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BEFORE THE AMERICAN DERMATOLOGICAL ASSOCIATION AT THE MEETING IN CHICAGO, JUNE, 1901.

BY

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It is with considerable diffidence that I, who am not a pure dermatologist, address so eminent a body of specialists as that now before me. I have felt greatly the honour you have done me in electing me President of this Association, and am sure that after the distinguished men who have preceded me, my occupancy of the chair will be a very inglorious one. However, I shall do my best, and trust that the Chicago Meeting will not be one of the least instructive and interesting, for the Local Committee have worked with a will and have accomplished much.

I have thought this a very suitable occasion (the first meeting in the 20th century) on which to look back and estimate the advances made in dermatology during the century which has lately been completed, and also to try and understand how much knowledge the dermatologists possessed a hundred years or more ago regarding the nature and causes of skin diseases.

We might say that the specialty of dermatology has been created during the past fifty years, and that no department of medicine has made greater strides forward than dermatology. Men interested in this specialty were the pioneers who first entered the then unknown sea of bacteriology, for to them is to be credited the honour and glory of first discovering the parasitic origin of many diseases. To Schönlein belongs the credit of first exploring these regions and opening up the whole field of cutaneous mycology, for he in 1839 discovered the parasitic fungus of Favus. In 1843 Gruby of Paris discovered the

ringworm fungus, and in 1846 Eichstädt discovered that of tinea versicolor.

The enormous influence that the discovery of the microbic origin of disease has had on surgery and medicine is incalculable. Without our present knowlege medicine and surgery would have been at a standstill, and we owe this, in the first place, to the men whose names I have mentioned above, and secondly to the magnificent work of Pasteur, Lister and Koch. As I have before said, perhaps no department of medicine has made more progress during the century just elapsed than dermatology; from being an indefinite, inexact and confused branch of medicine, it has developed into one of the most exact and scientific departments—from being a mere bye-path it has become a most important highway—and although there is much yet to learn about the pathology and etiology of diseases of the skin, nevertheless, during the quarter of the century just elapsed, and especially since the discovery of the microbic origin of many diseases, vast strides have been made.

Notwithstanding the fact that most of the pathological processes and changes are taking place before our very eyes, there is great diversity of opinion regarding the significance of those changes, and many difficult problems beset us which are as yet unsolved. Many skin diseases are more than mere local manifestations, for, as it has been said, "They have their roots in the interior," *e.g.*, such diseases as syphilis, tuberculosis, the eruptive fevers. There is a close connection between certain skin lesions and diabetes, dyspepsia, rheumatism, etc., acne may be connected with menstrual disorders, urticaria with the pregnant condition, with pleurisy, and the ingestion of certain obnoxious foods, and purpura with rheumatism. Many rashes are produced by drugs; obstructive jaundice may produce xanthoma, etc., and so it is evident that the pathology of skin disease is intimately connected with general pathology. How important, then, is it that the dermatologist should have a general knowledge of disease. The great principles of medicine and surgery should first be mastered before the study and practice of a specialty is undertaken. In this way a much broader grasp of the subject is obtained, and the specialist is much less likely to run into narrow grooves. Plato recognized this, and said that "the reason why the cure of many diseases is unknown to the physicians of Hellas is because they are ignorant of the whole, which ought to be studied also; for the part can never be well unless the whole is well."

Diseases of the skin are on the borderland between medicine and surgery, and both departments lay claim to certain skin affections.

Syphilis, tuberculosis and malignant diseases of the skin have been claimed by the surgeons, and the exanthemata, which occupy so much space in the works on dermatology of the early part of this century, have been almost given up by the dermatologists and annexed by the physicians, who in their text-books describe them very fully.

One hundred years ago the classification of skin disease, as described by Plenck in 1783, Willan in 1808, and Bateman in 1813, was based purely on the external appearances of the eruptions, the "physical-signs" as they might be called. The classifications adopted by these men are all much alike, namely, Maculæ, Pustulæ, Versiculæ, Bullæ, Papulæ, Squammæ, Tuberculæ, etc. Bateman has a class of exanthemata. Parasitic diseases were almost unknown, though Plenck has an order called "Insecta Cutanea." Elephantiasis Arabum, lupus, pellagra, syphilitica, keloid, diseases of the hair and nails, etc., were classed separately.

This classification was adopted by writers in England and on the Continent, either wholly or in a modified form. Then came the classification of Alibert, which divided the diseases of the skin into families, and was illustrated by a magnificent atlas of plates, which tended to popularize his views. His classification was as inaccurate as his pathology was erroneous; Rayer said, "it was deficient in unity and principle."

Hebra, inspired by Rokitansky, was the first to classify diseases of the skin on a pathological basis, and though his scheme has been much modified by recent discoveries and the better methods of histological investigations, most writers, even at the present time, have a classification more or less modelled on Hebra's system. I must not omit to mention the diathetic school of Hardy in Paris, and the anatomical and therapeutical school of Erasmus Wilson in London. In this Association both the clinical and anatomical classifications have been discarded, an alphabetical list of diseases being thought sufficient to fulfil all requirements.

Enough about classifications—a troublous sea on which I do not intend further to sail.

At the beginning of the 19th century *Impetiginous Eczema* of children was considered beneficial rather than injurious to the general health, and no remedial measures were advised. Now we know this eruption is due to a specific organism, and is best treated with germicidal remedies, and when cured the patient is much benefited. Cutaneous cancer was considered as the outward manifestation of a diathesis, the effect of which would soon be felt by some of the internal organs. Now we know that cancer is "prima facie" a local disease, and only becomes

general when the lymphatics are involved and the disease has lasted some time, that if eradicated early and thoroughly, it can be cured in many cases.

It was believed that the appearance of eczema or a lichen during the course of an internal malady, was always followed by a favorable solution of the disease; that during an acute disease the cutaneous affections would sometimes disappear, and physicians considered it was most important to administer remedies to bring it back so that by this means there might be a favorable termination of the internal disease. The idea that it is not well in all cases to try and cure an eruption, say of the scalp, for fear of entailing something worse upon the patient, is not yet extinct among intelligent people.

In the beginning of the last century in all works on Dermatology, Lepra and Psoriasis had separate chapters for their description, and were looked upon as distinct diseases. From the description given by Bateman in 1819, one would now conclude that they were one and the same disease; the only essential difference being that the patches in lepra are circular and discrete, while in psoriasis they are irregular and diffuse, and in 1842 S. Plumbe, although he devotes 12 pages to lepra and 21 to psoriasis, says that "he is fully convinced that for all purposes of useful discussion lepra and psoriasis might have been included under one head." He says also that "the information we have at present acquired in the modern study of cutaneous diseases, does not enable us to find a better reason for their separation than that afforded by the circumstance of its having been made by the ancients."

Arsenic and pitch were given with good effect then, and sulphur baths were strongly advised, but bleeding and purging were condemned by Bateman. White precipitate ointment is advised in some cases, also unguentum picis and dilute citrine ointment. Bateman found the decoction of the leaves and twigs of the Solanum dulcamara most beneficial.

As to the etiology of the disease, as much was known a hundred years ago as now; heredity was held to be a factor, and certain foods and drinks were said to produce it, cream, vinegar, oatmeal and alcohol, and in some cases violent exercise of the body are given as causes. Willan says cold and wet will bring it on, but the conclusion of most of these early writers is that the causes of this disease (lepra) are involved in much obscurity. No less than three varieties of lepra are described and eleven of psoriasis.

The history of *Scabies* is a most interesting one. Four different forms were recognized, viz., S. Papuliformis, S. Lymphatica, S. Purulenta and S. Cachectica. The clinical features of each one of these

were well known, and also the fact that scabies was contagious. Although the "itch mite" had been discovered as early as the 12th century, according to Hebra, and is mentioned by Ste. Hildegard in a book entitled "Physika," yet at the beginning of the 19th century it was unknown to most physicians, some recognized its existence, but it was regarded as a kind of louse and merely present accidentally in scabies. In the 17th century old women went about extracting these insects with the point of a needle from their burrows in the skin, and Borromo and Cestoni regarded the acarus as the cause of the disease, and said it could be communicated by contact and by shirts, pocket-handkerchiefs, gloves or other articles worn by the persons affected with the disease. The acarus would appear to have been lost sight of for many years, and even in the beginning of last century its existence was doubted by medical men in France, though veterinary surgeons were familiar with it as scab in sheep. But authors such as Bateman, Biett, and Casenave, still ignored it; some admitted the existence of the insect, but said it was a rare and casual circumstance, the approimate cause of the disease being the fluid secreted by the pustules.

Casenave (1829) said: "the proximate cause is wholly unknown," and thinks that pedicular diseases have been mistaken for it by those who believe in the itch mite. M. Gales had in 1812 at the Hôpital St. Louis, demonstrated many times the presence of the insect, and described it. Still Casenave says in 1828, "that until M. Gales, . . . would again visit the Hôpital St. Louis and reiterate his experiments, he should think himself justified in believing that the acarus does not exist."

In 1834 a Corsican named Renucci taught the physicians of Paris how to find the acarus. But old beliefs and superstitions die hard, and even after Eichstädt of Griefswald in 1846 described the burrow and position of the eggs in it, and the larval stage of the animal, and Languentin and Bourguignon described and gave drawings of both the male and female itch mite, and proved by experiment the contagiousness of scabies to be due to the transference of this insect, yet the profession was not convinced. In 1852, nay, even as late as 1864, some authors (Casenave, Duvergie and Gilbert), admitted that scabies could be communicated by the insect, but held that the secretion from the eruption itself was the most frequent cause of contagion. Duvergie said in 1863, that "Scabies may be a spontaneous disease," Hebra in 1846 wrote a paper on scabies, in which he credited the acarus with being the only means of contagion in this disease.

Ringworm of the Scalp was classed under the Herpes group of erup-

tions, with herpes zoster, etc., and was called herpes capitis, or tonsurans, that of the body, herpes circinatus. Most English dermatologists up to the middle of the last century held that ringworm was not contagious, because no other form of herpes was, and it was not inoculable. Casenave held strongly that H. circinatus was contagious, but did not know it was caused by a vegetable parasite. Andrew Paul, who published in 1838 an essay on ringworm, with plates, quaintly says in his preface that "he has added some plates containing representations from nature that those who have not leisure to read the book through may, however, by looking over them, have some knowledge of what it contains." Mr. Paul's work gives one an idea of the extent of the information on the subject which existed at that time. The nomenclature is most confused, for under Ringworm are figured herpes zoster, herpes iris, herpes circinatus or vesiculor ringworm, herpes labialis; porrigo favosa (well illustrated), porrigo decalvans (alopœcia areata), porrigo aparsa (favus), porrigo annulata (probably lupus erythematosus) and another in the head, probably true ringworm. And again impetigo figurata, probably impetigo contagiosa. There is also a good representation of a pediculus, which is said to attack the heads of children affected with ringworm. He holds ringworm is highly contagious, but is influenced by unhealthy secretion of milk, impure air, teething and surfeit. He looks on the disease as at first local, but afterwards becoming constitutional, as evidenced by the enlargement of the glands of the neck. Pediculi capitis, favus, herpes, scabies and seborrhœa are all confused with ringworm. The itch insect and pediculi are spoken of indifferently as one and the same, and he describes how the galley slaves at Leghorn are very dextrous with pin and needle in extracting them from the skin.

This book gives one a very good idea of the confusion which then existed as to the nature of the various diseases which attack the scalp, and the great ignorance which there was before the discovery of the ringworm fungus by Gruby in 1843.

Tinea Sycosis Barbæ had been described by Celsus and later by Galen, but Bateman is the first to give a good description of sycosis. He treats it with mercurial ointments, but at the same time prescribes alternative doses of mercury and antimony followed by cinchona or serpentaria, "especially where there appears any affection of the digestive organs, which not infrequently occurs with this eruption." Most of the writers of the early part of last century confuse ringworm with sycosis, and many later on describe this disease as caused by a vegetable parasite. Even as recently as the time of the great Hebra sycosis was supposed to arise from a morbid principle in the blood. Some said it was apt to occur in cooks, founders, stokers and others

subject to long continued heat; Erasmus Wilson supposed it due to night air, and many to blunt razors (a very probable contributory cause). Hebra said it was due to letting the beard grow; he laughed at the idea of the disease being caused by a dyscrasia.

Now we know that the disease is of microbic origin and contagious, and is often conveyed by the shaving brushes and towels of barbers. According to Unna, there are two forms of the disease, one of coccogenic, the other of bacillogenic origin.

Nearly all the works on dermatology in the early part of the century have a chapter on *Vaccinia* or cowpox, and give accurate directions how to procure the vaccine virus, and the appearance of the vaccine "pock" in its various stages is described minutely. Vaccinia is classed under the pustular eruptions. A number of spurious vaccine pocks are described. Casenave (1829) mentions the fact that small-pox sometimes co-exists with vaccinia, or that vaccinia does not always protect, the same may be said of innoculation, yet both will modify the attack of small-pox if they do not protect. He concludes by saying, "Vaccination without inducing any danger in itself is still a preservative means of the highest grade of utility, and it is perhaps the most glorious victory of the art of medicine."

Would that all thought so now! In those days people were familiar with the terrible ravages of small-pox, and knew that few reached adult life without being pitted, so they welcomed with joy any means which held out a promise of relief from the dread scourge. Now-a-days, anti-vaccination societies abound, and it has become as much of a cult as Christian Science, Homœopathy, and such like delusions. Alas for the progress of the human race and its improvement by education! Education has not destroyed superstition or the belief in fads, for it is among the so-called educated classes that quackery flourishes and has its chief support.

In this brief sketch I have given you a sufficiently long account of the state of knowledge of some of the diseases of the skin in the beginning of the 19th century, and have told you how confused most of this knowledge was. The discovery of the parasitic origin of many affections aided much in clearing away the clouds and mists which enveloped diseases of the scalp especially, and prepared the way for the Vienna school of pathology which was led by Hebra, who was inspired by Rokitansky. Hebra, by his scientific knowledge and his common-sense way of looking at diseases of the skin, has done more than any man to drive away the superstitions and fallacies which enshrouded dermatologists at the beginning of the last century, and in this he was assisted by Hardy of Paris and Erasmus Wilson of London.

During the last quarter of the 19th century the histological and

bacteriological methods of investigation have thrown much light on diseases of the skin, and have helped to place the study of dermatology on a scientific basis. Many new affections have been described, and many old ones have had to be re-classified. The parasitic diseases are becoming thoroughly known, and with the new means at our disposal for investigation, ringworm, favus, tinea versicolor and scabies are now fully understood—the first named, owing to the work of Sabourand and others, is now known not to be due to one and the same fungus, but to several different kinds.

Eczema seborrhœicum has been given to us by Unna, and Duhring has contributed Dermatitis herpetiformis. Then we have Raynaud's disease, myxœdema (Ord), angio-neurotic œdema, pityriasis rubra pilaris, parakeratosis variegata, porokeratosis, blastomycosis, and many others which I have not now time to even mention. Lupus, which formerly was classed under the new growths, is now placed under tuberculosis, though there is yet some difference of opinion as to the proper place of the erythematous variety.

Many new remedies have been introduced, such as chrysarobin for psoriasis, thyroid extract for myxœdema, and many new germicides, such as ichthyol, napthol, salicylic acid, resorcin, etc., their name is legion. The X-rays and sunlight have been pressed into the therapeutic service, and animal extracts are as popular now as in the middle ages.

The advances within the last quarter of the 19th century, both in medicine and surgery, as well as in the special departments, have been marvellous. Could one of our confrères of the first quarter of the century come to life, he would imagine himself to be under an enchantment, and yet the present generation look upon these wonders unmoved, and take them as a matter of course. It is possible that the present century will see much greater marvels than the past, and that diseases which are now raging in our midst may be altogether abolished, for most are preventible.

It has been said that nearly all lethal diseases might be classed under three heads, the *Tuberculous*, the *Carcinomatous*, and those due to *Septic germs*. It is very possible that these diseases may be abolished by some antitoxin, and that syphilis, leprosy and diseases of that class, may be so controlled as in time to be abolished altogether, and then the occupation of the doctor will be gone, for people would only die from old age or from accident; a few surgeons would be required to treat the accidents which would continue to happen.

Such is the dream of the more Utopian members of our profession, and I might say with Hamlet, "It is a consummation devoutly to be wished."

ON THEORIES OF INHERITANCE, WITH SPECIAL REFERENCE TO THE INHERITANCE OF ACQUIRED CONDITIONS IN MAN.*

BY

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Questions of inheritance at the present moment occupy a curious position in the minds of medical men and in medical literature. To judge from the medical press, we medical men are very Gallios—we care for none of these things. And yet, in family as in consulting practice, questions concerning heredity must and do continually present themselves. In attempting to arrive at a conclusion about a given case, we are bound to ask ourselves how far the frailties or follies of progenitors are responsible for the conditions found—how far the accidents or the sins of the individual. Each succeeding day you must have this question of possible inherited defect brought before you; constantly must you be forced not merely to inquire whether certain phenomena are matters of inheritance, but assuredly to recognize that this or other condition runs through all the members of a family and is an inherited weakness. And yet, although the lay reviews discuss the matter familiarly, and although perchance the charming partner you take in to dinner does the same, we scarce write about these things, save in connection with one or two branches of medicine, and when we do, I have no hesitation in stating, though it is a bold statement, that much of what is written is misleading.

Even in my own subject of pathology, treating as it does of the causes, the processes and the results of disease, in the discussion of which the laws of inheritance should obviously be carefully studied, if inheritance plays even a debatable part; turn to any of the text-books in our language and what do we find? A single page, or it may be but a single paragraph, is thought sufficient to introduce and to take leave of the subject. In short, from a concatenation of circumstances the medical study of inheritance is largely "taboo." Why is this?

It depends upon more than one factor. In the first place, while, as I shall point out later, the study of man is singularly well adapted for determining certain points in connection with inheritance, the fact that the generations of man follow each other at such relatively long inter-

* The first of a series of annual addresses under the auspices of the Brooklyn Medical Club, delivered May 17, 1901.

vals is against man being for most purposes a good subject for investigation. In the course of a long life the investigator can but study the characters of three, or it may be four, generations in one family, while influences acting upon the susceptible *fœtus in utero* in man, as in all mammalia, introduce complications. The basal facts of heredity have to be made out in the lower animals, in which generations succeed each other with fair rapidity and in which the eggs are fertilized and from the first developed outside the body.

Unfortunately, too few of us are trained biologists; the curriculum of the past, as of the present, laying too little stress upon the value of a broad biological training as an aid in preparing us to discuss those special biological problems which constitute medical study. Thus the medical world in general has to depend upon the biologists proper—upon the zoologists and botanists—for its views upon heredity, and the pure and simple biologists have run riot in their lucubrations upon this subject. Do not think that I mean to belittle them or to indicate that we do not owe much to all the investigations and all the writings of the biologists of the last twenty or thirty years. The facts which they have elicited have been of the highest value. Without these facts we would be nowhere, but the contending theories elaborated by them (perhaps I should be the last to make any such criticism) have been fearful and wonderful, have started from morphological rather than physiological conceptions, and as a result have assumed shapes which would not disgrace the schoolmen of the Middle Ages. While they have appeared to collate and harmonize the facts known at a given moment, new facts have caused them to need modification, and the successive attempts to utilize the old bottles for the new wine, where they have not burst the bottles, have led them to assume most grotesque shapes. In fact there has been developed such a muddle that no amount of midnight oil and wet cloths bound around the temples permits the ordinary mortal to disentangle and follow the course of one theory.

This being the state of affairs, it is little wonder that we have passed by on the other side and have been unwilling to apply the theories of the biologists to the problems of medicine—and this all the more because the trend of these theories has been in apparently strong opposition to medical experience. Of all the workers of late years Weismann has had the most influence upon biological thought, and his theory, if not accepted by all in its entirety—and if, indeed, now found unacceptable—has, nevertheless, profoundly affected the general consideration of this subject of heredity. That theory is very complicated, and with Weismann's successive publications has not by any means become easier to follow or to epitomize in language devoid of technicalities. Still, if

not every schoolboy, at least every educated man is supposed to comprehend the general tenor thereof and its main thesis or conclusion, that acquired characters—characters acquired by the individual—are not and cannot be transmitted to the offspring. To use Weismann's own expression, "We maintain that somatogenic characters" (characters originating in the cells and tissues of the body)" are not transmitted, or rather, that those who assert that they can be transmitted must furnish the requisite proof. The somatogenic characters not only include the effects of mutilation, but the changes which follow from increased or diminished performance of function and those which are directly due to nutrition and any of the external influences which act upon the body. Among the blastogenic characters" (characters originating in connection with the germ cells), "we include not only all the changes produced by natural selection operating upon variations in the germ, but all other characters which result from this latter cause" (1). In natural selection is to be found the key of the phenomena of inheritance.

Now, up to a certain point, we as medical men are prepared to accept this teaching. We know from experience that acquired mutilations are not transmitted, we acknowledge that no clear and satisfactory examples of the transmission of mutilations have been brought forward. We can realize that the loss of an arm, for example, has no direct influence upon the germ cells of the individual, and that so these germ cells if fertilized will develop into the complete individual. But there is another class of phenomena specially interesting our profession which appears to give a direct lie to Weismann's thesis. And it is, I think, this failure of the ruling theory to explain satisfactorily the phenomena in question which has been the main factor in making us as a profession not enthusiastic of late years to debate the subject.

For, accepting the theory, we must be prepared to deny wholesale the transmission of acquired defects of every order and give ourselves over to a most serious form of fatalism. If an individual is from the first feeble-minded, that is not his parents' fault; it is due either to an unfortunate commingling of the ids, or ancestral plasms, composing the promiscuous ovum and spermatozoon from which he is derived or to characters which have come down to him from previous generations. If he, being diseased, begets feeble-minded children, he is in nowise to blame—acquired characters are not transmitted. Either those feeble-minded children are an accident—a spontaneous variation—or more probably they represent the summation of characters inherited from long generations. If a man or a woman becomes an alcoholic, it is not his or her fault, it is the result of inherited tendencies; and if the children of the same are of weak constitution or idiotic, again the parents are blameless

—characters acquired by the parents are not transmitted, the characters of the parents must have descended to them. If a man is a criminal, again he is not to blame; criminality is atavism, is a reversion to an earlier state, is an inheritance of characters or features peculiar to primæval man. We are, so the popular translation of Weismann's theory goes, the descendants of criminals, or at least at a certain stage our ancestors were of an imperfect and criminal type. And if criminality appears in the family, with imperfect formation of head and brain and low mental state, that is due to the fact that by the fortuitous extrusion of certain ids from ovum or spermatozoon, the ids of the criminal ancestors have preponderated in the fertilized cell and the result has been that the individual has developed possessing criminal features. However much a man abuses his soma, or body, is of little moment; the effect upon the offspring is minimal.

I put this in strong language and baldly, and it may be urged that I exaggerate the state of affairs. I do not think that I do. I believe that in making this statement I but give expression to the general, if confused, ideas of the majority; nay, more, that I state the received conception of what Weismann's theory means when applied to man and to abnormal inheritance in man.

Now, if there is one conclusion to which we think experience surely leads us as medical men, it is that the sins of the father do tend to be visited upon the children even unto the third and fourth generation. We think we see this demonstrated day after day. But Weismann does not support the view. It is true that if we study Weismann we find that he does not state this in so many words; he admits (2) that the germ plasm is not absolutely unchangeable, that the nutrition and growth of the individual must exercise some influence upon its germ cells, "but in the first place this influence must be extremely slight, and in the second place it cannot act in the manner in which it is usually assumed to take place." Certainly he does not make it clear that he believes in the distinct transmission of any order of acquired characters.

WEISMANN'S THEORY.—Weismann, I need scarce say, explains inheritance along the following lines: The germ plasm, the essential matter of the fertilized cell from which the individual develops, must in the process of fertilization come to contain portions of the germ plasm of both father and mother, brought to it by the nuclear material of the ovum and spermatozoon respectively, and the germ plasm of the father and mother must contain portions of the germ plasms of paternal and maternal grandfathers and grandmothers. And so, going back through a long series of generations, it follows, according to him, that representatives of the germ plasms of a long series of ascendants, or progenitors,

are contained in the nuclear material of each ovum and spermatozoon. The constitution of a germ cell therefore may be represented, for purposes of inheritance, as made up of a vast number of ancestral plasms, or "ids," derived from the long line of progenitors.

I need not here explain his most ingenious demonstration of the means whereby at each successive act of fertilization a certain number of these ancestral ids are discharged, so that the ovum and spermatozoon each contain half the number originally present, and so that the number of ids in the fertilized ovum is kept constant. I need but point out, in passing, that by this process of reduction the set of ids discharged from one germ cell is by this theory held to be different from that discharged from another germ cell of the same individual. And as the ids in two fertilized ova are not identical, as the same series of ancestors do not contribute to the germ plasm of the two, so it is that individual variation originates; the ids varying, the individuals controlled or developed by these ids tend to vary. So it is by this fortuitous commingling that spontaneous variation is apt to show itself.

Further, it has to be noted that when the ovum undergoes segmentation, and half of the nuclear material passes into one cell, half into the other, according to Weismann a certain definite series of these hpothetical ids passes into each cell and, according to the series entering each of them, so are determined the eventual characters of the tissues to which those daughter cells eventually give rise. The germ cells of the new individual become differentiated at a very early period, receive the full complement of the ids, and so carry on the whole series of properties inherited from the ancestors.

Difficulties in Accepting this Theory.—This is a crude recapitulation of the main points of Weismann's theory. I have but mentioned those portions which especially bear upon my argument. To explain atavism, or the reproduction of characters in one generation which had not been recognizable in the previous generation but had been present in some earlier generations, you will see that the theory demands that some at least of these ancestral ids should have remained unchanged through a long period—it may be for centuries. For Darwin's case (3) of the return of features peculiar to the ancestral rock pigeon, brought about by crossing barbs, spots, and fantails, is clearly a case of atavism occurring after centuries of domestic breeding and loss of the features in question. So in such a case of atavism we must, in the terms of this theory, suppose that in the act of fertilization there is a summation and preponderance of just that series of unchanged ids which now in development lead to the bringing into evidence of the atavistic ancestral features. In other words, the theory demands that the ids must be sin-

gularly stable in constitution—that they grow and multiply, but retain the same structure.

But now Weismann has to admit that, under certain conditions, the ids are modified in their structure. This admission indeed is contained in the idea that the individual hypothetical ids vary in their properties; and as, if we trace back these ancestral ids to their common source, they must all originally have been identical in structure, we conclude that at the same time they are both stable and capable of change in constitution. Here indeed is the crux of the theory. How are we to define and realize for ourselves the limits of alteration? Natural selection cannot explain the alteration, unless we fall back upon the far-away hypothesis of multitudinous separate acts of creation in the beginning of things—affording a large number of distinct idioplasms—and even this hypothesis does not work out satisfactorily.

In the example already given of crossing of the old-established breeds of barbs, fantails, and spots, we must imagine that all the ids of each breed have been, in the germ cells of successive generations, exposed to almost identical conditions, and, as a consequence, modified along the same lines. Exposed to the same influences in the course of many generations, it is almost inevitable that all must become modified, for if there were any large number of unaltered ancestral ids contained in the germ cells it would inevitably occur that sports and atavistic forms would frequently present themselves. But this does not happen. Each of these varieties of the pigeon breeds singularly true. How, in short, are we to picture some of them passing from germ cell to germ cell through all the long years in an ancestral condition? Put to this test, the theory breaks down; we cannot picture the necessary conditions. It is, in short, an absurdity to regard the nucleus of the germ cell as containing a colony of what are, to all intents and purposes, separate and independent individuals, some of which have for centuries retained properties of one order, some properties of another, to conceive the germ cell as a colony of individual living beings, for this is what the theory demands (4).

Driesch's Demonstration of the Incompetency of the Theory.—But it may be urged, What is the use of all this argument to kill a theory already dead? For dead it is, so far as regards the ids, and Weismann's theory without the ids is like Shagpat without the identical. The brilliant observations of Driesch (5), abundantly confirmed as they have been by others, foremost among whom must be mentioned Professor E. B. Wilson (6), of Columbia, and T. H. Morgan (7), of Bryn Mawr, show that the conception is untenable. If in a segmenting ovum we find that normally each of the blastomeres, or primitive segmenta-

tion cells, gives rise to one special series of organs or tissues, but if nevertheless the ovum of sundry animals can have its cells shaken apart at the two-, four-, eight-, and even sixteen-cell stage, and each separated cell can be found capable of developing into an entire, if dwarfed, individual, then, obviously, each time the nucleus segments there is no passage into the daughter nuclei of particular series of ids destined to lead to the development of one particular region of the body. Rather, the variation in structure of the different tissues must be, to employ Driesch's words, "a function of their relative position" ("ihre prospective Bedeutung ist eine Function des Ortes"). The existence of these hypothetical ids is absolutely disproved. I dwell upon this theory because to-night I want more especially to discuss, on account of its importance from a medical point of view, this matter of the inheritance or non-inheritance of acquired characters. I hope that I have proved to you that the groundwork upon which the negative view is based is of proved unsoundness. The fact that a theory by which a position is supported falls through does not, it is true, afford proof that the position is wrong, but when we find that the dictum of non-transmission of acquired characters does not wholly accord with medical experience, we may well ask: Can we gain a conception of the intimate nature of inheritance which is in accord with that experience?

Inheritance, True and False.—My only regret is, that in striving to gain that conception, I shall have to inflict upon you yet another theory; my only apology, that that theory does appear to satisfy the conditions met with in man. First, however, it is necessary to lay down clearly what is not inheritance, for in medical writings and in ordinary medical parlance a terrible confusion prevails upon this point, and much that is certainly not inherited is commonly spoken of as being hereditary. There is, for example, no such thing as hereditary syphilis. There is congenital syphilis and there are, to employ Fournier's term, inherited "para-syphilitic" lesions, but "hereditary" and "congenital" are not and must not be regarded as interchangeable terms.

The confusion is due to the common error of regarding the individual as beginning his existence at the moment of birth and not until then, so that everything occurring before that moment is grouped in one category, everything after, in another. The chick, so to speak, is not a chick until it breaks open the shell; its status from the moment it ceases to be a new-laid egg—or, more strictly, the egg of commerce—until it emerges from the shell is not recognized in law, and fresh egg and chick are commodities of wholly different orders. But the individual existence of the chicken has already begun even before the egg

is laid, and what is true of the chick is equally true of the human being. The individual begins the moment that fecundation is accomplished, the moment the nuclear material of the spermatozoon fuses with the nuclear material of the ovum and these twain become one. Compared with the event, birth is seen to be of secondary importance, for the intra-uterine association of the embryo with the maternal tissues is but one means employed by a restricted number of species to insure the satisfactory nourishment of the individual during the earlier stages of development. The recognition of these facts is essential for any serious study of the problems of human inheritance. Any disturbance due to influence affecting the individual from without while *in utero* is *acquired*. It certainly must not be spoken of as inherited; it is an ante-natal acquirement or is of *congenital* origin. That alone is inherited which is the property of the individual at the moment he becomes an individual, which is a property of the germ plasms from which he originates, or is produced by the interaction of those germ plasms. The biologist has no alternative but to define inheritance according to the principle here laid down, nor have we, dealing with a limited field of biology, the right to modify terms in general scientific use for our own convenience.

Now, when we find that syphilis or tuberculosis acquired *in utero* during the later months is peculiarly severe and widespread in its manifestation, it is wholly unjustifiable to premise that the microbic germs of one or other disease could be present in either the conjugating ovum or spermatozoon, could pass into one or other of the blastomeres, in a latent condition, doing no harm to the developing ovum. The ovum would surely be destroyed or at the least be monstrous. Could it conceivably be present, it is more than debatable whether we could regard such a fortuitous inclusion as a part and portion of the germ plasm, and so a strict inheritance. However, I have already, at the Academy of Medicine in this city of New York, dwelt upon this subject (8). Suffice it to say that tuberculosis or syphilis of the new-born must, from every valid consideration, be an acquired congenital condition, not an inheritance. And, let me repeat, only that which is derived from the parental germ plasms is truly inherited.

It is to the germ plasm, the active matter in the germinal cells, and to the properties of that germ plasm that we must turn in order to gain our basis for any sound theory of inheritance. Weismann has done yeoman's service in emphasizing this fact. This germ plasm it is which conveys living matter from generation to generation.

Growth and its Essential Nature.—Now, whatever life is, the fundamental phenomena or possession of living matter is the perform-

ance of work coupled with growth—the capacity manifested by that living matter to assimilate non-living matter of certain orders, to absorb it, to endow it with like properties, to convert it into matter like unto itself, into additional living matter, in doing which, work is performed. In other words, difficult as it is to conceive or picture to one's self the details of the process, growth is essentially a process of conversion, *a chemical process*, and any adequate theory bearing on the phenomena of growth must primarily be along chemical lines. We are ignorant of what it is in the structure of living matter which gives it those properties; we are, if possible, more ignorant of the physics of the process of growth, of the nature of the force which, acting upon or inherent in the constitution of living matter, leads to this continuous process of assimilation and conversion, and in our ignorance we are unable to separate the chemistry and the physics of the process; we must, that is, regard growth as a *property* of living matter. We must also for present purposes speak of the matter which is essential to and directly concerned in the activity of any one species or individual as a single substance which, following Nägeli, we can refer to as "idioplasm," and our conception of the individual or of the separate cell-units forming that individual must be that in each we have to deal with two constituents, the *idioplasm*, or essential and directive living matter, and the *cytoplasm*, which is in the strictest sense non-living, or certainly unable to exhibit the whole series of vital properties apart from the idioplasm, and which consists of various formed elements developed and influenced by the controlling idoplasm, intimately connected therewith, it is true, but at the same time not an essential part of the same—the cytoplasm varying in its composition and nature under varying conditions which affect the idioplasm, the idioplasm under all conditions retaining certain cardinal properties.

That the constitution of the idioplasm is not absolutely but only relatively constant has also to be assumed. We are bound to recognize that it is capable of undergoing modifications within certain limits without loss of its cardinal properties, and this from the following reasons: Admitting, as we must, that the highest forms of animal and vegetable life have been evolved from the very simplest, that there has been an unbroken line of development of living forms from the simplest unicellular to the most complex multicellular; admitting also that in every act of reproduction, however simple or however complicated, the direct conveyance of the living matter of the parent into the offspring is to be demonstrated, that, in other words, the idioplasm of the primal living being has been continued on to successive and progressive generations, then we must admit that the idioplasm of the highest forms,

judging from its powers of controlling and directing the development of the highly complicated organism, is something very much more complex than the idioplasm of the unicellular organisms; that in the course of evolution this has undergone successive accretions of properties, and this accretion of properties is the manifestation and accompaniment of increasing complexity of constitution of that idioplasm.

This idioplasm must be capable of modification, either by its environment or under the action of some law of progressive modification. The fact that there exist to-day forms of life practically identical in the main details of structure with those of remote geological ages is against the latter view; we must hold that environment determines changes in the constitution of the idioplasm.

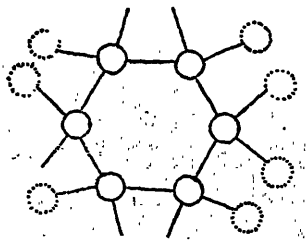
Chemical Theories of Inheritance.—The Isomeric Theory: It must now be asked, Can we imagine a chemical substance so constituted as to be capable of modification in its molecular constitution, and so in sundry of its properties, without undergoing complete change without other properties being lost?

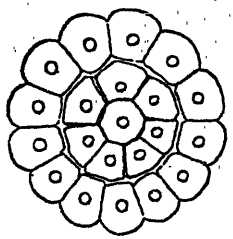
We can. If, as Prof. Walker, of McGill, points out to me, such relatively simple bodies as lactic and malic acids are capable of existing in more than one form—as lævogyrous and dextrogyrous and optically inactive modifications—and this with no obvious alterations in their chemical properties (though physically they show different actions upon polarized light, and physiologically we find that certain bacteria can act upon one and not the other form), then, certainly, the much more complex proteid material which would seem surely to be the basis of the idioplasm may present a very great number of molecular arrangements, and each of these may be accompanied by slight differences in certain physical and physiological properties.

Certain recent observations have rendered this additionally probable. By our present method of conceiving and visualizing the structure of chemical substances we regard the carbon atom in the molecule as being situated at the centre of the tetrahedron and as capable of linking four other atoms or groups one to each of the corners or apices of the tetrahedron. A substance like malic acid having a single central carbon atom may, therefore, be built up in three ways, with the linked groups arranged in one relationship to each other, or in the reversed relationship, or the substance may be a combination of the two atomic forms. These are all the forms we can picture as existing according to this system. But now a fourth form of malic acid has been found which is more dextrogyrous in the polariscope than is ordinary dextrogyrous malic acid. And the salts of this new form of malic acid show slight but distinct variations, in solubility, etc., from the ordinary malates.

If this is so, there may yet further be molecular modifications of such a relatively simple substance as malic acid, and *a fortiori* idioplasm may be capable of an enormous number of modifications.

THE SIDE-CHAIN THEORY OF INHERITANCE.—The mode of the atomic arrangement in the idioplasmic molecule may, therefore, in part, explain the variation in the properties of that idioplasm seen throughout the animal and vegetable kingdoms. I say in part, for if we assume that the structure of the individual is primarily the outcome of the structure and properties of the idioplasm, then for each different form of living being, nay, for each individual being, we have to assume a different atomic structure of the idioplasm. Or, otherwise, we have to assume that the modifications of this idioplasm are infinite in number. This, it seems to me, asks too much. The matter cannot be quite so





simple. Such molecular modification may play some part, it is true, but our conception of the structure and modifications undergone by the idioplasm must be more elaborate. We must, I think, formulate a theory of structure somewhat akin to that laid down by Ehrlich (9) in his now well-known theory of the nature of immunity. We can picture to ourselves the primitive idioplasm as composed of a mass of material each molecule of which is formed of a central ring, in which there can be attached side chains and from which sundry side chains can be detached without the central ring being destroyed.

This conception, which upon first encounter appears revolutionary and opposed to our ordinary chemical ideas, is, after a little deliberation, recognized as being but a statement, in chemical terminology, of what has been for long years the accepted physiological conception of the nature of protoplasm. It is, if I may so express it, the fundamental—the essential—conception of the constitution of living matter; it follows logically and inevitably the postulate of assimilation and growth. Whether we agree, with the majority, to distinguish between the idioplasm and the cytoplasm of the cell, or prefer to speak simply of protoplasm, it must, I think, be recognized by all that we are bound to assume—for the process of assimilation and, again, in order to explain

the variation in structure and properties of the various cells of the organism—that there is a central basal substance to which become linked, more or less permanently, or more or less temporarily, those other secondary substances which, not in themselves protoplasm, modify the constitution of the protoplasm as a whole. And these secondary substances, we see, are necessary for the full manifestation of the properties of that protoplasm. This conception is, I acknowledge, difficult to harmonize with the prevalent elementary conceptions of chemical action and chemical constitution, but it is, nevertheless, essential for the physiologist and unavoidable. What is more (for I do not pretend to be a chemist), I learn that it is not opposed to the more recent deductions of the chemists concerning the nature and properties of the more complex carbon derivatives. In other words, it is by no means heterodox from an advanced chemical standpoint.

Accepting this view, it is not necessary to regard the molecules of idioplasm as at all times presenting their completed structure, with every side chain attached. On the contrary, we are free to conceive the molecules being laid down and being transmitted in a relatively simple form, some of the side chains only becoming attached when the molecules are brought into certain particular relationships with their surroundings. It is not necessary, for example, to hold that already in the ovum there is idioplasm identical in structure with that eventually present in the muscle fibres or nerve cells developed from that ovum. Rather, we must hold that in the ovum there is one common idioplasm of simple type, to which, when distributed in the various cells derived from that ovum, different side chains become attached, according to the relationships assumed by those cells, so that the cells of different orders are controlled and formed around protoplasmic or idioplasmic molecules composed of those central rings plus varying series of side chains. Indeed, I am prepared to go further and to state that the idioplasm possessing its full complement of side chains must be regarded as *ipso facto* incapable of initiating cell multiplication.

I base this statement upon the fact, to which I have more than once called attention during the last few months (10), that it is only cells which are undifferentiated, or which have reverted to a simpler less differentiated form, that are found to undergo division. Highly differentiated cells never multiply as such.

Inheritance in Unicellular Forms.—If the primitive unicellular individual formed by this controlling idioplasm divides into two to form two individuals, each half will contain a portion of the idioplasm, and if the circumstances affecting the molecules of the new generation are the same as those affecting the parent forms, then this idioplasm will conti-

nue to assimilate to itself non-living matter and to endow it with its constitution and properties, and the individuals controlled by this idioplosm will correspond to the parent form and to each other.

But if the circumstances affecting the filial idioplasm vary from those affecting the parental, then these more unstable and loosely connected side chains will be the first to be influenced. The very act of assimilation (the surrounding medium varying in its composition) may lead to the substitution of other side chains, to slight variation in the composition of the idioplasm. And the cell or individual developed or controlled by the idioplasm will therefore vary from the parent form, while the products of division of this second generation, containing as they do this modified idioplasm, will exhibit like structural modifications. Here we have the simplest example of the inheritance of acquired characters.

There is, however, yet another property which we have to assume. It may be laid down as one of the great laws of biology that characters which are of the most recent acquirement are those which are most unstable, and are first lost; those which are oldest are the last to disappear. In man, for example, the first signs of generalized systemic weakness and imperfect development show themselves in connection with those properties which differentiate man from the animals most nearly allied, namely, in weakness and arrest of the higher functions of the nervous system, or, again, in susceptibility to certain specific diseases which are peculiarly apt to affect man, relative immunity toward which on the part of the healthy individual must be regarded as a comparatively recent acquirement. As my old teacher, James Ross, of Manchester, was the first, I believe, to point out, when there is progressive atrophy of the cells in the cortex of the brain, the first motor cells to show signs of that atrophy are those governing the muscles which differentiate man from other animals, namely, the opponentes muscles of the hand.

Hence it has to be laid down that the attachment of these side chains, which are recently acquired, is relatively unstable, that such recent side chains are most easily detached, so that the idioplasm and the organism developed around that idioplasm are prone to return to their former condition or lose characters gained by recent progenitors. The more side chains become attached, the more complicated the structure, the more unstable the equilibrium; hence the greater the liability to revert. As Professor Walker points out to me, parallel conditions are to be recognized in organic chemistry. The old-established view of the existence of "radicles" to a large extent admits this principle; certain central atomic groups in a compound are seen to be more fixed and not to undergo change when the attached groups are removed and replaced.

Still more closely allied is what has been observed in connection, for example, with aniline. The composition of this is $C_6H_5NH_2$. Here the H atoms of the NH_2 group can be replaced by other groups, by methyl (CH_3) and ethyl (C_2H_5) groups, etc., and it is found under certain conditions that, in carrying out a series of these replacements, the last group attached is the first to be split off and replaced.

We see this principle in action in the lowest forms of life. Contrary to what Weismann has laid down regarding parthenogenesis and asexual reproduction, it is comparatively easy to impress new characters upon the bacteria. By subjecting a growth of pigment-producing bacteria to the action of a temperature just below that which will cause their death, we can bring about a loss of pigment production, so that the rapidly succeeding generations are perfectly colorless, but gradually in the course of time the culture made from the original (heated) tube regains the power of pigment production. This may be in two or three days, or, again only after several transplantations at the end of two or three weeks, and when we remember that a bacillus divides and so forms a new generation in, on the average, something considerably less than an hour, it is seen that the acquired character may be impressed upon the race for some hundreds of generations (11). The more intense the alteration to which the bacillus is subjected, the longer and the more frequently the race is subjected to the altered temperature conditions, the longer it is before there is a sign of return to the normal. Translated into the terms of this theory, heat leads the idioplasm to have certain side chains, either modified or lost, and this modification or loss is inherited; but return to the normal environment leads the modified idioplasm in the process of growth and metabolism eventually to assume side chains of the same composition, the conditions of growth being similar to those under which the species originally acquired the side chain. Yet another solution, though it is one which I do not favor, is that not all of the molecules of the idioplasm undergo modification, a minority retain their original constitution, and, under favorable conditions, gradually come to preponderate.

Sexual Conjugation and Inheritance.—How, next, does this theory bear upon sexual conjugation and its effects, for this also is met with in many unicellular organisms? I shall not take up the explanation of the development of male and female characteristics; this is too large a subject, but I would discuss how fusion of the idioplasm of two individuals affects inheritance. In that fusion we have a mixture of the two idioplasms, and, as already pointed out, these idioplasms, as a result of the varying influences which have acted upon them, tend to vary in certain particulars in their constitution. This fusion must be either

a mere admixture, so many molecules of one idioplasm becoming admixed with so many molecules of the other, or a true chemical combination. If we presuppose a mere mixture, we are led along the lines of Weismann's theory and have to regard the idioplasm of the individuals of one generation as being composed of idioplasmic molecules or ids which have been passed down from the long line of previous generations. I have already pointed out the difficulties in which we find ourselves if we accept this view. The other view largely, if not entirely, removes these difficulties, nor does it introduce any fresh crop of serious difficulties.

We may regard, then, the idioplasms from the two parent forms as undergoing a true chemical combination,* the resultant idioplasm of the new generation being in truth a new idioplasm not possessing the identical properties of that of either parent, but being intermediate, tending in its characters and constitution toward the constitution of either one or the other according, it may be, to the number or chemical activity of the molecules of one or other parent entering into combination. Weismann supports his view by pointing out that for a certain period the maternal and paternal materials in the chromosomes of the daughter nuclei remain distinct, and reaches the bold and utterly unsupported conclusion that when the chromosomes fuse to form the irregular network pervading the nucleus, their constituents nevertheless remain distinct and sharply separable from those of the other chromosomes. But we have no evidence, in the first place, that the chromosomes alone contain the idioplasm, that chromatin and idioplasm are identical. Everything points to the fact that the idioplasm is contained in the nucleus, but we cannot with certainty advance further. It may be that the chromatin is but the cystoplasmic framework, the mechanism, as it were, by which the idioplasm is distributed.

If the germ cells of both parents possess certain loosely attached or unstable side chains of more recent acquirement, which are of like nature, there is no sufficient reason why the protoplasm of the offspring should not also possess them. We can thus realize how it is that abnormal features present in both parents may be equally or more prominent in the offspring. But in general we must recognize that, the parents varying in different directions, the tendency of conjugation is to preserve the mean, to bring about an approach to uniformity in the constitution of the idioplasm of successive generations of one species exposed to like influences.

* It may be asked, How can identical or almost identical substances undergo true chemical combination? Physicists nowadays freely recognize this possibility. Thus, everything points to the molecule of water being, not H_2O, but $3H_2O$; numerous other examples might be brought forward.

I need scarce say that in these higher uncellular organisms which present conjugation the cell already presents a nucleus, and that everything indicates that this nucleus is the controlling and directive body in the cell—that it is the nuclei which undergo conjugation—and that, in short, we have to recognize that the idioplasm of the individual is contained in the nucleus. It is by no means necessary to conceive that the whole of the nuclear material is idioplasm, or that the whole of the idioplasm enters into chemical combination with the molecules derived from the conjugating germ cell, molecule for molecule. I mention this in passing to indicate that it is not necessary to assume that when polar bodies are extruded the material forming them is identical with the idioplasm of the remaining nuclear material. The difficulties in explaining polar bodies and the reduction of the nuclear substance are no greater by this than by Weismann's theory. The exigencies of time demand that I should not enter in detail into the consideration of these subjects. Rather, I must give the broad outlines of the theory and pass on to consider inheritance in multicellular organisms.

Inheritance in Multicellular Forms.—Every multicellular organism arises from a single cell, the fertilized ovum, itself in all sexually produced forms the result of fusion of a male and female cell, of the ovum and spermatozoon. Studying the method whereby this one cell gives rise to the adult multicellular organism, we see that by successive acts of division this one cell gives rise to all the cells of the body. In the course of this process its nucleus divides and redivides, and that in such a way that at each division like portions of the nuclear material pass into each daughter-cell. This regular distribution of nuclear material affords a sound ground for believing that there is an equally regular and uniform distribution of idioplasm into each cell. Now, I have already pointed out the value of Driesch's observations in overthrowing Weismann's contention that there must be a qualitative difference in the idioplasm distributed to the daughter-cells. We have absolutely no ground for believing in any such qualitative difference; on the other hand, it is a legitimate inference that the idioplasm is modified by its environment. To take the simplest example—a multicellular organism composed of a spherical mass of cells. Those cells which come to form the peripheral layer of the individual are subjected to a series of reactions quite different from the series telling upon the centrally situated cells, and it requires no stretch of the imagination to predict that in the process of assimilation and growth on the part of the idioplasm of these outer cells, that idioplasm tends to be altered in its constitution as compared with the idioplasm of the centrally situated cells. So that the results of division of the peripheral cells, if retained in the same

environment, will tend to reproduce the characters impressed upon the parent cells, and so that, if this subjection to the special set of conditions is continued and impressed upon this order of cells for a sufficiently long period or with sufficient intensity, even when pressed or passing into other environment, the cell generations will retain these modified conditions, so that, for example, cells of mesoblastic origin will tend to maintain characters different from those derived from epiblast, and this whatever the ultimate position of the cells in question.

In fact, as a first law, we may lay down with Driesch that the structure of the cells in a multicellular organism is a function of their position, and this because the position of the cell determines the modification undergone by its idioplasm. As a second law we may lay down that the greater the change impressed upon the idioplasm of these cells and the longer that idioplasm is subjected to the conditions inducing this change, the more permanently will the daughter-cells exhibit the peculiar alteration in the idioplasm, with consequent modified structure wherever they find themselves in the economy. We have, in short, to recognize that two orders of forces determine the structure of every cell in the body: (1) The previous influences acting upon its idioplasm and causing it to be of a particular chemical constitution; and (2), the position in which the cell finds itself and the forces acting momentarily and immediately upon its idioplasm. Or, briefly, these two series of forces are inheritance and environment, and inheritance and environment determine the constitution of the idioplasm and the structure of the cells.*

Following this line of thought, we can understand how it comes to pass that the body cells and the germ cells in the higher and more complex organisms become so sharply divided, how it is that the body

* To the worker in bacteriology the hesitancy on the part of biologists in general to accept environment as a most important factor in originating variation is almost incomprehensible. Nothing is more remarkable in the study of the lowest unicellular forms of life than this effect of environment in bringing about changes in character, changes which not only tell upon a limited series of generations (as I have already pointed out), but are permanent in their nature. By no means, save altered environment, could Hansen (12), taking isolated yeast cells or "spores" (100 per cent. of which, when cultivated under ordinary conditions, gave rise to spore-bearing forms) and subjecting these to the highest temperature at which growth could still occur, obtain a race or variety of yeast which now, after twelve years, has continued to grow under ordinary conditions without once developing spores. By no means save altered environment is it possible to explain Vincent's conversion of the absolutely harmless potato bacillus or, again, the *Bacillus megatherium* (by long-continued sojourn within closed collodion capsules in the peritoneal cavity of animals) into forms profoundly pathogenic, and fatal to rabbits, mice, and guinea-pigs in the course of a few hours (13).

The argument that phenomena observed in unicellular organisms cannot be applied to multicellular organisms is, to say the least, a severely strained argument. The extent to which environment acts as a factor may, it is true, be diminished in these, but surely it cannot be regarded as being eliminated and rendered negligible.

cells are no longer able to reproduce the whole organism. Their idioplasm has become altered in certain directions to such an extent that it is able, under favorable conditions, to divide and reproduce cells of like nature, but the very extent of the modification it has undergone has taken from it that constitution or structure which is necessary to allow it to reproduce each and every order of cells which together form the individual. The germ cells, on the contrary, undergo no such extensive changes in constitution—as a function of their position in the organism, their idioplasm as it grows and is distributed into the successive germ cells retains its fundamental constitution with but little alteration, and when these germ cells are discharged they and their idioplasm, brought into like relationships to those affecting the parent germ cells, undergo the like series of developmental changes, and reproduce the whole series of cells, tissues, and organs characteristic of the species to which they belong.

In the terms of this theory, therefore, inheritance essentially depends upon the chemical constitution of the idioplasm or the life-bearing or biophoric protoplasm of the germ cells, not upon the number of the separate ids or biophores or ancestral plasms or pangenes contained in the idioplasm; and variation, whether slight and individual or extensive and leading to the production of species, is ultimately the expression of modification in the constitution of that idioplasm brought about by environment. Whereas Weismann's theory lays stress upon relative fixity in the constitution of the idioplasm, this theory admits freely the capacity for change in structure of the same. So long as the surrounding conditions are unaltered the idioplasm is unchanged; alter these conditions and the idioplasm is liable to variation in constitution.

Atavism.—Lastly, in regard to atavism and reversionary degeneration of the cells of the individual, this conception of the idioplasm with attached side chains, which are more firmly or more loosely attached, affords a perfectly adequate explanation. The more advanced the organism the greater the number of these attached side chains, the more recent the attachment of a side chain the more unstable that attachment. As a consequence, any profound disturbance will, according to its intensity, tend to cause the loosening and removal of the more unstable side chains in general in the order of their stability of attachment. And as the structure of the individual and of the individual cells is the expression of the constitution of the idioplasm, of the germinal idioplasm, and of the idioplasm of the individual cells, so according to the intensity of the disturbance will there be greater or less reversion to an earlier stage in the developmental history.

Let us now apply this theory to those special problems which I have referred to as being of peculiar interest to us as medical men. Can acquired defects be transmitted? In seeking to answer this question, at least three orders of phenomena have to be recognized and distinguished. These are:

1. The Non-inheritance of Acquired Mutilations.—To these I have already referred. We cannot conceive of the direct transmission of identical lesions of the order from parent to offspring. At most we can conceive of the possibility of indirect effect where the mutilation is extensive or affects organs playing an important part in general nutrition. If there is impoverished general nutrition we can understand that this can affect the germ cells along with the other cells of the organism, that the lack of due assimilation or the excess of sundry internal secretions which, in consequence of lowered general metabolism, have been imperfectly neutralized, by telling upon the blood and lymph, may lead to modification of the idioplasm of those germ cells, with the possible resultant imperfections in the growth of the fertilized germ, everything depending here upon the combination of the modified germ plasm of the mutilated individual with that of the other parent. If the number of molecules of this other idioplasm or the constitution of the same is adequate to counteract the loss of side chains in the idioplasm of the mutilated indvidual, there may be no recognizable effect. Or, on the other hand, the effect upon this latter idioplasm may be so serious as to lead to inherited defects in the offspring. But clearly these defects will be of a different order and a more generalized type; they will not be identical with the mutilation. There will be no direct transmission of acquired defects of this nature.

2. The Indirect Transmission of Acquired Diathesis.—With reference to diathesis, this also may be laid down, that acquired disease and the effects caused by disease cannot *in general* be transmitted in such a way that the offspring presents lesions identical with those produced in the parent, though it has to be recognized that there is the possibility of modification in that offspring due to the parental disease. There is the possibility of a certain amount of transmission, not of the identical local lesion caused by the disease in the parent, but of a modified or impaired condition of the germ plasm. We must recognize that constitutional disease, by leading to disturbance in the activity of important organs, tells not only directly upon these organs, but secondarily upon other organs. It leads, for example, to an altered condition of the blood and so to altered nutrition of all the cells of the body. Among other cells, the germ cells may be directly affected, their idioplasm modified and the offspring directly influenced. Conditions

affecting the parents are capable of influencing and modifying the descendants. It is this which is forcibly brought home to us in our medical work. It is changes of this order which are almost inevitably neglected by the morphologists, for they are not within their ken. The changes brought about in the tissues by what is essentially chronic intoxication may be so slight as to be inappreciable. Microscopical examinations may reveal nothing; only by their physiological effects can their existence be recognized. It is in the study of these conditions and their effects that medicine can afford the most valuable aid in the matter of inheritance.

All infectious diseases are intoxications. If a parent is the victim of syphilis, it is obvious from febrile and other phenomena not merely that there are local toxic phenomena at the foci of growth and multiplication of the germs of the disease, but that the toxines pass into the general circulation. They may produce no immediate structural changes in the cells and tissues, but we have evidence that the protoplasm of various tissues is affected, although the results of the disturance may only show themselves after long years. Indeed, the only explanation we can give of many remote effects of syphilis is this, that during the active period of the disease there has been a change wrought in the constitution of the cells of sundry tissues, slight and subtle, it may be, but sufficient to lead to premature exhaustion of the idioplasm of those cells. It would be absurd to argue that the immature germ cells lie absolutely dormant in the organism. They need nourishment, they assimilate; they are thus also apt to absorb circulating toxines, and their idioplasm must be affected in this act. Hence, while syphilis as such is not inherited, the toxines of the disease must be regarded as prone to set up molecular disturbances in the germinal idioplasm, and the offspring may show, not syphilitic lesions, but parasyphilitic lesions—various form of arrested and imperfect development of different tissues due to the intoxication and therefore modification of the germ plasm while still a portion of the parental organism.

Parental intoxication, therefore, is seen to be capable of directly affecting the germ cells, and if there is no direct transmission of the effects of such intoxication, certainly there are indirect effects. In demonstrating the truth of this statement, it must be freely admitted that conjugation and intra-uterine existence introduce grave complications. In fertilization it is obvious that the idioplasm of the sound parent may largely neutralize the defective constitution of that of the diseased parent, while we have constantly to guard against ascribing to defects in the germ plasm conditions acquired during intra-uterine life. If the mother is the subject of any toxic state (to use the broadest pos-

sible phrase), not merely may the ovum be directly affected prior to fertilization, but in the course of fœtal existence the organism of the offspring, deriving its nutrition as it does from the maternal blood, is liable to be affected and disturbed by circulating toxic substances and the development of the different tissues to be correspondingly influenced. The only conditions we can safely study are those in which the father is the subject of disease or intoxication, the mother exempt. Nor is it easy in cases of infectious disease, or even in frank intoxications such as the alcoholic, to be perfectly sure regarding maternal exemption.

Paul's observations, however, upon the effects of lead poisoning afford a most convincing demonstration along the required lines (14). Plumbism is peculiarly a trade disease. It particularly affects those following certain occupations; thus often the male wage-earning member of the family is alone exposed. Studying the history of thirty-two pregnancies in which the father was the victim of saturnine poisoning, the mother free from the condition, Paul obtained the following remarkable statistics:

Twelve resulted in death of the fœtus before term (eleven abortions, one child born dead).

Twenty children were born alive, of which eight died during the first year; four died during the second year; five died during the third year; one died later; two alone were found to be living, one aged twenty years, the other only twenty-one months.*

In connection with the effects of paternal syphilis, Fournier (15) has contributed strong evidence along the same lines, pointing to the great frequency of arrested development of various orders, from intrauterine death to infantilism. To his statistics objection may be made that certain of the infants recorded by him probably suffered from the actual disease acquired *in utero*, secondary to local infection either of the placenta or of the membranes. Discounting this possibility in a certain proportion of cases, his figures still remain very remarkable. But what is needed is a more searching study of these cases of defective children, the offspring of a healthy mother and an infected father, to make sure that we are dealing with parazymotic as distinct from zymotic lesions. In connection with the subject, Gheorghiu, studing malformations, has pointed out the remarkable frequency with which there is, on inquiry, obtained a history not merely of the mother, but of *either*

* Legendre, in his essay in Bouchard's *Traité de pathologie*, Vol, I (which in the first place directed me to Constantin Paul's admirable article), gives a table of 141 pregnancies which I cannot find in the paper referred to. Possibly this is from a later article by the same author, but the proportion of abortions as given by him is so much larger that I doubt if this can be the case.

father or mother, having been a sufferer from acute or chronic infectious disease at the time of conception (16).

3. The Direct Transmission of Acquired Constitutional States.—In the above-mentioned series of phenomena we have dealt, as I say, not with the direct transmission of acquired conditions, but with the deleterious influence leading to general defects of development and due to the action of toxic agents upon the germ cells prior to conception. Can we advance further and see evidences of direct transmission of acquired constitutional states? I think we can.

If, for example, an animal acquires immunity to a disease, we are convinced that the process of acquirement is a chemical process; that the action of the toxine of the disease has been to set up certain molecular changes, certain alterations in the composition of the cell substance, so that that cell substance now responds in a different manner when brought into contact with the toxine; and once this modification in the cell substance is produced, the descendants of this cell retain the same properties, that immunity to one special disease is not merely a momentary, but is a more or less lasting, state of the system. It is true that it tends not to be permanent; we see that, where it is attainable, the more prolonged and the more severe the changes set up in the process of immunization, the longer it lasts; we recognize, further, the action of the law that properties of most recent acquirement are soonest lost, and that there is a distinct tendency for the condition, or acquired state, of the cells to pass away. Nevertheless, we admit that inheritance of the acquired condition has to be granted in the case of the body cells in this connection. Here, again, if these processes obtain in connection with the body cells we must logically admit their action in the case of the germ cells. The idioplasm of body and germ cell is of like origin and must be susceptible to like influences.

The toxines circulating in the blood of the individual undergoing immunization must also affect the germ cells; they must acquire immunity, and the individuals developed from them must, subject to the law of loss already noted, have the same properties. Now, as a matter of fact, this transmission of acquired immunity has been occasionally noted, where, for example, both parents (rabbits) have been rendered immune to the *Bacillus pyocyaneus,* the offspring have been found more refractory to pyocyaneus infection, but in general the observations have been negative. This, as I have hinted, is only to be expected on account of the easy detachment of, if I may so express it, newly acquired side chains. It is, however, legitimate to suppose that successive immunization through several generations will cause the new side chains to become more and more fixed, and that racial immunity

is brought about by these means, a view more probable than the alternative of *mere* "survival of the fittest."*

Conversely, in those cases where immunity is not developed, in the case of chronic conditions like tuberculosis, we can, along these lines, comprehend how the toxines weaken the germ cells along the same lines as they weaken the general tissues of the body, and as the resistance of the body in general to a special microbe and its products becomes less and less, so also the idoplasm of the germ cells becomes less and less resistant, and so from parental disease the offspring gains a peculair susceptibility to one special disease. So that, in short, from disease acquired by the parents a particular diathesis is developed, a special susceptibility to the particular form of disease.

Here Weismann would make the somewhat subtle distinction that we are not dealing with the direct transmission of acquired parental defects—that the toxines produce these results not by acting on the body cells, but by direct action on the germ cells—that the inheritance is blastogenic, not somatogenic (17). This is a sorry and almost Jesuistic play upon words. Let us grant that they are of blastogenic origin; they are nevertheless of individual acquirement. The individual consists of body plasm and germ plasm, and whether the defect tell primarily or secondarily upon the germ plasm of the individual, we have here examples of conditions acquired by the individual being transmitted to the offspring.

But we can go further. Exogenous and bacterial intoxications are not the only intoxications; we recognize yearly more and more the existence of states of truly endogenous intoxication, auto-intoxications—of disturbed states of the constitution due to disturbances in glandular activity or to excess of certain internal secretions or of the substances ordinarily neutralized by the same. Such disturbances, acting on the germ cells, would be truly somatogenic.

If gout and the gouty diathesis are, as many hold them to be, of the nature of true auto-intoxications, if in a given percentage of cases (in France twelve per cent., according to Bouchard) the gouty state shows itself in those giving an absolutely negative history of gout in their progenitors, then we are at liberty, I think, to regard the gouty diathesis as an example of truly somatogenic acquirement of an inheritable constitutional state.

Defect in bodily metabolism has led to intoxication of the germ cells, and the offspring show a peculiar liability to be the subjects of

* It goes without saying that where both father and mother are immunized through successive generations and the fœtus—and its germ cells—acted upon by the maternal blood and milk, the development of acquired inherited immunity should become yet more assured.

intoxications of the same order. Here what is transmitted is a constitutional state, and that constitutional state may manifest itself in more than one way, but no one will deny that this is truly inheritance of an acquired condition.

We must, therefore, I hold, be prepared to admit the possibility of the transmission in inheritance of certain orders of acquired constitutional conditions—we must see that it is not necessary, with Weismann, to deny strenuously the inheritance of each and every order of acquired defect, and that along the lines of some such theory as that outlined this evening we gain a fuller harmony between theoretical considerations regarding the nature of inheritance and the facts as they present themselves to us day after day.

Conclusion.—Within the time at my disposal it has been impossible to touch upon many aspects of inheritance which interest us as medical men—upon spontaneous variations and their transmission, upon inbreeding and marriage of consanguines, upon degeneration as distinct from atavism, upon the particular problems of inheritance of nervous conditions, to mention but a few. It seems to me, however, that this conception of the properties of idioplasm is adequate to bring together and harmonize the facts we possess concerning all of the above-mentioned conditions.

Let me conclude with Weismann's apology: "Hypothesis, even when not absolutely right, may be of value in advancing our knowledge, if only they are relatively right, *i. e.*, when they correspond with the state of existing knowledge. They are like the feelers which the short-sighted snail stretches forth on its darkened path, testing this way and that, and withdrawing them and altering the route so soon as they come across any obstacle." (18).

I must, gentlemen, ask your forgiveness for bringing before you a subject so far outside the line of general medical thought, and for having inflicted on you so much that is theoretical. That was not my intention when I sat down to prepare the paper. I had intended to indulge in the main in a destructive criticism, to point out how Weismann's and allied theories fail to satisfy certain orders of conditions presenting themselves to medical men; but as I proceeded with the task it became obvious that mere destructive criticism was valueless, that it became imperative to present an alternative theory which for many months—I may truly say years—had been simmering within me, unexpressed.

BIBLIOGRAPHY.

1. Weismann. "On Heredity." Authorized translation by Poulton, Schönland and Shipley, Oxford, 1889, p. 413.

2. Weismann. *Ibid.*, p. 170.

3. Darwin. "Origin of Species," Sixth Edition, p. 18.

4. For a fuller discussion of the weak points in the Weismann-Roux Theory, regarded from an embryological aspect, *vide* Wilson, "The Cell in Development and Inheritance." New York, Macmillan, 1898, and Shearer, *Montreal Medical Journal*, May, 1901.

5. Driesch. *Zeitsch. f. wissenschaft. Zoologie*, liii., 1892, and lv., 1893, and *Archiv f. Entwickelungsmechanik*, 1900, p. 361, *ibid.*, p. 411.

6. E. B. Wilson. *Journal of Morphology*, viii., 1893, p. 579.

7. T. H. Morgan. *Anatom. Anzeiger*, x., 1895, p. 19.

8. Adami. Syphilis and the Liver. *New York Medical Journal*, April 22, 1899.

9. Ehrlich. *Vide* Plimmer, *Journal of Pathology*, v., 1898, p. 489.

10. Adami. Growth and Overgrowth. *Jacobi Festschrift*, 1900, p. 422, and *Med. Chron.*, Manchester, June, 1900; "On the Causation of Cancerous and other New Growths," *Brit. Med. Journal*, March 16, 1901.

11. I have discussed this subject of the variability of bacteria in the *Medical Chron.*, Manchester, September, 1892.

12. Hansen. *Compte rendu des travaux du laboratoire de Carlsberg*, v. 1900, p. (Abstr. *Ctbl. f. Bakt.*, 2te Abth., vii., 1901, p. 199).

13. Vincent. *Annales de l'Institut Pasteur*, xii., 1898, p. 785.

14. Paul. *Arch. gén. de méd.*, xv., 1860, p. 513.

15. Fournier, quoted by P. Legendre in Bouchard's *Traité de pathol.*, i., p. 263. Of 103 pregnancies in which the father was syphilitic the mother healthy, 41 children were born dead, 19 born definitely syphilitic, 43 children (not definitely syphilitic) lived but a short period.

16. Gheorghiu. *L'Obstétrique*, January, 1900, p. 63.

17. Weismann. *Loco. cit.*, p. 410.

18. Weismann. *Ibid.*, introductory note.

NOTES ON THE ACTION OF HEROIN AS COMPARED WITH THAT OF THE OTHER DERIVATIVES OF OPIUM.

BY

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Every physician has many times realized that the therapeutic agents at our disposal fail us in critical moments. In no instance is this more frequently or more strikingly brought home to us than in the use of opium or of its alkaloids. In not a few of our patients the desired effects are counteracted on account of the nausea and vomiting which are excited. This occurs at a time when rest and quiet are essential to the progress of the patient. In all cases almost without exception, constipation and loss of appetite follow the continued use of morphine or opium, which is necessary in some chronic conditions. Another disadvantage is that the layman of the present day is unfortunately too familiar with certain of the therapeutic properties of the drug without being aware of the danger which attends its use. The lethal dose of both morphine and codein is not far removed from the amount necessary to obtain the therapeutic action. The greatest drawback, however, to the physician in the employment of these drugs, particularly in chronic conditions and also in neurotic individuals, is the possibility of the formation of the drug habit. Any medicinal agent, therefore, which combines the desirable effects with the lack of its dangerous properties, must be received as a valuable acquisition among our therapeutic remedies. Heroin has been found in certain conditions to occupy this desirable position.

The drug was introduced by Dreser of Elberfeld about two years ago. At that time he was working on the action of codein and also on its relation to morphine. He found it to be a methyl derivative of this alkaloid, and determined to answer the question as to whether this derivative had a greater effect on the respiration than any other that might be formed. During the course of his research he observed that the diacetic acid ester of morphine affected the respiratory system to a greater degree than morphine itself. This synthetic product he called heroin.

Heroin is a white crystalline powder with a slightly bitter taste. It is insoluble in water, but readily dissolves in a weak solution of acetic or sulphuric acid. In its formation two hydroxyl groups of morphine

* Read before the Montreal Medico-Chirurgical Society, May 24, 1901.

are replaced by acetyl radicals. The dose is from gr. 1-20 to gr. 1-6. In comparing the lethal dose of heroin with the therapeutic dose, we find that the former is one hundred times greater than the latter, whereas with codein the fatal dose is but ten times the amount usually prescribed. Recently the hydrochloride of heroin has been introduced by Eulenberg. It differs from heroin in that it is soluble in water and may be administered subcutaneously. The dose is the same as that of heroin.

As to the mode of administration, heroin is usually given in powder made up with saccharum album or in solution with weak acetic or sulphuric acid. Triturates containing gr. 1-12 or gr. 1-6 are on the market.

The physiological action of the drug may be described as follows:—Externally and locally applied to the unbroken skin, it has practically no effect; from mucous membranes however it is absorbed and exercises an anodyne action.

On the digestive system in medicinal doses after repeated administration, heroin causes dryness of the pharynx and slight irritation of the fauces. There is no disturbance of the stomach, the appetite remaining unimpaired. Some observers have noticed slight nausea after the use of the drug. Morphine is stated to cause a hyperacidity of the gastric juice, but after even very large doses of heroin we have failed to observe any such effect. One patient to whom a very large dose was given experienced no gastric disturbance whatever.

On the heart and circulation the drug appears to exercise very little action. In over-doses it causes failure of the circulation, but not till some time after the respiratory system has been profoundly affected.

It is on the respiratory system that heroin exercises the greatest effect. It slows the frequency of the respirations and increases the depth and strength of inspiration. Its action is on the respiratory centre. Our knowledge in this respect is due to the careful and convincing experiments of Dreser, who demonstrated the effect of the drug by the graphic method.

On metabolism, we find the exhibition of the drug causes a profound alteration. It diminishes the amount of oxygen used and lessens the amount of carbon dioxide eliminated. In this way it slows metabolic processes. Dreser demonstrated that the oxygen in the blood is not diminished but rather increased after the employment of the drug. From the action of heroin on metabolism it is said to be an antipyretic, but all observers are not agreed on this point. Certainly no definite lowering of the temperature was observed in any of the cases to which it was administered in the Royal Victoria Hospital.

On the nervous system the drug in moderate doses has very slight

effect on the higher centres. In very few is there noticed any narcotic effect, unless the dose administered is large. A sense of malaise and depression may, however, be present. The respiratory centre is most affected by the use of the drug and also the cough centre. The cardiac and vasomotor centres are not influenced by medicinal doses. The drug kills by failure of the respiratory centre. In the cat, large doses cause generalized convulsions, its action in this respect resembling morphine. The peripheral nerves are dulled. Reflex action is lost in man after large doses are administered.

The indications for the therapeutic use of the drug are very apparent from the preceding remarks. Leo has aptly compared its action on the respiratory system to that of digitalis on the circulation. We have seen that it slows respiration and increases the force of the respiratory muscles. In dyspnœic conditions, whether due to pulmonary, cardiac, or renal disturbance, Leo has found it to render very valuable service. In those conditions where the mucous membranes of the bronchial passages are swollen and where there is increased secretion, it is of special value. The air has a longer time to traverse the obstructed passages and is drawn in and expired in greater volume and in increased force. In such conditions, which are frequent in elderly people, where morphine can be employed only with the greatest caution, we can administer heroin with safety.

Heroin has been described also as "a respiratory stimulant and a sedative to the mucous membrane." This being the case all irritative coughs which act injuriously on our patients, as in acute and chronic bronchitis and the early stage of pulmonary tuberculosis, laryngitis, pleurisy and pneumonia, ought to be affected by it. It is just in such conditions it has been of undoubted service. Codein, which is employed also in such conditions, is at times very disappointing. The respiratory rate is not influenced by codein and its continued use, in doses likely to be effectual, causes at times a troublesome diarrhœa.

As an analgesic it is inferior to morphine in this respect. Eulenberg, who has used the hydrochloride of heroin subcutaneously, considers that its value has been much underestimated in this respect. Locally, the drug has been used by Myrtl in pelvic inflammations with satisfactory results.

Strube regards the drug as indicated in all those conditions of dyspnœa or irritative cough for which one has up to the present used morphine or codein, being superior to the latter on account of its action on the respiratory centre, but inferior to morphine in its narcotic effect.

Untoward effects are seldom observed when the drug is carefully administered. In a few cases, nausea and vomiting have been met

with. In eighty-two cases in which it was employed in the Royal Victoria, no such effect was observed. No tendency towards the formation of a habit has been observed, although Harnack has indicated such a possibility. Strube states that further observations are necessary on this matter.

During the past two years several observers have published the results obtained from the therapeutic use of heroin. Floret was the first to do so, and he states that in only four out of twenty-five cases of pulmonary tuberculosis was the drug ineffectual. In three cases of asthma improvement was very rapid. In pain, especially when due to disturbance of the abdominal organs, it was inferior to morphine. Leo reports that out of thirty cases, consisting of two cases of uræmic dyspnœa, eight cases of chronic emphysema, five of bronchial asthma, and fifteen of chronic bronchitis, in only three, one of emphysema and two of chronic bronchitis, did the drug fail to relieve. Thermisch of Philadelphia has reported on the use of heroin in cough, and in two cases out of thirty no improvement followed the use of the drug. Both of these patients were suffering from pulmonary tuberculosis, one with extensive cavitation in the left lung and the other in the latest stages of the disease.

Einhorn observed improvement in three out of four cases of pulmonary tuberculosis, in the fourth case the drug was beneficial only for two weeks. In five out of seven cases of asthma the result was satisfactory. In two cases of chronic bronchitis the result was good in one case and in the other no improvement followed its administration. In three cases of cardiac dyspnœa the symptoms subsided in two and in one no benefit was observed. In two cases of cancer of the stomach and two cases of gastralgia, marked improvement resulted. In a case of tabes with gastralgia and enteralgia the pains were alleviated.

The drug has been used in the Royal Victoria Hospital during the past eighteen months. During this time we have had an opportunity of observing its effect in eighty-two cases. In twenty cases of pulmonary tuberculosis the drug proved beneficial in sixteen, lessening the cough and permitting the patient to have a comfortable night's rest. No effect on night sweats was observed in any case. In ten cases of acute bronchitis, the drug proved of value in every case, the cough was lessened and the sense of oppression relieved. In four of these cases the bronchitis was a complication of typhoid fever, but in none of them was there any effect upon temperature. In fourteen cases of chronic bronchitis and emphysema and eight cases of chronic bronchitis, there was improvement in every case. In two cases where morphine had been administered previously to the use of heroin and also after it had been used, the patients requested the heroin instead of the

morphine. In four out of five cases of bronchial asthma the drug was very effectual. In one case it was useless. One patient complained of dryness of the throat after the use of the drug and also of slight dryness of the cough. This may be counteracted by the use of small doses of potassium iodide. In two cases of abscess of the lung the drug as used in one with much benefit, but in the other its action was very fleeting. In one case of bronchiectasis the drug exercised a beneficial influence. Heroin was used in three cases of lobar pneumonia and two cases of bronchopneumonia, the cough being rendered slightly less troublesome. In five cases of pleurisy the distress was relieved. In three cases of endocarditis with marked dyspnœa in which the drug was employed, there was definite alleviation of the distressing symptoms. The drug was used in one case of aneurism of the aorta to relieve pain. It proved satisfactory in this case but in one case of brain tumour and in one case of abscess of the brain the headache was not relieved by the exhibition of the drug. For the root pains of compression myelitis the drug was used in two cases, but it did not compare with morphine in its effect. It was employed in two cases of carcinoma ventriculi with slight benefit. In two case sof morphinism, the drug was used with good effect in one but in the other its action was not satisfactory.

From our experience with the drug the following conclusions may be drawn:—Heroin may be regarded as a valuable addition to our therapeutic agents. It is superior to morphine or codein in irritative cough. In dyspnœic conditions it is of special value. As an analgesic it is inferior to morphine. Heroin hydrochloride should have further trial before a definite statement is made in this respect. It is less toxic and therefore safer than morphine or codein. We are as yet unable to state whether the habit is likely to be formed or not.

SARCOMA OF THE NASAL SEPTUM.*

BY

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The history of this case is briefly as follows:—

T. C., æt. 25, consulted me on the 12th March, 1900, complaining of obstruction in the left nostril, associated with frequent and alarming attacks of epistaxis of one month's duration. He had lost eighteen pounds in weight during the previous month, which he attributed to loss of blood; and, owing to weakness, he was compelled to resign his position as foreman in one of the departments of a steel manufactory in Cape Breton.

The nasal obstruction was first noticed about November, 1899, and gradually increased from that date. The organs, as far as could be ascertained, were normal. Examination of the left nostril revealed a bluish gray tumour of soft consistence and about the size of a walnut, situated at the upper anterior half of the quadrilateral cartilage. It was irregularly rounded and very vascular, as proved by the fact that the slightest manipulation with a probe provoked bleeding. Immediate removal of the growth was advised, and the patient consented.

I cleansed the nostrils thoroughly with an antiseptic solution, and applied freely to the tumor a glycerine alcoholic solution of suprarenal extract followed by an application of a ten per cent. solution of cocaine. The ischæmic effect of the suprarenal solution and cocaine considerably reduced the size of the growth and enabled me to engage it completely with the cold snare. I removed it very slowly, and cauterized the base with the galvano cautery. The loss of blood during and after the operation did not exceed one ounce.

The growth was very superficially attached to the septum, and as no induration was present, a more extensive operation was not indicated. I pointed out to the patient the dangers of recurrence and advised him to have his nose frequently examined. He has not followed my advice, but I heard indirectly six months after the operation that he was enjoying the best of health.

Dr. A. G. Nicholls summarised his conclusions with reference to the tumour as follows:—

"On the whole the specimen gave the impression of a myxoma, with some dilatation of the lymphatics, and showing a distinct tendency to sarcomatous degeneration."

* Read before the Montreal Medico-Chirurgical Society, March 23, 1901.

RETROSPECT
OF
CURRENT LITERATURE.

Medicine.

UNDER THE CHARGE OF JAMES STEWART.

Croupous Pneumonia.

GEORGE W. MORRIS. "Croupous Pneumonia, A Clinical Study of 500 Cases from the Records of the Pennsylvania Hospital." *The Amer. Jour. of the Med. Sciences, June, 1901.*

This interesting and important clinical study deserves more than a passing notice, and if space permitted it might well be fully reproduced in this column.

Of the 500 patients admitted, 125 died (25 per cent.) Seven became phthisical. The effects of the habitual use of alcohol, Dr. Morris claims, are seen in the higher mortality among German and Irish patients as compared with that among the Russian Jews, who, while generally ill-nourished, are more temperate in the use of alcohol. Further concerning intemperance, his analysis shows that of 34 patients known to have been drunkards, 23 died, or 67 per cent.

The mortality was lowest in the second decade, of which the mortality was 18 per cent. Labourers, teamsters and stevedores showed a mortality of 34, 50 and 46 per cent. respectively.

Site of the Lesion.	Number of cases.	Per cent. of the 500.	Mortality percentage.
Right lower lobe	145	29	18
Left lower lobe.	115	24	13
Both bases	60	12	48
Right apex	55	11	20
Whole right lung	45	9	26
Whole left lung.	36	7	20
Left apex.	20	4	25
Both apices.	4	9	40
Right middle lobe. . . .	14	2	21
Undetermined	7		

By a review of this table it may be seen that in 323 cases the right lung was involved.

Apical pneumonia was found more frequently in the first and third decades of life, 20 cases and 15 cases respectively. The temperature record shows that highly febrile cases are much less to be feared than silghtly febrile ones. The spring months of the year, April and May, show the greatest prevalency of the disease. The chill was noticed in exactly 50 per cent. of the cases according to the notes, but the writer suspects its presence in a considerably larger proportion of cases. Three hundred and one cases terminated in crisis, seventy-four in lysis. The highest number of cases terminated in crisis on the eighth day, 58; on the seventh day, 43; the ninth, 42; the sixth, 34; and the tenth, 30. A pseudo-crisis, recognized as a fall below 99° F. with a prompt rise to 102°, was observed in 54 cases. There were 57 patients who had suffered on a former occasion from pneumonia. Albumin with casts was found in the urine of 245 patients, while the urine of 78 patients showed albumin alone.

Of complications, jaundice (18), delirium tremens (17), typhoid fever (15), and pleural effusion (12), were the most common, and greatly influenced the mortality of the disease. Upon the question of relapse this analysis has not cast very much if any light. Dr. Norris does affirm, however, that two days after the crisis of a seven-day attack in a child, an infection of the same lung took place. Another case is cited in which an infection of the sound lung was observed twenty days after recovery from the disease in that first involved.

The treatment has been expectant and symptomatic. Venesection has been of great benefit to overcome cyanosis and marked dyspnœa. Wet or dry cups and the icebag for the relief of pleuritic pain, opium, ammonium carbonate, etc., were used, as indicated. "Oxygen inhalations were apparently the means of tiding a number of cases over the critical period.

Pernicious Anæmia.

HORACE C. COLMAN. "Pernicious Anæmia with an Analysis of Eighty-seven published cases, and an enquiry into the After History of Twenty-two reported cases. *The Edinburgh Medical Journal, March and April, 1901.*

Dr. Colman reviews at some length the physiology of the blood, especially those views which refer to the normal blood destruction, and concludes that there is a normal active destruction of red corpuscles going on in the liver. In pernicious anæmia this destruction is increased. The amount of increase determines the severity of the case. There is yet no adequate explanation of the cause determining this increased destruction in pernicious anæmia. The suggestion of Mott, that there is an exaggerated "ferrogenic function" of the liver;

of Jones and Brunton, that it is possible that some abnormal product of digestion or even some digestive ferment itself may act as a poison; of William Hunter, that there is produced in the gastro-intestinal tract a poison of cadaveric nature in small quantity and not constantly; of Gowland Hopkins, that the poison is of bacterial origin; and, lastly, of Hunter again, in a more recent article, in which he further develops his theory, concluding from the stomatitis, gastritis, and diarrhœa present, that one has to do with a "chronic infective disease localized to the alimentary tract, caused by a definite infection of certain parts of the mucosa of the alimentary tract chiefly of the stomach and occasionally also of the mouth and intestines"; all are set forth.

Dr. Colman does not include the views of those who hold that pernicious anæmia is merely an advanced stage, which may be reached by any anæmia. He has no doubt of the existence of a *distinct* disease which we call pernicious anæmia. The prognosis in cases of pernicious anæmia is shown in this paper to be fully in accord with that given by Addison fifty years and more ago; resisting all remedial efforts, sooner or later they terminate fatally. It is interesting, however, in this connection to note the subsequent events in the history of 22 reported cases. All these were cured. Arsenic was used in 15 cases, arsenic and salol in 2 cases, bone marrow in 2 cases, iron, phosphorus and betanaphthol in one case each. Ten of these died subsequently; three were lost sight of, doubtless may of them died. Two only were known to be living.

There appears to be nothing new in the matter of treatment. Generally speaking it may be said that milk and farinaceous food suit better. This point finds but little if any emphasis in recent textbooks on medicine. It has been shown that nitrogenous diet increases the normal blood destruction. Transfusion is not recommended. Intestinal antiseptics as salol, salicylic acid, betanaphthol, etc., seem to be much in vogue at present, and some go so far as to attribute to its antiseptic action the good effects following the use of arsenic. Others teach that it stimulates red bone marrow. Iron has sometimes been found advantageous, especially in cases where destruction is not excessive, and even in such cases after the arsenic had initiated the improvement.

Alcohol as a Therapeutic Agent.

J. Mackie Whyte. M.D. "Some Recent Researches on Alcohol: Their bearing on Treatment." *The Edinburgh Medical Journal, March, 1901.*

Dr. Whyte has given a comparatively full résumé of the recent researches on the action of alcohol when taken into the system, and in

the first part of his paper draws justifiable conclusions that the stimulant effect of alcohol on brain, heart or muscle, if existing at all, is very brief, lasting probably only a few minutes. Its apparent effect in stimulating respiration needs further investigation as to its mode of causation. On the tissues, alcohol acts as a protoplasmic poison, as shown by the impaired resistance to infectious attack. This is borne out both clinically and experimentally, and when one considers the varying susceptibility of animals to alcohol one appreciates the warning sounded by Frankel, when he says that one is bound to draw the conclusion that the employment of alcohol in the treatment of infectious diseases in man is not by any means to be lightly resorted to.

Alcohol in the treatment of nervous diseases finds a very small place indeed, if there be any justification of its use in such cases. Its use in alimentary diseases may be confined to cases of simple dyspepsia, when it is given in small quantities before food. In some cases of colic and diarrhœa, it may be used with no known bad effect. In kidney diseases, alcohol should be rigidly withheld.

Among acute infectious diseases, pneumonia was the disease in whose treatment the merits of alcohol were discussed, and several authorities are quoted on this subject. As this disease is so prevalent, and as in the treatment alcohol is so freely used, it may be of interest and profit to recall these opinions. Whatever value alcohol has as a food need hardly be taken into account in the treatment of pneumonia, since patients with this disease usually take plenty of ordinary food, and Schäfe is quoted as saying that "any small production of energy resulting from the oxidation of alcohol is more than counterbalanced by its deleterious influences as a drug." Dr. Whyte, contrasting his experience in two periods of his professional life, states that he feels better satisfied with the results obtained while using little or no alcohol. Aufrecht declares himself a decided opponent of the giving of alcohol in any routine way in pneumonia cases. However, there are decrepit patients to whom he gives pure alcohol, equal to two drachms of whiskey, with orange extract, syrup and water, every two hours. Certain other conditions also call for stimulants in the course of the disease.

Stursberg, from Schultz's clinic, claims that the statistics in Bonn afford no evidence in favour of alcohol. When, however, the patient is found who is habituated to its use, alcohol is given in the course of the disease. Camphor is strongly recommended in doses of from 1½ to 3 grains or more, as the best analeptic.

Kassowitz's argument is that alcohol is only toxic in its action, that no substance can be a food stuff and poison at the same time, and that camphor is far to be preferred to it as a stimulant. While deprecating the use of alcohol and advocating the use of camphor, he pleads ear-

nestly for sugar as a real food, economizing albumin and fat and stimulating muscle.

Barr, of Liverpool, accords in his view with those already expressed, and suggests that if alcoholic subjects need anything while suffering from pneumonia, four per cent. draught beer or stout is safest.

Before closing this valuable review, Dr. Whyte again refers to the treatment of alcoholic pneumonic patients and quotes once more from Aufrecht upon this subject. In delirium tremens, occurring with pneumonia or without it, he finds extremely favourable results from stopping alcohol entirely, believing, as he does, that it is bad practice to push the stimulant simply because the patient has been a heavy drinker. Beef juice, beef tea, milk, strong tea and coffee, camphor, strychnine, caffeine, ammonium carbonate, and digitalis will meet about all the indication in such cases.

W. F. Hamilton.

Surgery.

UNDER THE CHARGE OF GEORGE E. ARMSTRONG.

An Aborbable Murphy Button.

CHLUNISKY. "Ein resorberarer Darmknoff aus Magnesium." *Centralblatt für Chirurgie, No. 15, 1901.*

Chlunisky finds that the Murphy button has several faults, which he thinks he has at last overcome. To ensure the disappearance of the button after its usefulness is gone, he has constructed a button of magnesium, which disappears by absorption in from 16 to 20 days. At the end of two days it is found somewhat roughened, in four days slightly shrunken; and in from eight to ten days is becomes very much eroded. The use of this button in dogs is reported to have been successful. Unfortunately, in the one instance in which it was used in the human body, gastro-enterostomy for cancer of the pylorus, the patient died on the fifth day after operation from a double croupous pneumonia.

The author thinks that another weak point in the Murphy button is the spring and movable plate. If the spring is too weak it permits of the escape of infected matter, and of the development of peritonitis or the occurrence of hæmorrhage. If too strong, then too early and wide spread necrosis is the result. For this reason he has omitted altogether in his magnesium button the spring and movable lamella.

Reinfection of Sterilized Skin from the Cutaneous Sweat Glands.

MOHAUPT. "Beiträge zur Frage nach der Bedentung der Hautdrusensekretion auf den Sterilisationseffekt bei der Hautdesinfektion."

We are gradually coming to appreciate the impossibility of keeping hands sterile during an operation, and the reasons why. One reason is that only the surface, the outer epithelial layer, is rendered approximately sterile by any practicable means that have been employed up to the present. Granted that the surface is for the moment rendered sterile, probably the first instrument used or the first ligature drawn through the fingers removes the superficial, epithelial covering more or less, and leaves a surface that is not sterile.

In his investigations, Mohaupt has gone a step further, and has answered the question: How long will skin once sterilized remain sterile under a sterile covering? The time is very short. In 30 minutes the surface is found infected, and Mohaupt thinks the infection is from

the sweat glands rather than from the sebaceous glands. The infection occurred rapidly when the plantar surface of the foot was treated, a surface without sebaceous glands although rich in sweat glands. The result of these experiments would indicate that an operator must while operating disinfect his hands frequently with alcohol or other solutions, or use a protective covering such as impervious gloves.

G. E. Armstrong.

Surgery of the Spleen.

J. Collins Warren. "The Surgery of the Spleen." *Annals of Surgery, May, 1901.*

In an interesting paper on the surgery of the spleen Dr. Warren of Boston gives a list of diseases of that organ which have been successfully treated by operation. This list includes many diseases which the profession hitherto generally regarded as amenable only to medicinal treatment, for example, splenic anæmia, splenic leukæmia, amyloid disease of the spleen, etc. After referring to the interesting historical fact, that excision of the spleen was practiced in ancient times to prevent the "stitch in the side" to which athletes and especially runners were subject, the writer of the paper takes up the technique, results and indications for the modern operation of splenectomy. He then gives a detailed account of five cases of surgical treatment of the spleen.

He advises a vertical incision along the outer margin of the left rectus muscle, and sufficiently large to allow easy delivery of the organ, as any rough handling of so friable a structure as the spleen or its vessels may likely cause troublesome hæmorrhage. He also lays stress on passing the hand above the organ and turning it over into the wound, and thus readily exposing the vessels of the pedicle for ligation.

In all cases of excision of the spleen one must expect an increase in the number of white blood corpuscles and a diminution in the number of red cells. In a case of marked splenic leukæmia one cannot help wondering whether this aggravation of the former pernicious conditions, lasting as it does for several weeks after operation, might not cause death. Pyrexia is also another constant result of the operation, together with severe pleuritic-like pains in the left lung.

The paper is a most instructive one, and the past treatment of splenic diseases is not so hopeful that we can afford to pass by lightly any procedure which holds out a reasonable chance of curing the disease by surgical interference. The subject has not received the attention it merits from surgeons as a class, and to Dr. Warren and Dr. Frank Hartley amongst others, we certainly owe a debt of gratitude for drawing attention to it.

Operative Treatment of Obstructive Jaundice.

JOHN B. DEAVER, M.D. "The Mortality of Operation for Obstructive Jaundice." *American Medicine.*

Dr. Deaver of Philadelphia, in the introductory number of Gould's new weekly journal, discusses the mortality of operation for obstructive jaundice. The greatest danger is from hæmorrhage, either consecutive or secondary; the other causes of death are exhaustion and cholæmia, and it is doubtful, as the writer points out, whether these should not really be referred to one cause, viz., the toxic effects of a persistent cholæmia preceding operation, and therefore not attributable to operation, but rather to the neglect of it.

Dr. Deaver's statistics agree closely with the results published by Mr. Mayo Robson in his manual on "Diseases of the Gall-Bladder and Bile Ducts" (1900), and both writers agree that peritonitis after operation on the gall-bladder practically does not occur. That death should occur so frequently during and after operations on the gall-bladder, where persistent jaundice has been present, is no contra-indication to operation, but rather it shows that the operation has been too long delayed, and that as the result of a preventible cholæmia the blood has lost its coagulability, and hence the danger. As well might we expect good results in the operation of appendectomy if we waited for general peritonitis in every case before operating. There is no question that in the majority of cases of persistent recurrent jaundice, where the clinical signs point to cholelithiasis as a cause of the trouble, operation is too long delayed; and until we get some internal remedy capable of dissolving gall-stones in the ducts or gall-bladder, these cases should be in the hands of the surgeon. Even in the cases (and they are not rare) where the pain and jaundice are really due to some form of enteroptosis, especially movable right kidney, surgical help is the only hope of cure. But further, we have seen several fatal cases of general peritonitis where the starting point was a cholecystitis due to gall-stones. Had these gall-bladders been opened and drained the deaths might have been averted, for the chances of a patient with peritonitis following a septic gall-bladder are infinitely better, if the peritoneum be opened and drained, than would be in the same case of peritonitis due to infection from a septic appendix. So that, Dr. Deaver, as far as the experience of most hospitals go, is distinctly justified in his claim that the present statistics of mortality after operations for obstructive jaundice are distinctly unfair to the surgeon, simply because the surgeon in many instances has to operate on cases which are practically bile-poisoned before they come into his hands. Opening the gall-bladder and re-

moval of gall-stones as done in the interval between the attacks of colic and jaundice, is one of the simplest, safest, and most efficacious of surgical operations to-day; and even opening and draining a septic gall-bladder with concomitant local or general peritonitis, does not involve the same risk of a fatal termination as would the same operation in other cases of septic peritonitis; but it is a risk which we should rarely have to incur, for these cases could in the great majority of cases be operated upon earlier and the risk avoided.

J. M. Elder.

Reviews and Notices of Books.

MODERN MEDICINE. By JULIUS L. SALINGER, M.D., Demonstrator of Clinical Medicine, Jefferson Medical College, etc.; and FREDERICK J. KALTEYER, M.D., Assistant Demonstrator of Medicine, Jefferson Medical College, etc. W. B. Saunders & Co., Philadelphia and London, 1900. Canadian Agents, J. A. Carveth & Co., Toronto., Price, $4.00.

From the title under which this book appears one might expect a treatise on medicine in which one could find most if not all the latest that is accepted and taught touching the pathology, diagnosis, and treatment of internal diseases. One looks, however, in vain throughout the work for anything approaching a satisfaction of such an expectation. One looks to the preface for a justification of its appearance, when one considers the number of admirable text books on medicine, clinical diagnosis, pathology, the excreta, etc., already within the reach of any man who seriously contemplates the task of "equipment" for medical practice. Here, again, one is disappointed, for it is difficult to accord with the authors of this four-fold manual, when they write that since "in the present era the practice of medicine includes the study of a number of specialities, such as physical diagnosis, bacteriology, etc." . . hence it is necessary for the student to procure separate works upon these topics, and hence "it has appeared advisable for authors to combine in one volume as far as possible the essentials of these branches as applied to clinical medicine." To attempt what has been here attempted in the space of about eight hundred pages, is to fail to present to the student an adequate idea of the matter he should learn. The modern student must work out from the best sources his methods, and from these sources also he must acquire his matter.

Turning to the more particular examination of the contents, one finds methods of examination of the respiratory, circulatory, and abdominal organs set forth, while the nervous system is omitted, no mention whatever being made of the mode of examination of this very important system. Yet it seems that modern medicine has triumphed in matters connected with the pathology and diagnosis of nerve lesions. Modern medicine, we believe, teaches that in typhoid fever a more liberal diet than heretofore is allowed with safety. This work italicises the statement:—"There should be an absolute liquid diet." Modern medicine teaches that tracheal tugging is not pathognomonic of aortic aneurism. In the work before us no mention is made of the

recent observations upon this point. And, moreover, we find in the directions for testing this sign that "the patient should rest the chin upon the chest and he should be told to hold his breath; an upward and downward movement is noted if the sign is present."

We have yet to hear any authentic word against the cotton jacket in pneumonia; all careful physicians deprecate frequent examinations of the chest in that disease. "Poultices and the cotton jacket are of exceedingly doubtful utility and prevent the necessary and systematic examination of the chest" is what Modern Medicine teaches upon this point.

It may be said with general application, that throughout the chapters of this book many important matters are sacrificed to brevity, and time is thus mis-spent and false economy practiced by those who in their medical course would try to "get along" with Modern Medicine as a text book for bacteriology, physical diagnosis, clinical chemistry, and the practice of medicine. *W. F. H.*

A Text-Book of the Practice of Medicine. By James M. Anders, M.D., Prof. of the Practice of Medicine and Clinical Medicine in the Medico-Chirurgical College, etc., Philadelphia. Fourth edition, thoroughly revised. Philadelphia and London, W. B. Saunders & Co., 1900. Canadian Agents, J. A. Carveth & Co., Toronto. Price, $5.50.

The third edition of this work, issued in 1899, followed the second in less than a year, and but a few months have passed since the edition now under review was published. As compared with the third edition, it does not contain extensive alterations. Sprue, ileo-colitis in children, and acute colecystitis, together with a few other articles, have been written anew. Numerous additions have been made to the section on diseases of the digestive system.

The article on typhoid fever is comprehensive and fully up to date on the points in the diagnosis and treatment of this disease. Malaria is discussed to considerable length, and this article is illustrated very accurately in two plates showing the different forms of the parasites. Upon the "mode of infection" not as much is taught as might now be set forth. Yet at this point Dr. Anders refers to the "extra corporeal cycle of the plasmodium in certain species of the mosquito," and to the work of Bignami and Bastianelli. The medium of inhalation *may* explain some infections.

The views upon the bacteriology of yellow fever are not those recently set forth by a Commission of the United States Government appointed to investigate acute infectious diseases in Cuba, who found in numerous experiments reason to conclude that the bacillus icteroides

(Sanarelli) stands in no causative relation to yellow fever. In justice to Dr. Anders, however, it is to be said that this report was published in October, 1900—shortly after the appearance of this text-book.

The recommendation of the use of salicylic acid as an application to the affected joints in acute rheumatism is an advance on most text-books in medicine. In the etiology and treatment of whooping cough much stress is laid upon the theory that the germs of the disease are located on the mucous membranes of the respiratory passages. Taken early, cases of pertussis are treated with peroxide of hydrogen and assafœtida. Next to assafœtida, belladonna is preferred, given internally or in the very young used in a freshly prepared plaster. With bromoform, a keen disappointment has been experienced.

While admitting the unsatisfactory state of the sum of knowledge upon purpura, it is thought that this subject has been passed over too quickly. Under treatment of empyema we think the author makes a mistake when he refers to "resection of a rib" as Estlander's operation.

The chapters dealing with diseases of the circulatory system are especially good, much good advice and many valuable formulæ being given in a few pages. Tracheal tugging seems to have its value as a sign of disease properly ascribed to it in this text-book. In many other works upon aortic aneurism it has been too highly estimated. Under the treatment of aneurism of the aorta, combined wiring and electrolysis and the gelatin injection methods are included.

Part VIII. is devoted to the Nervous System, and opens with an introduction occupying twelve pages, in which important anatomical and physiological points are reviewed. The following sections deal with diseases of the peripheral nerves, of the spinal cord and its meninges, of the brain and its meninges, diseases of unknown pathology, vasomotor and trophic disorders. In this, as in other parts throughout the whole work, Dr. Anders quotes directly or indirectly the highest authorities. He has "gleaned without stint from medical literature," and we are of the opinion that he has succeeded admirably in bringing his text-book well up to date in those matters which pertain to correct diagnosis and rational treatment of disease. The book contains many illustrations and diagrams of pulse tracings, temperature curves, two remarkably good plates of the parasites of malaria and many others relating to the heart, lungs, and nervous system in diseased conditions. The setting forth in tables of points in the differential diagnosis has much to commend it, and it is of undoubted advantage to the medical student.

The modern orthography and terminology have been preferred. The printing and illustrative work is well done. After going pretty thoroughly over its pages, this work is confidently recommended to students and practitioners. *W. F. H.*

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

Stated Meeting, April 12, 1901.

J. W. STIRLING, FIRST VICE-PRESIDENT, IN THE CHAIR.

Tendon Grafting for Paralysis following Anterior Poliomyelitis.

DR. A. MACKENZIE FORBES showed a patient upon whom he had performed an operation for a foot-drop from infantile paralysis, and read a report of the case. See page 352 of the May number.

DR. G. E. ARMSTRONG had not had any personal experience of this kind of work, but thought that the result here promised to be favourable. He suggested that it would be of interest to have the case shown a year hence.

DR. W. H. HAMILTON asked whether the nutrition of the muscles was affected so that healing was not so rapid as ordinarily.

DR. FORBES replied that the cases which had come under his notice had healed nicely.

Excision of One-half of the Tongue.

DR. G. E. ARMSTRONG exhibited a patient from whom he had excised half the tongue for cancer. He stated that the majority of text-books condemned in a wholesale manner all partial operations for cancer of the tongue. Since, however, the publication by Butlin of his work reporting the removal of only half, the speaker had adopted the same method. Butlin's arguments were that recurrence after removal of the whole tongue was either in the cicatrix or in the glands on the same side as the disease and never in the opposite side. Thus one could get as far behind the disease in removing half as in removing the whole. Mr. Treves had raised the objection that the half of the tongue left was useless for speech, mastication, or swallowing, as it became dry, hard and curved like a parrot's tongue. Dr. Armstrong pointed out the incorrectness of this, as the remaining half in his cases, notably in the patient shown, came to lie in the centre of the floor of the mouth, did not tend to curl up and was quite moist and performed its functions well.

The technique of the operation was described, and several departures from the method advised by Mr. Butlin were described in detail. A full report will be published later.

Multiple Fracture of the Arm.

DR. ARMSTRONG showed a patient the subject of a double fracture of the radius, double fracture of the ulna, and fracture of the shaft of the humerus. The man had had his fractures reduced by the house surgeon at the Montreal General Hospital when first seen, and the humerus was in very bad position. Under anæsthesia and with the assistance of a number of the resident staff, efforts were made to get the humerus in good position but without success. At last wiring was decided upon with such excellent results that in the last skiagraph taken the line of fracture could not be seen. Skiagraphs had been taken and although they revealed the condition requiring to be dealt with and also the results of treatment, they did not show how to keep the bones in position.

DR. ARMSTRONG also referred to another case in which wiring had been followed by an excellent result, and a third, treated by a surgeon of great reputation, in which fracture of the elbow had been followed by complete ankylosis of the joint necessitating excision for its removal. He felt that if the latter case had been wired in the first instance the ankylosis would likely not have occurred.

Old Dislocation of the Shoulder.

DR. ARMSTRONG also showed a man residing in the centre of the city, who had received a dislocation of the shoulder and had not applied for treatment until fifty days after the accident. The dislocation was reduced on the 52nd day. The interest of the case lay in the difficulties connected with a late reduction owing to the danger of fracturing the bone or damaging the vessels. After considerable difficulty reduction was effected and at the time shown, two weeks later, the arm seemed to be in correct position.

DR. WESLEY MILLS thought it of interest to point out that in his student days the late Dr. George Ross, at that time both physician and surgeon, used to remove part of the tongue for cancer. In one case Dr. Mills remembered that the patient had learnt to speak fairly well after excision of one-half of the tongue.

Hyperplastic Inflammation of Serous Membrane.

DR. A. G. NICHOLLS showed specimens of this rare condition and gave an account of what is known regarding its production. A full report will be published later.

DR. W. F. HAMILTON thought that rheumatism was perhaps one of the causes leading to the condition described by Dr. Nicholls.

Notes on a Mild Smallpox Epidemic.

DR. F. G. FINLEY read a paper with the above title. See page 249 of the April number.

Stated Meeting, April 26, 1901.

J. M. ELDER, M.D., SECOND VICE-PRESIDENT, IN THE CHAIR.

Ununited Fracture of the Humerous.

DR. A. E. GARROW showed a patient with a fracture of the humerus which had failed to unite after many attempts to secure union. When first seen the arm had been carefully examined under an anæsthetic and a fracture made out at the junction of the middle and lower third. It was oblique in type and running downwards and inwards, the lower end of the upper fragment seeming to come within one and a-half or two inches of the elbow joint. After the swelling had subsided the arm had been put up and allowed to remain so for thirty-seven days, but on removing the splints it was found that no union had occurred. Without disturbing the ends of the bones it was then put in plaster of Paris, but on being taken down there was still no bony union. The ends were vigourously rubbed under an anæsthetic and allowed to remain in plaster until the 77th day, with still no union. On the 107th day, no union existing, an incision had been made in the posterior portion, and on exposing the fragments a moderate amount of organization tissue had been found. The ends of the bone had been freshened and drilled in a number of places, and brought together by chromicised catgut, and the arm had then been placed in plaster of Paris, but again no union had resulted up to the 167th day.

Dr. Garrow held that these cases were apt to occur where the blood supply was broken or interfered with.

Tumour of the Bladder.

DR. GARROW also showed a man operated upon for tumour of the bladder. The patient had had no symptoms beyond increased frequency of micturition with occasional hæmaturia until January, 1901. Ten days before admission to the hospital an examination for stone was negative, but after the instrumentation the frequency was lessened. The bladder was emptied 30 to 40 times during the day, about four ounces being passed during the hour. By rectal examination a moderately enlarged lobe of the prostate was made out; the urine was acid. The patient had lost about 40 pounds in weight. Further examination twelve days later by cytoscope showed that a node had appeared in the bladder wall and a distinct mass could be felt not evidently invading the rectum but burrowing its way into the rectal pouch. The case was undoubtedly one of primary carcinoma of the bladder of which the first and most urgent symptom was frequency of micturition.

The speaker had brought the case before the meeting as of interest because of the difficulty met with in making an early diagnosis of

primary carcinoma, and also that the proper method of treatment might be discussed. It was a question whether under the circumstances one would be justified in recommending extirpation of the bladder with transplantation of the ureters into the sigmoid flexure.

DR. ARCHIBALD showed microscopic sections of Dr. Garrow's case.

DR. GORDON CAMPBELL suggested that as the elbow joint was ankylosed and the muscles seemingly in good condition in the case of ununited fracture, an apparatus might be applied to the arm which would give the man a useful limb by making the site of non-union a joint controlled by the muscles.

DR. ELDER had felt, while listening to the report of the case, that possibly a better result might have been obtained by early wiring. In his experience if wiring was delayed too long it was not likely to be satisfactory.

With regard to the bladder case, the speaker thought that with the more common use of the cystoscope an early diagnosis of malignant disease of the bladder was more frequently made than formerly.

DR. GARROW, in reply, said he had not had a skiagraph taken as there was no difficulty in determining the state of the fracture, its location and direction.

Some General Principles of Electro-Therapeutics with Case Reports.

DR. S. F. WILSON read a paper with the above title which will appear later.

Stated Meeting, May 10, 1901.

JAMES PERRIGO, M.D., PRESIDENT, IN THE CHAIR.

Pseudo-Myxomatous Peritonitis.

DR. LAPTHORN SMITH reported this case.

Carcinoma of the Stomach.

DR. ARCHIBALD exhibited specimens from a case of carcinoma of the stomach removed by Dr. Garrow a few days previously. The point of interest in the case was that the cancer developed from an ulcer evidently of long standing. The microscopical findings showed a scirrhus of very pronounced type with enormous development of fibrous tissue but very few alveoli and neoplastic cells. The base of the ulcer was formed of dense fibrous tissue containing very few cells.

DR. ARCHIBALD pointed out how common it was to find carcinoma developing on an old ulcer.

THE OTTAWA MEDICAL SOCIETY.

A meeting was held in Water Street Hospital on April 26th, 1901, Dr. J. L. Cabot, President, in the chair.

DR. HORSEY reported two cases of *Soft Cataract* recently operated on with good results. The first was due to cutting injury in a young man of 24 years, and the other to some constitutional cause, non-diabetic, in a woman of 40 years.

General Ptosis of the Abdominal Organs.

DR. A. T. SHILLINGTON read a paper on this subject. In the discussion which folowed, the view was generally expressed that some central lesion was concerned in the production of the relaxation of the ligamentous and muscular tissues, possibly some derangement of the sympathetic system.

DR. PREVOST instanced cases where surgical treatment by colporrhaphy and ventrofixation caused improvement only for a time, the same condition developing after six months. General hygiene, massage, tonics, abdominal supports, and regulated exercise ought to be tried before operation was advised.

The Society met in St. Luke's Hospital on May 19, 1901, for the Discussion of Clinical Cases.

DR. JAMES GRANT, JR., showed three specimens of stones removed at various times by perineal section.

DR. MCCARTHY reported a case of *Intestinal Obstruction* with obstinate vomiting in a woman of 51, lasting three days. The cause was a very large enterolith, the size of a hen's egg, with a gall-stone nucleus. It was finally passed with the assistance of repeated high enemata.

DR. CHABOT reported a case of *Intestinal Obstruction* lasting for ten days in a woman of 74, with most urgent symptoms, including suppression of urine and convulsions. The case finally recovered after large doses of calomel.

DR. J. A. GRANT, JR., showed a patient for whom he had performed *Excision of the Rectum*, by a modified Kraske's operation. The operation had been undertaken for columnar carcinoma, and nine inches of the rectum were removed. The patient was a butcher, aged 40, who had suffered agonizing pain for months. The operation was accompanied by profound shock, but the man was doing well.

DR. KIDD showed hair removed from a *Dermoid Cyst* taken from a woman of 26 years from the abdominal wall just below the umbilicus. He also exhibited 50 *Gall-stones* removed three weeks previously from a

woman aged 40, the subject of recurrent colic without jaundice. A third case was that of the *rectum opening into the vagina,* which he cured by operation.

Other cases of *Gall-stones* were reported, two by DR. COUSENS, in which the calculi were passed in the fæces after systematic external massage of the liver in the region of the duct. Another, complicated by abscess, was reported by DR. MCCARTHY. No stones were found, adhesions were not disturbed. The patient made a good recovery. Symptoms of renal lithiasis were also present in this case.

DR. CHABOT reported the removal of a large *Submucous Fibroid* from a uterus found to be pregnant without interruption of the pregnancy. He also presented for DR. DEWAR a case of successful *radical cure of inguinal hernia* in an infant of six months.

This meeting was the concluding one of the session.

THE

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THE ANNUAL CONVOCATION OF THE MEDICAL FACULTY, McGILL UNIVERSITY.

The Sixty-Ninth Session of the Medical Faculty of McGill University was brought to a close on Friday, June 14, 1901, by the convocation for conferring degrees and awarding prizes. The degree of M.D., C.M., was conferred on 93 candidates, in the absence of the Principal, by Dr. Alexander Johnston, Vice-Principal.

Dr. R. H. Ker, B.A., the Holmes Medallist for the year, delivered the class valedictory, and Professor William Gardner addressed the graduates on behalf of the faculty.

HONOUR AND PRIZE LIST.

HOLMES GOLD MEDAL, for highest aggregate in all subjects forming the McGill Curriculum—R. H. Kerr, B.A., of Montreal,

FINAL PRIZEMAN, for highest aggregate in the Fourth Year subjects—S. Bruce, B.A., of Moncton, N.B.

CLEMESHA PRIZE, for Clinical Therapeutics—L. F. Robertson, B.A., of Stratford, Ont.

McGILL MEDICAL SOCIETY SENIOR PRIZES—1. H. M. Little, B.A., of London, Ont.; 2. C. K. Russell, B.A., of Montreal, Que.

HONOURS IN AGGREGATE OF ALL SUBJECTS.

1. Bruce, J., B.A.
2. Ker, R. H., B.A.
3. Robertson, L. F., B.A.
4. Penner, E., B.A.
5. Collison, H., McN.
6. Howard, A. C. P., B.A.
7. Mackay, M., B.A.
8. Campbell, R. P., B.A.
9. Leggett, T. H.
10. Egan, W. J.
11. Goodall, J. R., B.A.
12. Martin, E. A.

THIRD YEAR PRIZEMAN, R. McL. Van Wart, B.A., of Fredericton, N.B.

SUTHERLAND MEDALLIST, R. McL. Van Wart, B.A., of Fredericton, N.B.

HONOURS IN AGGREGATE OF ALL SUBJECTS.

1. Van Wart, R. McL., B.A.
2. Paterson, R. C., B.A.
3. Campbell, A.
4. Dixon, J. D., B.A.
5. Dixon, W. E., B.A.
6. Gardner, W. A., B.A.
7. Eastman, E. B.
8. Manchester, J. W.
9. Byers, J. R.
10. McKenzie, J. B., B.A.

SECOND YEAR PRIZEMAN. E. M. McLaughlin, of Winona, Minn.

SENIOR ANATOMY PRIZE, N. D. Parris, of Barbadoes, W.I.

McGILL MEDICAL SOCIETY JUNIOR PRIZES, 1. J. L. D. Mason, B.A., of Montreal, Que.; 2. J. C. Colby, B.A., of Stanstead, Que.

HONOURS IN AGGREGATE OF ALL SUBJECTS.

1. McLaughlin, E. M.
2. Nelson, W. E.
3. Burns, A. S., B.A.
4. Elder, R., B.A.
   Parris, N. D.
6. Cowperthwaite, H. H.
7. McKenzie, J. B., B.A.
8. English, J. M.
9. McCulloch, J. M.
10. Turner, G. H., B.A.

FIRST YEAR PRIZEMAN, J. A. Nutter, B.A., of Montreal.

JUNIOR ANATOMY PRIZE, J. L. Robinson, of St. Mary's, Ont.

HONOURS IN AGGREGATE OF ALL SUBJECTS.

1. Nutter, J. A., B.A.
2. McIntosh, L. deC.
3. Robinson, J. L.
4. Sellery, A. C.
5. Fyshe, J. C., A.B.
6. Dillon, W. P.
7. Wood, W. H.
8. Chipman, W. W.
   Lippiatt, H. T.
10. McLachlan, D. C.
11. Martin, J. C.
12. Miller, V. L., B.A.
13. Harrison, L. L., B.A.
    Reford, L. L.
15. Gillis, J. E.
16. Charman, F. D.

The following received the Degree of M.D., C.M. :

Bayfield, T. F.	Charlottetown, P.E.I.
Belanger, E. R	Ottawa, Ont.
Blake, J. J.	Charlottetown, P.E.I.
Browne, J. G., B.A.	Montreal, Que.
Bruce, J., B.A.	Moncton, N.B.
Butler, P. E.	Milltown, N.B.
Campbell, R. P., B.A.	Westmount, Que.
Carlyle, D. A.	Morewood, Ont.
Cartwright, C.	Kingston, Ont.
Coates, H. W.	Bass River, N.B.
Collison, H. McN.	Dixon's Corners, Ont.
Collison, J.	Dixon's Corners, Ont.
Crang, F. W.	Toronto, Ont.
Dalton, C. H.	Tignish, P.E.I.
Donaldson, A. S.	Brockville, Ont.
Duncan, J. W.	Montreal, Que.
Eagan, W. J.	Sydney Mines, N.S.
Ellis, R. L.	Youghall, N.B.
Fleming, J. E.	North Rustico, P.E.I.
Fuller, A. T., B.A.	Truro, N.S.
Gardner, R. L., B.A.	Brockville, Ont.
George, J. D.	Redwood, N.Y., U.S.A.
Goodall, J. R., B.A.	Ottawa, Ont.
Harley, R. J. O.	Cheshire, Eng.
Hope, J. T.	Glen Robertson, Ont.
Howard, A. C. P., B.A.	Montreal, Que.

Hunter, E. N. McL.	Merrimac, Mass., U.SA.
Jackson, G. F.	Brockville, Ont.
Johnston, R. DeL., B.A.	Montreal, Que.
Johnston, A.	Leeds, Que.
Johnston, J. L.	Martintown, Ont.
Jones, J. H.	Brockville, Ont.
Jones, Sydney, B.A.	Cleveland, Ohio, U.S.A.
Kendall, A. L.	Vancouver, B.C.
Ker, R. H., B.A.	Montreal, Que
Lawlor, F. E.	Dartmouth, N.S.
Learmonth, G. E., B.A.	Westmount, Que.
Leggett, T. H.	Ottawa, Ont.
Little, H. M., B.A.	London, Ont.
Lunney, T. H.	St. John, N.B.
Mackay, D. S.	Reserve Mines, N.S.
Mackay, M., B.A.	Montreal, Que.
Mackenzie, S. D.	Sarnia, Ont.
Macneil, J. W. L.	Kensington, P.E.I.
Macpherson, C.	St. John's, Nfld.
McDonald, C. A.	Milltown, N.B.
McDonald, E. E.	Fort Qu'Appelle, N.W.T.
Martin, E. A.	Kemptville, Ont.
Meighen, W. A.	Perth, Ont.
Millar, S.	South Dunham, Que.
Miller, G. H. S.	Alexandria, Ont.
Moore, J. C., D.V.S.	St. Chrysostome, Que.
Morgan, A. D.	Nanaimo, B.C.
Mullaly, E. J.	Souris, P.E.I.
Newcombe, W. E.	Vancouver, B.C.
Niven, J. K.	London, Ont.
O'Sullivan, M. T.	Glace Bay, C.B.
Patterson, A., B.A.	Montreal, Que.
Penner, E., B.A.	Gretna, Man.
Pittis, H.	Plainfield, N.J., U.S.A.
Redon, L. H., B.A.	Victoria, B.C.
Richards, B. A.	Yarmouth, N.S.
Roberts, J.	Hamilton, Ont.
Robertson, C. G.	Hawkesbury, Ont.
Robertson, L. F., B.A.	Stratford, Ont.
Robertson, R. D.	St. John, N.B.
Robidoux, L. E., B.A.	Shediac, N.B.
Rogers, H. B.	Peterboro, Ont.
Russel, C. K., B.A.	Montreal, Que.
Russell, E. M.	Springfield, Mass., U.S.A.
Rutherford, C. A.	Waddington, N.Y., U.S.A.
Ryan, W. T., B.A.	Fredericton, N.B.
Sanders, C. W.	Kemptville, Ont.
Shearer, C.	Montreal, Que.
Shearer, R. L.	Kelso, Que.
Simpson, A. S.	Bay View, P.E.I.
Simpson, E. G. W., B.A.	Lennoxville, Que.
Snyder, A. E. W.	Coaticooke, Que.
Stentaford, G. L.	Heart's Content, Nfld.
Stevenson, J., B.A.	Montreal, Que.
Stewart, C. L.	Russell, Ont.
Stewart, C. A.	Dunvegan, Ont.
Taylor, D. A.	Havelock, N.B.
Taylor, W. L.	Waterloo, Que.
Ward, J. A.	Lewiston, Maine, U.S.A.
White, E. H., B.A.	Montreal, Que.
Wiggin, W. L.	Lowell, Mass., U.S.A.
Wiley, B. E.	Fredericton, N.B.
Williams, W.	Remsen, N.Y., U.S.A.
Wilmot, L. B. B.	Oromocto, N.B.
Wilson, J. J.	Montreal, Que.
Winter, D. E.	Montreal, Que.
Wyman, H. B., B.A.	Chute a Blondeau, Ont.

Dr. Craik, Dean of the Medical Faculty, delivered a short address reviewing the life history of the Faculty from the time of its inception. Part of this address was as follows:—

"When the faculty first came into existence in 1829, it had in attendance at its first session 30 students. When it was twenty-one years old, in 1850-51, the number of students was only 53. When it was sixty years old, in 1888-89, the number had increased to 227; and now, twelve years later, when it has completed its seventy-second year, the number has reached 490, or within ten units of half a hundred. Of the 490 in attendance during the present session, 467 have been undergraduates, proceeding to the degree, while the remaining 23 were graduates and partial students pursuing special courses of study.

"The area from which the students have been drawn, has also increased, more particularly of late years, almost in proportion to their numbers. For many years the provinces of Ontario and Quebec, or Upper and Lower Canada, as they were formerly called, furnished all but a very small minority of our students, and these provinces together still furnish a majority of the whole; but the homes of the others are every year becoming more and more widely distributed over an area covering the whole Dominion, and stretching out over the whole of this continent; through the United States, Newfoundland and the West Indies, as well as across the Atlantic to Great Britain and Ireland, and this session even across the Pacific Ocean, to China and Japan. The number from different provinces and countries is as follows: Ontario, 156, or nearly 32 per cent.; Quebec, 142, or almost 29 per cent.; New Brunswick, 52, or 10½ per cent.; the United States, 47, or 9½ per cent.; Nova Scotia, 29, or nearly 6 per cent.; Prince Edward Island, 27, or 5½ per cent.; British Columbia, 13, or 2½ per cent.; Newfoundland, 9, or nearly 2 per cent.; Manitoba, and the North-West Territories, 4; the West Indies, 4; Great Britain and Ireland, 4; China, 2; Japan, 1; all of the last five, less than 1 per cent.

"The obvious lesson to be drawn from the foregoing list is, that, though situated in the French province of Quebec, our school attracts English-speaking students in increasing numbers from all the other provinces of the Dominion, as well as from other outlying British provinces, such as Newfoundland and the West Indies, and even from the British Islands themselves. More gratifying still is the considerable number—nearly ten per cent.—from the United States, where we have to compete with their great schools; and still more remarkable, the appreciable number from distant China and Japan. Indeed, it seems not too much to claim that the medical faculty of McGill University is being recognized as one of the representative medical schools of Anglo-Saxondom.

"When we adopted in 1894, seven years ago, the nine months' session in our four years' course, making thirty-six calendar months in all, we

were in advance in actual teaching time, of nearly every school in existence, and for a time it certainly relieved the tension of our sessional teaching; but the ever-increasing amount of matter to be taught has more than kept pace with the increase of time for teaching it, and here and elsewhere the idea of an additional year has been coming unmistakably to the front. The Medical Council of Great Britain has recommended it. So has the Medical Council of Ontario; and if Dr. Roddick's bill for Dominion registration and reciprocity throughout the British Empire becomes law, as we hope and believe it will next session; a five years course will be a necessary condition of such enregistration.

. . . . . .

"The present four years' course bears hardest upon the honest, hardworking students, with fair ability, but whose mental processes move slowly, and who find it difficult to take in, and to digest new facts and ideas; but once digested and assimilated, the knowledge becomes part of their mental organization and can scarcely be forgotten. Many such students are constantly, perforce, compelled to take an additional year under most unwelcome circumstances. To them the option of an additional year, without humiliation, would be a boon indeed. And why should not such a boon be accorded to them, if it could be done without injustice to others? With his work and his examinations properly graded, even the dullest student, if he be mentally sound, should be able to master every subject, even in the broadest curriculum. Nor should such an arrangement be unjust to the brilliant student. All important changes in a college course should, wherever possible, at least at first, be more or less optional. The brilliant student might, as before, be allowed to finish his work and his examinations in the four years; the additional year being spent in foreign travel, special studies, or in such other way as might be considered least onerous and most beneficial. Such arrangements are matters of detail, sometimes difficult indeed, but always capable of adjustment by patient and persistent effort.

"It is not our custom to adopt hastily or without careful consideration new ideas or theories, however plausible they may be; nor unfinished experiments, however conclusive they may at the time appear. We have ever preferred the guidance of the safe old rule, coming to us with such high authority, to prove all things, and to hold fast to that which is good. We have no intention of adopting the five years' course until such time as the public, and particularly all those interested in advanced medical education, shall have had time to weigh carefully

the arguments for and against the proposed extension, and with our present very extended course of our full sessions of nine months each, we can certainly afford to take another year to look at the matter from every point of view before making up our minds as to the proper course to follow.

"The extensive additions to our medical buildings which have been in progress during the last year, have resulted in the completion of a beautiful and commodious new wing on the western side of the present central building, and a large addition to the northern wing on its eastern side. The workmen are now busy with the remaining wing on the eastern side, to be symmetrical with that on the west; and when completed, early in September, the whole will form a block of medical buildings, which, for stately beauty, capaciousness and completeness of internal arrangements cannot be excelled by any medical buildings on this continent.

"I need not remind you that we owe these beautiful and extensive additions to our buildings to the munificent generosity of two members of Lord Strathcona's family—Lady Strathcona and the Honourable Mrs. Howard, who gave jointly one hundred thousand dollars to defray the cost of their erection.

"It was my sad duty last year to allude to the death in South Africa of Mr. O'Reilly, of Hamilton, Ontario, one of our students, who had gone to fight for his Queen and Empire in that distant land. We have had since then to lament the death in the same country of one who should have been in our graduating class to-day, Mr. Harold L. Borden, son of Hon. Frederick William Borden, of Nova Scotia, minister of militia and defence. He was slain on the battlefield while leading his men in deadly conflict with the enemy; and while we mourn his loss, we cannot but admire the courage and the devotion which caused him to sacrifice his brilliant prospects and to lay down his life at the call of his country. Courage and steadfastness were the qualities which chiefly distinguished him; and these have been the qualities inherent in Britons everywhere, which have made the Empire what it is, and which will keep the Empire great and powerful, both in peace and in war, while those qualities still remain.

"The session which is now closing has not differed materially from those which have gone before it. There has been the same steady progress in all directions, the same diligence and faithfulness on the part of the students, and the same high average in the results of the examinations. Our graduates of to-day are before you, and will bear comparison with any that have gone before them. We have no fears for them. We are proud of them—proud of them as graduates, proud

of them as gentlemen, and we send them forth to their life's work, well knowing that they will acquit themselves like honourable men, and that the interests and the good name of their alma mater will always be safe in their keeping."

CANADIAN MEDICAL ASSOCIATION.

We are pleased to be able to say that arrangements for the Winnipeg meeting (August 28th to 31st next) are progressing favourably. From what we can learn the gathering promises to be large and representative. Dr. O. M. Jones, F.R.C.S. (Eng.), of Vancouver, will deliver the Address in Surgery, and Dr. J. R. Jones, Winnipeg, the Address in Medicine. Several interesting discussions are arranged for, and the social side is being looked after as only a Western City can do it. There is to be an outing to Fort Garry, and on Saturday, the 31st August, an excursion to Brandon given by the profession of the Prairie City.

The railways have promised a single fare return rate on the certificate plan, good going August 20th to August 28th, and good to return leaving not later than September 15th. If the all-rail going trip is taken and one desires to return by the Lake route, a ticket will be issued on payment of $4.25—just enough to include meals and berth. If one desires to return by rail the ticket is issued *free*. This makes it possible for everyone to attend and a large number should, for we all have friends who are expecting us to visit Manitoba, the North-West or British Columbia, to all parts of which return tickets will be issued *after* the meeting for single fare from Winnipeg upon presentation of the certificate of attendance.

The General Secretary, Dr. F. N. G. Starr, Biological Building, Toronto, will be glad to furnish information to persons intending to take advantage of this unusually cheap trip to the West.

The following are some of the papers that will be read:—

On Surgery, O. M. Jones, F.R.C.S., Victoria, B.C.

On Gynæcology, Dr. T. S. Cullen, Baltimore, Maryland.

On Medicine, Dr. J. R. Jones, Winnipeg, Man.

On Tuberculosis and Milk, Professor Russell, University of Wisconsin.

The Sanitarium Treatment of Tuberculosis, Dr. Richer, Montreal.

Tubercle in Summer Diarrhœa of Children, Dr. Blackader, Montreal.

The Present Small-Pox Epidemic, Dr. H. M. Bracken, St. Paul, Minn.

Hæmatology, Dr. L. H. Warner, New York.

Skin Diseases, with Lime-Light Illustrations, Dr. F. J. Shepherd, Montreal.

Robert U. Patterson, M.D., McGill, '98, who spent a year as House-Surgeon at the Montreal General Hospital and held a similar position in the Montreal Maternity for six months, has recently passed the Entrance Examination for the U.S. Army Medical Corps, held at Washington. Of the 135 men who presented themselves, only 19 passed, and we are pleased to note that Dr. Patterson heads the list of the successful candidates. During the year which has elapsed since leaving the hospital, Dr. Patterson has been asting as assistant to Dr. Vidal, at Belt, Montana, and while there suffered from a severe attack of typhoid fever.

Dr. Charles A. Peters, M.D., McGill, '98, after filling the position of House-Surgeon at the Montreal General Hospital for a year, proceeded to England, where he obtained the degrees of M.R.C.S. Eng., and L.R.C.P. Lond. in January, 1900. In February of the same year he volunteered for service in South Africa as a civil surgeon attached to the R.A.M.C.

While in Africa most of his term of service was spent at No. 5 General Hospital, Woodstock, a few miles from Cape Town. For three months he was assistant on No. 4 Hospital Train, making three trips of one month each up country. These trips carried him into all four colonies and gave him an opportunity of seeing the places where most of the important battles of the war took place.

In April, 1901, Dr. Peters was sent to England in charge of invalided troops on the transport Canada and there resigned his position in the service. He intends to practice in Montreal.

NEURASTHENIA.

BY

G. Everett Learmonth, B.A.

In dealing with such an extensive subject as neurasthenia it will be my best endeavour to give you as concise and as general a knowledge of this disease as is consistent with the time allowed me. Treating mainly the salient points:—

It has been said that neurasthenia is more a modern than an ancient disease, but, as Clifford Allbut remarks, "we cannot suppose that the symptom group to which the name "Neurasthenia" is given is in any exclusive sense the product of our own times. As insanity and epilepsy, so neurasthenia had no doubt its sphere in all ages, but unlike the sufferers from the former two diseases, which had somewhat of a sacred character and thus enjoyed a certain protection, neurasthenic persons would be harshly dealt with and thrust aside and escape even medical recognition. Even in our own highly enlightened times the neurasthenic does not receive the attention which he, in every way, deserves."

Physicians, and young physicians especially, are apt to regard this condition more or less lightly, and so over and over again we come across a neurasthenic whose condition has resolved itself into a chronic one of a severe type, and this due in the greatest measure to the fact that he has been improperly looked after and treated by his medical adviser. The recognition of Neurasthenia as a distinct and important disease, is the requisite which you ought always to have in mind, and that it is one which requires the highest scientific medical knowledge, the greatest tact, the keen sympathy and the strong personality of the physician to cope with.

Do not think that neurasthenia represents a motley group of symtoms which arise mainly in the imagination of the patient, if that be the case it were better that you never had a neurasthenic to advise in regard to treatment.

Clifford Albutt says "The varieties of the disease and the wheels within its wheels are so many, and in apparent diversity so bewildering, that the essential unity of the process long lay hidden and its features long eluded classification and analysis. Neurasthenia signifies a wide generalization drawn from a world of particulars,—particulars which are apt to gather in sub-groups forming fairly consistent and uniform

maladies subordinate to the main disease; and the nature of these several lesser constellations of symptoms is revealed only by a subtle analysis and a training in exact clinical observations." Although all these symptoms require the keen observations of the physician to differentiate, yet, be ever mindful that when early and scientific treatment is resorted to there will be a tendency towards their elimination and consequent disappearance.

THE TERM NEURASTHENIA.—But now passing on from the general to the particular. The term "Neurasthenia" has been frequently attributed to the fertile brain of Beard of New York. This, however, is not the case, for in the first edition of Dunglison's Medical Dictionary, published in 1833, we find it used, and even further back we find its use in some of the German text-books.

It can be truthfully said, though, that Beard did much to popularize the term, and he was the first to give an accurate description of neurasthenia as a symptom group. Beard's first work appeared in the *Boston Medical and Surgical Journal* in 1869.

DEFINITIONS:—Definitions of the disease are many, but perhaps the best that I have yet met with in any of the literature on the subject is that given by William Osler [2]. He defines it as a "condition of weakness or exhaustion of the nervous system, giving rise to various forms of mental and bodily inefficiency." Perhaps it would have been better had he made especial note of the "mental inefficiency," for in neurasthenia it is the mental rather than the "bodily" inefficiency that is of great import, though in many cases the mental is consequent upon or secondary to the bodily condition.

ETIOLOGY:—What is the etiology of this affection?

There can be no doubt as to the causation, for all authors agree that it may be due to causes of hereditary or of an acquired nature. We are all aware that of transmissible hereditary tendencies, that of a defective nervous organization is most frequently transmitted.

Heredity:—When due to hereditary influences it generally evidences itself between the years of fifteen and twenty, that is, during the period of greatest bodily and mental change. Some authors state that the greater number of cases met with come under this heading of heredity.

The main predisposing factors when due to heredity are parental neurosis, psychosis, and excesses of all kinds particularly in the sexual relations, lowering the resistance of the organism as a living entity, and here the pathogenic factors have a fruitful field which otherwise would have been sterile.

Gout, rheumatism, syphilis, and tuberculosis may act as predisposing factors in the offspring [3].

And so it is that parents who have led irrational lives and who have brought their vital forces to a low ebb, may transmit to their children a defective nervous organization—defective in nerve force. So much for the hereditary influences.

Perhaps in persons originally endowed with ample nervous volume, a dislocation of the nervous and sluggishness of the auxillary, processes of these systems, or some such retrogressive state of nutrition as Hodge and others have demonstrated in the nerve cells of overworked wasps, may be equivalent to an original defect of capacity. Of nervous matter, instability is the peculiar virtue, not irritability; the fault in neurasthenia is that the vibrations of the sense organs, instead of being absorbed into the larger harmonies of the nervous system, take to short circuiting, whereby their energy is wastefully dissipated.

Acquired.—Now coming to the acquired forms of causation, what I set down as one of the chief factors here is strain; be it in what direction it may, strain acts as a potent factor in the production of neurasthenia. By strain I mean either bodily or mental strain—exercise in excess of the normal output, it may be either in the form of mental worryment or overexercise of the body in athletics.

Neurasthenia may follow the infectious diseases, especially influenza and syphilis, and in some instances typhoid fever. Such disorders as alcoholism, morphinism, cocaine mania, and the like act as primarily active factors of the typical form.

Religious doubts and excessive worship at the shrine of Venus are causes; also prostatitis, gonorrhœa and masturbation. In women, excessive fecundity, dysmenorrhea and the menopause are brought to exercise a marked exciting influence. The modern French writers lay great stress upon the role played by the neuroarthritic diathesis in its causation.

To these is to be added traumatic neurasthenia or that form consequent upon trauma or injury, generally associated with severe railway accidents and the like.

I have said that syphilis is a cause but it is often incriminated when it is possible that the injudicious use of mercury [5] is more to be blamed. The acquired form is of occurrence usually between the ages of thirty and fifty, yet "senile" neurasthenia is common in persons of advanced age.

Collins and Phillips, in a careful study of 333 cases of neurasthenia, have given the various causes of the disease in these cases. They are set down as follows:—first of all giving the relative frequency in male and female.

Sex:—Males, 183, (55 per cent); married, 36 (23 per cent.); single, 87 (26 per cent.); females, 150 (45 per cent.); married, 103 (31 per

cent.); single, 48 (14 per cent). Showing that the disease is more frequent in men than in women; here the preponderence of males over females is very marked:

Age:—Oldest, 67; youngest, 6; average, 33.3, most frequent decade, third.

Frequency according to decades:—10 to 20 years, 6.6 per cent.; 20 to 30 years, 33.6 per cent.; 30 to 40 years, 27 per cent.; 40 to 50 years, 16.2 per cent.; 50 to 60 years, 8.4 per cent.; 60 to 70 years, 2.1 per cent.; showing that the extremes of life are practically exempt.

Occupation:—Housewives 34, (28 per cent.). Tailors, 37 (11 per cent.). Clerks, 26 (8 per cent.). Indoor occupations, 264 (79 per cent.). Nearly one-half of all the patients gave their nationality as American.

Attributed causes:—Overwork, 27; masturbation, 26; worry, 18; fright, 10; childbirth, 12; sorrow, 11; traumatism, 8; previous disease, 7; alcohol, 4.

The effect of overwork and masturbation (the authors include for convenience sake, so they state, other irregular forms of neurasthenia) are here shown as being the strongest factors. These statistics are most valuable and they but confirm our knowledge of the causative agents at work in the production of neurasthenia.

Charcot's Classic Symptomatology:—Before entering into a discussion of the symptoms which come under various headings, I think that it will be of some service if I give some of the general symptoms of the disease and these have been well-designated by Charcot as neurasthenic stigmata and are fundamental and typical symptoms. Such are the pain and pressure in the head, disturbances of sleep, spinal pain and spinal hyperæsthesia, the muscular weakness, the nervous dyspepsia, the disturbances of the genital organs and the typical mental phenomena, irritable humour, psychic depression, feelings of anxiety, intellectual fatigue, incapacity of decision, and the like. In addition to these cardinal symptoms of the disease, Charcot described as secondary or accessory symptoms the feelings of dizziness and vertigo, the neurasthenic asthenopia, the circulatory, respiratory, secretory and nutritive disturbances, disturbance of motility and sensation, the fever of neurasthenia and neuasthenic idiosyncrasies. The anxiety conditions and the various phobias as well as the different varieties of tic, and the occupation neuroses when they accompany neurasthenia, are regarded as complications dependent in the majority of cases upon faulty heredity.

Complex Symptomatology:—Above all we know that the chief characteristic of neurasthenia is its complex symptomatology. Various classifications have been made to designate the predominating symptoms of

the disease, but the one now generally adopted is the one after the plan of Beard's. So we have:—

A. The cerebral type where the mental symptoms predominate.

B. The spinal, where the spinal symptoms overrule.

C. The cardiac, where the heart symptoms and circulatory symptoms are most in evidence.

D. The gastro-intestinal, where the gastric and enteric symptoms are the most prominent.

E. The sexual type where we have a host of symptoms originating in the genitals most in evidence.

Altough neurasthenia is thus grouped you will seldom, if ever, find symptoms present which taken together, can all be put under one single heading. As a rule two or more of these groups are associated with one another; thus we may find the cerebral and the spinal types hand in hand, or the cerebral, gastric and cardiac types in conjunction, or again the sexual, gastro-intestinal, cardiac and cerebral symptoms in the same individual.

We expect to find one of these groups most in evidence and altogether predominant with the symptoms of one or more of the other groups associated with it.

I will now take up separately each of these groups and give the main symptoms found. Here space and time do not allow me to thoroughly discuss the symptoms in particular, I will therefore confine myself to the more general, though in certain cases where I deem it necessary, I will dwell somewhat at length on the particular.

The Cerebral type:—The most prominent and altogether characteristic symptom here found is mental fatigue, and it may vary from a slight though troublesome brain weariness to the very severe form where there is total inability to perform ordinary mental work. These patients are generally irritable and depressed and brood more or less over their trouble. This sensation of brain fatigue is familiar to many men, especially if they be short of sleep. Insomnia is generally present, and as a rule is very intractable. The patient will sleep for a few hours, then waken up at an early hour and be unable to go to sleep again. Headache is usual, but not very characteristic, it is diffuse and the patient will tell you that he feels as though he had a heavy helmet on his head or constricting band, the so-called "casque neurasthenique." Loss of memory is present in most cases and complained of, though when closely questioned it will be found as a rule that the memory is fairly accurate.

Introspection or the looking inwards, and dwelling upon the condition morbidly is characteristic, altogether the patient is self-centred.

The various obsessions or anxieties are typical of cerebral neurasthenia, especially claustrophobia and agorophobia: Many other phobias may be present.

Claustrophobia is the fear of being shut up in a church, theatre, etc. This gives rise frequently to visceral sensations, and associated with it may be oppression of the chest, panting or heart constraint or a disposition to diarrhœa, known as "church diarrhœa."

Agorophobia, or the fear of an open space. This is a most peculiar condition and evidences itself when the patient comes into an open space. He begins to have weakness at the knees and he trembles all over and in fact seems to be almost panic stricken.

Clifford Albutt cites several of these cases but he is at a loss to account for the causation. He thinks that perhaps the origin is in some disorder of adaptation of the ocular muscles.

Many other phobias or "fears" are cited by various authors, but I will not detail them here.

Vertigo is a common symptom of neurasthenia.

Hyperacusis, an overacute sense of hearing is also a common symptom. Alterations in taste and smell are frequently present.

Photophobia or a dread and dislike of light is sometimes present.

Certain eye symptoms are important and should certainly be made note of. An aching or weariness of the eye balls especially after reading and muscæ volitantes or floating spots are present.

The condition known as neurasthenic asthenopia is very frequently present. These are the more prominent symptoms of the cerebral type and now I pass on to the spinal type.

The Spinal Type:—The chief feature of this form are weariness of the legs and pains in the back, these patients are always weak and good for nothing in body. The pains in the back are dull, diffused aches, or an acute pain with tenderness, especially in certain spots in the upper dorsal spines, between the shoulders, or again across the pelvis; here the tenderness being in the lower lumbar spines or in the sacro-iliac synchrondroses. This latter site is especially frequent in traumatic cases.

There are various perverted sensations of which these patients complain:—of tingling in the legs, formication or creeping sensations and, remarkably, of coldness, even of icy coldness, as if he had been standing in cold water. The limbs go to sleep easily. Even the tongue is not infrequently the seat of numb sensations and so sometimes fears of cancer arise. The gait may be, and often is, very slow, and feeble and creeping, but is never ataxic or paralytic, except in the hemiplegic form or associated with hysteria. The reflexes in neurasthenia are never absent but are generally prone to excess.

In some cases muscular weakness is extreme and may proceed to complete motor helplessness.

The Cardiac Type.—We find that where this form is in evidence the hearts action is ordinarily rapid and easily quickened and very rarely is it slower than normal. Above all, the patient is too conscious of its action and this may give rise to the so-called cardiac anxiety condition. The pulse of the chest and neck may be visible. In some cases it has been noted that the arteries are relaxed and constricted in turn. A late case of mine in the Royal Victoria Hospital was that of a man, æt. 36, who, although in the surgical ward, was being treated for a rectal symptom, which I believe firmly, was entirely of a neurasthenic nature. He evidenced rather marked cardiac symptoms and complained of an inability to sleep well at night, owing to the fact that, as soon as he placed his head on the pillow, the heart beat was distinctly felt and caused him great distress. No rectal lesion could be discovered. No signs whatever of organic disease were present.

Irregularity, or intermittence of the pulse is also far from uncommon, though any contingent cause, such as tea or tobacco, should be considered.

Pseudo-angina pectoris is apt to occur in nervous exhaustion and may occur in young patients—neurotic subjects. Such patients recover, but after a hard time of pain and bondage.

Neurasthenia in its uncomplicated forms, presents no cardiac murmurs, hæmic, or other, but a marked tenderness on pressure at the apex, is common and characteristic.

The Gastro-intestinal Type:—Here we find that symptoms of pain, sinkings and acidities of the stomach are common. Digestion as a rule is usually slow, occupying as much as seven hours for the process. In other cases it is alleged that the food leaves the stomach too quickly. The gastric juice, may be normal perhaps usually, the common defect being in the motor function; or again, there may be a deficiency or an excess of hydrochloric acid. Constipation is most frequent in this variety although diarrhœa may sometimes be present. The later may coexist with the former, and is the so called "Church Diarrhœa" which I have made mention of already.

The curious connection of membranous colitis with neurasthenia so far has not been explained. It does seem as though there was some peculiar relation between them.

The connection of neurasthenia with spasm of the colon is a curious phenomenon, and the persistence of the general disease seems to hang upon our success with the bowel disorder.

In certain cases, generally of the metabolic variety of neurasthenia,

we may find a sausage-shaped tumour in the right iliac fossa, or perhaps in the sigmoid or splenic flexure of the colon, and of a pulpy consistence. Perhaps the physician will visit his patient again and again being sure that there is something there. Perhaps an abdominal section will be made and with negative results in respect of static mischief but happily with the effect of the complete and inexplicable cure. This may be compared to the disappearance of severe symptoms following a nephrotomy for aching kidney.

In some gastro-intestinal cases there may be extreme emaciation and refusal of food, and these cases approach the type of anorexia nervosa.

The theory of auto-intoxication comes in here in the discussion of the gastro-intestinal type. Briefly, this theory is as follows:—That there is some peculiar connection between the absorption of the products of fermentation from the bowel and neurasthenia. That an auto-intoxication does take place has not been fully proven, and research work in this direction will be looked to with interest. Clifford Allbut thinks that perverted catabolism (retrograde tissue change) may be at the root of it.

Glénard's disease or enteroptosis, is sometimes present in these gastro-intestinal cases. It is not actually a disease but a symptom group characterized by looseness of the mesenteric attachments so that the stomach, the intestines, particularly the transverse colon, the liver, kidneys, and the spleen occupy an abnormally low position in the abdominal cavity.

The sexual type:—It may be said that these cases are as full of vexation to the physician as they are to the patient, and indeed they are the most incurable of all. The symptoms which the patient complains of are many, and the sense of delicacy in most cases is a minus quantity. Most authors advise the examination of the patient's urine, not so much for albumin or for sugar as for less radical changes. Phosphaturia, oxaluria, or azoturia (increase of urea in the urine) may explain much.

The sexual neurasthenic is one of the most miserable of beings, for his sufferings are constant and with him always.

There is present in most of these cases a condition of irritability and weakness of the sexual organs. He will usually complain of having losses at night, followed usually by great depression and fatigue and a host of other symptoms. There are few more pitiable conditions into which a man may fall than that of sexual neurasthenia, and to raise him from this condition the physician requires to be almost especially endowed.

Time and good living and high ideals are potent factors in the cure of this disorder. Impotence in most cases is the rule, yet sometimes sexual activity is retained.

Irritable bladder is a symptom noted in this group especially in men. In women, ovarian tenderness is not a special feature of neurasthenia, though frequently the ovaries may be extremely sensitive and painful. The testicle in men may also be very painful, and this feature of the trouble is often met with. Perhaps you will be consulted by the sexual neurasthenic more than by any other class of neurasthenics, and what you have to do is to let the patient give you his fullest confidence and let him feel that it is so. Do not ridicule his symptoms, for to him they are only too real and cause him a world of suffering.

PROGNOSIS:—What Clifford Allbut has said about prognosis I heartily endorse, and that is:—"The patient who can lift his eyes to the future will recover; he whose thoughts writhe in the past is on the broad road to lunacy," and so in great measure it is.

The patient who has hope and feels that he will recover has more than fought the battle. There are many things to consider in deciding on a prognosis especially if the organic changes outlined have not had time to so undermine the functions of the organs secondarily involved, especially the stomach and kidneys as to compromise their physiological functions and nutrition and elimination of waste products, and proper prophylactic measures are strictly enforced in conjunction with judicious treatment. Altogether, we find that in those cases of simple and sudden neurasthenia the prognosis is especially good, but where the disease has gone on for a somewhat long period it is apt to run a chronic course.

Neurasthenia cannot be said to shorten life though it may empty it of its achievement. Neurasthenia, like phthisis and not a few other diseases, is a costly mischance, not only in the damage it does, but also in its demands.

PATHOLOGY:—The pathological lesions occurring in neurasthenia have so far not been at all definitely described.

That there are changes is certain. Such men as Gowers, Sajous, Dercum, Allbut, Osler, Church and Peterson and others, say that as yet we know next to nothing of the pathological lesions of neurasthenia. So far all is theory. The experiments of C. F. Hodge (7) perhaps may cast considerable light upon the condition, also those of A. Mosso (8). Neurasthenia does not stand in any relation with anæmia, chlorosis or other affection of the blood. It is supposed to have a pathology of its own, involving the nervous system directly.

Hodge's Theory:—Hodge's experiments were on the English sparrow, swallow and honey bee, the cat, etc. The spinal cells of cat, etc., were stimulated with electricity and this stimulation was prolonged. Irrespective of the animals selected, changes were discovered in the new cells, and, further, these changes were all the same; they involved the

nucleus, cell protoplasm, and even the cell capsule when present, and of each there was a diminution in size and irregularity of outline. Recovery of individual cells was slow, thus, perhaps, demonstrating the fact that the process of recovery in neurasthenia is very protracted.

Mosso's Theory:—Mosso thinks that neurasthenic symptoms are possibly one to blood changes. He found that the blood of a fatigued animal when injected into an animal at rest produced in the latter the characteristics symptoms of fatigue.

Gout and Neurasthenia:—That there is a strong connection between gout and neurasthenia is clear, and I myself have had an opportunity of seeing a case where symptoms of both troubles were present. Urine of neurasthenics often contains uric acid in great excess. We are led to believe from the researches of Horbachzewsky that it represents the chemical disintegration of the nuclein constituent of cells and if this be true its presence in excess in neurasthenia and the relation of gout to neurasthenia acquires a new significance.

DIAGNOSIS:—With the group of symptoms before you, such as I have mentioned as given by Charcot and which I enumerated above, there ought to be no great difficulty in making a diagnosis. Yet a differential diagnosis is frequently required and we have to differentiate between neurasthenia and many other important nervous diseases especially from melancholia, hysteria, general paresis, bromism, locomotor ataxia in its early stage, and hypochondria.

Carter Gray (9); gives some interesting facts in arriving at a correct diagnosis. The main diseases to differentiate are the following:—

Melancholia is characterized by obstinate insomnia, by some curious sensations as a pressure, a creeping ache up or down the back, or actual pain in the back and neck, sometimes running far down the spine and sometimes as far up as the vertex of the skull, by a characteristic melancholic facies, nervous and melancholic agitation or absolute silence, with or without cataleptic symptoms. None of these symptom groups are present in neurasthenia.

Von Hösslin has given an admirable differential diagnosis between hysteria and neurasthenia. And it is as follows:—

Hysteria.	*Neurasthenia.*
Occurs chiefly in women and always in adult life.	As frequent in men as in women.
Marked by its sudden onset perhaps with some sort of fit.	The onset, unless traumatic, is usually gradual.
Has a capricious irreguar course.	Course is more or less monotonous.
Hallucinations.	Absent.
Clavus, clavus hystericus a localized pain in head in hysteria.	Absent.

Globus, i.e., globus hystericus sensation as if a ball in the throat.	Absent.
Definite areas of anæsthesia.	Absent.
Concentric abolition of visual field.	Sometimes present.
Contractures present.	Absent.
Neurosis of joints.	Absent.
Palsies of groups of voluntary muscles.	Absent.
Hysterical fits.	Absent.
Disposition to exaggerate the malady and to crave for sympathy.	Disposition to melancholy and hypochondria.

To these might be added the fact that in hysteria persistent efforts against the disease are nearly always beneficial while in neurasthenia they are usually injurious.

In general paresis, Carter Gray (9), there is a marked stupidity either occasionally or continuously and tremor of the tongue and facial muscles, lost or unequal kneejerks, unequal pupils, a staggering gait and the patient is more stupid and has stupid delusions generally of some exalted type. No case of neurasthenia ever has these symptoms.

Bromism is generally detected by the stupidity, peculiar fœtid breath, and the widely dilated pupils. In the early stage of locomotor ataxia we will find loss of the kneejerk, lightning or stabbing pains, seldom repeated in the same place, usually severe in character, and with these there is often associated some difficulty in micturition or there will be distinct incoordination.

Hypochondria is a fixed delusive idea of a particular disease or local suffering, not mere arguable apprehensions now of this and now of that disease. It is a mental state attended with delusions and it may complicate or follow neurasthenia. Suicide may occur in either malady, though of course more frequently in melancholia.

Again, neurasthenia has frequently to be differentiated from primary dyspepsia, dilatation of the stomach,—in this latter the patient when neurasthenic, does not often vomit, although he may ruminate. Graves' disease is often difficult to discriminate, though agorophobia and claustrophobia are strong arguments in favor of neurasthenia.

TREATMENT:—I cannot emphasize too strongly the fact that neurasthenics are improperly treated by the great majority of physicians. A patient with neurasthenia should be treated with as much attention as a patient with endocarditis or typhoid fever. Above all, in the treatment of neurasthenia, individualization (6) comes into play, and we have to deal with the patient's many idiosyncrasies and failings,—individualization is more necessary to a sure success than in almost any other disease.

The physician who has neither the time nor the inclination to devote such attention and care to the neurasthenic patient should have the frankness and moral courage so to inform the patient and not keep him on, by promises of recovery, which he cannot back up with results; while the physician who feels that he is discharging his duty by telling the patient that his sufferings are "imaginary" and "trifling" can scarcely be said to have the modern conception of this neurosis and is therefore unfitted to deal with it. Let the patient feel that you are in sympathy with him and give him hope and you will soon have his greatest confidence and with this strong factor you may proceed to advise your patient what to do.

Briefly outlined the treatment followed out by the highest authorities is somewhat after the following:—

First of all seek out the cause, whether it be of an hereditary nature or an acquired one. In hereditary cases, if the patient come or is brought to you early in life, then the best methods you can pursue are in the form of prophylaxis. In these cases neurasthenia is more the expression of a permanent quality than of an intercurrent disease. There may be an exceeding keenness of intellect, exquisite taste, etc.,—yet it may be a life of intense ill-health; there may be intervals of brilliant effort and feverish exertion, then followed by exhaustion and apathy, irritability, depression of spirits and bodily suffering. When in hereditary cases we speak of cure we are understood to speak only of the attack on hand. The importance of forming an early prognosis in children and young persons in whom an hereditary proclivity of neurasthenia is present and detected, cannot be overestimated.

Prophylaxis then in these cases must be followed out. From early in life, every means possible should be resorted to, to strengthen the bodily and mental condition.

Exercise in the open air as much as possible, good food, plenty of sleep and not overmuch brain work. The personal hygiene of the patient should be carefully looked into. Intellectual hygienics should of course be of an easy nature. The amount of brain work should be limited. Cold bathing properly prescribed should be an important feature. All forms of outdoor exercise which are healthful and do not cause strain should be recommended.

Alcohol and all other stumulants should be avoided and this is most important. I should also mention that at the age of puberty, when constitutional disturbances so frequently evidence themselves, the patient should be strictly guarded and watched.

Treatment of the acquired form and of Neurasthenia in general.—Here again, seek out the cause and endeavour by every means to have it

eliminated, whether it be due to overwork and strain, to home worries, or to whatever cause. As I have said before, make the patient your confidant.

Rest is required, not so much in the simple forms of neurasthenia as in the more severe. In the former, good hygienic rules and plenty of work and concentration will often work wonders. In the more severe forms, absolute rest is generally essential, rest in bed, even with isolation for from 5 to 6 weeks.

The Weir Mitchell treatment of rest, massage and dieting seems to prove of especial value in those severe forms where there is emaciation and debility. I have gone through a great deal of literature on this point, i.e., in regard to the Weir Mitchell or Mitchell Playfair system of treatment and I find that a majority of authorities are against its practice in many cases, though of course modifications of it are of value, especially where the massage has been done away with, as this in many cases predisposes the patient to irritability and often causes consequent insomnia. I am told that Dr. Osler has had wonderful results at Johns Hopkins Hospital. Clifford Albutt says:—that in the cardiac and gastric forms of the disorder no other method can approach the Mitchell method in the comparative certainty of its results and the permanency.

Where the abdominal walls are lax and the splanchnic venous system over full, Mr. Barnard recommends abdominal massage and the adoption of belts to support the feebly acting abdominal walls.

Wet sheets, sitz baths (bathing in sitting posture) and douches are of great value if judiciously used in all kinds of neurasthenia, perhaps more especially in the sexual form, where cold stimulating baths are of especial value. Yet on the whole, in many cases of neurasthenia, where there is debility great judgment should be used in prescribing.

The part of electricity, so far as I can discover, is by most authorities used as only a subsidiary measure. Forms of static electricity are most advised. Faradic bath is said to be of great value. I could never advise any medical man to try the use of hypnotism in this disease, it is of but little if any value.

And now coming to the use of drugs. If possible avoid using them at all. Their part is entirely a subsidiary one and in relief rather than cure, their aid is to be found. Remember that in neurasthenia there is a lack of control of the higher cerebral functions and that the careless administration of drugs, especially of such drugs as morphine, the bromides and alcohol, may lead to disastrous results.

The bromides are of some value more so in the sexual form of neurasthenia; use them in small doses and for brief periods of time, the secret of success. They are also much used in cerebral cases. In spinal cases

with great leg weariness their use is very restricted. In the fretful and sleepless they are very helpful.

Arsenic is of especial value and is recommended by all authorities. Its use is of value in gastric cases—yet it should be used with the greatest care for a period of some weeks duration till the dose has been increased until at least five minims of Fowler's solution are taken after the principal meals. Many gastric cases are cured by the use of arsenic alone.

Valerian may be of service, especially in cerebral cases with loss of memory, vertigo, vague sensations, incapacity, confusions. Should be given in the form of ammoniated tincture and in good sized doses.

There are certain drugs especially opium, whose use is almost a peril to the patient yet in severe gastralgia you may be forced to its adoption given in a pill containing a grain or two of silver oxide with a fractional dose of opium and is of especial value.

Altogether flee opium as you would a deadly poison. Codeine may take the place of opium and is of value.

Phenacetin is of some value in relieving nervous pains. Before giving the patient any hypnotic you should adopt every means in your power to produce sleep by natural methods, and when administered, hypnotics should be given with the greatest care. With a gouty history—for neurasthenia and gout frequently bear a close relation to each other—tr. of colchicum, twenty minims given at bedtime is of value.

For the anæmia, strychnine sulphate with iron and quinine is of value. Yet strychnine I consider is of little value in many neurasthenic cases, though much has been said to the contrary. Quinine sulphate is of use in non-anæmic cases, in a dose of 1|50 gr. t.i.d. increasing to 1|30 gr.

Diet:—It is not to be forgotten that in nearly all cases, in all except the strong and the well-nourished man with a good appetite, our chief indication is to push feeding as far as the patient can bear it, much further than many patients are willing to accept. In fatty patients no malt liquors of any description should be given.

The least possible fluid should be granted with meals to these fat patients, but one to two pints a day of an alkaline mineral water should be taken on an empty stomach, on rising in the morning, at noon, and at bedtime. It may seem easy enough to write out a routine line of treatment—a treatment which, if followed out thoroughly and with the best judgment will, yea, is sure to, give good results. On the other hand, where careless measures are adopted, where little sympathy is shown, there may be a life to answer. I have seen such cases.

Perhaps I have not paid sufficient stress on mental diversion as a highly important factor in the treatment of this disease. If possible, aid the

patient in pursuing some healthy hobby, something that will bring him more into the open air and nearer to Nature. If he be fond of botanizing, etc., so much the better. What is to be sought after is the concentration of the patient's mind on such things as will give him pleasure and take his thoughts from himself. Whatever the patient's pursuit in the treatment may be, see that the mental diversion is one which will at least interest him.

No more cruel mistake has ever been made in medicine than that of driving exhausted neurasthenics into amusements which they are not only too wretched to enjoy, but which actually aggravate their symptoms, for it should be always fully realized that fatigue must be avoided as if it were a poison.

BIBLIOGRAPHY.

1. Clifford Albutt's "System of Medicine," Vol. viii., Ed. 1899, pp. 134-163.
2. Wm. Osler. "Practice of Medicine," Ed. 1899.
3. Sajous Annual Analytical Encyclopedia of Practical Medicine. Ed. 1900. Vol. V., p. 193.
4. Phillip Zenner, *Journal Am. Med. Association*, May 21st, 1898.
5. Ravogli, *Journal Am. Med. Association*, May 21st, 1898.
6. Collins and Phillips, *Medical Record*, March 25th, 1899, pp. 413-422.
7. C. F. Hodge, "A Microscopical study of changes due to functional activity in nerve cells," *Journal of Morphology*, 1892, Vol. VII., p. 95.
8. A. Mosso, "Die Ermue dung." Leipzig, 1892.
9. Carter Gray, *Medical News*, Dec. 16th, 1899.
10. Apostoli, *Annales de lElect*, Jan. 15th, 1898.