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THE
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Original Communications.

GLANDULAR FEVER OF CHILDREN.

BY ALEXANDER MCPHEDRAN, M.B.

TORONTO.

FROM time to time during the last few years, I have met with cases of febrile disturbance in children, with enlargement of the glands, for which no cause could be assigned. The following case is the most characteristic, and will serve as the basis of a few observations on the disease, or on the symptom group, if it is not entitled to rank as a disease.

Douglas M., aged 4, a strong, healthy boy, fell ill on January 16th last. He became feverish, refused food, was thirsty, and complained of pain in the neck, especially the left side. There were some pains in other parts. When seen on the 17th the temperature was 102.5 F. He sat with the head held fixedly, refusing to allow it to be turned to either side. The neck was

tender, and the glands along the anterior margin of the sterno-mastoid muscle of the left side were enlarged, firm, and tender, the gland at the angle of the jaw being most affected; it was quite large and sensitive. The glands on the right side were not affected, and those in other parts of the body showed no change. The pharynx and tonsils were slightly reddened, but not painful nor swollen. Movement of the jaws or swallowing did not give pain except as the neck was disturbed. The bowels were constipated, requiring rather large doses of medicine to move them. The tongue was coated, and there was no appetite. He slept fairly well. The spleen was palpable below the costal margin.

Calomel, followed by salines, was given to move the bowels, and phenacetine for rest and comfort. Next day the condition was about the same. The glands on the right side of the neck were somewhat swollen, but never attained the size of those on the left side. On the 19th the temperature was normal and the left cervical glands were smaller, except the one at the angle of the jaw; it was rather larger. Next day this gland had increased in size slightly, and was tender, and the temperature was slightly elevated again. The neck was more freely moveable. The other glands were becoming reduced in size. It was feared that suppuration had begun in this large gland. A coating of iodoform in flexile collodion was applied to it. Two days later (22nd) the temperature was normal and the gland slightly reduced in size. The neck was moved with more freedom, and there was general improvement. There was quite marked anæmia; it required a couple of weeks before the gland was restored to its normal condition.

There were two other boys in the family, eight and eleven respectively, but neither of them became affected. Three weeks later the eldest took mumps; the contagion spread to the second boy, and later the youngest, who had just recovered from the glandular fever, passed through a well-defined course of the disease, showing that the glandular affection afforded no protection against the parotitis.

The history of this case gives a fairly accurate description of the affection known as glandular fever. It was first described in 1889 by E. Pfeiffer,* who claimed that it was an acute specific fever until then unrecognized and gave it its name. The affection occurs in children under fourteen years of age. It sets in suddenly; the temperature is raised to even 103° or 104° F. There is loss of appetite, thirst, coated tongue, constipation, and severe general pains.

*Jahrbuch für Kinderheilkunde, Band xxix.

The neck becomes stiff and painful early, with tenderness along the anterior margin of the sterno-mastoid muscle on the left side, where, by the third or fourth day, the glands at the margin and underneath the middle of the muscle are found tender and enlarged. There may be slight redness of the fauces, but no swelling, and the redness soon disappears. The head is held rigidly. After three or four days the swelling of the glands begins to diminish. By this time those on the right side become enlarged and may in a day or two reach a size as large as that attained by those on the left side. There may be marked tenderness in the abdomen and the mesenteric glands may be found enlarged. The liver is enlarged in the great majority of cases and the spleen in more than half. The other cervical, the axillary and the inguinal glands may be affected. The disease runs a benign course, rarely terminating fatally, but the child is left in an anæmic state from which it may take some weeks to recover.

Even were the history of the affection more marked it would not be sufficient to prove it a specific disease. To do that it will be necessary first to find its specific cause. The bacteriology of it has not yet been studied. There is much difference of opinion as to the pathological basis on which the symptoms depend. It has been suggested that there is infection by an "attenuated" streptococcus through the tonsils. This, if true, renders the view that the affection is an acute specific one untenable. As the mesenteric glands are often swollen it has been thought that possibly absorption takes place by the intestine. The early affection of the left cervical gland led Koplik to suggest the thoracic duct as the seat of absorption. Even if it were it is scarcely clear why the left cervical glands should be earliest invaded as they are not in the track of the lymph currents from the duct.

On the whole the pharynx seems the most likely avenue by which the poison gains access to the system, but it may possibly be absorbed by other parts. That it is infectious can scarcely be doubted from its limited epidemic character, its constitutional effects, its uniform course, its benign history, the invariable disappearance of the glandular tumefaction without suppuration, the marked anæmia and rather protracted convalescence.

Of recent papers on the subject the most important are those by Park West, who reports ninety-six cases occurring in Eastern Ohio, in the years 1893 to 1896, and* by Dawson Williams† who reports three cases occurring in one family. In those reported by West, the

*Archives of Pediatrics, December, 1896.

†Lancet, London, January 16, 1897.

symptoms were generally typical, and all recovered except one, a delicate child, convalescing from scarlet fever. In none of them did the glands suppurate. The duration was from nine to twenty-seven days. The anæmia was marked and convalescence protracted. The incubation was about seven or eight days.

The treatment is purely symptomatic ; no remedies appear to have any specific effect on the cause or duration.

HOUSE SERVICE IN NEW YORK HOSPITALS.

BY DR. F. S. VAUX.

Residing Surgeon, Mount Sinai Hospital.

NEW YORK,

IN reply to enquiries regarding the hospitals of New York, the character of their service, and the requirements for admission as resident assistant, this paper has been prepared, and it is hoped that it may furnish the desired information.

The city of New York is divided for ambulance work into many districts, and a complete set of rules has been prepared to govern the admission of emergency cases into the hospitals.

A *per capita* grant is made for all such cases, and naturally those institutions which maintain ambulances are only too anxious to secure their share. Partial or over-zealous constables might cause considerable friction by calling the same ambulance for a succession of cases, or by summoning one from a favored but distant hospital. To avoid these contingencies, the policeman summoning an ambulance is limited to those in his own district, and in calling them must observe a certain rotation. Full telephone communication is provided, and as ambulances here, as in all large cities, have right of way over all vehicles, the response is pretty prompt.

Usually the facilities are ample, the ambulances responding to about seventy calls a day, but any epidemic taxes them severely. Such an one was the heat plague which raged last August for ten days, during which time 1,300 persons died and thousands were prostrated. At that time the police patrol wagons were put on service, each with a surgeon and assistant. They did good work, and it was suggested that ultimately police ambulances would be substituted for the hospital ones, but so far the plan has not matured.

Naturally, the hospitals are grouped in certain neighbourhoods, and in this respect the uptown movement has been marked, and will continue to be so. Hudsons' (Chambers St.) Hospital maintains one of the largest emergency services in America, and indeed one of the greatest in the world. Situated near City Hall, and in the busiest

portion of the city, the accident cases are so numerous as to constitute almost its entire service.

The Good Samaritan Dispensary, New York Hospital, Bellevue, St. Vincent's, and the Charity are the principal down town ones. Fifty-ninth street is the official boundary line between up town and down town, so that Roosevelt, situated on this street, might be classed as either. It really is an uptown one, and grouped with The Woman's, Mount Sinai, The Presbyterian, and the German Hospitals. Up on Morningside Heights, near the magnificent new buildings of Columbia, is St. Luke's, which with the Haslem, and other smaller ones, supply the neighborhood.

So much for a general view of the various hospitals; any further description would be out of place, and information to that effect must be found elsewhere. All the above mentioned institutions, and a host of additional ones, require a large number of young men as resident assistants, and for this purpose examinations are held yearly or semi-annually. A graduate desirous of acquiring a practical experience, has therefore a large field to choose from, and it is by no means rare for a man to avail himself of this fact, especially if successful in his first attempt. But as a usual thing the ambitious student, on entering college, looks carefully over the various hospitals, notes the character of their service and the opportunities offered, to say nothing of his own chance of success, and after settling upon one, works steadily for it during his entire course. If unsuccessful, he may, of course, try for another, as there are about 68 or 70 positions open yearly for competition.

By an agreement, however, entered upon last year between New York, Roosevelt, St. Luke's, and the Presbyterian Hospitals, these four held their examinations simultaneously on May 6. The quiz system is very popular here, and although the work is along general lines for the most part, yet during the last month the style of questions, etc., in certain hospitals, are studied, and men prepared more particularly for them. Formerly, when candidates were fewer and hospital positions less sought after, the appointments were made partly by examination and partly by influence; but now the latter feature is being rapidly eliminated. This is, indeed, a necessary act of self-defence on the part of the examining committee, as the agencies at work for a candidate were innumerable, and for months preceding, the examiners were besieged by letters and the friends of applicants. Now, in many hospitals, even the time-honored "letter of recommendation and certificate of moral character" is tabooed, though in others the farce is still kept up. A farce it certainly is, for

he is indeed a sorry specimen who has not got at least one friend that believes him everything which the committee could require. Either an appointment should be solely the gift of the director, or else be put up for an honest, non-partisan competitive examination, without reference to influence or testimonials. This latter plan is fast being adopted, and indeed, in one well known hospital, the chairman of the examining board expressed himself thus : " If a man brings a letter to me, I tear it up, and examine him all the more closely."

The appointments, however determined, are on the average, four in number, two commencing each six months, to fill the places of the retiring house surgeon and house physician. This retiring system is essentially American, and characterizes all their upper legislative bodies. Of this system I shall speak later, and compare it with that which prevails elsewhere. At present I will describe the system as one finds it, at the same time giving the daily routine of a large hospital, such as Mount Sinai.

As a rule the successful candidates in the order of merit of their examination may select either one of the following positions :

- (1) A service of eighteen months upon the medical division and six months upon the surgical, commencing July 1.
- (2) A similar service, commencing January 1.
- (3) A service of eighteen months upon the surgical division and six months upon the medical, commencing July 1.
- (4) A similar service, commencing January 1.

It will be seen therefore, that whatever service is chosen, a man gets a practical experience on the alternate one. This is a wise provision, for the surgeon must make physical examinations of his patients, and the physician will often be called on to do work requiring the most absolute asepsis and antisepsis in addition to surgical technique. Let us suppose a man to be appointed to the surgical division and commencing on the medical wards as junior provisional ; he accompanies the house physician and visiting physicians on their rounds and does such ward work as is allotted to him. There is also laboratory work, including a good deal of blood examination, besides the microscopic examination of sputa fæces, etc., and the careful and thorough analysis of stomach contents. At the expiration of six months he becomes junior on the surgical service, and has special charge of the eye and ear wards. In the mornings, rounds are made and dressings done. In the afternoon, the operating theatre claims his attention daily, from 2 to 6 p.m., here he is second assistant and administers anæsthesia to private patients.

In Mount Sinai more than in any other hospital, the house surgeon gets a good number of operations for himself, some abdominal work being generally included. He also has the opportunity of doing some rarer work, such as the catheterization of the ureters.

For the first half of his second year he serves as senior, and begins to face the responsibility which rests upon the house surgeon. His share of the work in the operating room is the handing of instruments, no light task when sixteen different operations may succeed each other in an afternoon. When the house surgeon operates the senior assists him and in his absence assumes charge of the entire service. It is essential, therefore, that he have a most exact knowledge of the cases, and in this respect he prepares himself for the arduous duties of the last term.

Once house surgeon he assumes a dignity and importance only previously dreamed of, finding himself first assistant in the most important and difficult operations, and in sole charge of about 120 patients. From morning to night he has scarcely a moment to himself and is under a constant mental strain. Yet it has its compensations, for, apart from the magnificent experience he acquires, a good deal of actual surgical work falls to his share.

A house surgeon will have on an average a dozen laparotomies, fifteen or twenty herniotomies, a total of 100 hemorrhoid operations and curettements, and minor gynæcological surgery. He also gets bone cases, and ward surgery of all kinds and has the opportunity of doing rarer work, such as the catheterization of the ureters.

At the conclusion of his course, the custom in Mount Sinai, is to present him with a silver mounted surgical bag and a good assortment of instruments in addition to the usual diploma.

It will not be necessary to go into the details of the medical work as this is practically the same in all hospitals. Suffice it to say that the house physician enjoys the fullest confidence of the visiting physicians, and has the treatment of about 100 patients practically in his own hands. His opportunities for acquiring special skill in diagnosis are thus very great and are made the most of. At the expiration of this service he receives the same present from the hospital as his confrere on the surgical side.

Having thus briefly described the "retiring system," as found in Mount Sinai and the majority of American Hospitals, I will endeavor to compare it with the annual appointment system which prevails in others. Opinions differ as to the merits of these systems and I have endeavored to tabulate the various arguments for and against them, as follows :

ADVANTAGES OF THE RETIRING SYSTEM.

(1) The concentration of authority and responsibility in one who has had ample experience and careful training.

(2) Four thoroughly trained and well equipped men are sent out from the hospital annually, where otherwise there would be ten or twelve graduates needing a course of further training.

(3) Privileges in operating in the treatment of cases are willingly afforded to a man of eighteen months' previous training, which would not be given to one whose whole term was but a year.

(4) These privileges attract a superior class of men, those who are ambitious and are willing to be subordinate for a considerable time in order to attain them.

DISADVANTAGES OF THE RETIRING SYSTEM.

(1) It tends strongly to take from all save the house surgeon* that keen interest which comes from a sense of responsibility.

(2) Junior members of the staff, while not having any voice in the treatment of the patients, are nevertheless expected to be thoroughly conversant with every case, its history and progress.

(3) So that at any moment they may accompany one of the visiting staff, and give an intelligent account of the cases. On the surgical service this information has to be acquired almost entirely on morning rounds, as during the afternoon the operating-room demands their attendance. As an average surgical or medical service is about 100 beds, with but few chronic cases, the demand is certainly very great.

(4) The service is entirely what the house surgeon makes it. If he is smart and quick in his work, pleasant and courteous in his dealings with his staff, and instructive in his remarks on the cases, the service will be one of great value and very pleasant. If these qualities be lacking in part, or altogether, the service suffers in these respects, and the work drags correspondingly.

(5) The work cannot be materially lightened by the addition of men to the staff, for each one has to accompany the house surgeon on his rounds as well as to be present at every operation. It is the amount of time consumed in looking on while someone else does the work which makes a man tired and lessens his interest.

ADVANTAGES OF THE ANNUAL APPOINTMENT SYSTEM.

(1) It develops that self-reliance and confidence which characterize the older practitioners, and which only comes from actual responsibility.

*For the sake of brevity the term "house surgeon" will be understood to include "house physician."

(2) When the staff are all on the same footing there is an *esprit de corps* and good fellowship which is harder to cultivate in a graded system.

(3) From the first the men begin to consult one another over their cases, knowing that their time is short and the opportunities golden.

(4) Ten or twelve men get a good practical course each year where otherwise four specialists would be graduated.

DISADVANTAGES OF THE ANNUAL APPOINTMENT SYSTEM.

(1) Men on entering the hospital have the same privileges and responsibilities as at the expiration of their term.

(2) In consequence these privileges and responsibilities are cut down to a minimum, especially on the surgical service, where one cannot attain to the dignity of first assistant or do even minor surgery himself.

(3) The ambitious man, who knows his own weak points and is anxious to continue on, is forced to leave just when he is beginning to appreciate the opportunities to be afforded him by another year's work.

(4) There being no senior to direct them, men fresh from college are unable to derive the amount of benefit from their work they otherwise would. Also errors in diagnosis and treatment are more likely to be made, thus militating against the best interests of the hospital.

In the above paragraphs I have endeavored to summarize the chief points to be considered in a comparison of hospital services.

To judge between these two systems is no easy matter, and still more difficult would it be to say which might be the better to adopt. Indeed no absolute rule can be laid down; each hospital must decide for itself as to which system will serve its end best.

The service which might answer in a hospital where one surgeon operates alone for six months might be well suited by a system which makes the house surgeon and his assistants practically the operator's own staff, and yet would never work in a hospital where four or more surgeons were continuously on duty and present every day.

The character of the hospital work must also be taken into account, and any special features. An institution which is essentially a teaching one, with hundreds of students in daily attendance, makes demands upon the staff, both visiting and resident, which can only be met by special measures. Fortunately we are now limited

to the above systems, but can devise whatever seems most fitting. From personal experience of both systems I am strongly in favor of one which retains the special features of our Canadian hospitals, and yet secures the supervision of a more experienced man. Briefly it is as follows :

(1) Retain the ward system, making the men in charge of them responsible for the histories, ward routine and minor treatment, also insisting on thorough blood work and urinalysis.

(2) Limit the number of patients under each junior physician to thirty ; hospitals gain in the end by it, through the better attention the patients receive.

(3) Abolish all clerical and dispensary work from the course, thus giving a longer time on the wards, and confining these branches to those to whom they more properly belong.

(4) At the end of the year hold a competitive, practical examination, embracing physical diagnosis and laboratory work, appointing the three men who show the most intimate knowledge of their cases, and possessing the best technique, as house surgeon, house physician, and house gynæcologist. Choice to be given in order of standing.

(5) The three so chosen would commence their second or senior year's work simultaneously with the new staff, and would have the entire charge of their respective services. They would visit the wards, accompany the attending staff, and assist them in all operations. They would also be held responsible for the new men, and direct their work.

The visiting staff could then know that the routine of treatment would not be disturbed at intervals, and thus their work be much lightened.

The fortunate ones appointed to these positions would leave at the close of their second year, finished men in their respective departments.

I am aware that it is difficult to change old customs, and I know that under the system in vogue most excellent work is done, yet from actual experience and close observation I am convinced that in a modification as described above lies the ideal system.

In conclusion, it may interest some to know about the requirements for admission to the principal New York hospital—Roosevelt.

The service here is divided into a general and gynæcological. The former embraces medicine and surgery, and is conducted in the usual manner ; a written paper first, on which a candidate must make

a certain percentage to be allowed to compete in the oral examination which is held next day.

Time of examination, latter part of May; average number of candidates, thirty; vacancies, four.

The gynæcological department has an entirely separate service, and there is but one vacancy. To fill this an examination is held annually in December; it is oral, consisting of about twenty questions, embracing every possible point in gynæcology, and is very severe. The candidate appointed serves six months as senior and second assistant. The last half of his term he is house gynæcologist, and is first assistant at nearly every operation; average number of candidates, four. A previous hospital experience of at least one year is required.

Mount Sinai. Competitive examinations, without reference to religion or nationality, are held annually. This year the written examination commenced on April 7, and the oral on April 8. Each examination consists of about twenty-five questions, embracing the principal branches. Five appointments are open; the average number of competitors is fifty.

New York Hospital, the Presbyterian, and St. Luke's hold their examinations simultaneously with Roosevelt. The services are practically the same, and each hospital offers four appointments. From thirty to forty men compete annually.

The Woman's Hospital is, as the name implies, gynæcological. The trustees hold semi-annual examinations—Jan. 1 and July 1. Letters as to moral character, etc., must be furnished.

The length of service is eighteen months, and here, as elsewhere, a diploma is given on graduation. The examination is oral, lasts about half an hour, and is intended to show a man's general knowledge. Two vacancies are open semi-annually. The house surgeon does not assist at all operations. This fact may account for the small number of candidates, usually five or six.

Bellevue. The service here is complex, and consists of four divisions—one for Bellevue students, another for University of New York, a third for graduates of the College of Physicians and Surgeons, and the last one is open for outside competition. Each of these divisions embraces medicine and surgery. The examination is held late in May, and about sixty men present themselves for it.

Allied to Bellevue is the Charity Hospital and the Island services, both affording large opportunities for practical experience.

Selected Articles.

THE RELATION OF LAW TO INSANITY.

DR. R. M. Bucke, Medical Superintendent Asylum for Insane, London, in the course of his highly interesting annual report, makes the following pertinent remarks upon the relation of law to insanity.

As is well known to all persons, such as criminal lawyers and experts in insanity, whose calling requires them to take part in trials for crime, the law as at present existent in England and Canada rests upon answers by the judges to certain questions put to them by the House of Lords in the year 1843; such questions having arisen in the course of a debate in that House upon the trial of McNaughton for the wilful murder of Edward Drummond. In the course of these answers, which are too long to be quoted *in extenso*, the judges say: "To establish a defense on the ground of insanity it must be clearly proved that at the time of the committing of the act the accused party was laboring under such a defect of reason from disease of the mind as *not* to know the nature and quality of the act he was doing, or if he did know it that he did not know he was doing what was wrong." And this is virtually the law in Canada (as well as in England) to-day, the above sentence having been admitted almost verbatim into our criminal code of 1892 in the following clause: "No person shall be convicted of an offense by reason of an act done or committed by him when laboring under natural imbecility, or disease of the mind, to such an extent as to render him incapable of appreciating the nature and quality of the act or omission, and of knowing that such act or omission was wrong." Stands the law, and it is as certain as anything can be that under it irresponsible lunatics are year by year convicted of murder and hung. For of what use is it that the committer of the act shall know (as nearly all committers of such acts do) its nature and quality and that it is wrong if, through mental aberration, the result of the disease, he is irresistibly urged to commit it? or if his self-control is

by the same cause so undermined that provocation (perhaps quite trivial) being given, or temptation existing, he simply cannot resist the impulse to commit it.

In order to specifically test the value of the above criterion of responsibility laid down by the law of England and Canada, I, during the months of April, May, and June last past, examined every patient during that time resident in London Asylum, the total number aggregating one thousand and thirty-four persons, five hundred and sixty-nine of whom were women and four hundred and sixty-five men. I found that of these patients seven hundred and sixty-three were able to realize and appreciate the nature and quality of such an act as homicide, and to understand that such an act is wrong and wicked. In some of these persons the appreciation and realization while clearly existent was dimmed and blunted by the disease present, but in much more than half of them such appreciation and realization was as vivid as it is in the ordinary healthy man and woman. Of the remaining two hundred and seventy-one patients I found that one hundred and twenty-one, while fully able to express an opinion on the subject, seemed (either *ab initio* or as a result of their diseased state) destitute of moral feeling, and these disclaimed any sense of repulsion from such an act as well as any feeling or knowledge of its wrongfulness. The other one hundred and fifty patients (making up the full number) could (for various reasons) give no, or no intelligible, answers to the questions propounded to them. The reasons for this inability were various—a few of the patients were deaf mutes, others were aphasic, some were obstinate and would not speak, still others were debarred from speech by their delusions, and a considerable number were so demented that they were unable to understand the questions. The main fact is that of 1,034 patients, 763 (nearly three-quarters) are, according to the law of the land, responsible for such an act as homicide, and under that law would be liable to be executed for such an act. But the law of the same land says that these are not responsible men and women, that they are not capable of the responsibilities of life, and locks them up, many of them for life, in an asylum. The law cannot be right in both these (contradictory) assumptions. Not one of these 763 persons could legally, even if he were discharged from the asylum, or had never been admitted into it, his mental condition remaining as it is, sell a farm, make a will, or devote money which is rightfully his to any purpose, however good, to which he may desire to appropriate it—for all such and similar purposes these people have no standing before the law, but any one of them might, unless the accident of being committed to an asylum should save

him, be legally tried, convicted, and hung for a so-called crime by him committed. For his own purpose, from the point of view of the civil law, he is irresponsible, incompetent; from the point of view of the criminal law, on the other hand, he is responsible, competent. Is not this an anomalous and hard position for the lunatic? Where he wishes to be responsible and competent, the law says no, you can be and are neither; where he wishes not to be competent and responsible the law says, you are both.

It may be (as intimated above) that the lunatic confined in an asylum at the time of such homicide as supposed would not or could not be convicted of murder and hung, the point is that men suffering with the same disease and to the same degree as these are placed in the position which I have pointed out. But why should the bare fact of having been sent to an asylum make this immense difference in amenability to law? The committal to the asylum did not make the patient any more insane. Lunatics outside asylums are as truly mad and as truly irresponsible as those confined within these institutions. Many lunatics (as insane as any) are never sent to an asylum, and many others not until they have been insane ten, fifteen, and twenty years, and not then because they are more insane than they have been for years, but (probably) because the family has become impoverished by the continued care of the patient, because someone who had special care of him had died, or for some similar reason.

And the fact of the man's insanity and absolute irresponsibility, even as this is defined by the law, may, and probably will have no effect in saving him from a conviction. Only the other day in Canada a man was so found guilty and sentenced to death who was not only a lunatic (he having both delusions of persecution and aural and visual hallucinations) but was also congenitally imbecile to such a degree that according even to the words of the code he was irresponsible. In that case the facts of mental incompetency were so patent that the experts brought by the Crown to combat the evidence given for the defense declined to enter the witness box, thus acknowledging that the evidence given for the defense was unassailable. In spite of this the prisoner was found guilty and sentenced to death. Had this man been (as he ought to have been) an inmate of an asylum and there committed the same (so-called) crime he probably would never have been even tried—and it was not his fault that he was not in an asylum. Or had this man, being (as he was) at large, entered into a contract or made a will, and had the validity of such business transaction been questioned in a court his competence would undoubtedly have been denied.

TRACHEOTOMY vs. INTUBATION.*

BY DR. SEVESTRE.

Physician to the Sick Children's Hospital, Paris.

SINCE its introduction and employment successfully by Bretonneau, afterwards brought into common use and given an honorable position by Trousseau, tracheotomy has remained the only means at our disposal for overcoming laryngeal asphyxia in croup until the last few years.

In 1858 Bouchut proposed, under the name "tubage of the larynx," another method consisting of introducing, through the mouth, a tube into the larynx and thus re-establishing the air passage. In a paper presented before the Academy of Medicine, Bouchut reported two cases which appeared to him to establish :

(a) The ease with which tubage could be performed, the tube being held in place by the inferior vocal cords and not interfering with the function of the epiglottis.

(b) The tolerance of this tube by the larynx.

(c) The possibility of overcoming asphyxia by this means in preference to tracheotomy.

(d) The ease with which large collections of false membrane formed in the trachea and bronchi can pass out by this tube.

(e) The usefulness of this resource to physicians, who, in small villages far from help, can employ this method.

The new invention was violently attacked by Trousseau. The apostle of tracheotomy could not allow anything to lessen the importance of an operation which he had, after great exertion, succeeded in pushing to the front in the treatment of croup. He brought into the fight all the resources of his powerful intellect, and backed by an authority which could not be denied, despite the opposition of Malgaigne, he succeeded in obtaining a vote from the academy embracing the following conclusion :

(a) Tubage, as at present used, does not appear to us as sufficiently useful or sufficiently free from danger to merit the approval of this academy.

* Translated from *Progres Medical* by W. J. Greig, B.A., M.B.

(b) Tracheotomy, in the present state of science, is the proper thing to do when there is no longer any hope from the employment of medical methods.

These conclusions, reached after a long discussion, were considered by everyone as a formal condemnation of intubation. It must be remembered, however, that there were certain reservations, as if they feared the development of the future, and as if it was evident that the instruments of Bouchut were far from being perfect, and that his observations were neither sufficiently numerous nor sufficiently conclusive to carry conviction, and that, in brief, the method had not been sufficiently tried. During the discussion Malgaigne had used these words: "What an example does the history of lithotrity give us! Who knows but that tubage may be some day for croup, what lithotrity is to-day for stone in the bladder?"

Events justified his words. In 1881, O'Dwyer, a New York specialist, conceived the same idea as Bouchut, and without apparent knowledge of the work of the Frenchman, invented, or rather re-invented, tubage under the name of Intubation of the Larynx. But better-advised and more patient he did not hurriedly publish his method. He worked with zeal, obtained the best combination of instruments, and perfected his method to such an extent that within the last few years it has been used over the whole world without any important modification. When he had collected an imposing number of favorable results he announced the principles and the application of his new methods. Thus, while the discovery of tubage is due to Bouchut, the popularization of the method is due to O'Dwyer. He is more than a popularizer, and it is only fair to say, as they said at the Berlin Congress, tubage has two fathers, Bouchut and O'Dwyer.

Intubation was practised at once in America, and was not slow in almost completely replacing tracheotomy. Since, it has spread in England, Germany, Austria, and Russia, but has few advocates in France, where very few attempts have been made to use it. Jacques (of Marseilles) was the only one to regularly use it for a long time, whilst it made headway in Italy, Spain, and everywhere except France, until the end of the year 1894. At that time serum-therapy was being used by many physicians, and a new era began in the operative treatment of croup. The operation was nothing more than an expedient to prevent the patient dying asphyxiated, but did not hold out to him the hope of ultimate recovery by its assistance. It was used simply as a means to gain time, to prolong life until the serum began to act and could save him. Generally two or three

days were gained, often only twenty-four hours, and under these circumstances if this could be accomplished without injury the advantage was not to be despised.

Thus tubage, so far very little known in France, began to be used. The first attempts were few in number ; but quickly tubage began to supplant tracheotomy. In Paris, for two years past, in the two children's hospitals, tubage is the rule, tracheotomy the exception.

It seems to us that the moment has come to compare the two methods, judging from our experience in the two children's hospitals. From statistics compiled by M. Gillet, Prescott, and Goodthwaite, making a total of 48,690 cases, the result was practically the same in the two operations, viz : Thirty per cent. of recoveries. This was prior to serum-therapy. Statistics subsequent to this cannot be obtained because, practically, tubage is the only operation performed ; tracheotomy being done in cases where intubation was impossible or did not relieve the child.

It is different, however, when we study the elements of danger which enter into each operation, either at the time or subsequently. Tracheotomy is often difficult and futile in unforeseen accidents. A trained and experienced operator will generally triumph over all difficulties, whereas a physician possibly months or years without experience will often fail. If he does not make his incision with absolute precision, if he deviates ever so little from the median line, he will commit an irreparable error, and will thus seriously affect the final result. The end will be the same if his assistant does not hold the head immovable, perfectly straight, extended enough, but not too much. Hæmorrhage may occur, syncope, asphyxia, or apnœa. Even after the introduction of the cannula, the child may remain for some time in a state of apparent death, requiring every effort to resuscitate him. In short, the cleverest and most experienced operator is never certain of a successful result. Archambault, with his enormous experience, always took the precaution of informing the parents that the child might die in his hands.

As to tubage, it is much easier. Assuredly it is also a delicate operation, requiring great precision. But if one has taken care to train his hand, and if he proceeds with gentleness and care, he can not meet with any serious result. Two conditions are essential to do tubage well. The index finger of the left hand must possess great delicacy of touch, so that it can be quickly hooked around the epiglottis, the arytenoids serving as landmarks. The right hand, holding the introducer, must be trained to hold the instrument with-

out stiffness, and with an easy grasp, yet firm enough to assure precision of movement. It is an easy matter to train the left index. For the right hand, it is important to accustom oneself to manipulate the instrument and to perform the proper movements under the eye, finishing on a phantom furnished with a rubber larynx or in the cadaver. With such a training it is safe to practise on the living. The most frequent accident with beginners is to intubate the œsophagus. It is, then, easily seen that the child is not relieved, and also that the weight of the instrument in the gullet gradually draws the thread downwards. False passages in the larynx may result in hæmorrhage, but this can only occur where the manipulations are rough and awkward; vomiting produced by the tube in the larynx must be mentioned; fainting may occur as in tracheotomy, but it depends more on the state of the child than on the operation.

Increase of dyspnœa may follow tubage owing to displaced false membrane. This is a grave accident, but it generally happens that on withdrawing the tube, the child will cough violently, and reject the membrane. Following this also relief may be sufficient for a time to enable us to do without the tube. On the other hand, if a second attempt to intubate does not succeed, it will be necessary to do tracheotomy. This, however, is rarely necessary. To conclude, intubation is easier to do than tracheotomy, and there is less danger from serious accident. Moreover, the incision in tracheotomy gives an absorbing surface from which secondary infections may occur, and it is true that broncho-pneumonia is more frequent after it than after tubage. Again, when for pulmonary or other causes it is necessary to use cold applications to the neck and chest, the opening in the trachea is an insuperable barrier.

No matter how superior tubage may be to tracheotomy, there is one point which must not be forgotten. It must be insisted on. After the latter the child can be left to the care of the mother or of an intelligent nurse. Nothing is necessary but to remove the internal cannula if it becomes blocked. Instructions relating to food and air are easily followed. After tubage, the child must be the object of *very special care*. Not only on account of the difficulty in swallowing which can be overcome by certain artifices, but most serious accidents may occur. The tube is quite commonly rejected. Sometimes along with it a quantity of membrane is thrown off, which will enable the child to breathe easily, yet more often the tube must be instantly reinserted. Again, the tube may become blocked either slowly or suddenly.

False membranes detached from the trachea or bronchus by the

influence of serum can generally pass through the tube, notwithstanding its small calibre. But sometimes the tube becomes blocked suddenly at the lower end. The tube must then be removed. If that were all, the method of doing this could be taught to the nurse, but often it is necessary to re-intubate and for that a physician is necessary. When the obstruction occurs slowly, by successive deposits of mucus or debris of the false membrane on the inner face of the tube, the danger is less urgent, but exists nevertheless.

In short, an intubated child should always be under the direct and immediate care of a physician who can intubate or of other persons who can do the operation.

This is possible in a hospital when the interne can be on the spot in a few minutes; besides, it is necessary that the ward-guard must not be far away and moreover that other persons in the hospital service should be practised in intubation, to be performed at the first sign of obstruction of the tube.

But in a town or country practice where the physician cannot remain for two or three days at least, by the bed-side, intubation should be renounced in favor of tracheotomy.

Tracheotomy may be useful on certain other rare occasions. It sometimes happens, that from a very severe laryngeal spasm or other reasons that the tube cannot be put into the larynx. If after several failures, the necessity still exists, tracheotomy should be done before the child becomes exhausted.

Also in those cases where the child is not relieved by tubage, perhaps from the existence of membrane in the lower part of the trachea or in the bronchus. Under these conditions it is to be feared that tracheotomy will not be more successful than intubation, but it should be tried.

Tracheotomy is also indicated where there is reason to suppose, either before or after tubage, that the trachea contains much mucus or large masses of false membrane, which would be very apt to block the tube.

In other cases, the tube will be rejected every time for some reason which is not well defined. In other cases after a prolonged stay in the larynx, the tube cannot be removed without danger of asphyxia, either from spasm or tracheal contraction. In these cases tracheotomy should be done.

In conclusion we desire to say: Intubation is (without any doubt) the method of choice in operation for croup, but it should not be done when the case cannot be under the direct and immediate care of a physician accustomed to the operation.

In default of these conditions tracheotomy should be preferred.

THE CAUSATION OF CHLOROFORM SYNCOPE.*

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INTRODUCTION.

THE whole endeavor of this paper is directed towards the establishment of the true pathological cause of chloroform syncope, and the controversion of one of the most pernicious and dangerous doctrines ever put before the medical profession. This doctrine, so long received by many with credence, is that chloroform kills by paralysing the respiratory centre. Supported by the wealth of the Hyderabad Government, furthered by the prejudiced enthusiasm of Surgeon-Lieutenant-Colonel Lawrie, this statement, upheld by a series of experiments, many so careless in execution that they could not for one moment be accepted by a trained physiologist—this doctrine that the paralysis of the respiratory centre causes chloroform syncope, has been industriously spread abroad, and instilled into the minds of the whole medical world.

Chloroform syncope is a subject on which every medical man must have more or less clinical experience. It is one, therefore, that naturally each feels qualified to discuss or to write about in the medical journals. What is wanted at their hands is a careful record of the symptoms observed in chloroform syncope, rather than an addition to the mass of literature dealing with the theory of the subject.

Chloroform is a drug used by the young anæsthetist with the utmost hardiness, and until he has the misfortune in his practice to meet with a death caused by it, he derides the danger of the drug, and asserts that its safety merely depends on the care and skill of the administrator. After losing his patient he falls to descanting upon the unavoidable dangers of the drug, dangers which he is now the first to maintain cannot be met by any degree of skill in admin-

* An address delivered before the Society of Anæsthetists, London, February 18th, 1897, on the results of an experimental inquiry carried out by Leonard Hill, with the assistance of Harold Barnard, M.S., F.R.C.S., and C. Wall, B.A., of the London Hospital.

istration. In a certain institution in Great Britain, in the course of a recent year, there were out of some three or four thousand administrations no fewer than twelve fatalities. This is no exceptional case. The deaths from chloroform are not recorded in the medical journals, for these reflect upon the reputation of the administrator and the institution in which they occur. In America, on the other hand, so convinced are the medical men of the danger of the drug, that I understand from a distinguished American surgeon, Dr. Keen, that the use of chloroform as an anæsthetic is practically abolished there. In my discussion of the subject I shall confine myself purely to the experimental side of the question. It must, in the first case, be admitted that results of experiments upon animals are directly applicable to man. The point to consider is whether these experiments are done by competent and trained inquirers.

APPLICATION OF EXPERIMENTAL OBSERVATIONS TO MAN.

My scientific experience in every direction leads me to give an absolute denial to the too common teaching of theorists and declamations of clinicians that the results of experimental inquiry on animals are inapplicable to man. It is simply a confession of ignorance on the part of the clinician, who, knowing so little of experimental physiology to enable him to elucidate the clinical problem before him, upholds this cry. An example of how such error may arise is to be found on examining the effect of respiration on sphygmographic curves. On forced expiration occurring, the sphygmographic curve of the radial artery of man rises; on the other hand, in an animal the arterial pressure falls. For years this has been pointed to as exhibiting a distinct contradiction in the results obtained from men and animals; but agreement will be brought about on every point the moment the fact is grasped that the radial artery is accompanied by *venæ comites*, and that the *venæ comites* swell owing to the obstruction of the venous flow. This obstruction itself is due to the rise of intrathoracic pressure.

It is by the swelling of the *venæ comites* that the pad of the sphygmograph is elevated, and not by the rise of tension in the radial artery. This fact has lately been proved by a research carried out by Dr. Sequeira, Mr. Barnard, and myself, a research which demonstrates that the venous pressure can never be neglected in the reading of sphygmographic curves or in diagnosis of the condition of the pulse by means of the finger.¹ Out of the enormous mass of literature that deals with the question of chloroform, very few papers can be found based on true experimental inquiry. I shall briefly

summarize the results contained in these papers which have definitely added to our knowledge of this subject.

FALL OF ARTERIAL PRESSURE PRODUCED BY CHLOROFORM.

Before the rise of the graphic method Snow recorded a series of valuable observations made by direct inspection of animals who were submitted to the influence of chloroform vapor.² He found that when the animal inhaled air containing 3 to 6 per cent. vapor of chloroform, the respiration ceased while the heart sounds remained distinctly audible. When the quantity of vapor inhaled reached 8 to 10 per cent. the heart became extremely feeble, and the heart sounds might even disappear before the respiration ceased. So soon as the graphic method of recording the blood pressure was introduced, it became established by the Glasgow Committee and others that the arterial pressure falls during the administration of chloroform.

This fact is determined beyond all criticism. No one has ever introduced any evidence to the contrary. According to the Hyderabad Commission, as the fall of arterial pressure continues the animal first becomes insensible, then the respiration gradually ceases, and, lastly, the heart stops beating. What is the reason of this fall of arterial pressure which always occurs when a large dose of chloroform is given? The Commission ventured to give no opinion, but concluded :

“From all their experiments that the effects of chloroform are first exerted upon the nervous tissues. The vasomotor centre is very soon involved, the respiratory centre becomes paralyzed, and then the muscular tissue becomes affected, and last of all the heart.”

This is the statement that requires to be strenuously denied. One of the most valuable contributions which testify against this creed has been contributed by MacWilliam.³ This author opened the thorax, established artificial respiration, and either directly observed or recorded the extent of dilatation of the cavities of the heart. He found that when chloroform vapor was administered in an amount under 4 per cent., the heart exhibited pronounced dilatation by the time that the conjunctival reflex was abolished. Evidence of dilatation was obtained when chloroform was given in the ordinary amounts that are required to produce anæsthesia, and at a time when the arterial pressure had not fallen to any marked extent. When the dilatation became extreme the heart failed in its function as a central organ of the circulation. Though it continued to rhythmically contract, its action was feeble and entirely ineffective, and its cavities remained engorged with blood.

The dilatation occurred to the same extent after division of both vagi. Since the dilatation is not sudden in origin, and the organ, in spite of its functional inefficiency, beats rhythmically, it is clear that the method employed by the Hyderabad Commission of observing the movements of the heart by passing needles through the thorax into the cardiac muscle may lead to the most deceptive conclusions. The heart continues to contract and to agitate the needles, while its power of maintaining the circulation has completely vanished.

According to MacWilliam the fall of arterial pressure is in its earlier stages due mainly to the depressing effect of the anæsthetic on the vasomotor centre. The stage of depression is often preceded by a period of slight stimulation. The later stages are associated with failure of the heart as well as of the vasomotor centre. MacWilliam's experimental evidence for the failure of the vasomotor centre is as follows: "During the earlier stages of the fall of arterial pressure he produced a considerable rise of arterial pressure by firmly compressing the abdomen. If the heart was still but little affected by the poison the tension rose—as in the classical experiments of Stephen Hales—because by this compression the input into the right heart from the abdominal veins was increased, and the output from the abdominal aorta diminished. In a later stage, when the heart was poisoned, abdominal compression failed to produce any rise of arterial tension.

PARALYTIC DILATATION OF THE HEART.

In several animals MacWilliam observed sudden failure of the heart during the primary anæsthetization, while the respiration continued unaffected. On rapidly opening the thorax of these animals he found the heart to be in a state of paralytic dilatation. He managed to revive the circulation by rhythmically compressing the heart. In some cases this did not prove successful, as the heart remained paralyzed. The Commission confess that:

"It is impossible to say whether, after chloroform has been pushed and then discontinued, the respiration will be restored spontaneously or not, and it is never in any case certain that artificial respiration will restore the natural respiration and blood pressure, no matter how soon it commenced after the respiration stops. A great deal depends upon the after-fall (of arterial pressure); in some cases even after the respiration has been restored the pressure continues to fall and respiration again ceases, and artificial respiration then fails."

This exactly describes the results obtained by MacWilliam. In

these cases, according to this writer, where artificial respiration failed the heart had passed too far into a state of paralytic dilatation. The direct action of chloroform on the frog heart has been illustrated by a beautiful series of researches carried out by Sydney Ringer. The results of his experiments have become a subject of ordinary demonstration to my physiological students. In Ringer's tracings ⁴ is shown the comparative effect of ether and chloroform on the frog heart. In the first tracing Ringer showed the paralysis of the heart due to the addition of $1\frac{1}{2}$ c.cm. of chloroform to the nutritive fluid which circulated through that organ. The heart passed into a condition of paralytic dilatation. The second tracing demonstrates that 50 c.cm. of pure ether are required to arrest the heart. In no case did ether produce dilatation of the organ. This is supported by the fact that MacWilliam also obtained no evidence of dilatation during the inhalation of ether.

The whole frog heart can be immersed in pure chloroform and yet not immediately die. This is naturally so, because the concentrated drug, by killing and coagulating the protoplasm on the outside of the heart, forms a layer which protects the heart from the further action of the drug. Thus the crude experiment of pouring chloroform into the pericardium of the mammal led to a negative result in the hands of the Commission. To have a rapid effect the chloroform must be diluted and circulated through the coronary arteries, for thus it reaches every single muscle cell in the organ.

RESPIRATORY AND CARDIAC FAILURE.

The experiments of Gaskell and Shore⁵ are of the greatest interest and importance. On injection of chloroform into the cerebral arteries, the drug carried directly towards the brain first excited and then paralyzed the bulbar centres. Respiration became spasmodic and then stopped, the arterial pressure rose and finally fell, the heart was slowed and finally accelerated. In the hands of Cash and Dunstan amyl nitrite produced the same sequence of effects; amyl nitrite is the most powerful of dilators when introduced into the general circulation. These results are exactly similar to those produced by acute anæmia of the spinal bulb. After ligature of both carotids and both subclavian arteries, the sequence of symptoms follows the same course. But a fact unnoticed by Gaskell and Shore, but observed by me in many of my experiments on cerebral anæmia, is this. In certain animals, especially in those in a condition of shock, paralysis and not excitation of the vasomotor centre occurs immediately on the establishment of the anæmia as on the

injection of chloroform. In these cases the fall of arterial pressure is the primary and the failure of respiration the secondary symptom.⁶ In contrast to the effects obtained from injection of chloroform into the cerebral arteries, it was found by Gaskell and Shore that similar injections of the drug into the jugular vein in very small quantities produces a fall of arterial pressure, and diminution of the excursion of the pulse and of the respiratory undulations. The respiration frequently ceased after the heart beats had become no longer visible. This observation I confirm in every particular. I have constantly used this method to kill animals with the greatest rapidity at the end of experiments. The Hyderabad Commission failed to obtain this effect, although they injected 20 c.cm. of pure chloroform into the jugular vein in successive doses. The cause of this failure is to be found in the ignorance of precise physiological methods which was unfortunately betrayed throughout much of the work of the Commission. In Gaskell and Shore's experiments chloroform freely diluted was injected into the intact jugular vein, through which the blood was freely circulating. By the Commission, on the other hand, it was pure chloroform that was injected into the jugular vein after ligation of that vein above the seat of injection. In the one case the drug was carried directly to the heart, in the latter it remained in the vein. By Hare and Thornton⁷ this experiment has been made more than a hundred times, and the heart has in all cases rapidly failed. These authors found that

"Injection into the jugular veins of more than 2 to 4 c.cm. of chloroform caused arrest of inspiration, rapidly followed by cardiac arrest, which was not secondary to the respiratory failure but to a primary action of chloroform upon the heart muscle."

In regard to these experiments it must be remembered that the use of a needle by the Commission as an indicator of cardiac action is entirely fallacious. After injection into the jugular vein Hare and Thornton record that the heart is so widely dilated as to fill the pericardium almost to the point of bursting, and the cavities (particularly the ventricles) are engorged with blood. Although they may still be feebly contracting, the contraction is abortive, and fails to cause arterial flow. "Chloroform," they write, "is capable of causing death of the cardiac muscle whenever it comes in contact with it, and that there is no possibility of this arrest being due to vagal irritation is proved by experiments in which vagal section preceded the use of chloroform."

The most brilliant part of Gaskell and Shore's work is the contrivance of their cross-circulation experiments. They take two dogs,

“the fed and the feeder.” In the fed dog the carotid and the subclavian arteries are ligatured. One or more of these vessels are then connected by rubber tubes to one or more of the same arteries of the feeder. The jugular veins of the two animals are also put in connection. The blood of the feeder is rendered incoagulable by the injection of peptone or leech extract. By this means the circulation through the brain of the fed dog is maintained by the blood propelled from the heart of the feeder. The circulation through the rest of the body of the fed dog remains in its normal condition. If chloroform be now inhaled by the fed dog the drug circulates through the heart and the blood vessels of the lungs, abdomen, and the limbs of the dog. Its brain is supplied by the uncontaminated blood of the feeder. Under these conditions the heart of the fed dog passes into paralytic dilatation, while its respiratory movements are maintained unimpaired by the respiratory centre in the spinal bulb. If, on the other hand, the feeder be made to inhale chloroform, while the fed is given none whatever, the arterial pressure in the feeder will then fall, and the bulbar centres in the fed dog are first excited and then paralyzed by the drug derived from the feeder which circulates through them. In this case the arterial pressure of the fed dog rises while its respiration is paralyzed. By these ingenious experiments, which were several times repeated, these authors conclude that the heart is rapidly paralyzed by chloroform, that the respiratory centre is paralyzed, while the vasomotor is not only not paralyzed but rather excited to increased action. “There is no evidence,” they write, “that direct vascular dilatation, owing to the presence of chloroform in the blood, plays any great part in the fall of blood pressure.” This last statement is refuted by my experiments. An interesting fact which they notice, and one which has been frequently confirmed by myself in my researches on cerebral anæmia, is that the respiratory centre is much more easily affected by chloroform when its blood supply is to a large extent diminished.

In reference to the cross-section experiments, the objection has been raised that the blood supply to the spinal bulb is not entirely cut off by a ligation of the carotid and subclavian arteries. This objection carries no weight. It is perfectly true that by way of the anterior spinal artery a certain amount of blood does reach the spinal bulb. This does not to the slightest degree invalidate the main results of the research. On giving chloroform to the fed animal, the circulation is rapidly paralyzed, while the respiratory centre is maintained in full activity by the blood of the feeder. This is the one fact of importance, proved without any possibility of controver-

sion, that while the respiration remains in full force the circulatory mechanism poisoned by chloroform fails in a very short space of time to maintain its efficiency. If some of the blood of the fed animal did reach the spinal bulb, so much the worse for the respiratory centre, but we see that in spite of such contamination the respiration continued to act in an efficient manner. If the Hyderabad Commission failed to obtain these results on repetition of this experiment, which is one contrived by Shore, and Gaskell, who, to quote Lawrie himself, is "one of the two greatest physiologists in the world," the failure is only a further proof of the incompetence of the experimenters employed by the Commission.

SUMMARY OF PREVIOUS INQUIRIES.

From this review of past researches we can build up the following statement :

(1) Paralysis and dilatation of the heart resultant on the administration of chloroform is affirmed by MacWilliam, Ringer, Hare, and Thornton, Gaskell, and Shore.

(2) Paralysis of the vasomotor centre as a further result is affirmed by MacWilliam, Hare, and Thornton, and denied by Gaskell and Shore.

(3) Paralysis of the respiratory centre as another result is admitted by every experimenter.

(4) The Hyderabad Commission maintain that death is due to the failure of respiration, that cardiac failure is secondary and is a matter of no importance, as it never occurs during ordinary anæsthetization with chloroform. This is denied by MacWilliam and by Gaskell and Shore, who maintain that cardiac failure is the primary cause of death. To these may be added the opinion of Lauder Brunton—a compromise—that the weakening of the respiration causes an insufficient aeration of the blood, which in its turn gives rise to heart failure through the combined action of asphyxia and chloroform.

NEW EXPERIMENTAL OBSERVATIONS.

I shall now turn to my own experimental work in relation to chloroform. This research forms one of a series of researches which for the last few years I have been carrying out on the influence of gravity on the circulation.

If a dog be affixed to a board which can be swung round a horizontal axis, and cannulæ be inserted down the jugular vein and carotid artery and connected with manometers, and if the intravascular openings of these cannulæ be placed in the axis of rotation,

then the following points can be recorded.⁸ (The animal, during the period of observation, is, it must be noted, narcotized with morphine.)

(1) On dropping the animal into the vertical feet-down posture the arterial pressure falls to a slight extent, and then rises again almost to the normal level. A typical experiment may be demonstrated by the following figures :

The arterial pressure in the horizontal position equalled 140 mm. Hg. ; in the vertical feet-down position it fell to 120 mm. Hg., and then rose to 130 mm. Hg. The pressure in the superior vena cava fell about 8 mm. Hg., and remained at that level so long as the animal was in the vertical position. Both pressures were immediately restored directly the animal was returned to the horizontal position.

That the hydrostatic effect of gravity exerts no greater result depends on the integrity of both the vasomotor centre and the respiratory pump. This is shown by the results obtained in the following typical experiment :

The splanchnic nerves are divided through lumbar incisions. After this lesion is performed the arterial pressure in the horizontal position equalled 94 mm. Hg., while in the feet-down position it fell to 44 mm. On compression of the abdomen the pressure rose to 106 mm. On withdrawing the compression it fell again to 40 mm. On dividing the abdominal wall by a crucial incision the pressure fell to 16 mm. Finally, on rapidly opening the pleural cavity, the pressure fell to zero, and the circulation ceased, to be restored once more to 44 mm. by the resumption of the horizontal position.

By this experiment it was proved that the hydrostatic effect of gravity becomes of vital importance when the vasomotor tone of the splanchnic area is destroyed. When, in addition, the respiratory pump is thrown out of gear, the circulation in the feet-down position becomes impossible. In this wise is the circulation aided by the respiratory pump. We have seen that abdominal compression with the hand restores the arterial pressure to normal. The input from the veins into the right heart is increased, the outflow from the arteries into the abdominal capillaries is diminished. By powerful expiratory movements of the abdominal muscle the animal accomplishes the same manœuvre. At the same time by inspiratory movements of the thorax the blood is sucked as well as compressed into the right heart. This typical form of respiration is always manifest when the splanchnic vasomotor tone is abolished,

and the animal placed in the vertical feet-down position. The compensatory mechanisms can be abolished by one stroke of the knife, dividing the spinal cord at the level of the first dorsal vertebra. On dropping the animal then into the vertical feet-down position the arterial pressure falls to the zero line. By violent contractions of the diaphragm, excited by the anæmia of the bulbar centres, the heart may be sufficiently filled to produce, for a brief period of time, a series of effectual beats, and then once and for all the circulation fails. In one experiment the arterial pressure after division of the cord, done whilst the animal was in the horizontal posture, equalled 80 mm. Hg. The pressure fell to zero at once when the animal was dropped into the feet-down posture. By violent diaphragmatic respirations the arterial pressure was raised to 6 mm. The respiratory centre soon became paralyzed, and the circulation ceased. The empty heart, however, continued to beat vainly, and on returning the animal two minutes later to the horizontal position the heart was filled, the circulation renewed, and the arterial tension raised to its former level. This manœuvre is one which can be repeated several times. The animal can, as it were, be slain and brought to life again at will. If the thorax be opened the heart can be seen to fill or empty as the animal is turned into the horizontal or feet-down position. Now I know of no agent which can so rapidly abolish the compensatory mechanism for gravity as chloroform.

“To take an example : During ordinary anæsthetization with this drug the arterial pressure in the horizontal position equalled 92 mm. Hg., and in the feet-down position 17 mm. Hg. Compressing of the abdomen with a bandage caused the pressure to be maintained at 80 mm. Hg. On removal of the compression the pressure immediately fell again to 17 mm. Hg. Therefore during morphine narcosis the hydrostatic effect of gravity may produce a fall of pressure equal to only 10 mm. Hg., while during chloroform anæsthetization the fall may be as great as 75 mm. Hg.”

That the blood stagnates in the abdomen when the compensation for gravity is abolished is shown by the effect of abdominal compression. It is also shown by the fact that if, while the animal is in the feet-down position the vena cava inferior be clipped, no rise of pressure will take place on raising the animal into the horizontal position until the clip is removed. In the horizontal position compression of the abdomen will produce a rise of only about 16 mm. Hg.; in the vertical feet-up position the rise will be of about 3 mm. Hg.; while in the feet-down position there will be a rise of about 65 mm. Hg.

The effect of pushing chloroform is shown in the following type of experiment :

“In the horizontal position during morphine narcosis the pressure equalled 186 mm. Hg. ; in the feet-down position it represented 174 mm. Hg. On then pushing chloroform the pressure rapidly fell to 30 mm. Hg. At this point the respiration ceased. On returning the animal to the horizontal position the pressure rose to 56 mm. Hg., and the respiration immediately started again.”

This experiment, typical of many which I have performed, shows that the paralysis of the respiratory centre depends not only on the chloroform which is circulating through and poisoning the centre, but also on the height of the blood pressure. By lowering the tension the circulation through the centre becomes inefficient and the respiration fails. By raising the tension the circulation through the centre is once more rendered efficient and the respiration is renewed. The depth of anæsthesia likewise depends on the depth of the fall of blood pressure.

Now, on examining the tracings of the Hyderabad Commission, I find an absolute agreement between their results and my own. In their curves the arterial pressure is seen, when the chloroform is pushed, to fall rapidly and greatly ; the respiration stops when the pressure has reached a level not far removed from the zero line. When the chloroform inhaler is then withdrawn and the arterial pressure slowly rises from the excitation of the asphyxial blood, respiration starts once more. In their tracings and in my tracings respiration can be seen to cease at a certain pressure, and to start again when the tension once more rises to nearly that same pressure.

Although the tracings are so much alike, the interpretations are widely different. The Hyderabad Commission, engaged on a wild goose-chase to prove that respiration ceases before the heart fails, find in their tracings the proof that the failure of respiration is the primary cause of death. I, on the other hand, maintain that not only my own tracings, but theirs, too, conclusively prove that the failure of circulation is the primary cause of the failure of the respiratory centre.

I do not wish to deny for one minute that chloroform damages the respiratory centre and weakens the respirations, but the point that I insist upon is that the respirations would not cease at the moment when they do cease were not the centre damaged by the concomitant fall of arterial tension. The contrast between the effects of ether and chloroform on the compensatory mechanism for

the hydrostatic effect of gravity is most marked. If the subject be in the horizontal position, and the chloroform pushed, rapid fall of arterial tension will follow, and if in the feet-down position the fall becomes precipitous. In the feet-down position the fall becomes indeed so precipitous that the curve rapidly approaches the zero line, and the respiration then ceases. On the other hand, on pushing ether, the fall of tension is far more gradual, and on dropping the animal into the feet-down position the tension does not fall to anything like the extent that it would do after administering chloroform, and the respirations do not cease. Thus in two contrast experiments, on using ether in the first case the pressure fell from 125 mm. to 100 mm. during a period in which, on using chloroform, in the second case the pressure fell from 162 mm. Hg. to 30 mm. Hg. On pushing the chloroform, respiration stopped when the tension equalled 30 mm. Hg., while it was perfectly efficient at that tension on pushing ether. With both drugs the fall of pressure and the damage of compensatory mechanism are the same in character, but in the case of ether the onset is far less intense than it is in the case of chloroform. On turning the animal into a horizontal position, or on compressing the abdomen, the contrast between the result of the two drugs is very striking. In the case of ether the heart is undamaged, and the arterial tension is restored by either means to normal. In the case of chloroform the heart is damaged, and the pressure is not only not restored to normal, but in some cases, on the application of compression, it falls to zero owing to paralytic dilatation of the heart. A normal heart cannot possibly, by means of compressing the abdomen, be thrown into paralytic dilatation, while in the case of a heart poisoned by chloroform, this accident is one which not infrequently may occur.

The Hyderabad Commission carried out a few experiments on the effect of the alteration of the position during chloroform narcosis. The workers paid no attention to the fact of the absolute necessity of placing the arterial cannula in the axis round which the animal is turned. Their experiments were thus vitiated by the hydrostatic effect of gravity on the column of fluid in the tube which connected the cannula with the manometer. By the neglect of such a simple precaution the experiments on this point were rendered entirely worthless. During the course of a prolonged experiment I have always found that the compensatory effect for gravity becomes less and less, until finally in the feet-down position it is too inefficient to maintain the circulation. This increasing vasomotor paralysis I take to be the sign of the approach of what is commonly

known as a condition of shock. During this condition of shock inhalation of chloroform is the last straw to abolish the compensatory mechanism. The Commission attempted to instantaneously produce shock by such operations as drawing teeth, crushing testicles, or evulsing nails. In animals such operations, owing to excitation of the sensory nerves, merely induce a rise of blood pressure. A condition of shock is never by such means brought about in animals rapidly, but only in the course of an hour or so. In applying the conclusions drawn from these experiments and extended to man the Commission neglected the state of emotional fear which in human beings frequently precedes anæsthetization, which may by temporarily establishing vasomotor paralysis produce syncope. During emotional fear, if the patient be in the erect posture, the face will blanch, the heart empty, beat rapidly and feebly, and the blood pass into the abdomen. If, then, the horizontal position be taken up, and the abdomen compressed, the circulation is renewed and the syncope abolished. If chloroform be administered to a man sitting in a dentist's chair in a state of acute fear, it is easy to see how the drug may produce a fatal condition of syncope. The vasomotor mechanism is, owing to the state of fear, partly inhibited; the blood under the influence of gravity is stagnating in the abdomen, the heart is ill-filled, and the bulbar centres are anæmic. On inhalation of chloroform partial paralysis of the vasomotor mechanism may pass into total paralysis, and while the anæmic heart may pass into paralytic dilatation the anæmic respiratory centre will cease to act.

CARDIAC INHIBITION.

It is stated by the Hyderabad Commission that inhalation of chloroform has no effect on the length of the period in which the heart can be maintained in arrest by electrical excitation of the vagus. To this statement I must give a direct denial. On arrest of the heart in the morphinized dog these conditions arise: The arterial tension falls to zero, the pressure in the superior vena cava rises, and the respiratory centre is excited, as is the case in asphyxia, to the discharge of forcible expiratory spasms. By means of these spasms the venous pressure is greatly raised, and while the right heart is filled from the veins and compressed, the left heart is filled with blood from the compressed lungs. By such means the heart is rapidly excited to escape; if the respiratory spasms are prevented by making a section of the spinal cord at the level of the first dorsal vertebra, the period of inhibition is then enormously prolonged. In the same way, inhalation of chloroform prolongs the period of

inhibition, the blood pressure is lowered, the respiratory centre is weakened, the spasms on arrest of the heart do not occur, and escape does not readily take place. I have by means of chloroform very greatly prolonged the period of inhibition. In all such comparative experiments on the effect of excitation, it is absolutely necessary to stimulate the vagus with clip electrodes, so arranged that the nerve cannot shift from off the wires, and so constructed that the current is insulated and protected from short circuiting through the surrounding tissues. The Hyderabad Commission stimulated the vagus in the crudest fashion with electrodes held in the hands of an experimenter. During the first stage of pushing chloroform in a strong animal free from shock the bulbar centres are frequently excited by sensory stimulation of the nerve endings of the vagus in the respiratory tract. It follows that the respiration becomes spasmodic, the animal struggles, the heart is slowed by vagus inhibition, the arterial pressure first rises and then falls. It is suggested by the Commission that vagal inhibition is a safeguard, for it prevents by decreasing the velocity of flow, the chloroform being swept away in dangerous doses from the lungs by the circulation. The Commission denies that vagal inhibition can ever bring about death. I agree that the amount of cardiac inhibition excited by pushing chloroform is of no importance, and never entails syncope. At the same time, I have been able to kill animals by repeated and prolonged vagal arrest of the heart. The respiratory centre in these cases fails to act, since it becomes paralyzed by the anæmia of the bulbar centres. The heart is not killed by vagal inhibition but by asphyxia. In one experiment the spinal cord was divided at the level of the first dorsal vertebra, the heart was arrested by vagal excitation for five minutes, and the respiration entirely ceased. Finally the heart escaped, but the respiratory centre failed to recover. If in such a case artificial respiration be supplied the circulation recovers, the tension rises, and respiration starts once more. Such complete vagal arrest of the heart is never induced by chloroform, and therefore these experiments are of no clinical interest.

FATAL SYNCOPE IN AN EARLY STAGE.

In one year, out of 41 recorded deaths from chloroform syncope, 39 occurred during the primary stage of anæsthetization and before the surgeon had touched the patient. In those cases where syncope occurs during the course of a prolonged anæsthetization the patient can in nearly every instance be recovered by artificial

respiration. It is where syncope arises during primary anæsthetization that the danger of death is far greater.

In dogs this holds equally true. In my experience fatal syncope is usually met with during the primary anæsthetization. The method of administering chloroform to animals is at the start a crude performance compared to the method applied in the case of man ; and thus chloroform syncope is a phenomenon which can be very frequently studied by an experimentalist. My own experience of this primary syncope has been very great, in fact I have made a point of endeavoring to obtain the results which may give me the opportunity of studying the syncope and the methods of recovery. What is the difference between syncope in primary anæsthetization and that which occurs during prolonged anæsthetization ? Clinically this is the one question of vital importance. On this question the Hyderabad Commission throws no light whatever. The Commission writes :

“ In all cases of accidental death the usual chloroformist was absent, and no one was attending to the chloroform. The notes would have been more complete if some one could have watched the condition of the animal and noted the gradual but unheeded cessation of respiration without calling attention to it. As it is one has to be content with the remark that the breathing was noticed to have stopped at some particular time, but there is nothing to throw any light upon the condition during the important period that immediately preceded this discovery. A similar hiatus appears in the account of accidental deaths in the human subject, and is unavoidable. These cases are probably identical with the instances referred to by Snow, in which animals died in a sudden, and what was thought unaccountable, manner whilst chloroform was given to prevent the pain and struggles which would be occasioned by physiological experiments. There is no evidence whatever that death in a single one of them was due to paralysis or certain stoppage of the heart, as Snow assumes to have been the case.”

In this statement it seems to me the Commission gives away their whole case. They never observed these accidental deaths ; they left the primary anæsthetization to the hands of somebody who was not the usual chloroformist, and may have been the laboratory servant. In all cases of chloroform syncope occurring during primary anæsthetization I have carefully observed the symptoms. Either the pulse ceases before the respiration or the two cease together. By artificial respiration, and especially by rhythmic compression, first of the abdomen and then of the heart, I have some-

times maintained normal respiratory movements for three, five, or even ten minutes, while the circulatory mechanism has remained in a state of hopeless paralysis. On rapidly opening the thoracic cavity I have always found the heart to be as MacWilliam describes—in a state of paralytic dilatation. The cardiac musculature of the heart may rhythmically twitch, but entirely fails to empty its cavities. In these cases of primary syncope, and similarly in man, the course of events is almost always found to be as follows: Concentrated vapor of chloroform is applied to the respiratory orifice, the nerve endings of the sensory fibres of the vagus in the respiratory tract are powerfully excited. The animal struggles, the glottis is closed, and by the violent contraction of the muscles the intrathoracic pressure is raised. The animal performs the typical Valsalva experiment, and holds in its breath as long as it can. The effect of raising intrathoracic pressure is to diminish the output from the right heart, congest the venous system, and lower the arterial tension; the lungs are also compressed, and, to a large extent, are emptied of blood. Blood supply to the coronary arteries is diminished; this is due to the fall of arterial tension. The oxygen in the blood is decreased owing to the prolonged holding of the breath. By these means the nutrition of the heart is impaired.

Finally, on account of the excitation of the respiratory centre caused by the asphyxial blood, the animal is forced to take two or three deep inspirations. The lungs are immediately surcharged with chloroform vapor, and the blood reaches the coronary arteries carrying a dose of chloroform sufficient to throw the heart into paralytic dilatation.

SYNCOPE DURING PROLONGED ANÆSTHETIZATION.

The arterial tension is low and the respiration shallow. As a resultant of these conditions chloroform, however far pushed, never reaches the coronary arteries in an overwhelming dose. On the other hand, the arterial pressure falls to a further extent, the respiratory centre ceases to act, and the animal gradually and not suddenly enters into a state of syncope. In the one form of syncope artificial respiration frequently fails on account of the paralytic dilatation of the heart; in the other form, if the symptoms are noticed in time, artificial respiration is uniformly successful. It must, of course, be admitted that the form of syncope first described is not universally met with during primary anæsthetization. The syncope here again may be gradual in onset, and due to vasomotor and respiratory paralysis rather than to cardiac failure.

It has been suggested that chloroform produces dilatation of the right heart by causing pulmonary constriction, and so obstructing the blood flow through the lungs. There is no evidence of this. The lungs after death are found to be pale and empty of blood, not because of the vasomotor constriction of the pulmonary vessels, but in consequence of the animal dying with the thorax in the expiratory position. If the trachea be clamped at the height of a forcible expiration there may be only one-sixtieth of the weight of the whole blood of the body within the lungs. If, on the other hand, during a deep inspiration the trachea be clamped there may be as much as one-tenth of the whole blood within the lungs. It has taken the whole experimental acumen of such excellent workers as Bradford and Dean and Francois-Franck to demonstrate the existence of a pulmonary vasomotor mechanism at all, and while it has been proved to exist it has been found to be extremely feeble.

That the failure of the circulation is not secondary to the failure of the respiration, or brought about by asphyxia, is shown by the ensuing considerations. On pushing chloroform in an already anesthetized animal the blood pressure can be lowered to zero, and the circulation will cease in a very short time after the respiration has ceased. In such a case we have no asphyxial rise of blood pressure, and no asphyxial convulsion on the part of the animal. Now in a curarized animal, in which no struggling occurs, on cessation of artificial respiration the heart continues to beat for a very long period. On re-establishing artificial respiration I have seen the heart recover even when more than fifteen to twenty minutes have elapsed after the cessation of the respiration, but in no case is it possible to recover an animal from chloroform poisoning after cessation of respiration, unless artificial respiration be established at the end of an interval of at most two or three minutes. If the heart be thrown into paralytic dilatation the artificial respiration must be applied far earlier than this. This is a proof conclusive that chloroform paralyzes the circulating mechanism far more rapidly than does asphyxia in a non-struggling animal. In a struggling animal during simple asphyxia the heart is of course far more rapidly paralyzed owing to the rapid diminution of oxygen in the blood and the impediment to the circulation, which is caused by the rise of intrathoracic pressure during the violent expiratory spasms.

TREATMENT OF SYNCOPE.

From the previous experimental discussions in this paper, I believe it is conclusively proved that chloroform may paralyze the

heart, the vasomotor mechanism, and the respiratory centre. I will now say a few words as to the possible means of recovery from cardiac syncope. If it happened that we simply had to deal with failure of the respiration this would be no matter of grave danger to the patient. Artificial respiration will remove the danger. If simple vasomotor paralysis occur concomitantly with failure of respiration, as is always the case, artificial respiration combined with slight elevation of the abdomen to a level above that of the heart would immediately restore the patient to safety. It is when the clinician has to deal with the paralytic dilatation of the heart that the gravest danger has to be faced. As it is impossible to diagnose whether this condition may exist or not, every case of chloroform syncope should be treated as if it did exist. Recovery can be brought about, and, so far as my own experience goes, practically in almost all cases, by following this simple procedure. At the moment syncope occurs the patient must be placed in the horizontal position, and artificial respiration applied. The chest must be rhythmically compressed by placing the hands on each side of the thorax, so that the heart may share in the compression, and the circulation through that organ may by artificial means be maintained to a certain extent. If this is not quickly successful in restoring the pulse and natural breathing, the patient should be turned into the vertical feet-down position. By this simple means the dilated right heart will be emptied into the abdominal veins. Whilst this is taking place, artificial respiration must be maintained. I have frequently seen the paralyzed heart start beating again on thus emptying it of the blood. After a few seconds the patient should be returned to the horizontal position, and the right heart will thus be refilled with a fresh supply of venous blood. By means of the artificial respiration this blood is driven on through the lungs to the left heart, and thence into the coronary arteries. If this manœuvre does not prove successful at the first attempt, it must be repeated. Since I have adopted this method I have scarcely failed to recover a single case of chloroform syncope. The success enormously depends, of course, on the swiftness with which the condition of syncope is recognized. Nelaton's inversion, or the feet-up position, is only a safe measure in cases of syncope arising from vasomotor paralysis. Either inversion or compression of the abdomen are fatal mistakes in cases of cardiac failure. I have shown by a series of experiments that a poisoned heart is with the greatest ease thrown into paralytic dilatation by compressing the abdomen.

By rhythmically and artificially compressing the thorax or the

heart, I found it possible to maintain an arterial tension of 20 to 30 mm. Hg. This causes the coronary arteries to be flushed with fresh blood, and the heart to be excited to spontaneous contraction. After the circulation has thus been renewed, the respiration frequently remains in abeyance because the arterial tension is too low to excite the centre to activity. In this condition the best plan is to cease artificial respiration, and carefully observe the pulse. The arterial tension, on account of the asphyxia, will rise, and when it has reached a certain level, spontaneous respiration will start once more. If by any chance the pulse should show signs of again flagging artificial respiration must be immediately resumed for another period.

As to the danger of administering chloroform I entirely agree with the Hyderabad Commission that the inhaler should only be applied when the respiration is quiet, should be removed entirely if the patient show any sign of struggling. If this precaution be always taken deaths from chloroform would become far more rare; nevertheless, it must always be looked upon by the inexperienced as a most dangerous drug, and one the use of which should be avoided whenever ether can be appropriately substituted. Pure chloroform, I have found, kills in exactly the same way as impure chloroform. The A.C.E. mixture, on the other hand, is safer than pure chloroform, simply because the latter drug is diluted, and therefore is not given in a concentrated form. Chloroform is the predominant partner in the mixture, and when A.C.E. is pushed the animal dies with all the symptoms of chloroform syncope.

CONCLUSIONS.

(1) Chloroform produces a primary failure of the circulating mechanism and a secondary failure of the respiratory centre. The respiratory centre fails to act not only because it is damaged by the drug, but because of the anæmia of the spinal bulb produced by the fall of arterial tension. This is proved by the fact that the action of the respiratory centre can be renewed by raising the arterial tension. The depth of anæsthesia depends, as does the paralysis of the respiratory centre, on the primary fall of the arterial tension.

(2) Chloroform, more than any other known agent, rapidly abolishes the vascular mechanisms which compensate for the hydrostatic effect of gravity.

(3) Chloroform abolishes these mechanisms by paralyzing the splanchnic vasomotor tone, and by weakening the action of the respiratory pump. When these mechanisms are totally abolished the circulation is impossible if the subject be in the feet-down position.

(4) Chloroform also produces paralytic dilatation of the heart. It acts directly like amyl nitrite on the musculature of the whole vascular system.

(5) There are two forms of chloroform syncope: (a) During primary anæsthetization. The patient struggles, holds his breath, raises the intrathoracic pressure, congests his venous system, lowers his arterial tension, and finally takes deep inspirations and surcharges his lungs with chloroform. In the first stage the left heart becomes impoverished; in the second stage it is suddenly filled with blood. This is drawn from the lungs, and is full of chloroform. The chloroform passes into the coronary arteries, and the heart is thrown into paralytic dilatation. Respiration and the pulse either cease simultaneously, or the pulse before respiration. (b) During prolonged anæsthetization this arises from gradually giving chloroform to too great an extent. The arterial pressure falls lower and lower, and, secondarily, the respiration ceases because of the anæmia of the spinal bulb. The heart is not in this case paralyzed by chloroform, because the drug is taken in gradually by the shallow respirations, and distributed slowly by the feeble circulation.

(6) Artificial respiration and the assumption of the horizontal position, if applied in time, will always resuscitate a patient from the second form of syncope.

(7) Artificial respiration, established with the patient in the horizontal posture, is also the treatment indicated in the first form of syncope; the heart should be rhythmically compressed by squeezing the thorax. If this does not quickly renew the pulse, the patient should be put into the vertical feet-down posture. The dilated right heart is thereby completely and easily emptied of blood. Artificial respiration is maintained during this manœuvre, and the patient is brought once more into the horizontal posture. By rhythmic compression of the chest an efficient circulation is maintained through the coronary arteries; by first emptying and then filling the heart a fresh supply of blood is brought into that organ. If this does prove the successful on the first trial it can be repeated.

(8) Inversion, that is, placing the subject in the feet-up position or compression of the abdomen will increase the paralytic dilatation of the heart. In this kind of syncope both these forms of treatment are worse than useless.

(9) In the condition of shock or emotional fear the compensatory mechanism for the effect of gravity is almost abolished, and chloroform may easily be the last straw to completely paralyze the circulation.

(10) Vagus inhibition of the heart is of no importance as an agent in the production of chloroform syncope.

(11) Ether is in every respect a far safer anæsthetic than chloroform. According to Ringer's experiments on the heart, ether is fifty times less dangerous than chloroform.

(12) With the practical conclusion of the Hyderabad Commission that the chloroform inhaler should be removed during the struggling of the patient or when the respiration is of irregular depth, I am in absolute agreement, but I consider their interpretation of their own experiments and tracings concerning the origin of chloroform syncope to be mistaken.

Not only the work of all physiologists but also the tracings of the Commission, when rightly interpreted, prove that paralysis of the circulatory mechanism, and not of the respiratory centre, is to be dreaded by the anæsthetist.—*British Medical Journal*.

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(1) See tracings and figures, *Journal of Physiology*, 1897. (2) *On Anæsthetics*, 1888. (3) *British Medical Journal*, 1890. (4) *Practitioner*, vol. xxvi., p. 436. (5) *British Medical Journal*, 1892. (6) For tracings see *The Physiology and Pathology of the Cerebral Circulation*, 1896, p. 128, *et seq.* (7) *Report to the Hyderabad Commission*, Davis, Detroit, 1893. (8) For further details and tracings see the *Journal of Physiology*, 1895-97.

Progress of Medicine.

MEDICINE

IN CHARGE OF

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PARAPNEUMONIC PLEURISY.

Lemoine (*Jour. de Méd.*, October 10, 1896) has made a series of observations on the various forms of pleurisy occurring in the course of pneumonia. He finds that besides the pleurisy which may follow in pneumonia, the so-called metapneumonic variety, there is another to which he has given the name "parapneumonic," which consists in an effusion concomitant with or immediately consecutive to the hepatisation. These latter are apparently quite different from the metapneumonic form, and instead of being so frequently purulent are more likely to remain serous, the fluid in point of fact being found not to contain any micro-organisms, and especially no pneumococci. It is probable, therefore, that it depends on these latter organisms, but that they are for some reason incapable of producing suppuration. Should a pleurisy with effusion appear some weeks after a pneumonia, it is extremely liable to be purulent, whether by a difference in the pneumococci or from the enfeebled condition of the patient. The parapneumonic form always follows closely or accompanies the pneumonia, and its physical signs are added to those of the other condition. Its course is very different. Sometimes the fluid has completely disappeared by the time the crisis has come; more often, however, the pneumonia has begun to resolve, although the fluid may be at its height, and it may happen

that the fluid is only discovered when looking for evidence of complete disappearance of the pneumonic exudation. The effusion may remain several days without increasing or diminishing, and may then, like the pneumonia, resolve. The two processes, pulmonary and pleural, seem to be independent, the disappearance of the one sometimes leaving the other unaffected. The author does not think prognosis is materially altered, the only difference being that convalescence is somewhat slow. He suggests thoracocentesis as the best therapeutic measure.—*British Medical Journal*.

JAUNDICE AND PERFORATION OF THE GALL-BLADDER IN TYPHOID FEVER.

Dr. Francis Hawkins (Reading).—The rarity of cases of jaundice with typhoid fever is mentioned by Sir Wm. Jenner, Murchison, Osler, Frerichs, Louis, Andral, and Liebermeister. The age varied in the cases on record between eighteen and fifty-four; as to sex, this complication is more frequent in males; as to time of appearance, it has been observed on the third, fifth, fourteenth, twenty-sixth, twenty-ninth, thirty-eighth day, and once during a relapse.

As causes have been mentioned: (1) a catarrhal process, and (2) parenchymatous liver changes, the liver being sometimes healthy, sometimes soft and containing nodules of pultaceous matter, sometimes presenting purulent tumours, and sometimes being acutely atrophied.

I bring before you a recent case of special interest, that of a female gipsy, eighteen years of age, suffering from typhoid fever, the abdomen being tumid and showing pink spots; the liver slightly enlarged, bowels irritable, pulse ninety-six and regular, respiration forty-four with rales, temperature 104° F., urine free from albumin, specific gravity 1030.

For the first five days there was constant pain in the back and legs, rejection of food, bowels frequently open, night delirium, formation of fresh spots, temperature 102° to 104.4°, respiration thirty-six; next day, severe pain in the right half of the epigastric region and over the right lower axillary and hypochondriac regions, respirations forty per minute with evidence of dry pleurisy over the right base, axillary and lower mammary regions, vomiting constant, temperature 105.8°.

On the following day the conjunctivæ and skin of the upper part of the body were jaundiced, bile was found in the urine, and the

stools were frothy and white. The next day the jaundice increased, the pain over the above-named regions was more severe, and extended around the umbilicus and the region of the gall bladder was extremely tender. The day after, the jaundice was still marked, there was bile in the urine, which with fæces was passed unconsciously; respiration fifty per minute, breathing *mainly abdominal*, dry pleurisy on the left side and also on the right.

After this, the pain over the epigastric region decreased and ultimately disappeared; bile was vomited, and the jaundice persisted until death, having lasted from January 22nd to February 14th. Once, and for one day, with the exception of the conjunctivæ being yellow, it quite disappeared. Of pulmonary complications, there was, ten days before death, extreme dyspnœa, the face was cyanosed, the soft parts were drawn in, and respirations were fifty-six per minute, the breathing being abdominal, varying from sixty to eighty. The patient died from the pulmonary complications.

Post-mortem: The stomach was distended, there were adhesions of gall-bladder and stomach, the gall-bladder being adherent to the peritoneum, and around the adhesion was a small area of peritonitis; the anterior wall of the gall-bladder after adhesion was broken down, showing perforation. The contents of the gall-bladder were purulent; the walls were thin, especially on the posterior surface, where there was also almost perforation. The cystic duct was not blocked by the easily movable gall-stone. The liver was uniformly enlarged, showing cloudy swelling, but exuding no bile.

The gall-stone had not caused complete blocking of the choledochus, and, had it blocked the cystic duct, that in itself would not have produced jaundice, if the hepatic duct and choledochus were open. Purulent inflammation within the gall-bladder without destruction of the choledochus, according to Frænkel, may produce jaundice, and this condition existed. The typhoid fever may have been the exciting cause, and suppuration of the gall-bladder may occur during the attack, though perforation of the gall-bladder pathologically in typhoid is as rare as the occurrence, clinically, of jaundice with the same disease.

HEART PAIN.

Taking consecutively a hundred cases of coarse and decided forms of disease of the heart which have been under his own immediate care, the author has found that in just half the number there was no complaint whatever of pain in any part of the chest. Seven-

teen referred the pain generally to the front of the chest; fifteen to the back (especially between the shoulders); twelve suffered pain at the epigastrium; eleven suffered pains on the left side of the chest; while two referred their suffering to the right side. Those who localized the pains to the exact area of the heart were but eight, and of these, two complained of it only after exertion. One described it as a sense of extreme soreness at the apex, while in another it partook of the character of neuralgia about the left breast. Only eight per cent. who complained of pain directly referred to the situation of the organ diseased.—*Dr. A. Ernest Sanson, in Med. Rec.*

In the London *Lancet* of October 17, 1896, there is reported by Dr. W. A. Ellison an extremely interesting case of acute ascending myelitis complicating measles. The patient was a boy of 14; the rash appeared on May 31, and he exhibited all the usual signs of a well-marked typical case of measles. The history of the case is as follows:

April 1. Vomiting and diarrhœa previously present subsided this day. Temperature fell below 104° ; had been above this previously.

April 2. Symptoms all declined; evening temperature 99° .

April 3. Temperature was normal. This day the boy could not pass his urine, so a catheter had to be used. Dr. Ellison noticed that he bore catheterization with "extraordinary equanimity." After this he said he was fairly comfortable but had sort of "influenza pains" in his toes and legs. The patient spent a restless night, and on April 4, at 9.30 a.m., he was found to have complete paraplegia, with absolute anæsthesia from his toes up to his axilla, where there was very slight sensation. Thoracic movements much impaired, superficial reflexes about thorax and abdomen very slight; reflexes of lower extremities entirely absent.

From this on the lad's condition became much worse. Temperature ran as high as 107° , and all control over bowels and bladder was lost; respirations were now entirely abdominal and thirty-two to the minute. Coma now came on, and the patient died on the 5th. Temperature taken immediately after death was 109.2° .

[NOTE: This case occurred during an extensive epidemic of a very virulent type of measles. It is to be regretted that no post-mortem was held, so that we do not know what the gross or microscopic changes in the cord were. Amongst the complications or the sequelæ of measles paralysis are rare. Hemiplegia is very rare,

and paraplegia only slightly more so. Barlow records a case (Medico-Chirurgical Society's Transactions, 1887) very similar to this one, which terminated fatally on the eleventh day.]—J.G.C.

THE RELATION OF TOXIC AGENTS TO THE PRODUCTION OF NERVOUS AND MENTAL DISEASES.

Dr. Ira Van Gieson discussed this subject at a meeting of the section of Neurology of the New York Academy of Medicine. The following is a digest of his remarks :

Our knowledge of the effects of toxic agents upon the nervous system is meagre, because they have not received the same study as the effects upon other organs. The laws of pathological processes are few, uniform, and unavoidable, and the brain does not escape them. The clinical results, however, are much more complex, because the functions of the nervous system are so varied and its anatomy so intricate. In spite of the multiplicity of names nervous symptoms are really due to but a few basic changes in the nervous tissue similar to those seen in other organs of the body. In fact, most, if not nearly all, the diseases of the nervous system are dependent upon or secondary to diseases of the general body, which are in turn usually due to, or associated with, poisoning from intrinsic or extrinsic toxic agents, *e.g.*, bacteria and their poisons, auto-intoxication, alcohol, etc.

Many of the lesions in the kidney have analagous conditions in the nervous system. Thus acute parenchymatous nephritis which so often occurs in connection with infectious and contagious diseases has exactly its counterpart in the brain, and if the poisons producing the lesions are not too voluminous or intense the cerebral as well as the renal tissue returns to its normal state and the lesions disappear. Acute and chronic diffuse nephritis, in which both the stroma and the parenchyma are involved, has its analogue in the nervous system in some forms of general paresis. Sometimes the pia, if stripped off, carries with it some of the cortex, just as the capsule of the kidney carries with it part of the cortex of that organ ; and certain cases of epilepsy are due to chronic interstitial inflammation of the brain analagous with that of the kidney. The brain lesions are caused largely by the same things which produce the kidney lesions. The chief causes are poisons, especially the products of bacteria. The bacteria vary in virulence and kind and number. The resisting forces of the body also vary, and in such diseases as typhoid, with marked brain symptoms, we might either assume that the bacterial forces are powerful or the bodily forces weak.

Acute degeneration of the nervous system occurs in a great variety of acute infectious diseases, the eruptive fevers, sunstroke, auto-intoxication, cachexia from removal of the thyroid, eclampsia, alcohol and phosphorus poisoning, etc. All, if the poison was not too intense, acted in the same way, causing acute degeneration. The chromophyllic plaque, within the cell, disintegrated in greater or less degree, and the cell might even be destroyed. Thus in an autopsy after typhoid he had found nearly universal breaking up of the chromophyllic plaques, and yet the woman had only moderate delirium and cerebral symptoms, which tends to show that such an amount of change in the nerve cells is not uncommon in this disease and restoration might still be possible. The extent to which brain cells can recover after acute degeneration is no less remarkable than the similar recovery of kidney cells after acute degeneration of that organ. He thinks the freedom of the terminal circulation of the nervous tissue has much to do with its power to resist bacteria and poisons. The greater the intensity and amount of the poison the greater is the effort of nature to protect herself by throwing out an exudate, and this in multiple sclerosis results in patches of sclerotic tissue.

In the discussion, Dr. P. M. Wise, State Commissioner in Lunacy, said that there could be no doubt that a large proportion of the cases of insanity were of toxic origin. He thought disease of the kidneys was the source of the poisoning in a large number. He had noted in some cases of periodic insanity a relation between the attacks and the quantity and quality of urine, and had sometimes been able to abort a threatened outbreak of the symptoms by stimulating kidney elimination.

THERAPEUTICS

IN CHARGE OF

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CALCIUM CHLORIDE IN ITCHING.

Dr. Savill (in *British Medical Journal*), gives the drug in twenty grain doses in water after meals. He has seen no absolute failures, but it remains to be determined in what class of cases it is most useful. In long-standing cases it should be tried for some length of time.

PRURITUS VULVÆ.

Ruge (*Berliner klin. Wochensh.* 1896, 18,) frees the genitalia from hair, washes out the vaginal canal with sublimate solution so that no pathological material remains and then covers the diseased spots on the vulva with 3.5 per cent. carbol-vaseline. The procedure must be repeated every 3-4 days until a good result is secured.

EUCAINE.

J. S. Gibb (*Philadelphia Polyclinic*) has used eucaine in diseases of the throat and nose, and sums up the results of his experience as follows: (1) Eucaine is equally efficient with cocaine as an anæsthetic in ordinary examinations. (2) Eucaine possesses equal anæsthetic power with cocaine, and hence is as useful in operations in the nose, pharynx, or larynx. (3) Eucaine is nearly, if not quite, as effective as cocaine in reducing engorged turbinates. (4) Eucaine is superior to cocaine in that it is less likely to produce toxic symp-

toms. (5) Eucaine is superior to cocaine in that it produces far less unpleasant subjective symptoms; especially is this true as regards the pharynx.

CARBOLIC ACID BURNS.

After finishing a post-mortem examination, I washed my hands thoroughly with soap and water under a tap. Part of the contents of an eighty-ounce bottle, labelled carbolic acid 1 in 20, was poured over both hands. The skin immediately turned white, intense burning and tingling commenced. Endeavored to wash off acid with water. A colleague recommended alcohol, of which a bottle was soon procured, and hands thoroughly washed with it. The burning and tingling almost immediately ceased. Some time afterwards five spots on the forearms, where the acid had dropped, were red and burning. Alcohol had then no effect. These were brushed over with saturated solutions of picric acid in water.

Results: Shedding of superficial layers of skin on hands; staining of five spots on forearms with picric acid.

Conclusions: (1) Bottle contained four ounces of fluid carbolic acid undiluted. (2) Alcohol is but immediate treatment for burns with carbolic acid because the acid is soluble 6 in 1 of alcohol. (3) Saturated solution of picric acid in water, in this, as in other superficial burns, is good treatment. G.S.

A CASE OF HÆMOPHILIA.

A boy sustained an injury to the head. In the region of the temple there was a wound about $\frac{3}{4}$ inch in length. During two days various attempts were made to stop the hæmorrhage, even tampons with Tr. Ferri. Mur. being used without effect. The boy was completely exhausted and feverish.

Dr. T. Bienwald took from a vein in the arm of a healthy woman with a hypodermic syringe about a drachm of fresh blood. This he injected into the bleeding wound. The foreign blood clotted in a short time, and the hæmorrhage was arrested after a light protective bandage was applied.

Bienwald thinks that the clotted foreign blood acted like an elastic tampon in all the interstices of the wound, or else that the foreign blood supplied the particular ferment for thrombosis of the vessels which is deficient in the blood in cases of hæmophilia.

(*Deutsch Med. Wochenschr.* Nr. 2, 1897.)

(*Central. für die gesammte. Therapie,* April, 1897.)

G.S.

OBSTETRICS

IN CHARGE OF

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THE NEW YORK MATERNITY HOSPITAL RECEIVES A PRINCELY GIFT.

We envy men of large wealth in one particular only, or chiefly, let us say, and that is in respect of their luxury of liberal giving to worthy causes. Such a luxury has Mr. J. Pierpont Morgan of New York, recently indulged in, in a gift of a ton of money, more or less, to suffering womankind. He purposes to denote \$1,000,000 for a new building, ten stories in height and fire-proof throughout, to the New York Lying-in Hospital. Wealthy women have given largely to churches and art, but it has been left to a man, already known for his generous gifts in other quarters, to seize the opportunity to qualify the parturient suffering of the poor. The following comment in the *New York Herald* explains gracefully and cunningly the concomitants of the generous gift :

“ Mr. Pierpont Morgan has done so many things with his right hand which his left hand knew nothing about that it gives us a peculiar pleasure to congratulate him on an act of beneficence concerning which he is compelled to take the public into his confidence. There are many men in New York who are not only princely in the extent of their fortunes, but equally princely in their gracious generosity. Among these Mr. Morgan occupies an enviable place. He has bestowed a large sum on a most worthy institution. There are in this city tens of thousands of women who while passing through the ordeal of child bearing are dependent on charity for nursing and medical attendance. The Lying-in Hospital has done what it could to alleviate their sufferings, but Mr. Morgan's beneficence increases its power for good at least one hundred fold. The condition on

which this gift is based—namely, a sufficient endowment to keep the institution in perfect running order—offers another opportunity to our citizens to assist a cause which makes a very pathetic appeal to the community.”

The influence of a physician, Dr. Thomas M. Markoe, is said to be back of it all. The annual income of the hospital is \$47,000, inclusive of \$12,000 that the city is in the habit of apportioning to it. It is stated that no donor during his lifetime has given an equal sum to a charitable institution. Five of the junior physicians on this hospital's staff have been travelling and investigating the home and foreign hospitals, their expenses having been defrayed by Mr. Morgan, and this has been going on in a quiet way, for fully two years. The new building as at present designed is to be a ten-story fire-proof structure of steel framework and a body of granite and light brick. It is to be ten stories high and capable of accommodating six thousand patients yearly, as against the present capacity of about 2,768. In the cellar floor will be the laundry, furnaces, dynamo rooms, a disinfecting room, and rooms for servants and attendants. The basement will contain a student's dormitory and sitting room, drug store, instruction room, and clinic and examination rooms. The kitchen and dining room for attendants will be on this floor.

IMPROVED METHOD OF VAGINAL IRRIGATION.

Prof. F. Ahlfeld believes that the infrequency of infection from post-partum vaginal injections is due to the fact that the fluids injected wash the germs present up into the cervix as they rebound from the posterior wall. To avoid this he uses a glass canula, closed at the end, but bored with rows of small openings sloping obliquely from the top downward, so that the liquid injected is always flowing evenly and gently out of the vagina. With this instrument and the usual antiseptic precautions, these injections have ceased to be followed by accidents in his practice.—*Gaz. Méd. de Liege*, December 31.

ETIOLOGY OF OPHTHALMIA NEONATORUM.

Chartres contributes a long article to the December *Archives Clin. de Bordeaux* to call attention to a fact he proceeds to demonstrate, viz., that the serious ophthalmias are those produced by streptococci or by an association of streptococci and gonococci, or by these two and others. The gonococci alone are comparatively harmless and yield to treatment. The treatment should be prompt and powerful, consisting of copious irrigations with potassium per-

maganate, lime, boric acid and cauterization with nitrate of silver. This combination acts on all the various species of microbes which may be producing the ophthalmia. He concludes by insisting on the necessity of bacteriologic investigation.

THE HINDU LYING-IN CHAMBER.

According to the *Indian Medical Record*, the mortality in child-bed among Hindu women is notoriously high, a circumstance which is no doubt largely due to the very early age at which they usually become mothers. A still more potent cause, is, however, to be found in the shocking and apparently deliberate barbarity with which they are treated during the puerperium. The lying-in chamber of a Hindu family is ordinarily a little, damp, ill ventilated hut or room in some remote corner of the court yard or compound. In this the expectant mother is placed and there she remains from eleven to thirty-one days, during which, according to Brahminical law, she is looked upon as unclean. There is only one small inlet in this apartment, and the door is carefully closed to exclude those evil spirits, light and air. In order, probably, to purify the unfortunate woman by heat, wood fires are kept burning in the room both night and day. The smoke has to find its way to the outer air as best it can through any chinks there may happen to be in the roof or walls, which are usually made of bamboo with a thatching of mats or straw. With the view of more effectually exorcising the unclean spirit, a powder composed of peppercorns or ginger is given to the patient during the first few days ; this preparation is administered either in the form of a paste or dissolved in boiling water as a tisane. It is not surprising to learn that the result of this elaborately perverse therapeutics is that something like 40 per cent. of the women subjected to it die of puerperal fever and tetanus within the first fortnight after delivery.

SURGERY

IN CHARGE OF

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AND

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SURGICAL TREATMENT OF SPASMODIC TORTICOLLIS BY KOCHER'S METHOD.

Quervain (*La Semaine Médicale*, 1896, No. 51), as the result of a statistical study, finds that operations on the spinal accessory nerve designed to cure spasmodic torticollis are mostly abortive. Among sixty-one collected cases, including ligature, stretching, avulsion, and resection, there were only twelve cures; twenty-two cases were improved. Kocher, discouraged by the results of seven operations on the accessory nerve, has adopted a method of his own since 1884. This consists of complete cross-section of all the involved muscles. The results are far better than those reported from any other method. In all, twelve cases were treated. Each of these had been subject to a thorough, prolonged, and persistent palliative treatment, including medicaments, massage, hydrotherapy, electricity, and orthopædic appliances. This cross-section of the muscles did not cause atrophy and paralysis, nor did it materially interfere with the mobility of the head. Of the twelve cases operated on, seven were definitely cured; the remaining five are still under a prolonged manipulative and gymnastic treatment which Kocher considers absolutely essential after his operation.

The somewhat naive explanation given as to the rationale of the cure is that the nerve-centre (irritation of which is undoubtedly the cause of torticollis in the great majority of cases), on sending out its impulse to the muscles, is so discouraged at the lack of result that it ceases to trouble in this way.—*Therapeutic Gazette*.

TREATMENT OF APPENDICITIS.

McBurney points out that there is no medical cure for appendicitis, even though some cases recover without operation ; and whilst he considers appendicitis a surgical disease, yet operation may not be necessary in every case. The true cause of this affection is probably a stoppage of the drainage from the appendix to the colon, and preliminary treatment is often worse than useless. The opium treatment relieves pain and discomfort, but entirely masks the symptoms at a most important time, for it is in the first twenty-four hours from the beginning of the attack that we can decide not only as to the diagnosis, but as to the probable course and result of the case. If in five or six hours there is no increase in urgency, the patient is not in immediate danger kept at perfect rest in bed ; if in twelve hours there is still no increase in the severity of the symptoms, the patient should soon begin to improve. On the other hand, if the urgency of the case has steadily increased in twelve hours from the time when the diagnosis was made, an operation will probably be called for. After two attacks a patient is sure to have a third, and each attack renders operation more difficult and dangerous. All the advantages lie with operation between the attacks. In an operation during an acute attack the prognosis is worse. In operating between the attacks it is rarely safe to do so in less than two weeks after an acute attack. McBurney was formerly more willing to operate during the attack than he is now. The chief cause of death is delay of one sort or another. In abscess cases the sooner we operate the better.—*Medical News*.

GENITO-URINARY AND RECTAL SURGERY

IN CHARGE OF

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THE EFFECTS OF BICYCLE RIDING ON THE PERINÆUM.

In the *Gazette hebdomadaire de médecine et de chirurgie* for December 6 there is a long and interesting article on this subject by M. E. Aldhuy, in which the author deals with the lesions of the perinæum produced by the bicycle saddle, the action on the urethra and on the *bas fond* of the bladder, the action on the external genital organs, and acute traumatism of the perinæum and their ætiology. He draws the following conclusions: (1) The injuries produced by the bicycle to the perinæum are of a grave and various nature. (2) Certain lesions of the perinæum have been observed, such as cutaneous erythema, abscesses, hæmatoma, etc., and finally, a more or less profound anæsthesia caused by repeated pressure. (3) There have been observed also certain functional troubles, such as the retention of urine often seen in men and undue frequency of urination in women. (4) The existence of urethritis from pressure of the saddle is not demonstrated, but it is certain that chronic inflammation of the canal and certain inflammatory complications, such as urinary abscesses, etc., may be produced or aroused by the bicycle. (5) Sometimes the venous arrest due to the compression of the perinæum provokes erection, although this is rare; more frequently, on the contrary, the continual perineal massage of the saddle produces temporary impotence. (6) With regard to genital excitation in women, it has certainly been much exaggerated. The bicycle has not the inconveniences of the sewing machine. (7) The majority of cases observed up to the present time have been due to a bad posture or to a defective saddle. (8) The real accidents to which bicyclists are exposed are traumatic in nature, and are produced by jolting over uneven roads, which throws the rider forward on to the end of the

saddle ; they are also caused by falling on the rear wheel or on the framework. These falls are not very serious ; sometimes a slight tear of the urethra may be observed, but they are cured rapidly without the least complication. In a very curious case, to which the author refers in the beginning of his paper, a fall on the wheel caused an enormous hæmatoma of the perinæum and of the scrotum. The bloody tumor increased, and the patient presented symptoms of internal hæmorrhage. M. Poncet, says the author, ascertained the integrity of the canal by means of a catheter. A very large incision was made in the centre of the mass, which enabled him to discover a tear of the transverse artery of the perinæum. The hæmorrhage was arrested with a ligature. (9) More frequently, however, the urethra is involved, and sometimes completely ruptured. In this case all the complications which follow rupture of the canal may be observed. (10) As the section of the urethra is here ordinarily very distinct, suture of the two ends may be followed by union by first intention. M. Poncet obtained very remarkable results in a case in which, seven years after a complete rupture of the perineal urethra, the patient did not show the least symptoms of stricture.—*N. Y. Medical Journal.*

NOTE.—We may add that seminal vesiculitis also follows in certain cases.

DANGER IN BICYCLE RIDING.

At the last meeting of the Berlin Medical Society Dr. Albu spoke on the dangers of bicycle racing. He said he had examined twelve bicycle racers on the ground at Halensee, near Berlin, both before and after races lasting from five to thirty minutes. In each case he found symptoms of acute dilatation of the heart after the race ; the pulse was enormously accelerated, the lips and face were more or less cyanotic, and there was considerable albuminuria. The dilatation of the heart, in some cases, lasted several hours, and Dr. Albu thinks that repeated training and participation in races might transform it into chronic dilatation. Of course he added that these dangerous symptoms only accompany excessive exertions on the bicycle, whereas moderate bicycle exercise was universally recognized as healthy. In the debate that followed Professor Virchow drew special attention to the position or "seat" of the bicyclist. He said there was no doubt that the prone position must affect the abdominal organs.

ARTIFICIAL TESTICLES.

The single and double castrations for hypertrophy of the prostate has again brought up the question of substitutes for the testicle from a cosmetic point of view.

Dr. Loumeau, writing in the *Annal de la Policl de Bord.*, Juli, 1896, advises the use of hollow, oxoid, rubber bodies as being elastic, not absorbable, and not too heavy. Catgut, silk, aluminum, glass, and other substances have been tried. Catgut is absorbed, metals and glass are too hard or too heavy.

He relates a case in which a double castration was done on a man sixty-five years of age, and the rubber balls stitched into the testicle sac.

They were well borne, and served their purpose well.

(*Centralblatt fur die gesammte. Therapie*, April, 1897.) G.S.

PÆDIATRICS

IN CHARGE OF

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NEW YORK ACADEMY OF MEDICINE—PÆDIATRIC SECTION.

Dr. J. L. Smith gave some diphtheria statistics from the New York Foundling Asylum for seven years ending December 1, 1896. In 1890 the percentage of deaths was 50 per cent. ; in 1891, 52 per cent. ; in 1892, 38 per cent. ; in 1893, 28 per cent. ; in 1894, 24 per cent. ; in 1895, 45 per cent. ; in 1896, after antitoxin treatment, 12 per cent. During the last five months of 1896 there had been 65 cases treated, with three deaths.

Dr. Winters claimed that the antitoxin question would never be settled by hospital statistics. Careful study and observation in private practice were needed. He quoted figures to make it appear that the present low rate of mortality is due, not to antitoxin, but to a milder type of disease, than has occurred for several years. He also gave figures which showed that equally good results had been experienced without antitoxin, and that several physicians had a high mortality percentage with antitoxin, although in the majority of cases it had been injected on the first or second day. Loeffler had treated seventy-one consecutive cases with his solution without a death. He stated that the files of the London *Lancet* would show that an average higher weekly rate of mortality had occurred in England since the antitoxin treatment than the average during the past ten years. At the Willard Parker Hospital in August, 1896, the mortality was 37 per cent., and in November, 25 per cent. despite antitoxin. This, he thought due to the character of the epidemic at the time.

He then dealt with the question of dosage, stating that the quantity injected had increased from 1,500 to 6,000 units, and that following this the death rate had run up to 60 per cent.

He then detailed some unfortunate experiences of physicians in private practice. Dr. Dorning had lost seven consecutive cases with antitoxin. Dr. Dallas had lost ten out of eleven. He mentioned two cases in which a tonic spasm had followed the injection. Both children died in this condition. The daughter of a physician had received a dose of antitoxin and convulsions with cyanosis promptly followed. On recovery it was ascertained that diphtheria was not present at all. All the world had heard of the death of Prof. Langerhan's child. He reported three cases in the practice of other physicians in which convulsions and cyanosis occurred after antitoxin. One of the children died.

He claimed that the use of antitoxin was gradually lessening, and in proof cited the fact that at one time the New York Board of Health had fifty horses on hand, last year they had eight, and this year only four.

Dr. Winters was followed by a number of other physicians, the majority of whom were opposed to him, and refuted many of his arguments.

EDUCATIONAL USES OF HYPNOTISM.

Dr. R. Osgood Mason, (*Pædiatrics*, February, 1897) gives particulars of seven cases.

Case 1—A school girl, 15 years old, intelligent and a great reader of books that interested her, but who had no aptitude for school work. She was always at the foot of her class, and always being plucked, owing to self-consciousness and timidity. Six times she was hypnotized, and while in that condition suggestion was made to her that if she would concentrate her mind on her studies, she would lose that excessive self-consciousness and timidity. She immediately began to improve and two months after treatment passed an examination with 79 per cent. of the marks. The improvement was maintained.

Case 2—An intelligent woman, 35 years old, although a good reader, could not spell without a dictionary. She was also a sleep walker. Suggestion during hypnotism cured the somnambulism. Suggestion was also made as follows: "You can read. The correct form of each word you wish to write is already in your mind. When you are in doubt, you will not think how the word is spelled. You will become passive and at once an impression of the correct spelling will come to you and you will write it correctly without hesitation." Immediate improvement followed three treatments.

Case 3—A seven year old boy, cowardly in all his actions, was made a strong, brave boy by hypnotic suggestion.

Case 4—A five year old girl was cured of night terrors.

Case 5—A boy of sixteen was cured of self-abuse and cigarette-smoking.

Case 6—A man was cured of morbid sexual ideas and practices of the homo-sexual type.

THE BACILLUS OF FRIEDLANDER IN PHARYNGITIS AND TONSILLITIS.

In a communication to the *British Medical Journal*, March 20, 1897, W. C. Pakes, assistant demonstrator of bacteriology at Guy's Hospital first directs attention to the published account of investigations by Nicolle and Hébert concerning the occurrence of Friedlander's pneumo-bacillus in the throats of persons suffering from pharyngitis and tonsillitis, and afterwards describes his own investigations on the same subject, carried on at Guy's. Nicolle and Hébert inoculated 1,600 tubes from the throats of patients seen by them and found the pneumococcus six times. Since November, 1894, 500 tubes have been examined, inoculated from patients from the out-patients and wards at Guy's. In five cases Pakes found the bacillus of Friedlander; twice in pure culture, twice in association with the Klebs-Loeffler bacillus and once with the staphylococcus aureus.

Cases 1 and 2 were both children. There were small yellowish plugs on both tonsils, which were spreading towards one another. Klebs-Loeffler bacilli were found in conjunction with the bacillus of Friedlander. The children were sent to a fever hospital and were lost sight of.

Case 3—A man aged 30, complained of a sore throat, which he had noticed for a few days. The fauces were red, and the tonsils red and swollen: there was a slight colorless exudation on both sides of the fauces. There was no constitutional disturbance, and the patient said that he felt perfectly well except for the sore throat. The cultivation on coagulated blood serum was a pure one of Friedlander's bacillus. On the following day the throat had the same appearance, and the second cultivation again proved to be a pure one of the same bacillus.

Case 4—A man, aged 20, complained of a sore throat which he had noticed for about a week. The fauces were red and injected, and there were two or three whitish plugs over the crypts of the tonsils, but no sign of membrane. The culture on blood serum was

found to consist of the bacillus of Friedlander and staphylococcus aureus. Two days later the throat was still inflamed, but less sore. A second cultivation revealed the presence of the same two organisms.

Case 5—A girl, aged 6, was brought to the hospital because she had a sore throat. The tonsils were red and swollen, and a few plugs of whitish material were present. The temperature was 100° F. A pure cultivation of Friedlander's bacillus was found on the blood serum. No further observation was made.

THROMBOSIS OF THE VEINS OF GALEN AFTER SCARLET FEVER.

In a report to the Clinical Society of London (*British Medical Journal*, March 20, 1897), Dr. E. W. Goodall described a case of scarlet fever in which death was due to spontaneous thrombosis of the veins of Galen. The patient, a girl aged eight years, had a moderately severe attack of fever. On the evening of the eleventh day, when apparently convalescent, she was seized with a succession of general convulsions, which after a few hours gave rise to more or less general rigidity and gradually deepening coma. There was pyrexia, the temperature rising shortly before death to 107.4° F. The pulse was very frequent. There was no optic neuritis, and the urine was free from albumen during the whole of the illness. At the necropsy ante-mortem clot was found in the veins of Galen and in the straight sinus. The clot was hardly, if at all, adherent. Both choroid plexuses were covered with a thick layer of recent lymph. The optic thalami were in a condition of red softening, the left being almost diffuent. Beyond slight ulceration of the tonsils there was no other lesion. There was no middle-ear disease. The case was brought forward on account of its rarity, as when spontaneous thrombosis occurred after a specific fever it was usually located in the heart or one of the vessels of the lower extremities.

TUBERCULOUS PERITONITIS TREATED BY OPERATION.

At the March meeting of the Northumberland and Durham Medical Society Dr. MacDonald exhibited three children who had been operated upon for tuberculous peritonitis. The fluid had been washed out, adhesions broken down, and the wounds sutured without drainage. All had made good recoveries.—*British Medical Journal*, March 27, 1897.

PSYCHIATRY AND NEUROLOGY

IN CHARGE OF

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A NEW METHOD OF LOCALIZING BRAIN LESIONS.

At a late meeting of the Royal Academy of Medicine in Ireland Mr. Robert Cox read a paper on "A New Method of Localizing Brain Lesions" and exhibited the necessary apparatus for its employment. He pointed out that there was need of a more perfect method of locating the important areas of the cerebral cortex on the overlying surface of the scalp, seeing that most, if not all, the methods generally employed are either limited in their scope or complicated in their application, while many give rise to error by the use of a standard measure, the inch or the centimetre, for varying surfaces. He thought the method he was about to describe would be found devoid of these objections. For its use two things were necessary: (a) an instrument which he had invented and called a cerebrogrometer, and (b) a diagrammatic map of the hemisphere of the brain, prepared from readings made by the use of the same instrument on the cadaver and casts of the brain *in situ*. This map might be substituted, or augmented, by a list of indices made in the same way. The instrument consists entirely of the mechanical device technically known as "lazy tongs" formed into a circle, with two accessory loops attached to the circle by their ends in such a way that they arch over it at right angles to each other. One loop bears the numerals, beginning at each end with 1, and ending in the middle with 10; while the other loop has the letters A to V in consecutive order from before backward, that bearing T forming the junction with the circle behind. The map is made on gnomonic projection with the radii or longitudinal lines marked by letters, and the semicircles or lines of latitude by numerals. In using the instrument it is necessary to extend it in all parts, and apply it to the head with

the rivet forming the function of the lettered hoop with the circle in front on the glabella, and the rivet marked V at the other end to the occipital protuberance; then to press down the loops between these two points in the middle line, and close the circle round the head on such a plane that the numeral 10 will rest on the lettered band. The instrument is then in position, when, to find any given point—say, Broca's lobe—it is only necessary to consult the map or list of indices for the bearings thus given, as "C₄, left side," and place the 10 of the numbered loop on the C of the lettered loop, when the numeral 4 will lie over the part. Having thus shown the simplicity of the method, for the carrying out of which no recourse need be had to any science, and the almost automatic action of the cerebrographometer, he proceeded to explain its accuracy, showing that it was applicable to all-sized heads, and formed its own unit of measurement for each, thus eliminating the errors due to the use of a standard measure for a varying surface. The two fixed points taken, the glabella and occipital protuberance, place the circle on that plane considered so important by Professor Fraser as bearing a fixed relation to all important parts of the brain. His opportunities of testing its accuracy were very few, but in those it gave excellent results, while with regard to Rolando's fissure, perfection seemed to have been reached.

SENSORY DISTURBANCES IN LOCOMOTOR ATAXIA AND THEIR LOCATION.

Some years ago the subject of locomotor ataxia was thought to be practically exhausted, the symptomatology and pathology clear; the disease was labelled and put away upon the nosological shelf. More recently the question of its pathology has been awakened afresh and is not yet settled, and additions to our knowledge of its symptomatology are far from infrequent. Such an addition we may count the investigations of Laehr regarding the occurrence of anæsthesia upon the trunk. It is about two years since Hitzig called especial attention to this symptom, but the work of Laehr is the fullest and most systematic up to date, embracing as it does the careful, often-repeated examination of sixty cases of locomotor ataxia. In only five was there no anæsthesia of the trunk, and these five were all cases of locomotor ataxia complicating dementia paralytica, in which the spinal affection was secondary to and much less prominent than the cerebral affection. This trunk anæsthesia is usually not very marked, and relates particularly to the perception of touch

rather than pain, in contradistinction to the sensory disturbance of the lower extremities, which ordinarily first manifests itself as an analgesia, while sensation for touch is normal. Its location is generally at about the level of or just below the nipple, and takes the form of a band reaching from the spine to the middle line in front. It is nearly always bilateral, but the bands of the two sides may not be of the same width nor on the same level. Want of symmetry is generally due to the anæsthesia of one side extending lower, as the upper border seldom differs on the two sides. In the incipient stage the band is narrow, taking in one or two intercostal spaces and their borders, or the anæsthesia itself may not be constant. Indeed, in this stage there may be no distinct anæsthesia, but simply an inability to locate touches well, while the power of localization is often found in the area adjoining a distinctly anæsthetic surface. When the anæsthesia is very slight, a prolonged examination of touch and pain sensation may improve it, so that the anæsthetic area diminishes in size. One of the most interesting facts elicited by Laehr's investigations is that the areas of anæsthesia correspond closely, not to the peripheral nerve distribution, but to the spinal segments, as outlined by the work of Thorburn, Starr, Sherrington, Head, and others. The band about the trunk has a more horizontal position than the ribs, so that if it corresponds to a certain rib in front it falls one or two vertebræ below it behind. In some cases the author could watch the gradual extension upward of the anæsthetic zone. With great regularity, as soon as it reached the third intercostal space, it began to extend on to the arm, at first affecting only the inner surface below the axilla, and then gradually covering the whole inner border before it spread much toward the radial side. Eventually the whole arm may become anæsthetic, but always by this extension from the ulnar to the radial side. As already mentioned, this corresponds to the gradual upward invasion of spinal segments, and a similar progression downward on to the lower extremities could also sometimes be traced. But it is not to be forgotten that a peripheral neuritis, which is now known frequently to occur in locomotor ataxia, may entirely change this distribution of anæsthesia. Analgesia of the ulnar trunk—that is, absence of pain when it is pressed against the condyle—he finds to be much less frequent (sixteen in forty-three) than did Biernacki (fourteen in twenty), who first described it. (The editor has found it in fully fifty per cent. of his cases.) It is of interest, too, to note that the author found in a number of cases entirely distinct bands of anæsthesia corresponding to spinal segments separated by a considerable

interval, which would seem to show that the pathological processes of locomotor ataxia may begin at nearly the same time in different parts of the cord. Another interesting fact is that at the border of the anæsthetic zone the skin is often hyperæsthetic to pricking, pinching, and cold ; and not only this, but in this hyperæsthetic zone the cutaneous reflexes are particularly lively. Laehr thus easily accounts for the difference of opinion regarding the activity or absence of the superficial reflexes in locomotor ataxia. If the place we stimulate to elicit a superficial reflex (*e.g.*, the abdomen for the abdominal reflex, the inner surface of the thigh for the cremaster reflex) happens to be within the anæsthetic zone, the reflex will be diminished or lost ; if within the hyperæsthetic zone it will be exaggerated. The author considers the trunk anæsthesia to be a very early, but not the earliest, sensory disturbance, as some degree of analgesia of the lower extremities generally precedes it.—*Medicins.*

ORTHOPÆDIC SURGERY.

IN CHARGE OF

CLARENCE L. STARR, M.B. Tor., M.D. Bel. Hosp. Coll.,

Surgeon to Industrial Refuge.

At the recent meeting of the American Orthopædic Association, held in conjunction with the Congress of American Physicians and Surgeons, at Washington, D.C., many subjects of very great interest to the general practitioner were discussed, as will appear in the transactions of the society.

Dr. E. H. Bradford, of Boston, Mass., read a very able paper before the general meeting of Congress, on congenital dislocation of the hip, which showed very clearly the pathology of the affection, the present methods of treatment, and the hope for still further advance in the future.

Dr. Bradford said that it would appear that in a great many cases of congenital dislocation of the hip the acetabulum is not so rudimentary as is generally believed. In fact, in a great many cases the acetabular cavity is quite well developed. In nearly all cases, however, the cavity is filled with fibrous or cartilaginous tissue, and frequently one thickness of the capsule, having been drawn upward by the displaced head, is glued over the cavity.

In those cases in which the cavity is fairly formed, and the upper lip of the acetabulum still partially intact, it is possible to reduce the dislocation as in an old traumatic dislocation. The chief hindrances to reduction are (1) the shortness of all the adductors of the thigh; (2) the interposition of a fold of the elongated capsule between the head of the femur and the cavity of the acetabulum; (3) the fulness of the cavity with fibrous tissue.

The adductors may be stretched by putting patient in bed with leg widely abducted and then with weight attached to foot making traction in line of abducted limb. As much as fifteen or twenty pounds may be attached to the foot for purposes of extension. At the same time a band should be passed around the thigh near its head, and traction made downwards at nearly a right angle to the

abducted limb. This tends to depress the head of the bone toward acetabulum. After a week or two of such traction it is often possible, under influence of an anæsthetic, by forcible traction, then flexing, abducting, and rotating outwards the thigh, to reduce the dislocation. The reduction will be accompanied by a more or less distinct chuck, such as occurs after reduction of a recent dislocation.

Now if patient is put up in plaster in this abducted and flexed position and kept from three to four weeks, then brought down to straight line by slow degrees, and patient allowed to walk, a cure will often be effected.

The pressure of the head of the bone will cause absorption of tissue in the acetabulum, and gradually the cavity will become deepened, until it is sufficiently perfect to retain the head of the thigh in all positions of the leg.

Massage and light gymnastics should be continued for some time after plaster is removed, when cure will be complete and the walk almost, if not quite, perfect.

In those cases in which the acetabulum is rudimentary, there being only a small triangular depression with little or no upper rim, it will be found impossible to proceed as above mentioned, and then the only course to pursue is to operate after the plan laid down by Lorenz, of Vienna.

This consists in opening up the joint, and, with a specially constructed spoon, scooping out a new cavity, into which, by forcible traction, accompanied at times with division of the adductors, the head of the thigh may be reduced. A plaster dressing is then applied, and the case, after closure of the wound, treated as a non-operative case.

Dr. Bradford is of the opinion that, with a little more experience, and a still clearer knowledge of the pathology of the affection, congenital dislocations of the hip, which have hitherto resisted treatment, may be added to the triumphs of modern surgical art, and placed on the list of curable affections.

Dr. V. P. Gibney, of New York, in discussing the paper, said he could not take such a rosy-tinted view of the subject as did Dr. Bradford. He thought in all those cases where a reposition could be secured without operation we could hope for excellent results, but his experience with operative procedures had not been of the brightest. Two or three cases had developed an acute arthritis from the operation, two or three became septic, and two or three of his best cases died of intercurrent affections.

Dr. Harry M. Sherman, of San Francisco, also discussed the subject, giving an account of his personal work with Lorenz in Vienna. He was not fully decided as to final results in operative cases, but was convinced of one fact, and that was that it required a great deal of skill and experience to get good results, or results equal to those obtained by Lorenz and Zoffa.

Editorials.

THE TORONTO GENERAL HOSPITAL TRAINING SCHOOL FOR NURSES.

WE have been informed by Miss Snively, the superintendent of this training school, that an important addition is to be made to the institution in the shape of a diet kitchen, which will be under the charge of Miss Burnham, who has passed through a regular school for cookery, and received a diploma after passing the prescribed examination. As we have already informed our readers, the course for nurses, which formerly extended over two years, has lately been increased to three years. One of the additional subjects for the third year is "invalid cooking." It will be the duty of Miss Burnham to give the nurses practical instruction in this subject. She is not a nurse, but was formerly a successful school teacher; and, it is confidently expected, she will be thoroughly well qualified for her new duties. Dr. O'Reilly, the medical superintendent of the hospital, has had a kitchen well arranged and well equipped for the trial of the new scheme. Invalid cooking is an exceedingly important subject, and we are glad to see these new facilities provided for this admirable nursing school.

THE MEETING OF THE ONTARIO MEDICAL ASSOCIATION.

THE seventeenth annual meeting of the Ontario Medical Association will be held in the Educational Department of the Normal School, St. James' Square, Toronto, Wednesday and Thursday, June 2nd and 3rd, 1897. This society was organized in 1881, when the first meeting was held in Toronto under the presidency of the late Dr. Workman. Since that time it has grown in strength to such an extent that it is now the most vigorous medical society in Canada.

We are informed by the secretary, Dr. J. N. E. Brown, that the two important committees have completed their arrangements in a satisfactory way, and expect a very successful meeting. The committee on papers and business have received promises of over forty papers. Dr. Coventry, the president elect, showed commendable zeal in coming from Windsor to Toronto to attend the most important meeting of this committee. In addition to the ordinary papers read at the regular sessions in the Normal School there will be a series of short clinics given in the General Hospital.

The Committee of Arrangement have decided that the visiting members shall be entertained at luncheon, after which they will be taken for a short cruise on the lake. This entertainment will be similar in character to those given in recent years. The yacht trip, which must necessarily be a short one, will probably be much enjoyed if the weather be favorable.

We hope there will be a large attendance. At the same time we have no desire to injure the meetings of the Canadian and British Medical Associations which are to be held in Montreal. To the thousand members of our Ontario association we would advise as follows: Make your arrangements to attend the *big* meeting in Montreal, and give a hearty welcome to our friends in Great Britain who will cross the ocean to meet the members of our profession in Canada; also, try to come to our meeting in Toronto. We want them to keep the Montreal meeting first in view. We desire Ontario to show a hearty appreciation of what our brethren in Montreal are doing to make the important meeting a decided success. We also want our province to recognize the efforts of our able and genial president, Dr. Coventry, and his committees to make the Toronto meeting a pleasant and profitable one; and, in consequence of such recognition, to attend in large numbers.

DANGERS OF CHLOROFORM.

THE occurrence of several lamentable deaths from chloroform in this province within the past year emphasizes the need for widespread publication of the selected article in this issue. We have long held with Sansom that the main conclusion of the Hyderabad Commission was a dangerous dogma. It is not unlikely that following the teaching of this authority many administrators have allowed cases of cardiac depression and dilatation to proceed beyond the point of recovery when a closer observation of the circulatory system would have obviated such calamities.

The errors of the Commission appear to be not in the tracings but in the reading of the "infallible records made by the animals themselves." Since the time of Clover, who himself "gradually discarded chloroform in favor of ether," we are glad to note that ether is becoming more and more the anæsthetic of election for general surgical purposes.

It is fifty times safer than chloroform, says Ringer. Wood tells us that syncopal death, which is common under the influence of chloroform, is rare under the influence of ether.

Such an authority as Mr. Jonathan Hutchinson writes (Archives of Surgery, Oct., 1889, on Safety of Ether): "I speak from a tolerably extensive observation both of my own facts and those of others when I say again what I have often said before, that I think that we ought to have a clear canon in full force on this most important subject. I have not the slightest misgivings in my belief that the restriction of chloroform would save many lives every year. The canon I would venture to suggest is this:

Never give chloroform alone in the first instance: let it be either preceded by ether or in mixture with it.

In view of the strong position taken by such clinicians and therapists, supported by the unanimous opinions of well-known and experienced anæsthetists as Braine-Bailey, Hewitt, Buxton, Turnbull, and the experiments of Gaskell and Shore, Hare and Thornton, Hill and MacWilliam, why should we not at once adopt what the best authorities have proved to be the safest anæsthetic, instead of groping about in a dangerous fashion for individual experience with chloroform?

Children are quite as susceptible to poisonous effects of chloroform as adults, infants take ether or some mixture containing it with greater safety and with less difficulty, when properly administered, than is commonly supposed. The aged also take ether well, provided the air-limitation be not too great in degree.

We are speaking, of course, of the great generality of cases, and are quite aware that some conditions of the patient and certain operations and battle-field necessities call for the use of chloroform.

KOCH'S NEW TUBERCULIN.

Koch's article in the *Deutsche Medicinische Wochenschrift* of April 1st has excited a great deal of interest. He begins by answering the objections to the possibility of acquiring immunity. Those who deny that immunity can be acquired point to the fact that even persons who have been cured are liable to renewed infection, and that patients may have tuberculosis for many years without acquiring any immunity. Koch explains this by saying that in chronic tuberculosis the conditions for the absorption of the bacilli and their products are unfavorable, the organisms being usually surrounded by dead tissue. In acute miliary tuberculosis the organisms are at first abundant, but later mostly disappear. This disappearance he attributes to an acquired immunity, which, in the acute form, comes too late to be of any benefit. He proposes to imitate the process which takes place in acute tuberculosis, and thus confer immunity without risking a fatal issue. He describes his experiments in this direction. Injections of dead bacilli failed because they led to abscess formation, and absorption was thus hindered. Intra-peritoneal injections gave some promising results, but led to adhesions, constrictions, and other pathological changes which often caused the death of the animals experimented upon. Chemical destruction of the bacilli altered their chemical constitution and destroyed their specific action. The glycerin extract which created such a sensation in 1890 was a great step forward, and was found to produce an immunity—but a toxin rather than a bacillary immunity in the majority of instances. He found this tuberculin of the greatest diagnostic value, even at a very early stage, in man as well as in animals, and has had no reason to alter his original views as to its value in this respect.

He then tried mechanical destruction of the bacilli, and his new tuberculin is the product of this method. The greatest difficulty was met with in getting rid of the protecting layer of sebatic acid. This was finally accomplished by triturating dried cultures in an agate mortar with an agate pestle. The bacilli were thus mechanically broken up—distilled water was added and the mixture separated in a centrifugal machine. The products were a whitish fluid free from bacilli, and a sediment composed of broken down bacilli and some organisms which had escaped destruction. This sediment was subjected to the same process again and again until every trace of the bacilli had disappeared and nothing remained but a series of clear fluids. The first of these fluids, the whitish opalescent one

referred to, he found to differ from those which followed, and a glycerine extract of it was practically identical with the old tuberculin of 1890 in that it caused a reaction but did not confer immunity. This he named the tuberculin O, or "T.O." The second fluid he called tuberculin R, or "T.R.," and it contains substances insoluble in glycerin, for, when glycerin is added to it a cloudiness is produced.

This second tuberculin, the "T.R." is the one he proposes as a remedy for tuberculosis, and he uses it in the same way as the old tuberculin, commencing with a very minute dose and gradually increasing. He commences with $\frac{1}{5000}$ of a milligram, and if this produces a reaction still further reduces it. But if no elevation of temperature is produced he goes on injecting a gradually increasing dose every second day, until at the end of about three weeks he can inject twenty milligrams without any marked reaction. He insists that perfectly free and highly virulent cultures must be used in the preparation.

As to the results, he has experimented upon both guinea pigs and man; and, whilst his statement is cautious and conservative, he is none the less confident that "T.R." will prove of great value in suitable cases. He has obtained brilliant results both in lupus and pulmonary tuberculosis, but warns us that patients in an advanced stage will receive little or no benefit. Neither will it cure those with marked secondary infection, especially if with streptococcus. He found that patients whose temperature was over 38°C. were seldom benefited. But in suitable cases improvement was invariably the result. Indeed, many of the cases appear to be cured, but sufficient time has not elapsed to enable him to say that relapse may not occur. He looks upon the treatment as harmless, as with carefully graduated dosage neither reaction nor unpleasant results followed.

The following were the only symptoms observed in suitable cases of pulmonary tuberculosis: A slight increase in rales, then rapid decrease in amount of sputum to the vanishing point, and decline in temperature curve.

The preparation of the tuberculin is fraught with the greatest danger, and it is evident that elaborate precautions must be taken to prevent infection of those who triturate dry cultures of virulent bacilli. The work should only be done in establishments where all precautions are provided for. Experiments are now being carried on with a serum preparation obtained by the use of tuberculin, but he is not yet able to say whether it will prove effective.

No doubt the new preparation will soon receive extensive clinical testing, and the results will be awaited with great interest. If they justify the hopes which the distinguished investigator so confidently anticipates the practice of medicine will be revolutionized, and Koch will have gained a fame even greater than that of Jenner, Pasteur, and Lister. To show the possibilities of the new tuberculin some experiments with guinea pigs are of remarkable interest. When an animal is immunized by repeated injections gradually increased to the maximum it is found that large and repeated injections of most virulent tuberculous cultures may be administered with impunity, and the animal upon being killed shows no trace of tuberculosis or tubercle bacilli. Administered to guinea pigs affected with tuberculosis in the early stage a cure is brought about in from two to three weeks.

The new tuberculin will be placed on the market by a German house in the form of a glycerin solution containing a milligramme in each cubic centimetre. This solution is diluted with sterilized salt solution to obtain the minute initial dose ($\frac{1}{300}$ of a milligramme.)

Book Reviews.

The following books have been received :

- NEW VOLUME OF HARE'S SYSTEM OF PRACTICAL THERAPEUTICS. *A System of Practical Therapeutics*. By eminent authors. Edited by Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Volume IV. Octavo, 1100 pages, with illustrations. Regular price, cloth, \$6; leather, \$7; half Russia, \$8. Price of Volume IV. to subscribers to the *System*, cloth, \$5; leather, \$6; half Russia, \$7. Price of the *System* complete in four volumes of about 4,500 pages, with about 550 engravings, cloth, \$20; leather, \$24; half Russia, \$28. Lea Brothers & Co., Publishers, Philadelphia and New York.
- THE DISORDERS OF DIGESTION IN INFANCY AND CHILDHOOD. By W. Soltan Fenwick, M.D., B.S., London, member of the Royal College of Physicians; physician to out patients at the Evelina Hospital for Sick Children, etc., with illustrations. 377 pages. 8vo. Price, 10s. 6d. London: H. K. Lewis, 136 Gower Street, W.C.
- THE JOURNAL of CUTANEOUS AND GENITO-URINARY DISEASES has lately changed hands, the Physicians' Publishing Co. having purchased the Journal from William Wood & Co. Dr. J. A. Fordyce has retired from the editorial chair and is succeeded by Drs. James C. Johnston and George K. Swinburne.
- THE DISEASES OF THE STOMACH. By Dr. C. A. Ewald, Extraordinary Professor of Medicine at the University of Berlin; Director of the Augusta Hospital, etc., etc. Translated and edited with numerous additions from the third German edition by Morris Manges, A.M., M.D., Assistant Visiting Physician in Mount Sinai Hospital, Lecturer on General Medicine at the New York Polyclinic, etc. 600 pages. Profusely illustrated. Price— New York: D. Appleton & Company. Toronto: G. H. Morang, representing D. Appleton & Co., 63 Yonge street.
- CLINICAL LESSONS ON NERVOUS DISEASES. By S. Weir Mitchell, M.D. LL.D., Edin., Member of the National Academy of Sciences Honorary Fellow of the Royal Medico-Chirurgical Society of London. Handsome 12mo., 299 pages, with illustrations and two colored plates. Cloth, \$2.50. Lea Brothers & Co., publishers, Philadelphia and New York, 1897.

Medical Items.

DR. C. W. CHAPIN has removed from Brantford to Canisville.

DR. F. C. BEDELL has removed from Hollier to Merrickville.

DR. W. J. WEAVER has located in Athurette, N.B.

DR. HOLFORD WALKER, Isabella street, has gone to Manheim to investigate the Schoy method of treatment in heart disease.

THE A. L. HUMMEL ADVERTISING AGENCY have removed from 108 Fulton street to The Woodbridge Building, 100 William street, New York.

E. B. TREAT, medical publisher, has removed from 5 Cooper Union to 241-243, 23rd street, New York. Two sons, William and Edwin C., have been admitted to partnership and the firm will in future be known as E. B. Treat & Co.

The secretary has already received the following list of papers for the Ontario Medical Association, which meets on June 2 and 3:

Present Status of the Radical Cure in Hernia—G. A. Bingham, Toronto.

Serum Therapy in Medicine—J. L. Davison, Toronto.

Albuminuria of Pregnancy—R. W. Garrett, Kingston; G. Gordon, Toronto.

On the Clinical Value of Inflation of the Stomach—H. L. Elsner, Syracuse, N.Y.

Study of the Dried and Stained Preparation of the Blood—Harold C. Parsons, Toronto.

Treatment of Ulcers—Seneca D. Powell, New York.

Nervo-Motor Dyspepsia—H. J. Hamilton, Toronto.

Treatment of Eclampsia—W. J. Wilson, Toronto.

Traumatic Lesions of the Spinal Cord (with specimens)—G. A. Peters, Toronto.

Paper, Chronic Endometritis: Causes and Treatment—J. W. S. McCullough, Alliston.

Remarks on Modern Therapeutics—J. T. Fotheringham, Toronto.

Strepto-Mycosis—J. C. O. Hastings, Toronto.

A Case of Gangrene of the Rectum—L. Teskey, Toronto.

Two Unnamed Diseases—James Sampson, Windsor.

The Injurious Effects of our Overwrought School System on the Health of Public and High School Pupils—R. Ferguson, London.

The Orthopædic Aspect of Nervous Diseases—H. P. H. Galloway, Toronto ; B. E. McKenzie, Toronto.

Cystic Tumors of the Ovary, Complicating Pregnancy, Labor, and the Puerperal state, with notes from cases—H. Meek, London.

"A Severe Case of Gonorrhœal Iridocyclitis"—G. H. Burnham, Toronto.

Some Considerations in the Management of Pregnancy—E. E. Harvey, Norwich.

Pain and some of its Aspects—D. Campbell Myers, Toronto.

Paper—Dr. Hanks, Blenheim.

The Cottage Sanitarium Treatment of Pulmonary Phthisis—N. A. Powell, Toronto.

Should the Medical Profession of Ontario be Self-Governed?—J. W. McLaughlin, Bowmanville.

Abscess of the Lung (Report of a case)—J. S. Hart, Toronto.

A Plea for Radical Operation for Hernia Among the Insane—A. T. Hobbs, London.

The Value of Aseptic Methods in the Treatment of Pus Cavities—A. Primrose, Toronto.

Tuberculosis of the Liver—R. W. Whiteman, Shakespeare.

Pneumococcus Infection—H. B. Anderson, Toronto.

The Treatment of Gastro-Intestinal Catarrh in Infants—H. D. Livingstone, Rockwood, Ont.

My Experience with Gall-Stones—J. F. W. Ross, Toronto.

Pathological Cord Specimens—Wm. Oldright, Toronto.

Experience with the Schott Treatment of Heart Disease—H. Walker, Toronto.

Symptoms and Diagnosis of Gall-Stones without Jaundice—J. E. Graham, Toronto.

BRITISH MEDICAL ASSOCIATION—MONTREAL MEETING, 1897.

Since our last issue the list of officers for the Montreal meeting of the British Medical Association has been completed. Dr. Herman M. Biggs, of New York, having accepted the invitation of the Council to deliver the address in Public Medicine. (Dr. Biggs, the scientific head of the New York City Health Department, physician to Bellevue Hospital, has done much to advance his subject. His address will be one of the features of the meeting.)

By an Order in Council, the Provincial Government has subscribed \$2,000 for the purposes of the association ; altogether, therefore, through the public spirit of the Dominion Government, Provincial Government, and Montreal City Council, \$10,000 has been granted towards the expenses of the meeting. This, with a guarantee fund which is being obtained from members of the profession in Montreal and with private acts of hospitality on the part of the citizens, should be ample.

Sir Donald Smith, the High Commissioner, has invited the members of the association and its guests to a reception at 1157 Dorchester Street upon the Wednesday evening of the meeting. Other leading citizens are offering afternoon entertainments. The Montreal Golf Club has also thrown open its links to members during the meeting, and in very many directions generous help is being offered by those unconnected with the profession.

All this activity in Montreal is, we are glad to learn, being met by a very promising condition of affairs upon the other side of the Atlantic. We learn that several steamship companies have already their best berths engaged by members, while some have ~~already~~ a full complement of prospective travellers. The invitations to the leading members of the profession in the United States have already been forwarded, and now the various sections are busy preparing their programmes.

We herewith print the provisional programme, corrected up to date, it being understood that this is provisional and liable to further modification :

PROVISIONAL PROGRAMME.

Wednesday, August 18, to Thursday, August 26.—Meeting of the British Association for the Advancement of Science at Toronto.

Thursday, August 26 to Monday, August 30.—Excursion for members and guests of the British Association from Toronto *via* Niagara, Kingston, the Thousand Islands, Ottawa, etc., to Montreal.

Monday, August 30.—Meeting of the Canadian Medical Association at Montreal.

Tuesday, August 31.—12 a.m., service in the English Cathedral. 2.30 p.m., Windsor Hall : Opening ceremonies and addresses of welcome. 3 p.m., address by the president-elect, T. G. Roddick, M.D., M.P. 4 p.m., garden parties, excursions, around the mountain, etc. 9 p.m., soirée at Laval University.

Wednesday, September 1.—10 a.m., McGill University : Opening of sections. 3 p.m., Windsor Hall : Address in Medicine, by Dr. Wm. Osler. 4 p.m., excursion down the St. Lawrence, etc. 9 p.m., reception by the Hon. Sir Donald A. Smith, K.C.M.G.

Thursday, September 2.—9.30 a.m., McGill University ; Sectional meetings. 1.30 p.m., lunch on the mountain. 3.30 p.m., Windsor Hall : Address in Surgery, by Mr. T. Mitchell Banks. 4.30, excursion across the island, etc. 7.45 p.m., annual dinner of the association, Windsor Hall.

Friday, September 3.—9.30 a.m., McGill University : Sectional meetings. 3 p.m., Windsor Hall : Address in Public Medicine, by Dr. Herman M. Biggs, and concluding general meeting. 4.15 p.m., excursion to St. Anne's and down the Lachine Rapids. 9 p.m., soirée at McGill University.

Saturday, September 4.—Excursions to Ottawa, Quebec, Kingston, Lake Memphremagog, etc.