction from the tip of the appendix to the orifice of the cava, just above the diaphragm, 14 c. m. (6 in.). The front of the heart was formed almost entirely by the right chambers. The pericardial sac was partly obliterated by old adhesions, which were situated particularly over the right ventricle, involving the left ventricle only a short distance beyond the septum. The greater part of the right auricle itself was free and the whole of the posterior surface of the heart. The adhesions were composed of strong fibrous bands. The right auricle was enormously distended and filled with partially decol-

orized clots. The walls seemed somewhat thickened and the endocardium was opaque. The orifice of the inferior cava was unusually large, measuring 4.5 c. m. in diameter; looking into the cava from the auricle one saw directly the large openings of greatly dilated hepatic veins, into which the index finger could be passed. The coronary sinus was also greatly dilated and the foramina Thebesii were unusually distinct. The right ventricle was much dilated and hypertrophied. The tricuspid orifice was large; admitted five fingers freely. The papillary muscles were thickened and flattened; the trabeculae likewise thickened and flattened. The segments of the tricuspid valve were a little opaque but not shrunken. The septum ventriculorum was closed. The thickness of the wall of right ventricle was 8 mm.; the length, 11 c. m. The pulmonary artery was large. The valve segments were normal and held water. The left ventricle was not nearly so large as the right; measured 8 c. m.; thickness of the muscular wall, 10 mm. The mitral segments were not shrunken, but were thicker throughout than normal. The mitral orifice admitted two and a half fingers. At the point of insertion of the chordæ tendineæ of the mitral segments there were a few calcified points. The posterior papillary muscle and the trabeculae were flattened. The endocardium of the left auricle was opaque and thickened, but the cavity itself was not specially dilated. The aortic valves held water. The segments were not specially thickened, except the middle one, which was thickened, and this segment presented a small aneurismal dilatation as large as a split pea, which looks towards the artery. The aorta just above the valve was 6 c. m. in circumference; at the end of the arch, 3.5 c. m.; at the coeliac axis 3 c. m.; just above the bifurcation, 2 c. m. The vessel was small and the walls thin.

On microscopical examination the liver showed enormous dilatation of the vessels. The tissue looked almost like an angioma. In other places the liver tissue was better preserved. The increase of connective tissue was not diffuse, but in circumscribed thick bundles. The muscular tissue at the right ventricle showed a moderate degree of fatty degeneration, which was much more marked than on the left side.

Remarks.—There are many points of great interest in connection with this case, but I only can refer here to the recurring

ascites with proliferative peritonitis. The case is almost the exact counterpart of the one under my care in Philadelphia.

Chronic proliferative peritonitis is met with chiefly in adults under conditions similar to those which produce cirrhosis of the liver. It has been in my experience a rare disease in childhood; and in the adult the symptoms are in reality those of atrophic cirrhosis of the liver, and the diagnosis is very rarely made before death.

Rosenbach is the only author I can find who suggests the possible connection between adherent pericardium and a chronic peritonitis; and he thinks that the chronic proliferative process extends along the veins, through the diaphragm, and involves the peritoneum. It is not unlikely that in the case here reported this sequence may have occurred. Some of the cases of indurative mediastino-pericarditis present a very similar clinical picture (see Harris, *Medical Chronicle*, 1895).

Other points of great interest in the cases were: The enormous hypertrophy and dilatation of the heart with only partial pericardial adhesions; the clinical picture of mitral valve disease, which most of these cases of adherent pericardium present so soon as the cardiac dilatation becomes excessive; the diastolic murmur along the left sternal margin which was probably associated with insufficiency of the valves of the pulmonary artery—Graham Steell's murmur of increased pulmonary tension; the subcutaneous fibroid nodules in a child who had never had acute arthritis and who had no mitral valve disease; and lastly the remarkable tumor formed by the pulsating liver.

1 WEST FRANKLIN STREET.

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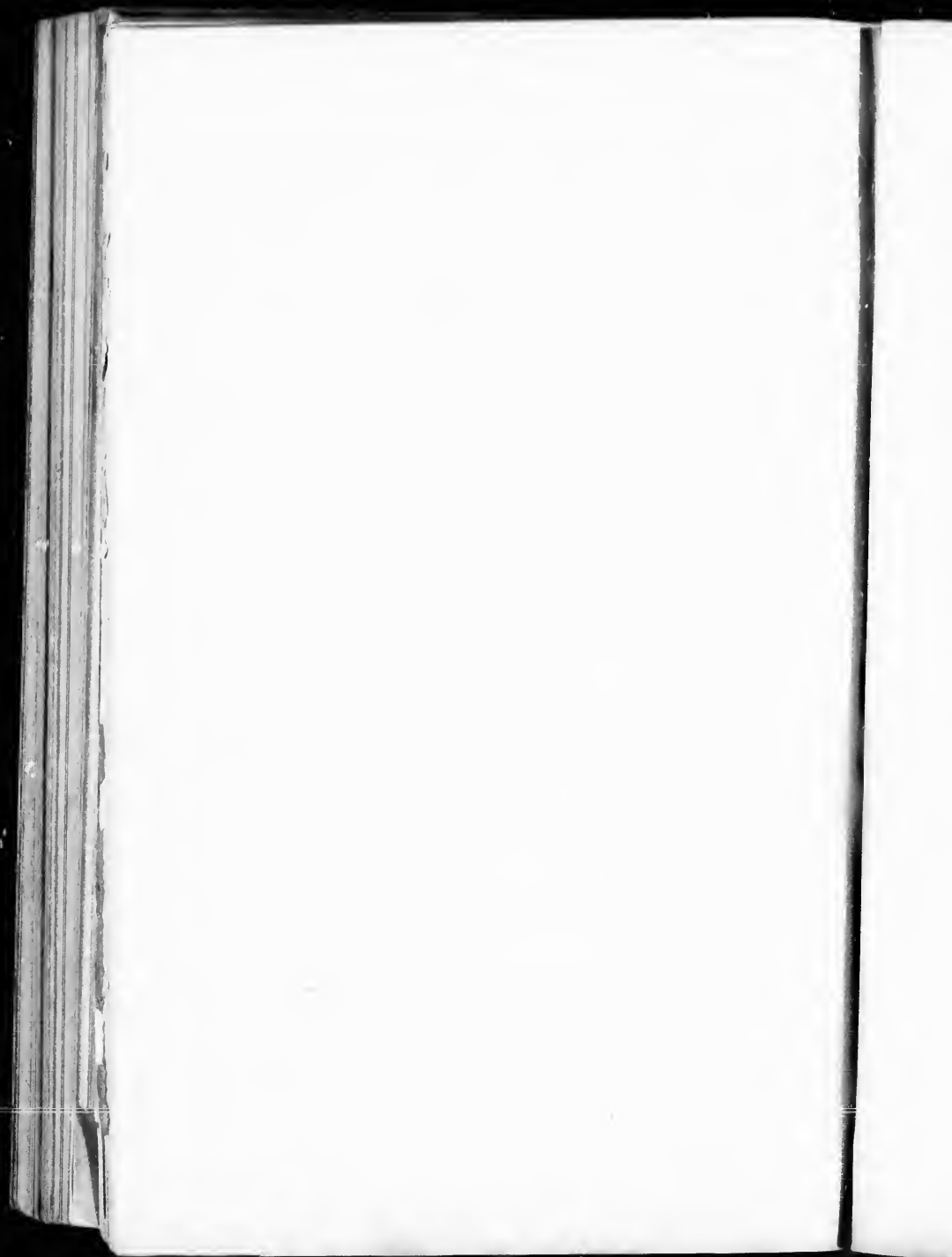
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Hemiplegia in Typhoid Fever.

BY

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HEMIPLEGIA IN TYPHOID FEVER.¹

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I SHALL speak to-day of two cases of great interest, illustrating a rare form of paralysis in typhoid fever. First, let me call your attention to a diagram which I have placed on the blackboard of the forms of paralysis most commonly met with during and after the specific fevers. You see, they are very varied in their symptomatology, and varied, too, in the nature of the local lesion.

	SYMPTOMS.	LESION.
Paralyses during & after fevers.	Hemiplegia	Thrombosis of veins of meninges. Thrombosis and embolism of cerebral arteries.
	Paraplegia.	Hæmorrhage. Meningo-encephalitis. Myelitis.
	Diplegia.	Neuritis.
	Monoplegia.	Neuritis.
	Local paralyses.	Polio-myelitis. Neuritis. } Toxic. Myositis. } Pressure.

We can divide the cases into those with central lesions, either of brain or cord, and those with peripheral lesions, affecting the nerves and muscles. In diphtheria, small-pox, scarlet fever, measles, and typhoid

¹A clinical lecture at the Johns Hopkins Hospital, Dec., 1895.

fever, the patient may become hemiplegic at the height of the disease, a condition which may be preceded by convulsions. In reviewing a large number of cases of hemiplegia, particularly in children, one meets with many instances in which the paralysis has developed during the course of one or other of the infectious diseases; thus, of the one hundred and twenty cases which I analyzed from the Infirmary for Nervous Diseases, Philadelphia, and the Institution for Feeble-Minded Children, Elwyn, there were sixteen with this history.

The anatomical lesion in these cases is not known in all instances. In a certain number, hæmorrhage has been found; in others, thrombosis of the cerebral arteries, or of the meningeal veins; while an acute encephalitis may exist.

You will find an exhaustive consideration of the whole question in the address by Dr. J. J. Putnam before the Third Congress of American Physicians and Surgeons, published in Vol. III. of the Transactions.

I have recently given in full detail our experience during the past six years of paralysis during and after typhoid fever.*

Of the nine instances under observation five were monoplegias, or local paralysis, and in four all the extremities were involved—diplegia. In every one of these cases the lesion seems to have been a neuritis. You will notice that I have placed among the lesions causing local paralysis, myositis. I have done so because we have had several instances in which the disability was associated with great pain in the muscles, with positive swelling, and great tenderness on pressure as though the trouble was within the muscle itself. The two cases which I shall first show you illustrate one of the most serious of the accidents of typhoid fever.

CASE I.—*Protracted attack of typhoid fever; in the tenth week, while the fever still persisted, sudden convulsions; hemiplegia, with aphasia.*

Annie F., aged 7, admitted to the medical wards October 3, 1895, complaining of inability to use the right hand.

There is nothing of note in the family history. With the exception of measles at four, she has been unusually strong and well; and has always been a very bright, intelligent child.

* Studies in Typhoid Fever, Johns Hopkins Hospital Reports, Vol. V.

During the first week of April of the present year, the patient had much malaise with headache and debility and epistaxis. On the 6th she went to bed, complaining of pain in the abdomen, fever and diarrhoea. She had a slow and protracted attack, the diarrhoea and fever continuing for more than ten weeks. She seemed to be doing well until Sunday, June 3, when she was seized with violent convulsions which were confined to the head, the right arm and leg. She was unconscious. The attack came on in the morning, and in the afternoon the movements ceased in the head, but movements of flexion and extension continued in the arm for nearly two days. It was then noticed that the right side was completely paralyzed, and the child was unable to move arm or leg. The face was also involved. With the hemiplegia there was total loss of the power of speech, and she remained aphasic for seven weeks. She improved, but very slowly. Voluntary movements were first noticed in the right leg six weeks after the convulsion. She has never regained power in the arm, but she has gradually begun to talk again. The child has now, as you see, the attitude and gait characteristic of hemiplegia, which has partially recovered. You noticed as she walked into the room that she limped, the right leg being dragged, with the foot inverted. You see, too, that she has worn away entirely the outer portion of the sole of the right shoe. Crippled as she is, yet she gets along very well and is able to run quite briskly. You notice as I throw this coin into the arena, that when she attempts to pick it up, the right arm is extended from the side and semi-flexed, but she puts the left arm and side forward, and grasps the coin with the left hand. When in repose the right arm is held close to the side, the wrist flexed, and the fingers also flexed. She can voluntarily flex and extend the arm at the elbow; can lift the hand to the head, but the power of extension in the wrist and the power of extension in the fingers, and of grasping with the hand are almost completely lost. When making any exertion, as in running for an object, the paralyzed arm is held out from the side, but there are no irregular movements in it. The condition of the face has improved very much since we first saw her early in October, but there is still paresis of the muscles.

In one other respect, too, she has got very much better. You notice now that she can name objects cor-

rectly, recognizes a knife, a watch, and a cent, but is confused somewhat between a cent-piece and a five-cent piece. Her sister tells us that in the matter of speaking the improvement has been quite rapid of late, and, indeed, she says a great many more words now than she did when she came under observation early in the session. She looks also bright and intelligent, and evidently understands what is said to her.

Briefly, then, this child is suffering with hemiplegia which followed a convulsion in the latter part of an attack of typhoid fever. She is recovering the power of speech and the paralysis of the face and of the leg is better, but the arm remains quite helpless and is becoming spastic.

As not infrequently happens, when one unusual case appears, another is certain to follow, and I am able to show you here a second instance of hemiplegia developing during typhoid fever in a man who has just applied for admission to the hospital.

CASE II.—*Severe attack of typhoid fever in March, 1895; at the end of the second week, without convulsion, slight hemiplegia, which persists.*

W. H. B., aged 25, clergyman, was admitted to the hospital November 30, complaining of paralysis of the left arm and leg.

His family history is good. Patient was not at all strong as a child; but was very well as a young man and while pursuing his theological studies.

On March 10, 1895, he went to bed with headache, fever, and diarrhœa. Gradually all the features of a very severe attack of typhoid fever developed, with much delirium.

On March 24th the paralysis developed suddenly without convulsions. There was also, Dr. R. K. Kneass informs me, no aggravation of the delirium following the attack.

He had no difficulty in speaking, there was no trouble with either rectum or bladder. He had a very protracted convalescence. Throughout the summer there was a gradual improvement, so that about July 1st he was able to stand and began to walk. The power over the leg muscles has returned more rapidly than in those of the arm. He has never regained any power in the fingers. There has been a steady gain in weight since his illness. This is the history of the case as obtained by Dr. Thomas, who first saw him, and from Dr. R. K.

Kneass, who kindly wrote to me about the original attack.

You noticed as the patient came in that the attitude and gait were those typical of hemiplegia. The left leg is dragged, the arm is held close to the side, flexed at the elbow, and the hand flexed.

He is well nourished, the face looks pale, but the color of the lips is good. There is no trace of paralysis of the facial muscles, and the eyes are normal in every respect. The left arm can be moved at the shoulder and elbow, and slightly at the wrist in flexion. The hand cannot be extended. The power of pronation and supination is lost. There are only very slight movements of extension of the fingers. The muscles of the arm are very thin, and the interossei are wasted. The left leg can be moved freely at the thigh and flexed and extended at the knee. The feet can be flexed and extended slightly. Movements of eversion and inversion are better performed. The deep and superficial reflexes are everywhere exaggerated on the left side. The ankle clonus is very readily to be obtained. Sensation appears to be perfect.

An interesting feature, not noticeable at first, is the occurrence of wide, irregular, choreiform movements on attempting any voluntary effort with the left arm. The patient's mental condition is excellent.

As I have already stated, hemiplegia in typhoid fever is exceedingly rare. Even in children, in whom hemiplegia is a more frequent complication of the specific fevers, it is very uncommon. Of the one hundred and twenty cases which form the basis of my monograph on the Cerebral Palsies of Children, there was no instance of hemiplegia following this disease. Of the one hundred and sixty cases collected by Wallenberg, four only occurred in typhoid fever. In a somewhat rich experience in typhoid fever no other cases of the kind have ever come under my observation. In the "Clinical Society's Transactions" (Vol. XXVI., 1893), Dr. Francis Hawkins has collected seventeen cases from the literature. Three of these occurred in children under fifteen years of age. In the fourteen cases in which the data were given, the time of onset was in the second week in one case, during the third week in six cases, during the fourth week in two cases, during convalescence in five cases. The right side was paralyzed in twelve of the sixteen cases in which the side was men-

tioned. Aphasia accompanied the hemiplegia in twelve instances. Of the seventeen collected cases only two died, and in both of these a thrombus was present in the middle cerebral artery. Probably this is the usual lesion in typhoid fever, and, as you know, in this perhaps more than in any other disease, there is a tendency to the formation of thrombi in the arteries. Endocarditis is so rare that hemiplegia from embolism must be very uncommon.³

We had this year a sad illustration of the occurrence of thrombous formation in the cerebral arteries in typhoid fever. The case is given in full in our recently issued "Studies in Typhoid Fever," but I give here a brief abstract since it bears directly upon the question.

The patient was a young man, aged 22, of good family history, who was admitted April 24, 1895, on the fourth day of an illness, in which he had headache, pain, and fever. On admission the temperature was 104°, but sank on the following morning to 100.7°. For the following three or four days the temperature range did not reach the bathing point, 102.5°. On the 27th rose-spots were seen, and the spleen was palpable. On the morning of the 28th the temperature was 99.3° and in evening 100°, and he seemed to be doing well in every respect. At noon on the 29th, as we were making the visit in the wards, Dr. Thayer was hurriedly called, and he found the patient in some distress, complaining of uneasy feelings in the head. The pupils were dilated, and in a few minutes he had a short, sharp, general, clonic convulsion, beginning almost simultaneously in both arms. The eyes showed marked conjugate deviation to the left and upwards, the head also being drawn somewhat to the left. For about an hour the convulsions were repeated at short intervals. Morphia was given hypodermically, and chloroform administered. They then became less intense, and finally ceased altogether for several hours. During the convulsions there was profound unconsciousness, and in the severer ones great embarrassment of the respiration, so that he became quite livid. In the interval the patient appeared to be conscious, and spoke to those about him, and seemed to understand questions, though he had a confused, frightened look. At 5 P. M., the convulsions recurred with great severity, and in spite of inhalations of chloroform,

³ "John Hopkins Hospital Reports," Vol. V., page 465.

they recurred at intervals until ten o'clock in the evening, when in a severe one the patient died. The convulsions were general, but the more intense movements were on the right side.

The autopsy showed a marked hæmorrhagic enteritis affecting the ileum, which presented here and there small ulcers in Peyer's patches. The heart was normal. The following is a description of the lesion in the brain by Dr. Flexner: "There was an area of thrombosis in certain of the vessels on the convolutions of the left side. At the time of the autopsy this was seen to involve the branches springing from the middle cerebral artery; but at this time the dissection was not completed. Subsequently in the formalin hardened specimen it was seen that the thrombi were situated in the ascending parietal and parietal-temporal branches of the middle cerebral artery. The meninges over these vessels contained small hæmorrhages, and the brain substance corresponding to them, while not softened, showed small extravasations of blood, although the surrounding tissue was quite firm. Small, but quite extensive punctiform hæmorrhages could be seen to occupy the cortex and adjacent white substance in the immediate neighborhood of the thrombosed vessels. These areas extend sometimes for a distance of two cm. (usually toward the convexity) from the vessels.

"The internal carotid artery was free from thrombosis, as likewise the Sylvian branch. The ascending parietal and parieto-temporal arteries, including at the points of their origins in the middle cerebral artery, were occluded by an adherent, partly decolorized, and quite firm thrombus. More recent dark thrombi were traceable into the branches of these arteries; for example, into the branches running in the Rolandic fissure, the sulcus between the ascending frontal gyri and the ascending frontal convolutions, and the branches supplying the temporo-parietal region generally. The inferior external frontal artery, and the arteries of the anterior perforated spaces were free from thrombi.

"On section of the brain there were no gross anatomical lesions. The ventricles were not dilated.

"Cultures of typhoid bacilli grew from different organs."

There is no possibility of perfect recovery in these two patients. The little girl will, in all probability, regain completely the power of speech. In both cases

there will be some additional improvement in walking. In the matter of prognosis in recent cases, it is worth noting that of fourteen of the cases collected by Hawkins, in which the result is given, nine recovered completely.

These upper motor segment paralysees in the fevers are fortunately exceptional and rare. In a much larger series of cases the lower motor segment is involved and the picture is of a spinal or neuritic paralysis. The lesion may be either central, involving the grey matter of the cord to a greater or less extent, or peripheral, involving the nerves of the extremities, more rarely those of the eye and of the palate.

Gowers states that anterior polio myelitis is more frequently secondary to typhoid fever than to any other acute specific disease, adding, however, that when the onset is subacute the symptoms are, no doubt, due in many cases to a multiple neuritis. The very full report given by Bury of cases of paralysis following typhoid fever (in the monograph by Ross and Bury on peripheral neuritis), does not, however, bear out this statement. In a great majority of all the cases there noted the condition had been evidently a peripheral neuritis. It is stated that some cases have presented the picture of an acute ascending paralysis, and death has followed in a few days; but it may be that even in these instances with the type of Landry's paralysis the lesion is a peripheral neuritis. The two cases of ascending myelitis described by Raymond (*Revue de Medicine*, 1885), both of which showed marked changes in sensation, as well as progressive muscular debility, and which recovered rapidly, would nowadays certainly be regarded as neuritis. There is less doubt about certain cases of monoplegia and of local paralysis; as in the case reported by Shore (*St. Bartholomew's Hospital Reports*, Vol. xxiii), in which there was acute myelitis of the anterior cornua from the third to the eighth cervical nerves.

For the purpose of comparison I show you a third case, illustrating the neuritic form of paralysis in typhoid fever. From his general appearance you can easily see that this patient has been through a severe ordeal. He has been in the private ward for exactly two months, and is now, as he would express it, as long and lank and brown as the Ancient Mariner. He is, however, convalescent, and has consented to come

before you to-day that you may see the remnants, at least, of a complication which, for a time, caused us great uneasiness.

I will first read you his history. The clinical summary is as follows:

Severe attack of typhoid fever; in the fifth week, pain in right arm and gradual loss of power in arm and hand; in sixth week, loss of power in both legs without pain; gradual recovery.

A. B., aged 26, one of the associate professors in a New England college, was admitted August 30, 1895. There is nothing of any special moment in his family history.

Early in August he paid a visit to the Eastern Shore, at which time he was quite well. On the 16th he began to complain of headache and pains in the limbs. On the 24th he noticed for the first time fever in the evenings. His appetite, however, was good until about four days before admission. He has had no bleeding from the nose. He has been thoroughly purged with calomel. For a week he has had a good deal of tenderness in the abdomen.

On admission, the features of typhoid fever were quite well marked. There were rose spots and enlargement of the spleen. For the first week the temperature ranged from 100 to 105°.

On repeated examinations of the urine during the first month he had slight traces of albumin and an occasional small hyaline cast.

About the 21st of September the patient began to complain of pain in the right arm. It was difficult to get from him the exact location. He winced when the shoulder was touched, or the arm, or the elbow. Movement of the arm was very painful, and pressure on the elbow or shoulder, or on the arm caused him much pain. There was no swelling of the joints. He complained, too, that the fingers were numb and stiff. During the next two or three days this condition became more aggravated. The temperature ranged from 98° to 102°.

On the 24th of September he complained that he could not move his legs well, and that they were stiff, but he could move his feet and toes readily. On this day, however, there was distinct wrist drop on the right side. He could neither extend the fingers nor the wrist. It was impossible to fix accurately the point of most pain about the arm. He winced when the humerus was grasped, but there was no special tenderness over the

ulnar nerve or along the brachial cords. The extensor surface of the right arm seemed a little swollen in comparison with the left. For the next few days he did not complain so much, but there was almost complete loss of power in the right arm.

On the 30th the pain was very much less. He could neither lift the right arm from the shoulder joint, nor flex or extend it at the elbow. There was complete wrist drop, and he could only just move the fingers. The legs could not be drawn up, nor could he move the toes of either foot. The muscles were flabby and greatly wasted from the fever, but they were not tender.

There was slight improvement in the paralyzed limbs. He could move the hand and forearm, and the wrist could be slightly extended. The grasp, however, was scarcely perceptible. There was still deep-seated tenderness in the muscles.

On October 7, he could not lift either leg from the bed; the feet were in the typical position of bilateral foot drop. There was no tenderness in the muscles or along the nerves; no paræsthesia; the sensation was normal.

October 10 the note was: "He cannot extend the fingers. He can flex the arm at the elbow, but it falls over at once. The left hand and arm are not and have not been affected. He can draw up the legs slightly at the hips. There is still complete foot drop."

During the last few days he has improved very rapidly. He can extend the hand and move all the fingers, but the grasp is very feeble. The legs can be drawn up at the hips and flexed at the knee, though there is still quite evident bilateral foot drop. He can, however, move the toes a little. The rapid improvement within the past few days is a very favorable omen in the case.

The distribution of the paralysis in this patient is quite unusual. In the paper already referred to, you will find full details of the nine cases of neuritis during and after typhoid fever, which have been under observation in the hospital during the past six years. The prognosis is usually good, and in the case before you the improvement of the past ten days has been so marked that probably his recovery will be rapid.⁴

⁴With systematic friction to the arm and legs the power returned within a few weeks.

with doses of from 1 to 2 grams (gr. xx-xxx) daily, and ascending to from 5 to 6 grams (gr. lxxv-ss) daily. Nearly all authorities who have written on the subject of the treatment of aneurism have pointed out the value of this remedy. No explanation of its action that is thoroughly satisfactory can be offered. It certainly has no effect upon the coagulability of the blood. It may have an effect upon the thickening of the other blood-vessels, and in this way reduce pressure, but all agree as to its utility. Rest in bed and the continuous use of the iodid have, upon the whole, given better results than any other mode of treatment; at least it can be said of this method that it does no harm, and if it does not assist in cure it does not interfere with the natural course of the disease. Cold, in the form of ice-bags, has been tried and recommended, the ice-bag being kept upon the tumor for weeks. The action of the ice-bag in cardiac disease has already been referred to, but one would be too optimistic to imagine that this measure could seriously affect an aneurism in one way or another. Such an application might interfere with the nutrition of the skin and in this way do harm, but beyond this no positive effect, of a detrimental character or otherwise, could, it seems to me, be expected. Barium chlorid, in doses of 5 milligrams (gr. $\frac{1}{12}$), three times a day, has been highly spoken of. Some patients seemed greatly relieved, but more cannot be urged for the remedy. The continuous use of opium has been recommended by various authorities. The great objection to such use of opium, or morphin, is that a habit may be established, but this need not be weighed very heavily against it. At the same time, the making of an opium-eater of a patient is a danger that should be taken into consideration, especially in individual cases. However, as I have stated in connection with the use of opium in other diseases of the heart, the drug should be used freely if necessary to secure relief from pain; and, in a disease so very fatal as aneurism its use undoubtedly prolongs life—certainly makes life more bearable. Hypodermic injections of ergotin have also been recommended for the cure of aneurism. No less an authority than Langenbeck claimed to have observed benefit from such treatment. The symptomatic treatment must be confined especially to the general condition of the patient, to complications (notably tuberculosis), to pain (which can be relieved by morphin, codein, the ice-bag), to sleeplessness (for which either anodynes or hypnotics should be freely used), and to hemorrhage. When the hemorrhage becomes great, as in the rupture of an aneurismal sac into a bronchial tube, the physician is powerless. Smaller hemorrhages, depending upon lesions of blood-vessels in other parts, must be treated according to the rules established for the treatment of hemorrhage.

In closing this chapter I am compelled to state my conclusion that the whole subject of the treatment of aneurism is up to the present time a very unsatisfactory one. While cases of cure have been reported, and cases of spontaneous cure have been observed, I am free to confess that I have never seen a case of thoracic aneurism cured. I have seen various methods employed, and have, I think, been able to prolong life, but I have not observed anything approximating a cure.

DISEASES OF THE BLOOD AND THE DUCTLESS GLANDS.

BY WILLIAM OSLER.

THE ANEMIAS.

THEORETICALLY the anemias depend upon either increased consumption or diminished production of the blood-elements, formed or unformed; but it is practically impossible to make a division of the cases into those with increased hemolysis and those with defective hemogenesis. Not infrequently the two conditions coexist. Of the pathology of certain of the more important forms of anemia we are still ignorant. For the purposes of this section I shall consider—(1) Anemia from hemorrhage; (2) The secondary or symptomatic anemias; and (3) The primary or essential anemias.

1. ANEMIA FROM HEMORRHAGE.

Small hemorrhages, such as an occasional bleeding from the nose, make no impression whatever on the general condition. Frequently repeated, however, they may lead to very pronounced anemia, as, for example, in cases of uterine myomata, or of hemorrhoids, or of ankylostomiasis.

Acute anemia follows loss of large amounts of blood, as in hemorrhage from wounds or erosions of arteries, in post-partum bleeding, and in the so-called spontaneous hemorrhages in subjects of the hemorrhagic diathesis. When the bleeding takes place quickly and in large volume there is a true oligemia. The amount that may prove fatal depends a good deal upon the rapidity with which the blood is shed. A person may lose in acute hemorrhage, without dying, so it is said, at least a third of the blood-volume. The largest amounts that I have known were seven and a half pounds of blood, which escaped into the pleura from rupture of an aneurism, while in a case of cirrhosis of the liver, in a patient of Dr. George Ross, ten pounds of blood (by measurement) were lost within a week, without a fatal result.

In acute anemia the chief danger is the lowering of the blood-pressure to a point at which it is impossible to maintain the circulation; less serious risks are hemorrhage into other parts (as in the brain, instances of which have been known to occur during venesection, and during hemorrhage from a round ulcer) and the occurrence of paraplegia or a neuro-retinitis.

A question of interest is, How low may the blood-count sink after hemorrhage and yet the patient recover? In a case of hemorrhage from a duodenal ulcer the blood-count sank to 740,400 red corpuscles per c.mm. The patient

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had bled for two days, and on admission to the hospital the count was a little under 1,000,000 per c.mm. The accompanying chart (Fig. 32) from a case of purpura hemorrhagica illustrates the rapidity with which the anemia is produced, and the comparative slowness of the restitution.

The indications in anemia from hemorrhage are, first, to check the bleeding;

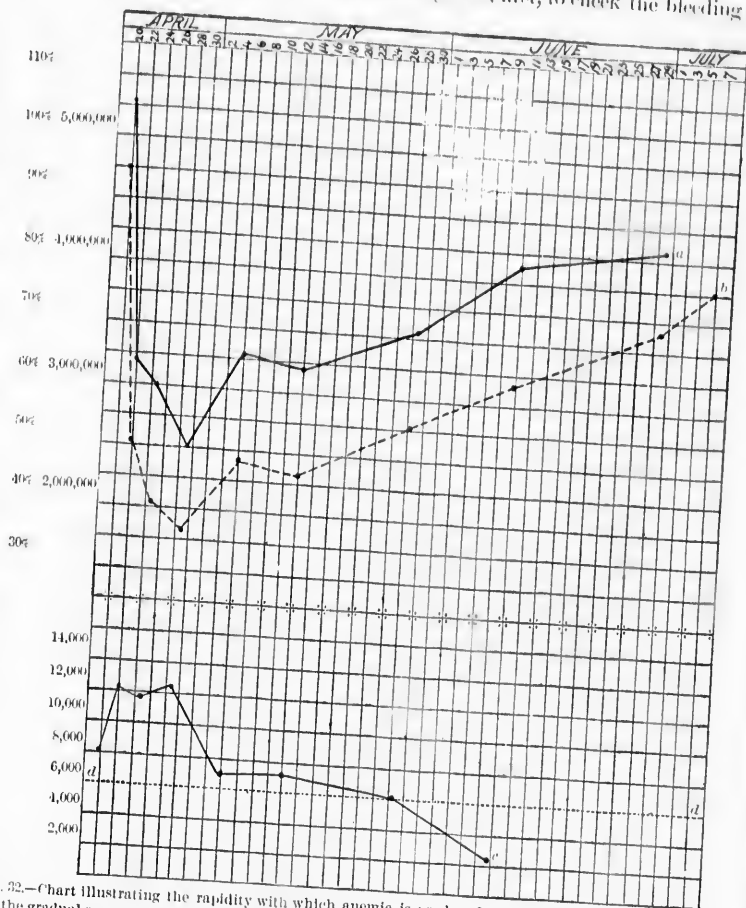


FIG. 32.—Chart illustrating the rapidity with which anemia is produced in purpura hemorrhagica, and the gradual recovery: a, number of red corpuscles; b, percentage of hemoglobin; c, number of colorless corpuscles; d, d, mean normal number of colorless corpuscles.

second, to replace, if necessary, the volume of circulating fluid; and third, to favor in every way blood-formation.

It is impossible to speak here of all the measures employed for checking hemorrhage (they depend so much upon the situation of the bleeding vessels),

but it may be said in general that absolute rest in the recumbent posture, with the head low, the local application of cold, and the administration of opium are perhaps the most important. The dangerous hemorrhages of pulmonary tuberculosis, gastric ulcer, and typhoid fever result from erosions of vessels—lesions little if at all influenced by the various medicinal remedies employed in such cases. Under the appropriate sections will be found fully discussed the indications in the various forms of hemorrhage.

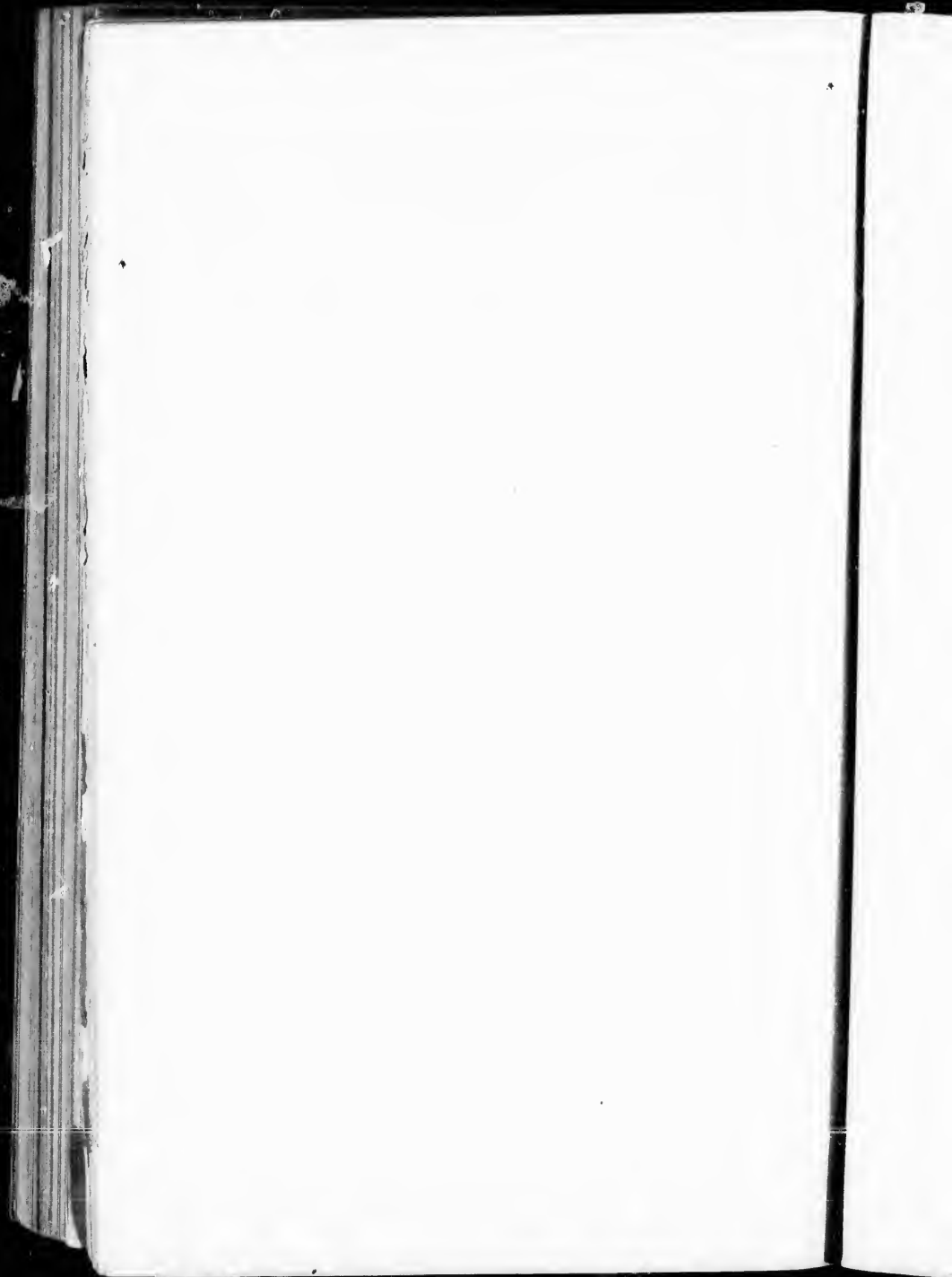
Here, however, may be considered means to be adopted to meet the second indication—namely, to replace as quickly as possible some of the circulating fluid that has been lost. When collapse seems imminent in the sequence of a profuse hemorrhage, what is known as auto-transfusion may be practised, by applying Esmarch's bandages to the extremities. Sufficient blood for the heart and brain may in this way be furnished. If this does not suffice, artificial transfusion must be practised, for which purpose the defibrinated blood of a healthy individual is to be employed. From 200 to 300 c.cm. may be injected without any risk. The transfusion may be followed by a chill, which is not usually of serious import. Von Ziemssen's method of transfusion is one likely to come into general use. Two or three well-made glass syringes, of a capacity of 20 or 25 c.cm. each, are provided with sharp hypodermic needles, united by a short piece of rubber tubing. The instruments must all be carefully sterilized, and the skin of the arm of both the giver and the receiver of the blood properly disinfected. A couple of assistants are necessary, and a supply of hot sterilized water and hot sterilized salt-solution. The syringes and needles are kept in the hot sterilized salt-solution. The blood is drawn with a syringe directly from the median vein of the giver, without any preliminary incision. It is usually necessary to apply a bandage on the upper arm in order to get the vein sufficiently distended. When the syringe is nearly full an assistant inserts a needle into the median vein of the receiver, and the blood withdrawn from the giver is injected directly through the needle. With instruments in proper order and everything prepared systematically there is very little risk of the blood clotting; and Von Ziemssen says that from 200 to 300 c.cm. of blood can be injected in this way in the course of fifteen minutes. If for any reason it should be thought advisable not to transfuse into the vein directly, 15 or 20 c.cm. of blood, withdrawn in the way described, may be injected subcutaneously.

A means that has supplanted in great measure the transfusion of blood is the use of sterilized saline solutions. The technic is very simple: The warm solution is poured either into a funnel or into the bag of a fountain-syringe, provided with rubber tubing of proper length, to which is attached an aspirator needle. The needle is inserted beneath the skin of the flank, and from a pint to two pints (500. to 1000.) of the fluid allowed to run in slowly. By means of gentle massage the fluid can be readily diffused beneath the skin. If necessary, the salt-solution may be directly infused into a vein. The most common solution is the common sterilized salt-solution of 0.75 per cent. The following solution has been much used for the subcutaneous infusion in

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The third indication, namely, to further blood-production, is best met by a liberal diet and the use of preparations of iron. It is important to bear in mind that the cases of this group are the very ones that at first do not bear iron well, and much more reliance should be placed upon the diet and general hygiene than upon the use of medicinal preparations. Later, if the anemia persists, the readily assimilated preparations of iron may be employed. As will be noticed in the chart given (Fig. 32), the restoration of the hemoglobin does not keep pace with the regeneration of the corpuscles.

2. SECONDARY ANEMIAS.

(a) **Anemia from inanition** may be due either to a deficiency in the food-supply or to serious alterations in the physiologic processes by which digestion and absorption are carried on. Instances of this form are seen in prolonged starvation, in cases of carcinoma of the esophagus, and in chronic dyspepsias, particularly those associated with atrophy of the mucous membrane of the stomach. It is to be remembered that there may be a very high grade of inanition without much anemia; in cases of anorexia, with wasting of the most profound kind, the blood-count and the hemoglobin may be but slightly reduced. So also in the professional fasters, as in Succi's case, the relative number of red corpuscles and the hemoglobin may remain unchanged.

(b) In a very important group the secondary anemia follows a persistent drain on the albuminous materials of the blood, as is so often seen in cases of chronic nephritis, of protracted suppuration, and of prolonged lactation.

(c) **Toxic Anemias.**—Various poisons, organic and inorganic, influence profoundly the condition of the blood, either destroying rapidly large numbers of the corpuscles or influencing their production. The most rapid anemia of this type is produced by the parasite of malaria, the action of which may in a week or even less cause a very intense anemia. Of the other acute infections, septicemia is often associated with anemia of high grade; the eruptive fevers are not in their early stages associated with marked changes in the blood, but, as a sequence, severe anemia may develop, particularly after typhoid fever. Syphilis often influences in a profound manner the blood-condition, and in both the acquired and hereditary forms a waxy pallor may be a very striking feature.

Of the inorganic poisons, lead is that which most frequently causes anemia, and in chronic plumbism this occasionally reaches a high grade. Usually, however, the anemia is of moderate intensity, but in any obscure case that resists treatment the gums should be examined with care. I have never seen an instance of lead-anemia in which the blue line was not well marked. The anemia associated with the prolonged action of arsenic, mercury, or phosphorus is not nearly so common.

In all cases of severe symptomatic anemia there are features other than the anemia that are of importance, such as breathlessness, palpitation of the heart

on exertion, feelings of vertigo or faintness, nausea, sometimes vomiting, or prolonged and troublesome dyspepsia. Small traces of albumin in the urine, and a few tube-casts, are almost constant accompaniments of anemia of a medium grade, and slight fever is not at all uncommon.

Treatment of the Secondary Anemias.—In every case it is most important to seek for the cause, as upon this may depend the success of the treatment. Thus it is quite useless in a case of chronic plumbism to attempt to cure the anemia without first taking measures to secure the elimination of the lead and to prevent additional poisoning. In many secondary anemias the cause is beyond control, as in malignant disease.

In no group of cases is the beneficial effect of an open-air life more striking than in many of the symptomatic anemias. In a case of anemia associated with protracted empyema, after the removal of the pus, a stay of a few weeks at the seaside or in the mountains, living in the open air, with good food, will rapidly bring about a normal blood-condition. The same good results are seen in the anemia following prolonged lactation. Even in cities very much can be done. Instead of remaining in a close room all day, the window should be open and the patient suitably covered, or when possible the patient should be wheeled upon a balcony. In cases of chronic illness there is still too much dread of open windows. Anemic patients feel the cold very much and require to be warmly clothed. In very many cases, particularly in women, when the cause is obscure, it is often best to begin with a modified Weir-Mitchell treatment. The value of rest in bed has been emphasized of late by several writers, and I can bear testimony to its worth. With rest may be combined massage, the value of which in stimulating blood-formation has long been known, and which would appear from the observations of J. K. Mitchell to be of very special service in promoting blood-distribution. The importance of massage in conjunction with hydrotherapy in anemia has been demonstrated by Dr. Mary Putnam-Jacobi, and there is no question that the combination of these two methods is of very great value in stimulating the changes that lead to blood-formation.

The diet should consist of easily digested articles, and should be varied and regulated a good deal by the appetite and the tastes of the patient. It is important to remember that digestion is almost always feeble in cases of anemia, and the patient is better with four or five small meals than with two or three large ones in the day. Very anemic patients do not, as a rule, bear an exclusively milk diet, and in any case in which the Weir-Mitchell method is indicated this part of the treatment may be modified. A diet rich in albuminous elements is usually better borne than one in which the carbohydrates and fats predominate. Tea and coffee should be used in moderation. Anemic patients do well, as a rule, without stimulants of any kind. When borne by the stomach, good porter is advantageous in the anemia of the convalescent from fevers.

In many cases hygienic and dietetic measures suffice to restore a normal condition of the blood. The bitter tonics may be used to stimulate digestion,

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for which purpose also pepsin and hydrochloric acid may be given. Particular attention should be paid to the state of the bowels, as constipation is so often an accompaniment of anemia. The milder salines are to be preferred. The pill of aloes, nux vomica, and belladonna is a useful laxative in the cases under consideration. Preparations of iron are usually indicated. The mode of action of iron in anemia will be considered when speaking of chlorosis. It is sufficient here to say that in the secondary anemias, from whatever cause, iron is, as a rule, readily assimilated. If the digestion is out of order, it is best not to attempt to use this drug, but to rely first upon hygienic and dietetic measures, and to try to regulate the bowels and to get the digestion into good form. It is well to begin at first with the milder preparations, such as iron and quinin citrate, and subsequently use the sulphate, which is the favorite iron-preparation and so largely used in the form of Bland's pills (see page 911). The more fanciful preparations of iron are very rarely indicated. Year by year a very large number of patients with anemia pass through my hands for treatment, and many of whom have been on all sorts of new iron-compounds, the introduction of which has benefited the manufacturing pharmacist much more than any one else. In the anemia of young children, following acute illnesses, and in connection with glandular enlargement, the sirup of iron iodid is very advantageous. Preparations of arsenic may be given with the iron, or may be substituted when there is any contraindication to iron. Of the powerful action of arsenic in stimulating blood-formation in certain cases there can be no question. It seems more particularly indicated in the anemias connected with enlargement of the lymph-glands, and it is in value almost equal to iron in the chloro-anemia of tuberculosis and in the anemia of lymphatic tuberculosis (scrofula) in children.

The natural iron-waters are very useful in the various forms of anemia, undoubtedly owing in great part to their own inherent beneficial effects, and in great part to the mode of life that is led at the spas. Yeo remarks that "At the most celebrated iron-spas the iron-water is richly charged with free carbonic acid, and the value of an iron-spring is greatly dependent on the amount of free carbonic acid it contains. When these waters are exported some of this carbonic acid is necessarily lost, and there is a great tendency in the bottled waters to a deposition of the iron in the form of oxid, which detracts greatly from the value of iron-waters except at their source." The iron is usually present as bicarbonate and in very small proportions. The most important iron-spas are Schwaibach, St. Moritz, and Pymont, in Europe.

3. THE PRIMARY OR ESSENTIAL ANEMIAS.

There are two chief disorders in this group, namely, *chlorosis* and *idiopathic or progressive pernicious anemia*.

Chlorosis.—This affection, which occurs chiefly in young females, has symptoms in common with other anemias, but it comes on without appreciable cause and is characterized by marked diminution in the hemoglobin of the individual corpuscles.

While the essential cause of chlorosis is unknown, the intimate relation between it and the evolution of the sexual functions is shown by its onset in young females between the ages of fourteen and twenty. The affection is rare in males. Hereditary influences are met with in a few cases, and it is stated that the children of families in which tuberculosis is prevalent are more likely to become chlorotic. The disease is most common in city-bred girls, particularly in those who live sedentary lives, and whose work or position does not enable them to have plenty of out-of-door exercise. In dispensary practice the cases are most numerous in sewing-girls and factory-operatives, who work in close, ill-ventilated, badly lighted rooms, who have long hours, and whose diet is insufficient and imperfectly prepared. The disease, however, is common enough in well-to-do families. There is a close relationship between the disease and menstrual disturbance. It often occurs early in girls in whom the menses have appeared prematurely. Other cases are associated with a late development of puberty. Scanty menstruation or total amenorrhœa is the most constant concomitant. Cases with menorrhagia are much less frequent. Blonds are more commonly the subject of the disease than brunets. From the frequent association of dyspepsia and constipation with the disease, an intestinal origin has been sought, and Sir Andrew Clark particularly has advocated the view that it results from the absorption of toxic products from the bowel—a copremia. In this country Forehlheimer has strongly advocated the same view. On the other hand, a primary nervous origin is claimed by some writers, who base their opinion upon the development of the disease after a sudden shock or a violent emotion, such as disappointment in love; and the nervous factor is one that has often to be taken into account. In certain instances the entire vascular system has been found abnormally small (a condition that Virchow has described as hypoplasia), with imperfect development of the generative organs.

The symptoms of the disease are those of anemia, with one or two additional features, of which the retention of the panniculus and the yellow-green color of the skin are the most important.

In many cases the disease is quite transitory, lasting only a few months, yielding readily to treatment, and never recurring. In other instances there is a tendency to frequent relapse, so that writers have spoken of a relapsing form. The recurrence may be within a few months, or may be deferred for several years. So common, however, is this tendency that it is always well to warn the patient or her mother of this feature.

There is a condition met with in women, and not unknown also in men, in which anemia of a chlorotic type persists for many years. The patients feel well and are able to attend to the every-day occupations of life, but there is a constant pallor. On examination of the blood the most striking feature is its impoverishment in hemoglobin. These cases, too, are very resistant to treatment.

The following brief statement, with the accompanying charts (Figs. 33, 34), illustrates the main features: The red globules may be present in normal numbers, although in all severe cases there is a considerable oligocythemia. In

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FIG. 33.—Case
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Thayer's series of 63 cases, studied in my clinic, the average number of red blood-corpuscles to the cubic millimeter was 4,096,544, or 74 per cent. of the normal, and the average quantity of hemoglobin was 42.3 per cent. This relatively slight oligocythemia, first pointed out by Duncan, is the distinguishing characteristic of the blood in chlorosis, and serves to differentiate it from

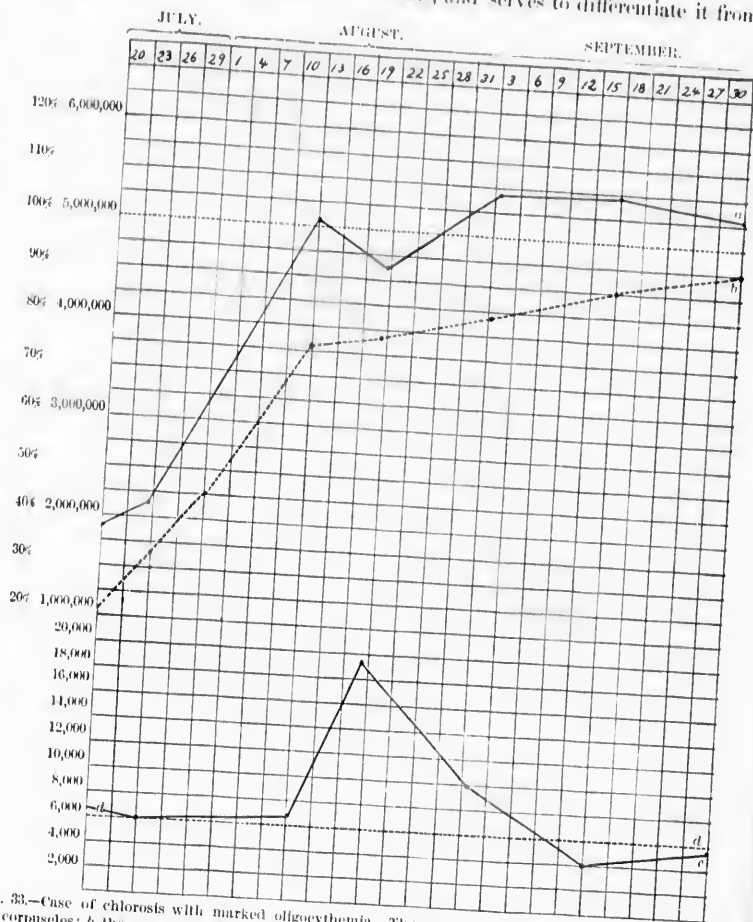


FIG. 33.—Case of chlorosis with marked oligocythemia. The curve *a* represents the number of red corpuscles; *b*, the percentage of hemoglobin; *c*, the number of colorless corpuscles; *d*, *d*, the mean normal number of colorless corpuscles.

pernicious anemia, in which the globular value in hemoglobin is increased. In one case the oligocythemia was profound—1,953,000 red corpuscles, with 17.5 per cent. of hemoglobin. The colorless cells were only slightly increased in number, averaging in the 63 cases studied by Thayer 8467 to the cubic milli-

meter—*i. c.* 1 colorless to 408 red corpuscles. One case with over 85 per cent. of red globules and only 35 per cent. of hemoglobin presented the clinical aspect of a profound anemia.

The treatment of chlorosis is simple, and in the large majority of cases exceedingly satisfactory. In protracted and severe cases, particularly when

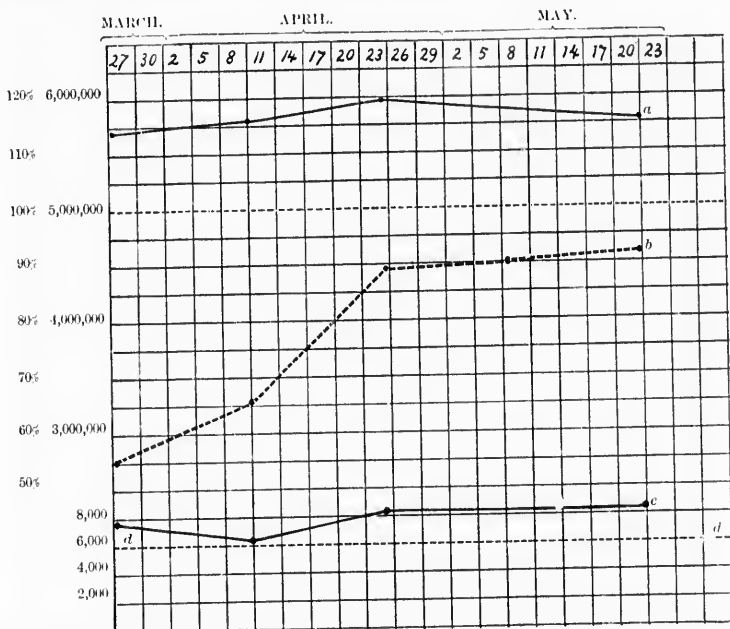


FIG. 31.—Case of chlorosis with marked oligochromemia: the curve *a* represents the number of red corpuscles; *b*, the percentage of hemoglobin; *c*, the number of colorless corpuscles; *d*, the mean normal number of colorless corpuscles.

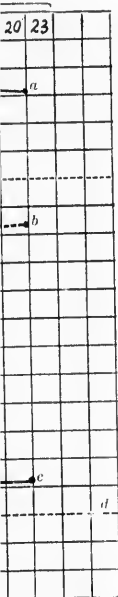
there has been swelling of the feet and much breathlessness, it is best to confine the patient to bed for a couple of weeks. As a rule, this is not necessary; and the patient should be in the fresh air as much as possible, but not taking much exercise. Among the poorer classes, however, we often have to treat cases in factory-girls who are unable to give up work, but even in these the results of treatment are usually quite brilliant. The three important points in the treatment are correction of errors in diet and digestion, regulation of the bowels, and the administration of iron.

The directions for the hygienic and dietetic treatment are those of the secondary anemias. Great stress has been laid upon the importance of purgatives, and an extreme position is expressed by Sir Andrew Clark, who said that if he had to treat the disease with one drug only, he would choose a purge. This, however, is an entirely exaggerated view of the relations of constipation and supposed fecal toxemia to the disease. Time and again I have demon-

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strated to my students the complete inutility of purgative remedies to cure ordinary cases.

In some cases sulphur is an excellent laxative. The ordinary purgative salts will usually suffice.

The essential feature in the treatment of the disease is the administration of iron. Almost any preparation of the drug, administered in sufficient quantities and for a long enough period, will effect a cure, but the general opinion is in favor of the inorganic preparations, and among these for years the sulphate, given in the form of Bland's pills, has been the chief favorite. I usually employ the formula given by Niemeyer:

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To make ninety-six pills.

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At first one pill may be given three times a day, and then the dose gradually increased until three pills are taken three times a day. I can fully endorse the following statement of Niemeyer: "I do not suppose that Bland's pills excel all other ferruginous preparations in virtue; indeed, I have repeatedly satisfied myself that colleagues who made use of other recipes obtained equal results, provided only that they gave doses of equal size; but I also believe that the efficacy of Bland's pills cannot be surpassed, simply because they can be administered in very large doses without distressing the patient." It very rarely happens that any other form of iron is needed. The carbonate and the reduced iron sometimes agree better with delicate stomachs, but with the new organic preparations of iron I have no experience. The general opinion, however, of men who have used them seems to be that they are not nearly so efficacious as the inorganic compounds. Seeing, as I do, patients who have been under the previous care of practitioners, I cannot say that either the diagnosis or the treatment of chlorosis has reached a satisfactory standpoint. Too often the physician has been playing with such fanciful compounds as beef, wine, and iron, or some of the newer organic compounds, to the neglect of the older, simpler, and far more potent remedies.

The mode of action of iron in chlorosis has been much discussed, and is still an unsettled problem. Bunge's theory, which, I see, in the recently issued third edition of his well known *Lehrbuch*, he has not modified, is thus set forth:

"Previous observations have rendered three conclusions probable: . . .

1. The inorganic preparations of iron promote the formation of hemoglobin in chlorotic subjects; 2. The salts of iron are not absorbed at all; 3. Our food contains only organic forms of iron.

"It appears to me that the following hypothesis reconciles all three conclusions, and is not opposed to anything that we know: We must assume that the organic compounds of iron are in some way protected from decomposition in the digestive canal by the preparations of iron. . . Sulphid of ammonium

gradually separates the iron from the organic compound of iron. Now, alkaline combinations of sulphur are also found in the intestine, especially in digestive disturbance, which is invariably one of the symptoms of chlorosis. If inorganic compounds of iron are present, they will at once fix the sulphur of the alkaline sulphids, before it can act upon the organic compounds of iron. The latter are thus preserved from decomposition, and are absorbed.

"It appears that in chlorosis the amount of gastric juice secreted is insufficient (perhaps by reason of the poorness of the blood), and that, in consequence, fermentative organisms are introduced into the intestine. The chief importance of the gastric juice probably lies in the antiseptic action of the free hydrochloric acid. Should the amount of hydrochloric acid be insufficient, fungi and bacteria get into the intestine, particularly those which produce butyric fermentation. In butyric fermentation, however, hydrogen is set free, and, by the reducing action of the nascent hydrogen, alkaline sulphids are formed from the compounds of sulphur in the food. These decompose the organic compounds of iron. In this respect a recent suggestion, that hydrochloric acid is a more effectual remedy for chlorosis than iron, should be taken into consideration. Again, the experience of physicians, that iron is only of use in cases of typical chlorosis, and not in other forms of anemia, agrees well with my hypothesis. In all those forms of anemia caused by disturbance in blood-formation outside the intestinal wall the preparations of iron which cannot be absorbed are naturally useless.

"Finally, the doctrine . . . that iron is only effectual in large doses is in harmony with my hypothesis. Considerable quantities of iron are necessary to render the alkaline sulphids formed in the intestine inert, whereas a very small amount would suffice for the formation of hemoglobin."¹

On the other hand, there is some experimental evidence to show that inorganic iron is absorbed. "Kunkel fed two dogs on a similar diet, but to one gave iron in addition. After some time he killed them, and on determining the amount of iron in the various organs he found that the liver and other organs of the dog which had taken iron along with its food contained considerably more than those of the other dog. Experiments on mice gave similar results. He himself, however, points out that this experiment is not conclusive, as the iron administered might only improve digestion and allow the iron of the food, which is in organic combination, to be more freely absorbed."²

Another view, the so-called stimulation-theory, is that "the iron of the food, which equals about 6 to 9 centigrams daily in an ordinary diet, is more than sufficient to make up any deficiency of iron in the blood, and that unused iron is always being excreted from the bowel even in chlorosis. The intestinal mucous membrane, however, is supposed to be so bloodless that it cannot properly perform its absorptive functions, hence the iron of the food is not taken advantage of. But when inorganic iron is given, it stimulates and tones up the gastro-intestinal mucous membrane, so that digestion and absorption of

¹ *Physiological Chemistry*, Woodbridge's translation, p. 103.

² Stockman: *British Medical Journal*, 1893, i.

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food take place satisfactorily, and in a short time the iron in the dietary makes good the deficiency in the blood." There is no question that iron will cure anemia without exerting any influence upon the intestinal canal. Stockman's paper is of particular interest in connection with this whole question, as he has gone over the whole practical aspect of the question, and has shown, as was of course known before, that inorganic preparations of iron given hypodermically will cure chlorosis, and that with iron sulphid also the cases recover rapidly, and on the other hand that bismuth and manganese, which are just as capable as iron of absorbing hydrogen sulphid or of acting as intestinal stimulants, prove inert in chlorosis.

A. B. Macallum has recently made an exhaustive study of the absorption of iron, which would seem to prove conclusively that the inorganic salts are absorbed. "His grounds for stating that iron-salts are absorbed, a fact which has been denied, are drawn from microscopical examination of the mucous membrane under various conditions. In well-fed guinea-pigs taking iron the intestinal mucous membrane, after treatment with alcohol, assumes, when treated with ammonium sulphid, a more or less dark color, due to the formation of sulphid of iron, which, under the microscope, is seen to be limited to the subepithelial portions of the tips of the villi. Here it is deposited in leucocytes which surround the end of the lacteal vessel. When the dose of iron is larger, or, apparently, when the administration is continued for a long time, the iron is present also in the epithelial cells themselves, and passes from them by a process of internal secretion into the plasma of the venules. These venules are the portal radicles, and leucocytes containing iron are found in the capillaries of the liver, and the peripheral cells of the lobules contain iron. Similar leucocytes are found in the spleen. Beyond this point the iron was not traced, and the question whether it is ultimately assimilated and fixed as inorganic iron remains unsettled; but the research serves to prove that iron-salts have not, as has been asserted, merely a stimulant action on the epithelial cells of the mucous membrane. Any stimulant action they may exert is a concomitant of their absorption. Though some of the subepithelial leucocytes of the villi appear thus to carry part of the absorbed iron into the general circulation, the more important agent in the transference of the inorganic iron from the villi to other parts of the body is the blood-plasma."¹

Progressive Pernicious Anemia.—Addison gave the first clear clinical description of the disease in the following terms: "For a long period I had from time to time met with a very remarkable form of general anemia occurring without any discoverable cause whatever—cases in which there had been no previous loss of blood, no exhausting diarrhea, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous, or malignant disease."

In any large group of severe anemias that have the characters which may be designated by the terms *progressive* and *pernicious*, a certain number will conform to this type of Addison, as during life and after death the cause remains obscure, and to such the old designation of *idiopathic* is still appropriate.

¹ Abstract from *British Medical Journal*, May 5, 1894.

There has of late been a tendency to overlook this point, and while there are various causes that may produce anemia at once progressive and pernicious, these cases, however much they may simulate it, do not belong to the type described by Addison, in which there exist none of "the usual causes and concomitants of the anemic state." The following conditions may be associated with or lead up to profound and progressive anemia, which may be confounded with the true idiopathic form of Addison: (a) The severe post-partum anemia described by Channing, Gusserow, and others; (b) the form of chronic gastritis associated with great atrophy of the mucous membranes; (c) the parasitic anemias due to the ankylostoma or to the bothriocephalus; and (d) lastly, in a few rare instances of carcinoma the anemia is early and progressive, and the patient may die profoundly anemic without any suspicion that a neoplasm is present.

Now, apart from these conditions, which are more or less readily recognized, is the form described by Addison, which is most frequently seen in males, occurs in the middle period of life, and in which the causal factors remain obscure. In a number of cases gastro-intestinal disorders precede the attack; in others mental shock or great worry. Of late the theory has been advanced that the disease has its origin in the intestinal tract, and is due to the absorption of poisons—ptomaines produced by certain micro-organisms. These are supposed to cause rapid blood-destruction, particularly in the portal system. This is followed by the deposition of increased amounts of iron in the liver, and accounts also for the increase in the iron in the kidneys, and the excess of pigments, particularly the pathologic urobilin, in the urine. This view, which has been so strongly supported by Wm. Hunter, has been received with much favor, though opposition is not lacking, as in the recent work of Hopkins.

The clinical features of idiopathic anemia are very characteristic. An individual who perhaps has before been perfectly healthy begins gradually to develop the symptoms of anemia. Occasionally the onset is rapid, but as a rule it is so insidious that the patient is scarcely able to give the exact date of the beginning of his illness. He becomes paler, and notices that he tires easily. Headache, vertigo, and ringing in the ears are not uncommon as early symptoms. All these may be gradually aggravated, and later on the pallor may be extreme, the skin assuming a characteristic lemon-yellow tint. The digestive functions become disturbed, the appetite is poor, and nausea and vomiting are frequent. The ankles become edematous, and hemorrhages may take place into the mucous membranes. The end is graphically described by Addison: "The debility becomes extreme, the patient can no longer rise from bed, the mind occasionally wanders; he falls into a prostrate and half-torpid state, and at length expires; nevertheless, to the very last, and after a sickness of several months' duration, the bulkiness of the general frame and the amount of obesity often present a most striking contrast to the failure and exhaustion observable in every other respect."

The prognosis is extremely grave. The disease has been supposed to be invariably fatal, and the reported cases of cure have been regarded as examples

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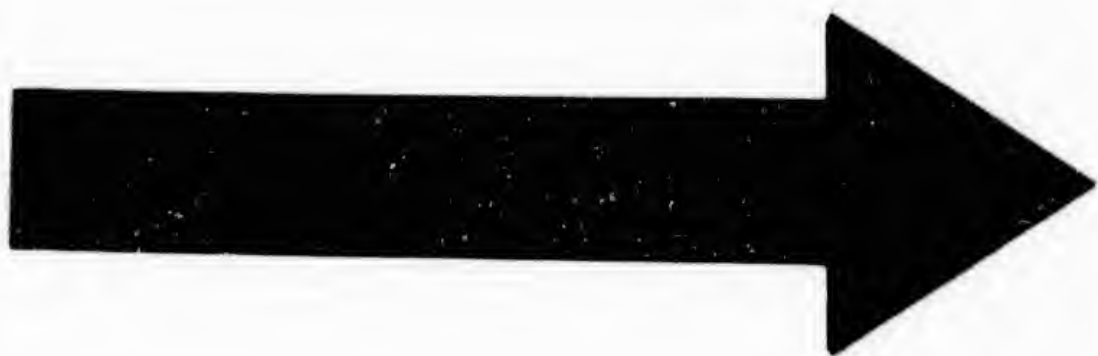
of mistaken diagnosis, but since the introduction by Bramwell of the treatment with arsenic cases have been cured, or the progress of the affection has for a time been checked. Relapses after apparent cure are very common, so much so that Stephen Mackenzie groups these cases into a form of relapsing pernicious anemia.

Treatment.—The general hygienic and dietetic measures spoken of under the head of the Secondary Anemias may be carried out in this case, more particularly the rest in bed with massage. Hunter recommends an exclusively farinaceous diet, believing that upon this there are fewer putrefactive changes in the intestines. Intestinal antiseptics have been used to combat these changes. When the patient has improved, a change of air, travel, and residence in a warm climate through the winter months are particularly to be advised.

Upon the true pernicious anemia of Addison iron appears to have little or no influence. In a majority of the cases that I have seen this drug has been used persistently without any effect. The use of arsenic in this disease by Byrom Bramwell was one of the most important therapeutic advances in the treatment of the severe anemias. In certain cases arsenic seems a veritable specific, and even in the most extreme grade the condition may not be hopeless. The following is a good illustrative case:

An active business man, aged forty-three, who was seen on March 4th, gave a history of dyspepsia, and, for the preceding six months, of failure in strength. There was shortness of breath on the slightest exertion, and at times attacks of agonizing pain at the heart resembling angina. The man had not lost much flesh; indeed, as is usual in these cases, the subcutaneous fat was well developed. When first seen, the anemia was marked; the lips and tongue were very pale, and the sclerotics pearly. The general surface did not look so pale, on account of the patient's dark color and a decided sallow-yellow, sub-icteroid tint of the skin. The temperature was a little elevated; the pulse 100, and of moderate volume. With the exception of a heart-murmur, there were no symptoms elicited in the examination of the thoracic and abdominal viscera. The blood showed in a marked manner the corpuscular changes of advanced anemia. The blood-count could not be made at the time, but when I next saw the man, two weeks later, there were only 700,000 red corpuscles to the cubic millimeter, and the color-percentage was about 20. He was put to bed, given a milk-diet, ordered massage once a day, and as medicines bismuth and sodium carbonate, with Fowler's solution m_v (0.31), three times a day, to be increased one minim (0.062) daily at the end of a week. He had been taking, by the advice of his physician, an elixir of iron and strychnin, which was continued.

For two months there was not much apparent change, though the number of the colored corpuscles increased to over 1,500,000 per c.mm. The arsenic had been pushed to 15 drops three times a day, when puffiness of the eyelids and forehead came on, and the drug was omitted for a week and started again with m_v (0.31). On reaching m_xiij (0.8) a slight red rash appeared, and the arsenic was stopped, and, after beginning at m_v (0.31) again the man reached m_xx (1.23) t. i. d. On these large doses he seemed to improve more rapidly, and he bore them for two weeks or more, when gastric irritation supervened, with diarrhea. The drug was then stopped for ten days, and pills of gr. $\text{r}\overline{\text{ss}}$ (0.00065) of arsenous acid ordered. On January 31st the patient was allowed to get up. By June 13th he was able to move to Cape May. The blood-condition has rapidly improved, and at the last count the corpuscles were nearly 4,000,000 per c.mm. When seen on September 7th he looked remarkably vigorous, had a good appetite, was at business, and feeling very well.



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The subsequent history of this case illustrates an only too common feature in the disease.

The man remained well for nearly two years, was very active in his business, and sat for a session in Congress. Anemia then developed again, and when I saw him about four months after its onset he had much edema, and an extreme grade of anemia, from which he never rallied.

Fowler's solution is the most satisfactory form in which to give arsenic. Beginning with doses of from 3 to 5 minims (0.18-0.31) thrice daily, it may be gradually increased until the patient takes 15 or 20 minims (1.-1.23) at a dose. The better the patient bears the arsenic the greater are his chances of recovery. The drug should be interrupted only when toxic manifestations develop, and then after a week it should be started again at the dose the patient was taking when the toxic symptoms appeared. Sometimes a patient will take arsenous acid more readily than Fowler's solution, or it may be necessary to employ the drug hypodermically. It is well to be frank with the patient, and explain the liability of relapse, and to urge the importance of very careful attention to hygienic and dietetic rules, and on the slightest indication of oncoming anemia arsenic should again be used.

In a few instances the condition has been relieved by iron after arsenic has failed. I have not met with such a case.

Of other remedies, inhalation of oxygen has been recommended, and there have been several instances in which apparently this has been beneficial. Fraser has recently recommended the use of the extract of bone-marrow, but in the case which he reports arsenic was given conjointly. The patient improved, and within two months the blood-count rose from 1,000,000 per c.mm. to 4,000,000. Several other cases have been reported; one by Danforth, in which also, however, arsenic was given with the bone-marrow. The marrow is very readily prepared in the form of a glycerin-extract, by chopping up sheep's ribs into small fragments, and allowing them to macerate for three or four days in glycerin; the product is then strained and the resulting liquid administered in teaspoonful-doses three times a day. I have recently employed such an extract in two cases; in one it was given for nineteen days without causing any improvement. Fowler's solution was then ordered, and rapid increase in the corpuscles took place. In the second case the blood-count fell during the use of the bone-marrow. Various preparations of bone-marrow are now on the market.

LEUKEMIA AND PSEUDO-LEUKEMIA.

(a) *Leukemia*.—This disease is characterized by a persistent increase in the number of the colorless corpuscles in association with changes, either singly or together, in the spleen, lymph-glands, and bone-marrow.

Although we speak of lymphatic, splenic, and myelogenous leukemias, we rarely see a pure form of any one of them. The splenic form alone is much the most frequent. Only one instance of pure myelogenous leukemia is on record. With the splenic form the bone-changes are usually well marked.

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Clinically and anatomically the lymphatic form is very sharply marked, and all of the leukemias may be grouped under the splenic-myelogenous and the lymphatic forms.

In rare instances the changes are most advanced in the lymph-elements of the bowel or in the pharynx and tonsils, and in a few instances the lymphatic elements of the skin are first involved.

The disease may run an acute or a chronic course; the latter is much more frequent. We know nothing of the essential pathology of the disease. There are many points of contact between leukemia and the infectious granulomata, and some of the fatal cases run a rapid course like an acute infection, but although several micro-organisms have been described in connection with cases, the true nature of the disease remains doubtful. It does not seem probable that either malaria or syphilis bears any etiologic relation to leukemia.

Symptomatology.—The onset may be so insidious that the splenic tumor fills a large part of the abdomen before the patient suffers much inconvenience. As a rule, it is for this "lump in the side" that he first consults the physician, or perhaps he notices that he has been getting short of breath and has palpitation of the heart, pallor, and other symptoms common in anemia. Epistaxis and gastro-intestinal symptoms often occur early; they may even precede the onset of the disease. There are instances in which a sudden or fatal hemorrhage has been the first symptom. In one of the cases of my series a boy who died of hematemesis had been two days before

presently quite well, and had played in a game of lacrosse. The symptoms referable to the stomach, such as a feeling of oppression after eating, nausea, and vomiting, are rarely absent. The vomiting, in fact, often appears early, and is at times a troublesome feature. The bowels are usually loose, diarrhea frequently occurring early in the disease; this is said to be more frequent in those cases in which the lymph-follicles of the intestine are involved. The stools are thin and watery; in some cases there is a true dysenteric process in the colon, with tenesmus, and mucus and blood are seen in the feces.

The liver becomes enlarged at some stages of the disease; jaundice is not common, but may result from obstruction due to catarrhal inflammation of the bile-duct or to pressure of the glands in the hilus of the liver. Ascites may be a prominent symptom, and is probably due either to the splenic tumor or to the pressure of enlarged glands on the portal vein.

The Blood.—No matter what the form of the disease, it is the blood-examination alone that offers distinctive features. In the liemo-myelogenous forms of leukemia the most striking blood-change is the enormous increase in the number of colorless cells. Instead of the normal proportion of 1 colorless to 500 or 1000 red cells, the proportion in leukemia may be 1 to 19 or 1 to 5, or the two kinds may occur in equal numbers; indeed, there are cases recorded in which there were actually more colorless than colored elements. A drop of blood from the finger-tip in a well-marked case will be more or less turbid,

reddish-brown in color, or in extreme cases possibly chocolate-colored. Very often a single glance through the microscope at the fresh blood-slide will settle the diagnosis.

Lymphatic leukemia is not so frequent. The cervical glands are usually first involved, and then the axillary and inguinal groups, and subsequently the deep-seated glands in the thorax and abdomen. Usually these cases run an acute course, and may terminate within three months. I have recently had under observation a case that has persisted for eight years.

An enormous leukocytosis might be mistaken for a leukemic condition, but may be easily excluded by the study of stained specimens; in all ordinary leukocytoses the increase affects solely the polynuclear neutrophiles. The enlargement of the spleen in chronic malarial cachexia or malignant disease may also be differentiated from leukemia by the blood-examination. It certainly is not justifiable to make (as has been done in at least one case of leukemia) an exploratory abdominal incision to examine the spleen before the blood has been carefully studied.

The pure lymphatic form of leukemia has to be distinguished from general lymphadenoma, or Hodgkin's disease; in the latter, however, the glands are found in much larger bunches; and, besides, the blood-condition is in lymphatic leukemia quite characteristic.

(b) **Pseudo-leukemia, or Hodgkin's disease**, is characterized by progressive hyperplasia of the lymph-glands with anemia, and sometimes with the development of secondary lymphatic growths in various organs.

Etiology.—At present we must allow the term pseudo-leukemia to cover certain groups of pathologic conditions that before long will be recognized as definite and distinct diseases. One has only to attempt to acquaint himself with the literature of Hodgkin's disease to appreciate the hopelessly confused condition in which the matter at present stands. There is a growing conviction, especially among the German clinicians, that in at least one class of cases, if the patients live long enough, there develops a true leukemia; and certainly there are several instances recorded in which under direct observation such a change has taken place.

Hodgkin's disease is more common in the young, over 60 per cent. of the cases occurring in persons under forty years of age. That it is an infectious-process there would now seem little reason to doubt. What the infectious agent is we do not know. Those cases in which pyogenic cocci have been found are to be looked upon as pseudo-leukemias with a complicating septic infection.

Symptomatology.—As we are at present forced to include under the name of pseudo-leukemia conditions varying so widely in a pathologic sense, it will of course be impossible to lay down a typical and definite series of symptoms applicable to all cases.

The variation in the rate of growth and in the size of the glands at different times is astonishing. When they have been large they may diminish in volume or even entirely disappear; a rapid diminution in the size of the glands shortly before death has been frequently observed.

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The spleen is often sufficiently enlarged to be easily palpable in the left hypochondrium. The thyroid gland is occasionally affected, and in rare instances the thymus as well.

The patient may go on for a long time complaining of little else than the inconvenience resulting from the presence of the tumors. Sooner or later, though, the anemia and the cachexia gradually appear. He begins to feel languid and disinclined for exertion, whether mental or physical; edema of the legs, headache, palpitation, and dyspnea succeed. The blood-count is, as a rule, not strikingly low; in only one instance have I seen the red blood-corpuscles sink lower than 2,000,000 per c.mm., and often there is no decrease at all in their number. There is no extreme poikilocytosis, and the leukocytosis is inconsiderable. In the differential count the lymphocytes appear to be relatively increased. When there is marked leukocytosis, with a preponderance of lymphocytes, we have to think, of course, of a lymphatic leukemia. An occasional nucleated red cell (normoblast) may be found.

Diagnosis.—We have to carefully exclude syphilis. Even when no history of chancre can be obtained, the patient must be questioned with regard to ulceration of the throat, falling out of the hair, and if it be a woman one should ascertain whether or not she has had miscarriages. The differentiation from tuberculous adenitis may be even more difficult. The chief points of distinction are as follows: Tuberculous adenitis is more common in the young, and involves the submaxillary group of glands oftener than those running along the anterior and posterior borders of the sterno-mastoid, whereas these latter are more frequently the first attacked in Hodgkin's disease.

A long-standing affection of one group of glands without an extension of the process to others is suggestive of tuberculosis rather than of lymphadenoma. The disease is to be distinguished from genuine leukemia by the examination of the blood, which should be carefully made in all cases.

Treatment of Leukemia and of Pseudo-leukemia.—There are acute cases running a rapid course, often with chills, and sometimes high fever, and for such palliatives are alone indicated. In a great majority of all cases the disease is incurable, and proves fatal after a longer or shorter period. Spontaneous recovery has undoubtedly occurred, and not only has the excess of leukocytes disappeared, but the spleen has diminished in volume. It is to be remembered, however, that in both leukemia and pseudo-leukemia the course is extremely variable. There are cases that run a very slow course, and the condition may persist indeed for eight or ten years with the retention of a fair measure of health. Much depends really upon the presence or absence of anemia, and if the red blood-corpuscles keep above 60 or 70 per cent., as is common, the patients may feel very comfortable.

Arsenic is the only remedy that seems to have any positive influence, and it should be given systematically and in increasing doses, just as in pernicious anemia. I have several very interesting charts showing the beneficial effects of this drug in leukemia. The chart contained in my article in the *American Text-book of Medicine*, of a case that was under observation from September,

1890, to November, 1892, is particularly interesting. The leukemia was of high grade. On admission there were 500,000 leukocytes and 2,000,000 red corpuscles per c.mm. From January 29 to February 21 the patient took arsenic in increasing doses, and the colorless blood-corpuscles fell from 714,000 to 7500 per c.mm., and the red blood-corpuscles increased to 3,500,000 per c.mm. Through the months of March and April the leukemia entirely disappeared, and the colorless blood-corpuscles were often below 4000 per c.mm. The larger the doses the patient can take, the more beneficial the drug would appear to be. It is best given in the form of Fowler's solution. I have used it hypodermically, and in several cases have followed Mosler's plan of direct injections into the spleen, which has not, however, any special advantages.

In Hodgkin's disease arsenic also is the most trustworthy drug, and under its use the glandular enlargements may diminish remarkably. Caution has to be exercised in these cases, as arsenical neuritis may occur. I have reported an instance of Hodgkin's disease in which severe peripheral neuritis developed after the use of $f\bar{3}iv\ \bar{5}j\ \bar{m}xvii\bar{j}$ (125) of Fowler's solution.

Of other drugs, iron is sometimes useful when there is pronounced anemia. Phosphorus in doses of gr. $\frac{3}{32}$ (0.0022) three times a day has sometimes seemed beneficial. Inhalations of oxygen may also be tried. The results are, however, very variable, and as in most of the cases arsenic has been used at the same time, it is difficult to say how much of the benefit was due to the oxygen alone.

Cold douches in the region of the spleen may be tried; and electricity perhaps may give the patient a feeling of comfort and satisfaction that something is being done for him. Notwithstanding the fact that the disease is almost invariably progressive, the practitioner can do much to relieve distressing symptoms. Care should be exercised in the use of purgatives, as an acute colitis is a not infrequent and sometimes fatal complication. Hemorrhages, which are always dangerous, are to be treated according to the usual methods. Very little can be done to relieve the dragging sensations in the side, but warm applications often give relief.

The surgical treatment of leukemia and of pseudo-leukemia is not very satisfactory. Of twenty-four cases in which the spleen has been removed, only one recovered. In cases of Hodgkin's disease, when seen early and only a few glands are enlarged, if there be no cachexia, removal may be considered.

A few cases have been treated recently with bone-marrow, and in one instance reported by Lawrie¹ the results were very striking.

ADDISON'S DISEASE.

This remarkable affection, a sort of cachexia characterized by asthenia, irritability of the stomach, and increased pigmentation of the skin, is associated in a large proportion of the cases with disease of the suprarenal capsules.

The pathology of the disease is still obscure. On the one hand it has been urged that the symptoms are not due to disease of the adrenals, but to involve-

¹ *British Medical Journal*, Dec. 1, 1894.

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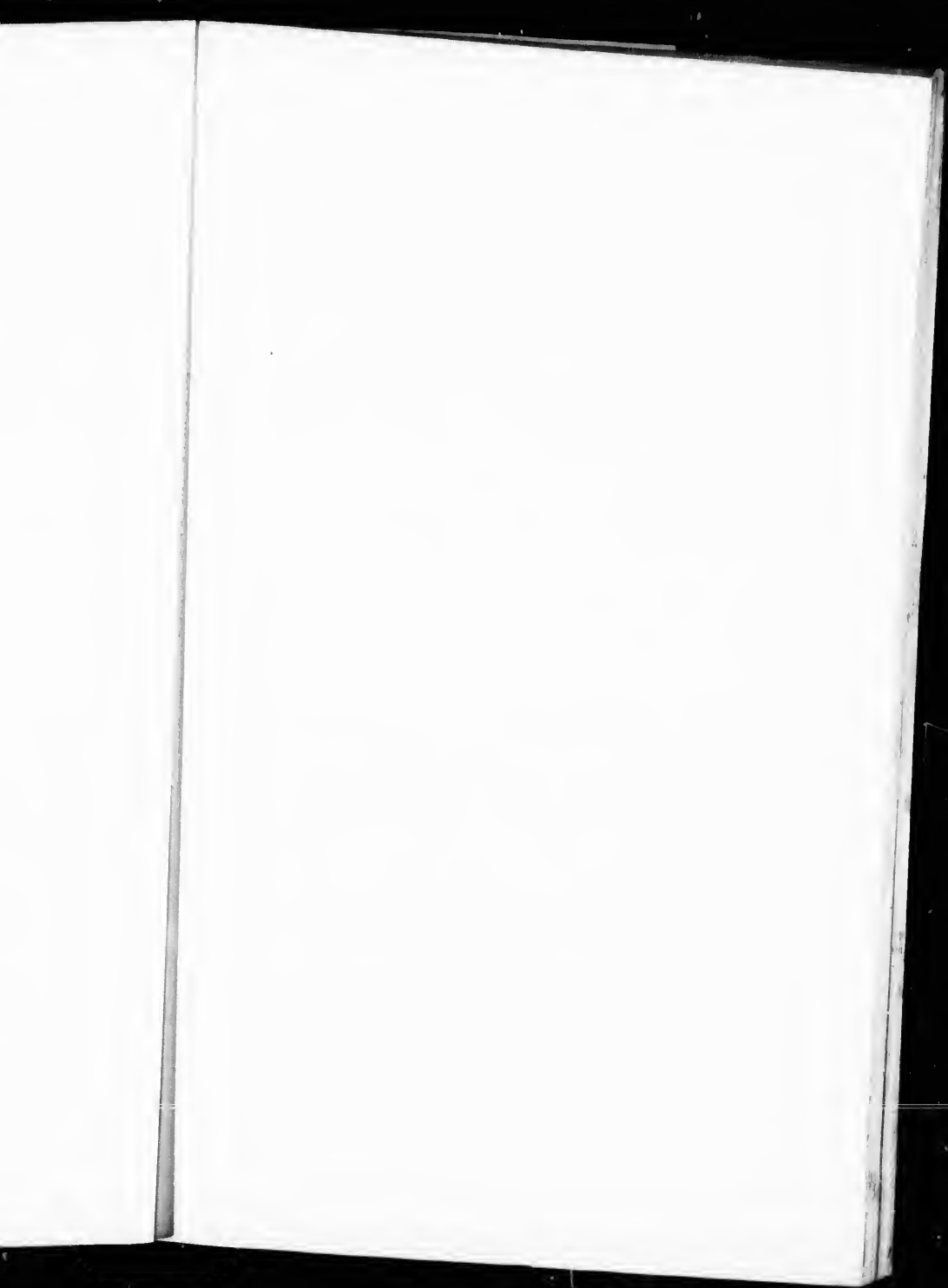
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ment of the ganglia and nerves of the sympathetic system. On the other hand the symptoms are regarded as due to disturbance of the functions of the adrenals. According to this view these glands produce some internal secretion essential to the life of the individual, either on account of the influence that it exerts on the nervous system or because it neutralizes or destroys certain poisons that are constantly being produced in the body. Such poisons, it is held, if left to themselves, give rise to the peculiar symptoms that are characteristic of Addison's disease. Recent work rather favors the view of adrenal inadequacy—that "the symptoms are due to an inadequate supply of suprarenal secretion. Whether the deficiency in this internal secretion leads to a toxic condition of the blood, or to a general atony and apathy, is a question which must remain open" (Rolleston).

A majority of the cases occur in males. Increased pigmentation is usually the first symptom noted, but prior to its onset there may have been nausea and vomiting, or diarrhea. The asthenia is usually marked and out of all proportion to the general condition. The slightest effort, mental or physical, causes fatigue. Sometimes there is pain in the back and a sense of pressure in the renal region. Death usually occurs from the progressive asthenia, sometimes from sudden coma, or in a protracted fainting-spell. There are instances reported in which the disease has run a very acute course.

The outlook for treatment is not very satisfactory. There can be little doubt, however, that cases have recovered, though death is the usual termination. There are no known measures that check the advance of the disease. Many of the symptoms, however, can be relieved. Should anemia be present, iron and arsenic may be tried. General tonic measures must be employed to support the patient's strength, and if the asthenia is pronounced, he should be kept in the recumbent posture.

The treatment of the digestive disturbances is very important, and to meet this indication the physician's skill will be taxed at times to the utmost. The diet should be light and nutritious, many patients doing best when confined to a strictly milk diet. For the nausea and vomiting creosote, hydrocyanic acid, iced champagne, etc., may be tried. On account of the liability to profuse diarrhea great caution must be used with regard to purgative medicines, and constipation, when it exists, is best relieved by enemata. Bismuth in large doses controls the diarrhea. It is doubtful whether counter-irritation to the back is in any way beneficial. Tuberculin has been tried in a few cases, and according to Goldscheider¹ in one case with favorable results.

The success attending the use of thyroid extract in myxedema has naturally called attention to the possible benefit of the use of extract of the adrenals in Addison's disease. Oliver has treated two cases with marked benefit, and improvement has been noted in cases similarly treated by Rolleston and others. In a case at present under my care the patient gained nineteen pounds, and has lost the extreme apathy and debility from which at first he suffered. He remains in good condition after eight months' treatment, but there has been

¹ *Deutsche medicinische Wochenschrift*, 1894.

no change in the pigmentation. The gland is given in the form of a glycerin-extract, and the patient may receive at first the amount equivalent to one, and subsequently to two or three, suprarenal bodies.

EXOPTHALMIC GOITER (GRAVES' DISEASE; BASEDOW'S DISEASE).

Although this disease has a very complex symptomatology, in its fully developed forms it is readily recognized by the triple features of enlargement of the thyroid, exophthalmos, and rapid heart-action. It occurs much more frequently in women than in men, in the proportion of about 12 to 1. It is sometimes seen in several members of a family. There is a remarkable instance on record of a hysterical woman who had ten children, eight of whom had exophthalmic goiter, and one of these children had four daughters with the disease. It is not very uncommon to see two members of a family affected. Worry, fright, and depressing emotions precede the development of the disease in many cases. In a large number diarrhœa has preceded the onset.

The symptoms come on gradually, although there is an acute form, with vomiting, diarrhœa, and even maniacal outbreaks. To the well-recognized triple combination of exophthalmos, goiter, and tachycardia there has been added a fourth cardinal symptom, namely, tremor, which is present in a very large proportion of cases, and which is of value in the diagnosis of the early and masked cases. For the more special features and symptomatology of the disease the reader must be referred to the manuals of Practice.

Three principal views have been advanced to account for the pathology of the disease: first, that it is a neurosis; second, that it is an affection of the medulla oblongata; and third, that it is really a disease of the thyroid, and that the symptoms are due to perversion of the functions of this gland. This latter view has been particularly advocated by Möbius, Greenfield, Joffroy, and others. The following are the arguments in its favor, which I take from a recent paper by one of my assistants, Dr. Oppenheimer:

(1) *Pathologic anatomy.* All autopsies have disclosed some changes in the thyroid gland, and frequently these have been in the direction of functional hyperplasia. In some cases, however, the gland was almost completely fibrous.

(2) *The action of thyroid extract.* Soon after the discovery of thyroid therapy for myxedema, Murray, and later others, warned against the effects of overdosage. These were notably tachycardia, tremor, headache, sweating, prostration and anorexia, diarrhœa and polyuria. At a meeting of the Société des Hôpitaux held October 12, 1894, Béclere reported a case in which exophthalmos developed after an overdose of thyroid, and at a later meeting of the same body, Ballet and Enríquez reported some experiments on a dog in which they injected thyroid extract. The dog had two courses, and in each developed goiter, which diminished and disappeared when the injections were omitted.

(3) The usual effect of thyroid administration in exophthalmic goiter is to increase the symptoms. There are exceptions to this.

(4) The most successful line of treatment, so far, is that tending to diminish the bulk of the goiter. Out of sixty-eight operations on record, complete

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recovery followed eighteen, more or less improvement twenty-six, no change nine, almost immediate death five, and death within twenty-four hours four; in four cases there was apparent cure, but the symptoms recurred, and in two cases the operation was followed by tetany. This makes about 50 per cent. improved by the operation, and a mortality of about 13 per cent.

(5) The striking contrast of symptoms between exophthalmic goiter and myxedema. This is well shown in two sisters recently under my care:

	Exophthalmic goiter (Mrs. A., aged nineteen).	Myxedema (Mrs. B., aged thirty-seven).
Pulse	100-120.	58-70.
Heart	Impulse heaving. Apex in sixth interspace. First sound loud.	Negative.
Eyes	Prominent (no v. Graefe's sign).	Not prominent.
Thyroid	Symmetrically enlarged.	Not to be made out.
Tremor	Present.	Absent.
Skin	Moist; sweats.	Dry and harsh.
Face	Flushed; red patches on cheeks.	Heavy and full; uniform color.
Temperament	Emotional and neurotic.	Apathetic and heavy.
Weight	137 pounds.	189 pounds.
Thyroid treatment	(Had to be omitted because of increase in symptoms.)	Steady improvement and complete recovery.

(6) Finally, the course of the disease is more like an intoxication. It is probable that the chief brunt of the toxemia falls on the central nervous system, and this would give rise to medullary symptoms without marked lesions.

Treatment.—The disease may disappear spontaneously. I know of two instances in women, in which, after the symptoms had persisted for several years, recovery followed, and apparently not as a result of any special course of treatment. Change of climate, particularly moderate elevation, has been followed in some cases by marked benefit. In advanced cases, with very rapid action of the heart, and perhaps hypertrophy and dyspnea, the altitude should not be too great, but Yeo, who advocates this very warmly, says that "much misapprehension exists as to the effect of such moderate elevations as this (3250 feet) on the circulatory organs; in the first place the sedative effect on the nervous states which such resorts usually produce reacts most favorably on the circulatory organs, and the purity and tonic quality of the air have a general strengthening and restorative effect."

Systematic hydrotherapy, with massage, will often be found very beneficial. The wet pack carefully applied will sometimes do more than any other single measure to allay the rapidity of heart-action and the general vascular excitement. I have seen good results follow, too, the local application of cold in the form of an ice-bag to the precordium. The treatment of the disease with electricity has been much vaunted, and has been claimed by ardent advocates to be in many cases curative. On the other hand some authorities deny that it yields any permanent benefit. The claims of certain specialists in electricity are certainly exaggerated. The continuous galvanic current is advised. The important matter is to give the treatment a thorough trial of three or four months.

The drug-treatment of the disease is most unsatisfactory. Belladonna is perhaps the most trustworthy medicament, and should be given until it produces physiologic effects. I have never seen any good results from the use of ergot. The vascular depressants, such as aconite and veratrum viride, are rarely indicated. Digitalis will sometimes do good, particularly in the anemic cases, when combined with iron. In the advanced stages of the disease, when the heart begins to fail and edema appears, I have seen it prove very beneficial. Strophanthus has also been employed. The combination of potassium bromid with valerian is often useful in allaying the excitable condition so pronounced in many cases. In the paroxysms of urgent dyspnea, with palpitation of the heart, hypodermic injections of morphin may be tried; Tronseau recommends copious venesection. In some cases in which these paroxysms are most pronounced, a whole series of remedies may be tried without avail. The diarrhea is sometimes obstinate and difficult to treat. Thyroid extract has been used of late in many cases, nearly always with injurious results, aggravating the palpitation and increasing the nervous condition; although in some cases great benefit has been reported.

In a few instances attended with hypertrophy of the mucous membrane of the nose, or polypi, treatment of the local conditions has been followed by cure.

The surgical treatment of exophthalmic goiter has of late proved more hopeful. Excision of portions of the gland has been practised, and in a few cases ligation of the arteries passing to the thyroid has been beneficial.

MYXEDEMA.

A disorder that follows loss of function of the thyroid gland, characterized clinically by an infiltration of the subcutaneous tissues, in children by an arrest of development, and in adults by the gradual production of a cachexia in some respects resembling cretinism. There are three groups of cases:

1. **Cretinism, Sporadic and Endemic.**—When there is congenital absence or atrophy of the thyroid gland, the infant is born a cretin and does not, as a rule, survive birth very long. The body is stunted and broad, and the subcutaneous tissues over-developed. Sometimes the child shows only slight traces of the disease at birth, but as development proceeds the condition becomes very manifest. There is a subcutaneous myxedematous swelling; the head is large; the neck short and thick; the lips full; and the tongue large and often protruding. Mental development is extremely slow. In some cases the thyroid gland cannot be felt; in others there is slight enlargement; sometimes there is a definite goiter. In other cases, the condition does not develop until between the third and fifth years. Growth is retarded; the head becomes disproportionately large and broad, the nose *retroussé*, the lips thick; the limbs are short, the subcutaneous tissues infiltrated; the skin has a glossy appearance, and there is a thick, solid edema above the clavicles. The voice has either a rough or a stridulous character, and the hair often becomes thin and scanty. These changes are usually progressive, and reach their maximum between the twelfth and fifteenth years. The child never properly matures, and, the condition remain-

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. Belladonna is given until it produces from the use of atrum viride, are rarely in the anemic disease, when they are very beneficial. Potassium bromide on so pronounced palpitation of the heart, as Osseau recommends, is most profitable. The diarrhea has been used of treating the palpitations, and has given great benefit.

ous membrane of the eye, followed by cure. The iodate proved more beneficial, and in a few days was beneficial.

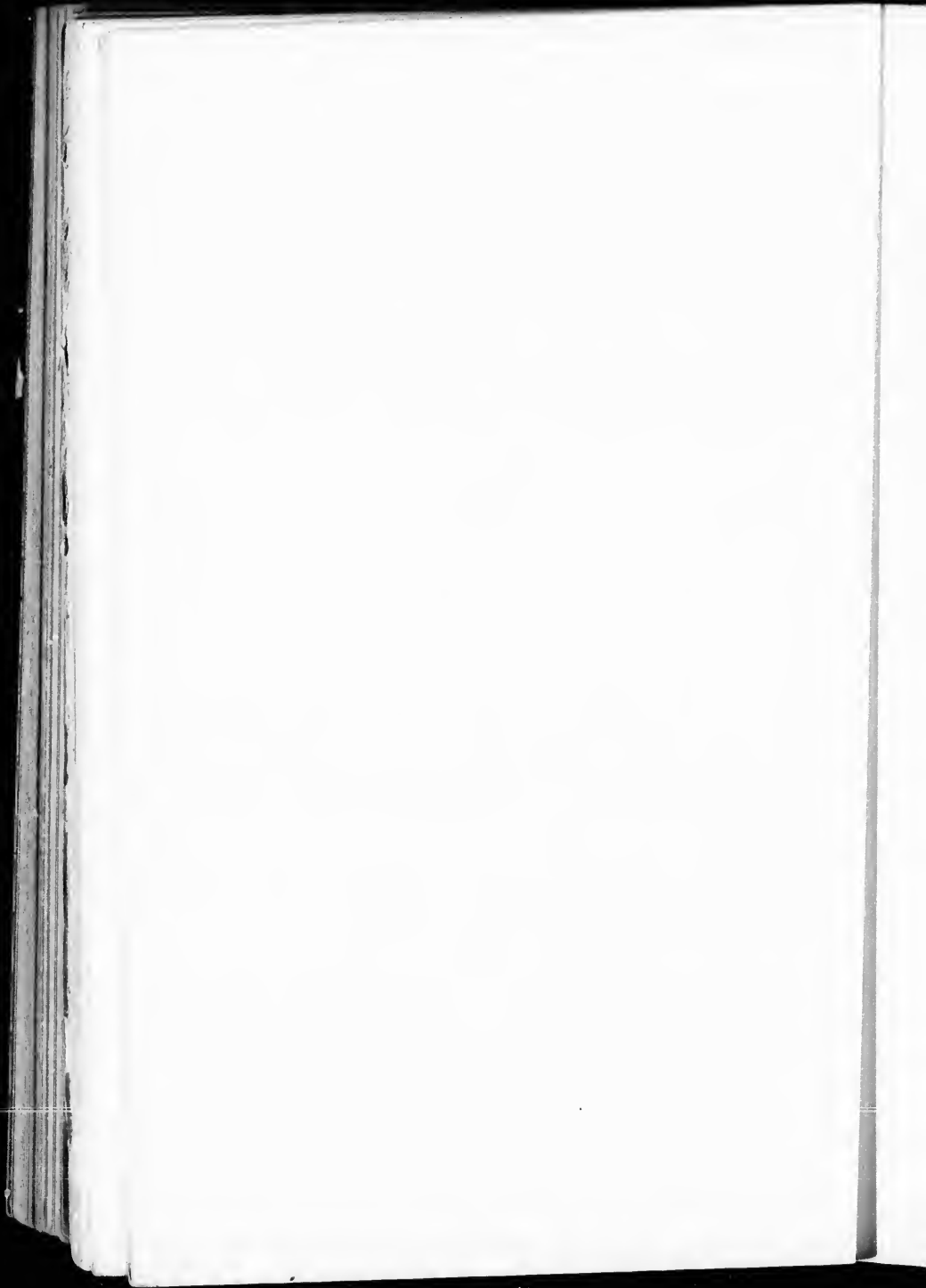
and, characterized by an arrested development, cachexia in some cases:

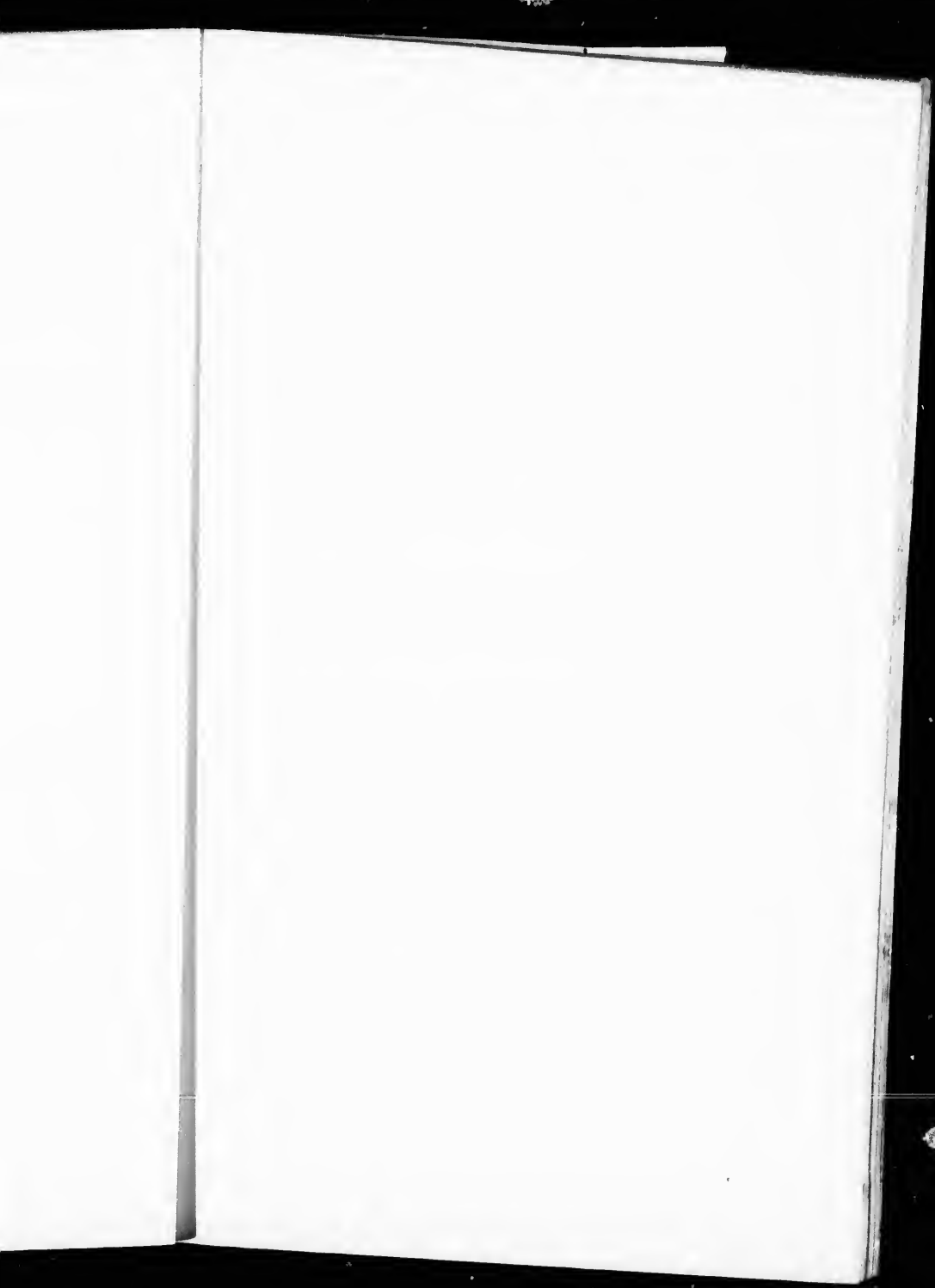
congenital absence of the thyroid gland does not, as a rule, produce any and the subcutaneous tissue only slight traces of the disease. The face becomes very large; the head is large; the neck is thick and often produces the thyroid swelling. Sometimes there is a large swelling of the neck until between the shoulders. The limbs are short, the feet are large, and there is a rough or a scaly skin. These changes are usually present at the twelfth and thirteenth months of life. The condition remains

DISEASES OF THE BLOOD AND THE DUCTLESS GLANDS. PLATE VI.



Case of myxedema, showing the effects of four months' treatment with thyroid extract in Johns Hopkins Hospital.





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ing stationary, at the twentieth, or even the thirtieth, year the mental and physical characters are those of childhood. The change in the thyroid gland consists in either progressive atrophy or the development of a goiter that interferes with the function of the gland.

Cretinism prevails extensively in regions in which goiter is endemic, and the cases of congenital and early cretinism are usually in the children of goitrous patients. Sporadic cases occur in all countries. They are rare in America. Although I was able to collect only about a dozen cases from the literature and from inquiries in institutions, the disease is, I think, not infrequent, and it is very important now that the cases should be recognized early.

2. **Myxedema Proper.**—The disease is more frequent in women than in men, in the proportion of 6 to 1. The following are the symptoms described by Ord in the report of the Clinical Society: "Under the head of type-signs the following may be enumerated: The marked increase in the general bulk of the body; the firm swelling of the skin, not pitting on pressure, inelastic, adherent to the parts beneath, and not affected by gravitation; the dryness and roughness of the skin, tending, with the swelling, to obliterate all lines of expression; the imperfect nutrition of the hairs, leading to their loss; the local tumefaction of the skin and subcutaneous tissue noticed in various parts of the body, but most frequently in the subclavicular regions; the turgescence and infiltration of mucous membranes, leading, in the mouth, to an affection of the teeth homologous with that of the hairs just mentioned; the remarkable physiognomy; the slow, painful utterance, monotonous voice, and leathery quality of tone thereof, with curious nasal explosions at short intervals during speaking; the slowness of thought and movement; the slowness of perception and response; the defect of memory; the frequent occurrence of mental disorders of an irritable and suspicious character, or of hebetude and somnolence alternating with excitability; the tendency to fall, owing to disorder of co-ordination; the existence of subnormal temperature of the body; the aggravation of all symptoms during low climatic temperatures; and the diminution or apparent absence of the thyroid gland. Among the minor or accessory signs may be quoted abnormal subjective sensations, belonging particularly to taste and smell; occipital headache; marked alterations of temper; and a curious persistence of thought and action, overriding all attempts at interruption by friends and observers."

3. **Operative Myxedema (Cachexia Strumipriva).**—Complete extirpation of the thyroid gland is followed in men and animals by the gradual production of a condition identical with myxedema, and to which Kocher, who first noted it, gave the name *cachexia strumipriva*. The experiments of Horsley and others have shown that if a small portion of the gland be left these symptoms do not occur, and in the cases of total extirpation in animals that survive accessory glands have been present. These have been found in all situations, from the base of the tongue to the aorta; thyroid tissue has even been found in the hyoid bone and in the trachea. Of 408 complete thyroidectomies analyzed in the Clinical Society's report, myxedema developed in 69.

These three conditions, then—cretinism, myxedema proper, and operative myxedema—not only stand in close relation to each other, but are in reality identical afflictions, induced by the loss of the function of the thyroid gland, which would appear to supply some material necessary to the maintenance of the normal metabolism, more particularly of the connective tissues of the body.

The diagnosis of the various forms of myxedema rarely presents any difficulty, but in both children and adults the condition is likely to be mistaken for nephritis, particularly if, as is sometimes the case, the urine is slightly albuminous. The solid character of the edema, however, the state of the thyroid gland, the presence of subcutaneous swellings above the clavicle, are points that should lead to a diagnosis. The color in myxedema is usually more yellow; that in chronic nephritis is waxy white. The puffiness and swelling in myxedema are more diffuse and firmer, and pit but slightly. The swelling of chronic nephritis is most marked in the legs, and one rarely sees that general subcutaneous infiltration present in myxedema, in which disease, also, the rough, harsh skin and the disturbance of the nutrition of the hair are often present. Then, mental and cerebral features are more common in myxedema, particularly the headache, feeling of fatigue, and incapacity for mental effort.

Certain symptoms occur at the time of the menopause in women that may cause difficulty in diagnosis. There may be slight swelling of the face, often with a little dryness of the skin and pallor not unlike those of myxedema, and occasional swelling of the feet.

Treatment.—As the patients suffer a great deal from cold, they should be kept warm, and when possible should live in a mild, equable climate. McCall Anderson has advocated the treatment by warm baths, shampooing, and Turkish baths, combined with the use of arsenic, strychnin, and pilocarpin.

The use of the thyroid gland in the treatment of myxedema by Dr. G. R. Murray was a brilliant deduction from the physiologic experiments of Horsley and others. The literature on the subject has grown enormously, and several exhaustive summaries have been made.¹ It is quite settled that the administration of the thyroid gland of animals will, within a variable space of time, remove the symptoms of the disease, whether the case is one of sporadic cretinism, or of myxedema proper, or of the cachexia strumipriva.

Mode of Administration.—The gland may be given raw or cooked, or in the form of a dry powdered extract. If given cooked it should only be par-boiled. Dried extracts and tablets are now to be had, and, as a rule, are quite trustworthy. It makes in reality no difference in what way the gland is administered, so long as proper care is taken to select healthy glands.

The glycerin-extract can readily be made by any practitioner. Several dozens of thyroids of young sheep or calves are carefully separated from the connective tissue, cut into small pieces about the size of a bean, and then put in a jar and covered with glycerin of the best quality, allowing 2 c.cm. of glycerin for each lobe of the thyroid used. The mixture is permitted to stand

¹ The fullest is by Heinsheimer: *Entwicklung und jetziger Stand der Schilddrüsenbehandlung*. München, 1895.

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for twenty-four or thirty-six hours, and is then squeezed through a cloth, so as to get as much liquid out as possible. Of this, 2 c.cm., corresponding to about half a gland, may be given at a dose. If used for hypodermic injection, to a dram (4.) of the glycerin-extract is added half a dram (2.) of a 1 per cent. solution of carbolic acid in distilled water, of which mixture from 10 to 15 minims (0.62-1.) may be injected three or four times a week.

Dosage.—Of the glycerin-extract one may begin with ℥v (0.31) three times a day, increasing to ℥xv or ℥xx (1.-1.23). In cases of infantile myxedema, it is well to begin with ℥j or ℥ij (0.062-0.12) three times a day, and gradually increase until ℥x or ℥xij (0.62-0.74) are taken. Of the powdered gland one can begin with from gr. iij to gr. v (0.19-0.32) three times a day.

Murray divides the treatment of cases into two stages—first, the removal of the symptoms of the disease; and secondly, the maintenance of the healthy condition. In the first stage it is well to begin tentatively with small doses, and gradually increase them. The symptoms of too rapid introduction of the remedy are flushing of the face, gastric irritation, and in a few instances vertigo, fainting, and in some cases epileptiform convulsions. Rapid and feeble heart-action, with profuse perspiration, has also been noted. It is well, however, not to suggest to the patient the probable effect of the remedy, as these untoward symptoms are in reality rare. The good effects are usually noticed within two or three weeks, and in some cases within a month the change has been remarkable. These effects are seen in the gradual reduction of the swelling and the loss in weight; one patient of mine lost twenty-five pounds in twenty-five days. The hair begins to grow, the temperature increases slightly, reaching normal, and the mental processes become more active.

In cases of infantile myxedema—congenital cretinism—the changes are usually remarkable, and some of the illustrations given by Bramwell, Raillton, and others, showing the results of a few months' treatment, are truly astonishing. In a case under my care there occurred in the course of fourteen months an entire loss of the cretinoid aspect; the color became good, the nutrition greatly improved, and the flesh became firm and solid; the patient developed rapidly and increased four inches in height. Previously not able to walk, she now ran and walked about everywhere. Finally, the mental development was extraordinary. At the beginning, though she could try to say a few words, her vocabulary was confined to "mamma" and "papa." After fourteen months she talked clearly and said almost everything.

When the normal condition has been reached, the treatment must still be continued. The amount of the gland used may be diminished, but if the treatment is interrupted the symptoms are likely to recur. The treatment has not been long enough in use to speak positively as to whether the use of the extract can ultimately be abandoned. It all probability it has to be used continuously. In cases that have resulted from surgical extirpation of the gland the same beneficial results have followed the administration of thyroid extract.

DISEASES OF THE KIDNEYS.

BY JAMES TYSON.

WHILE alterations in the chemie and morphologic composition of the urine are the consequences of other than renal and vesical affections, the diagnosis of such affections, with the notable exception of diabetes, depends for the most part on other symptoms than changes in the urine, while the indications for treatment are as seldom based on such changes. In the case of the diseases whose treatment is to be considered in this article, a thorough study of the urine is an indispensable condition, as on it largely depends the accuracy of diagnosis on which a rational treatment must be based.

PROPHYLAXIS.

The prophylaxis of inflammatory conditions of the kidney may, in a word, be said to be the avoidance of their various causes. So far as the infectious diseases that are the most common cause of acute nephritis are concerned there is little to be said, as accidental circumstances beyond our control are generally responsible for their visitations. Cannot, however, something be done to diminish the chances for the operation of such causes? Undoubtedly, in certain instances. Particularly is this true of scarlet fever. I am confident that nephritis is a much more infrequent sequel of scarlet fever to-day than it was twenty-five years ago, because of the greater care now taken during convalescence from this disease. Formerly, when children were allowed to be up and go about the house and even out-of-doors when desquamation was barely complete, nephritis and other sequelæ were much more common. It is a matter of extreme importance, therefore, that children with scarlet fever should be carefully guarded during convalescence. Desquamation should be thoroughly complete before they are allowed to leave the sick-room, while the avoidance of currents of air is of extreme importance. Seldom are less than six weeks sufficient for this purpose, and this period should be insisted upon even in mild cases. This becomes the more reasonable when it is remembered that mild cases are really more likely to be followed by nephritis than severe ones. Why it is that the nephritis after scarlet fever is excited by exposure during convalescence rather than at the time the poison is most active is not clear, but the fact remains. It may be that the chilling of the skin thus induced throws enough more work on the kidneys, already overwrought in their efforts to eliminate the poison, to produce an inflammation. Nephritis is not, however, limited in its occurrence to this stage of the disease, as it not

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*The Cerebral Complications of Raynaud's
Disease.*

BY

WILLIAM OSLER, M.D.,

PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE.

FROM

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES,
NOVEMBER, 1896.

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Extracted from The American Journal of the Medical Sciences, November, 1896.

THE CEREBRAL COMPLICATIONS OF RAYNAUD'S DISEASE.¹

BY WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE.

RAYNAUD'S disease may complicate many affections of the central nervous system. Perhaps the most frequent disorder with which it is associated is hysteria. Case VIII. in Raynaud's original thesis is perhaps the most remarkable example on record. With the most aggravated paroxysms of pain and local asphyxia, she had hysterical convulsions, contractures, and analgesia. The literature contains a number of less aggravated examples. Levy (*Revue Neurologique*, January 30, 1895), who recently discussed the question, holds that there is a purely hysterical form, induced by emotional causes, and which may be relieved completely by hypnosis.

Raynaud's disease is not at all uncommon in asylum-cases, as noted by Southey.² The disease has been met with in epileptic dementia (Wiglesworth)³ and in acute mania. Bland's⁴ patient, a male aged twenty-three years, had had fits from his thirteenth year. In an attack of acute mania he stood on his feet for eight nights. The disease developed in the feet, and at the same time paroxysmal hæmaturia occurred.

Ritti⁵ has reported two cases in which local asphyxia developed in the period of depression in cases of *folie à double forme*.

The disease has been noted in many chronic affections of the brain and spinal cord. There are three instances at least of the association with hydrocephalus, two of the cases in adults, and one, reported by T. K. Monro,⁶ a child of nineteen months, had from birth mottled patches of local asphyxia in different regions, and at the age mentioned developed symmetrical gangrene of the toes. There are instances also in connection with syringomyelia and with locomotor ataxia.

Visceral manifestations, the expression of vascular changes of a kind similar to those which produce the peripheral phenomena of the disease, are exceedingly rare. In a few instances gastro-intestinal crises and attacks of colic occur not unlike those which develop in angioneurotic œdema; but I know of no post-mortem report of a case in which changes

¹ Read before the American Neurological Society, 1896.

² Quoted in Barlow's Appendix, Sydenham Society Selected Monographs, 1888, p. 193.

³ *Trans. Path. Soc. Lond.*, xxxviii, 1887, 1.

⁴ *Annales Médico-Psychologie*, 1882, t. viii.

⁵ *Glasgow Medical Journal*, 1894.

⁶ *Lancet*, 1889, i.

in the organs have been found at all suggestive of prolonged local disturbance of the circulation.

Occasionally there are symptoms pointing to serious disturbances in the functions of the brain. A number of the patients have been epileptic; but with the exception of the first case, to which I shall refer, I know of no instance in which the attacks appeared to be directly associated with the development of Raynaud's disease. In Case XIX. of Raynaud's original thesis, usually quoted as an illustration, the woman had epileptiform attacks which preceded and were not specially related to the gangrene of the feet of which she died.

Our attention was directed to cerebral symptoms in the disease by a patient at the Johns Hopkins Hospital, whose case is reported in full by Dr. H. M. Thomas in Volume II. of the *Reports* (1890). I give here a brief abstract and a note of his condition subsequently to Dr. Thomas's report :

CASE I. *For six winters attacks of Raynaud's disease; attacks of epilepsy occurring only when the local symptoms were present; hemoglobinuria.*—This man, aged twenty-six years, had had for three winters in succession attacks of Raynaud's disease, the hands and feet and ears and nose being affected. The case presented nothing unusual so far as the local condition was concerned. He had had losses of substance in the ear-tips, but not of the nose or of the fingers. The most remarkable peculiarity was the occurrence of the disease in the winter only, and the association of it with severe epileptic convulsions and with hemoglobinuria, a symptom which has been frequently noted in the disease. The epileptic attacks occurred only in the winter, and always in association with the local asphyxia and the bloody urine. The report given by Dr. Thomas is up to January 10, 1890. The patient was in the wards on two subsequent occasions: on February 6, 1892, and March 21, 1893. In the winter of 1891-92 the ears and nose troubled him very much, and he had had blotches on the arms. Up to the date of his admission he had had no convulsions. He had had several attacks of bloody urine. We did not see him again until March 21, 1893. During this winter he had repeated attacks of discoloration of the ears, nose, and fingers, with the passage of bloody urine. On this admission he had no convulsions. He had, however, two additional symptoms of great interest, namely, attacks of severe abdominal pain, resembling colic, which recurred at intervals, and enlargement of the spleen, which could be felt 4 cm. below the costal margin. The patient has not been under observation for the past three years, and I have not been able to find his address.

I can find no parallel case in which the epilepsy occurred only during the manifestations of Raynaud's disease.

So far as I can gather from the literature, the only instance in which aphasia developed in connection with the attacks is reported by M. Weiss.¹

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¹ Wiener Klinik, 1882.

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vated attacks of local asphyxia in the fingers, with arthropathies and superficial gangrene of the left cheek, followed by atrophy of the left half of the face; she also had patches of superficial gangrene on the buttocks. On October 8th she had suddenly disturbance of speech, with pallor, and slight cyanosis of the lips. The attack lasted fifteen or twenty minutes. On November 5th she had a similar attack. Weiss attributed the cerebral symptoms to a spastic ischaemia in the region of the third left frontal convolution.

In the following remarkable case there were recurring attacks of aphasia with transient hemiplegia. The clinical summary is as follows:

CASE II. *For five or six years occasional attacks of numbness, with mottling of the fingers. In April, 1891, an attack of dizziness and, perhaps, transient loss of consciousness; a month later a second attack, with pain and local asphyxia in the little and ring fingers of the right hand. In January, 1892, a third attack of dizziness, unaccompanied with asphyxia and right hand. A fourth attack on the 2d of February, with aphasia, loss of power in the right hand, and with paresis of the right foot; rapid recovery. On March 31st a second attack of complete aphasia, with spasm in the right hand and aching in the right leg and toes. In February, 1895, local asphyxia, necrosis of terminal phalanx of middle finger of right hand. On April 4th severe attack, with headache and slight paralysis of the left arm and third attack of aphasia, with right hemiplegia, local syncope, and asphyxia in right hand and fingers. In January, 1896, intense pain in right hand; rapidly developing gangrene extending to the elbow; coma; death.—Mrs. H., aged forty-eight years, admitted to Ward C of the Johns Hopkins Hospital, February 9, 1892, complaining of difficulty in speaking and of peculiar sensations in her fingers.*

The family history is good. She knows of no similar complaint in any of her relatives. She is married and has had a number of children. She had one miscarriage in 1878. As a rule, she has enjoyed excellent health. In 1875 she had acute rheumatism, affecting the hands, elbows, and hips. The attack was very intense for a week, and lasted in all about six weeks. At intervals she had had slight returns of the pains in the joints. Six weeks ago she had what her doctor called rheumatic gout in the big toe. On several occasions she had had slight attacks of renal colic, and, though she has been told by her physicians that she has gravel, she does not think that she has ever passed a stone.

For five or six years at least she has had peculiar feelings in the fingers, a sense of tingling and numbness, chiefly at the finger-tips and on the pads; sometimes, too, in the ball of the thumb. At these times the fingers become mottled. The condition persisted usually for only a few hours, though she has had attacks in which it lasted for one or two weeks. The tingling feeling was sometimes so aggravated that she would put her hands on ice. The fingers were never blue, but on several occasions she had irregular bluish spots on the back of the right hand. The fingers never became cold and dead. The condition rather resembled that of chilblains, though she had never suffered from that complaint

as a girl. During these years she never thought seriously of the condition. It was annoying, but not very troublesome. The toes were never affected.

In April, 1891, she was seized with dizziness while at the breakfast-table; a queer sensation began in the feet, spread all over her, and for a moment she lost her sight, and, she thinks, consciousness. The attacks, though of very short duration, frightened her very much. A month later she had a second attack. About seven o'clock in the morning she felt suddenly that things were moving, and she had to take hold of a chair to prevent herself from falling. She was given brandy, which nauseated her, and she vomited three or four times. The face and lips were congested, not pale; the speech was not affected. Within a few hours she felt quite well. She noticed, however, that her right arm ached very much, and at eleven o'clock she looked at her right hand and saw that the little and ring fingers were of a purplish-blue color. They remained black and painful for nearly five days, and were numb for a longer time. There was no loss of substance. She had no further attacks until just five weeks ago, when she again became very dizzy, and would have fallen had she not grasped a chair. In this attack the index and little fingers of the right hand were affected, and the doctor thought she would have lost them both, as they remained cold and black for days. The skin turned of a greenish-black color and gradually came off. The nail, however, did not come off. The fingers are now healing, and new skin is forming. In the first attack she had slight disability of the hand, which in the second attack was much more marked, so that she could not dress herself or use the hand to feed herself. She thinks, too, that the hand was somewhat swollen.

A week ago she had a third attack, which came on with much ringing in the head, particularly in the right ear. She felt very dizzy, but did not lose consciousness. Her teeth, however, chattered, and there were involuntary movements in her right hand. She had headache and saw double. She found that her right hand was almost useless. She could move it from the elbow and shoulder, but she could not hold a glass of water. On attempting to get up she scarcely could stand, and the right foot and leg were weak. For the first time the speech was affected. She could only mumble words, and could not be understood. She had no nausea and no vomiting. The difficulty in speaking and the slight hemiplegia have persisted, and it is for this condition that she seeks relief.

S. P.—The patient is a well-nourished, somewhat corpulent woman; the color of the face is good; the venules on cheeks and nose are a little dilated. The pupils are equal, react to light and on accommodation. There is no diplopia; the ocular movements are perfect. There is no facial paralysis, and there are no disturbances of the sense of taste or smell. The temperature is normal; pulse regular, tension a little increased; the vessel-wall of the radial arteries is a little sclerotic. The movements in the right hand are good, but the hand is weak and the grasp feeble. She can pick up a pin, can use a fork, and can write, though slowly and with difficulty. She says that the power in the hand has been returning rapidly within the past few days. The skin of the left hand and fingers looks quite natural. The terminal phalanx of the right index finger is of a deep bluish-red color, and the nail is deeply discolored. On the pad of the finger the skin is very dry, and there is

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a thick layer of old dry epidermis, which on the ulnar side of the phalanx is of a greenish tint. Over the rest of the phalanx there is new skin. The middle and ring fingers look pale. The terminal phalanx of the little finger is covered with a shining new dermis. The nail-bed is swollen, and it looks as though the nail might come off. The condition of these fingers followed the attack early in January. She says that there is tingling in the thumb and in the middle fingers, and in the palm of the hand, and they feel hot like fire. The sensation in the hands is good on both sides. All trace of paralysis of the foot has disappeared. She walked upstairs, and she now seems to walk without any dragging. There is no distinct aphasia, and she does not appear to have any difficulty in expressing ideas; but there is a hesitancy in the speech, and the articulation is somewhat stammering. She names objects at once, and she reads easily. There is no hemianopsia.

The examination of the heart was negative, with the exception of a slight accentuation of the aortic second sound. The hypogastric and right iliac regions of the abdomen are occupied by large masses, probably fibromyomata.

The urine was light yellow in color, with a specific gravity of 1023, and a faint ring of albumin with cold nitric acid; no tubercasts; no blood.

The patient remained under observation until the 20th. She improved steadily, and on leaving the hospital she spoke with clearness and without hesitation. The fingers had almost healed, and the dry, greenish skin came away from the terminal phalanx of the index finger. On several occasions there were marked hyperemia and hotness of the right thumb, associated with a burning sensation, and on the back of the right hand a spot appeared about 2 cm. in width, which was very hot and tender.

Through the kindness of Dr. Boutelle I have been kept informed at intervals of the subsequent progress of this case. In a letter dated April 4, 1892, he says:

"Two weeks after her return from the hospital she had another attack of giddiness, not associated with any trouble in the fingers, or with loss of speech. On March 31st she had a very remarkable attack. She had burning sensations and nervous feelings in both hands, but was up and about and feeling very well. At three o'clock she was talking with some friends when she suddenly became completely aphasic. There was no giddiness. She was laid on a lounge and a messenger was sent to fetch me. I reached the house at 4 p.m. She was perfectly sensible, understanding everything, but was unable to reply. She could protrude the tongue fully and open the mouth. She seemed to know what she wanted to say, but could not express it. There was no double vision. The right hand was stiff, and at times convulsed. The attendants said that the thumb had been drawn strongly into the palm of the hand and that the hand and arm were cold. When I saw her they were warm, but the fingers and thumb had a tendency to spread and to become stiff. About 6 p.m. the power of speech began to return, and when I saw her the next day she talked as well as before the attack. There were one or two small discolored spots here and there on both hands, not associated with any pain, or with any threatening of gangrene as was formerly the case in the fingers."

Dr. Bontelle informs me that from this date until the summer of 1894 she remained well, having no symptoms of the trouble. At this time she had a sudden attack of pain and aching in the right leg and toes, but no discoloration. The pains would last for from a few minutes to a few hours and then disappear. Under date of March 25, 1895, he writes:

"Six weeks ago the middle finger of the right hand became very dark over the terminal phalanx, just as in the old attacks, but there were no cerebral symptoms. The discoloration has been disappearing, and is now almost gone. The nail is slightly raised, but I do not think it will come off. She consulted me lately for a return of the intermittent pains in the right leg. (These are probably pressure-pains from the myomatata.) The general appearance is healthy, the pupils are normal, and the speech is natural. She took at this time nitroglycerin in very full doses without any benefit."

On April 8, 1895, Dr. Bontelle writes:

"Just now Mrs. —'s case is presenting some very peculiar features. On April 4th, about 9 P.M., she had an attack of faintness and giddiness, with pain in the index, ring, and little fingers of the right hand. I saw her the next evening about six o'clock. She had had a severe headache, particularly in the right temple. She said that her left arm and leg felt weak and heavy, but she could move them very well. There was, however, marked clumsiness of movement in the left hand. The fingers were semiflexed, and she had difficulty in straightening them. There was no discoloration in the left hand. The terminal phalanges of the index, ring, and little fingers of the right hand were discolored and tender to the touch. On the palmar aspect of the middle phalanx of the index finger and on the palmar aspect of the metacarpo-phalangeal joints of all the fingers of the right hand there were spots of discoloration, slightly tender. The following day the discoloration of the right hand was less marked. The speech and intelligence were normal. The slight paralysis of the left hand continues. She moves it with difficulty. To-day, the 8th, the discoloration is more marked in the fingers, which are very tender."

This patient's son, a young medical man, has kindly sent me the following note of an attack which occurred on July 19, 1895:

While dressing the patient had an attack of partial unconsciousness. For ten minutes the right side was helpless and the speech impossible; she was dull and very lethargic. The arm recovered motion first, and then the leg. Sensation was restored later than motion. She complained of a dull, aching feeling in the arm during the day. The hand was stiff and the middle finger blue. On the 20th there was still aching in the right arm, with now and then an exacerbation, until luncheon, at noon, at which time all the fingers and the hand became of a dead-white color. In a short time the tips of the fingers became dark blue, and spots of the same color appeared on the hand, particularly in the palm. The pain was very intense, and she suffered terribly, requiring several hypodermatic injections of morphine in rapid succession.

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blue, with a few scattered blue-spots on the hand. The tip of the nose was also slightly blue, the only occasion on which she had any symptoms referable to the face. There was a spot of ecchymosis an inch, by half an inch from the styloid process of the right radius.

On the 22d she was very much better, and was able to get up. The hand was still cold, but the blue color of the fingers was fading.

On the 23d and 24th she improved rapidly. At this time an oculist examined her eyes, and said she had choroiditis, with beginning optic atrophy. In this attack the urine was negative.

On April 3, 1896, Dr. Boutelle writes:

"Mrs. — died January 29, 1896. She did very well for a time after my last report. Last summer she had a rather prolonged attack, not so severe though as the former ones, and without any paralysis or brain-did not ulcerate. Early in January, after feeling pretty well, she one day took a drive and ate rather heartily at supper. During the night she had an attack of giddiness and vomiting, followed by intense pain in the right hand. Morphine had to be given freely to relieve the pain, which she could not locate exactly, referring it to the elbow or upper arm. All of the fingers turned blue, and there was no sensation in the hand. She was a little bewildered and confused mentally, but there was no loss of power of speech. Any movement of the hand or arm gave the most intense pain. Gradually the coldness and lividity increased, until the hand and arm were dark purple as far as the elbow. She sank into a coma, and died in a couple of days."

Her son writes about the final attack:

"On his return home at his mother's final illness he found the right hand and fingers completely gangrenous. The arm was mottled nearly to the shoulder, and as far as the elbow it looked as if it must also become gangrenous."

Severe and persistent headache, alternating with or even taking the place of a well-marked attack, has been referred to by H. C. Wood in the discussion of a case reported by Cleemann,¹ in which angina pectoris complicated the disease. The patient described the pain as of a character very similar to that which occurred in the fingers.

I am indebted to Dr. H. V. Ogden, of Milwaukee, for the report of the following case, possibly of the nature of Raynaud's disease:

CASE III. *Painful swelling of the legs between the knees and ankles, recurring for two and a half years; falling attacks of doubtful nature, possibly hysterical.*—K. T., aged thirteen and a half years, German, of a neurotic family. She is a large, healthy-looking girl. Her illness began with what appears to have been an attack of chorea of considerable severity when she was ten years old. This was followed immediately by three groups of symptoms, viz., painful swelling of the legs, painful swelling behind the left ear, and falling attacks, all of which have continued until now.

1. About a year after the onset the condition of the legs is described

¹ Transactions of the College of Physicians, Philadelphia, 1892.

by a physician who saw her, as follows: The child was kept to bed; the pain came on about 8 P.M., and lasted more or less through the night; the legs from ankle to knee were puffy, swollen, and red, extremely painful, and very markedly hyperæsthetic. She lost much sleep and ran down rapidly. This state had developed rapidly after the chorea.

When I first saw her in July, 1885, the painful attack came on in the middle of the morning, and lasted a couple of hours, and during this time the condition was much the same as described above, though much less severe. In the interval the skin had a reddish, mottled, edematous look. Some constant pain and excessive hyperæsthesia. As well as could be made out the sense of temperature was blunted, if not lost. Knee-jerk present, though slight. The affected area extended from the insertion of the patellar ligament to ankle, and was sharply defined at each limit, and extended completely around the legs.

December, 1885. On the whole better. The affected area has become limited, by the approach of the upper and lower boundaries some two or three inches nearer each other. Has better and worse days, but for last year or more has been active in playing about, except during attacks of pain, and lately these have not been severe or distinct enough to make her lay up, but all day the condition is as described in July, 1885, the subjective sense of pain going off when she goes to bed, but coming on in the morning, sometimes before, sometimes after getting up.

2. Ever since the beginning has had a deep-seated carache, more or less constant. This is accompanied by redness and swelling over the mastoid process, which comes and goes, but never suppurates. The intensity of the pain and swelling coincides.

3. Falling attacks. At first, and for a year, she would fall forward, two or three times a day, on her hands and head, and unless caught would roll over on the floor. There was no aura, no convulsion, and probably no loss of consciousness, but of this she is not sure. Recovery was quick. For the last two years has always had time to get to a chair or lounge, never loses consciousness, and it never lasts more than five minutes, and often only a few seconds. I saw one which consisted merely in putting her head on her mother's shoulder, who was sitting near her, and almost immediately picking it up again. It had the appearance of being done for my benefit. During these attacks she feels faint and powerless. Heart-sounds normal.

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