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REFLEX NEUROSIS.

By A. S. FRASER, M.D., Sarnia.

A reflex neurosis may be described as a disturbance of function by some cause acting at a distance through the medium of reflex mechanisms. It may also be said that the mechanisms in question are seldom, if ever, in a normal condition during the existence of the neurosis. In order to consider intelligently the general conditions which give rise to reflex neurosis, it will be necessary to review to some extent what is known of normal reflex action. The structures concerned in a reflex action are, an afferent nerve, a nerve centre (consisting of nerve cells and fibres), and an efferent nerve. The relation of these parts to each other is now better understood than it used to be. It has been found, by means of the improved staining methods discovered by Golgi and others, that the nervous system is made up of nerve units held in position by neuroglia and connective tissue.

Each nerve unit consists of a nerve cell and its branches. The branches of the nerve cells are contiguous but never unite with each other. The intermingling of the branches of different nerve cells has been called a synapsis. An impulse passing along a nerve fibre is transferred to another nerve fibre by means of the synapsis and is thereby frequently changed in character.

One branch of each nerve cell differs from the others. This is what was formerly known as the axis-cylinder process, but now called the neuraxen or axen. This process or branch conveys impulses from the nerve cell while the stouter branches or denelutes convey impulses to the cell. This being the case it is less difficult to understand how it is that an impulse passing along a centripetal fibre may depart from its normal course and influence some distant part in a most unexpected manner. For instance, an afferent nerve fibre comes into relation in the spinal cord by synapsis with a considerable number of other fibres with one or more of which it should have a normal functional communication, but owing to the centre being in an abnormal condition the impulse is switched off, and when it arrives at the cerebral centre it gives false information, in fact much the same as when telephone-wires are crossed, and not only are the impulses carried by the wrong fibres,

but they may be altered in character so as to be altogether out of proportion to the stimulus which gave rise to them. Nerve fibres which convey impulses to and from the central nervous system are divided into afferent and efferent. Besides the nerves of special sense, the afferent nerves are those of touch, temperature, muscular sense, and of general sensibility, including those of pain. The efferent nerves are motor nerves to skeletal muscles vaso-motor, secretive, visceromotor, inhibitive, accelerative and tropic. Nearly all of these fibres terminate in the spinal cord and form synapses with the nerve cells and fibres which go to make up the numberless centres in the cord.

It was for a long time supposed that the sympathetic nervous system formed connecting links between the different parts and organs of the body, and by this means events occurring at one part influenced the function of the parts or organs more or less directly connected with it by means of sympathetic nerves. This view has been abandoned for several years by physiologists, as it has been clearly proved that the sympathetic ganglia are quite incapable of any reflex action, and that they serve as distributing points only for nerves coming from the brain and spinal cord.

It is the business of the vaso-motor nerves to provide the exact quantity of blood to each particular part of the body at the exact time at which it is required, and this is accomplished by reflex action, the tissues calling for more or less blood as may be necessary, and the vessels are filled by means of reflex mechanisms in the medulla and in the spinal cord.

Considering the great number of reflex mechanisms, and their extreme sensitiveness and complexity, it is surprising that more serious functional disturbances are not constantly occurring. It is, however, quite a common experience to find the gravest structural changes occurring without giving rise to any reflex phenomena. While a reflex neurosis may have its starting point in any part of the body, they are most frequently found to exist in connection with lesions at the orifices of the body and in the generative organs, more particularly in females, and in some cases the reflexes appear to follow their normal paths, as when a painful ulcer of the rectum causes spasm of the sphincter ani, or when an adenoid growth or a patch of congested mucous membrane in the naso-pharynx gives rise to a cough.

Cases, however, are not uncommon where a disturbance of function may exist for some time without any indication that it is reflex in character, until perhaps by accident the true cause of the difficulty is discovered.

Considering the disproportion that exists between the gravity of the cause and its effects in a large proportion of reflex neuroses we must conclude that the condition of the nervous system is at least frequently the chief factor of the complaint.

A condition of irritable weakness may be to some extent constitutional or natural to the individual in a given case. It may depend upon nervous strain, but it is probable that the most frequent cause is an abnormal condition of the blood, resulting either from auto-infection from the intestinal canal, or defective secretion, either internal or external.

The effect of ptomaines absorbed from the intestinal canal is frequently noticed in cases of intestinal indigestion. As there are a great variety of bacteria frequently present in the intestines there must be a corresponding variety of ptomaines. Some of them depress and some exalt the reflex excitability. Disorders of internal secretion have lately been receiving considerable attention, and it has been pretty well established that besides what are known as the glands, nearly, if not quite, all of the other glands have an internal secretion, as disease or removal of any gland has an effect apart from what might be expected from the failure of its

ordinary work. The effects of bile and urine poisons are easily recognized and well understood.

The diagnosis of a reflex neurosis is often a matter of great difficulty. Those cases in which pain is a prominent symptom are the least obscure, for although the physiological connection cannot usually be traced, yet experience has led physicians to associate certain painful sensations with lesions more or less distant. Thus pain in the ear frequently arises from a decayed tooth which gives rise to no painful sensations itself. Some forms of headache are associated with ulterior disease. Some painful conditions of the ovaries give rise to a variety of reflex phenomena. But when the reflex disturbance does not affect consciousness originally, and the patient only feels the disturbance, or rather the consequence of the disturbance, of function caused by the reflex neurosis, then the tangle presents many difficulties. It is probable that reflex disturbances are constantly taking place which do not affect consciousness, and it is easy to understand that in such cases the nerves involved are vaso-motor, secretive, tropic, etc.

The treatment of reflex neurosis must consist, in the first instance, of removal of the cause, and when this can be accomplished by surgical procedures, the results often appear miraculous. The cure of a fissure of the anus or a lacerated cervix uteri, while unimportant from a surgical standpoint, is often followed by relief from a most distressing train of reflex symptoms that have lasted for years.

The removal of one or both ovaries for the relief of reflex neurosis, while often followed by recovery, is of more doubtful advantage, the perfect neurosis disturbance which sometimes follows is occasionally persistent, and is probably due to a loss of the internal secretion of the gland.

While surgical procedures are very often successful in giving relief, it will be found that in a large proportion of cases, more or less of the trouble remains and the patient is not restored entirely. Then it becomes necessary to inquire into the general condition of the nervous system and adopt such means as may seem to offer the best prospect of bringing the nervous system to its normal condition. In fact, in every case it will be necessary to bear in mind that a perfectly healthy nervous system will stand a great deal of abuse before it kicks, and that an impaired nervous system will kick when the provocation is very slight.

SOME LEADING EUROPEAN GYNÆCOLOGISTS AND THEIR WORK.

By A. LAPHORN SMITH, B.A., M.D., M.R.C.S.Eng., Montreal, Can.

My last letter described very briefly what I saw in Paris; this letter will speak of some well-known gynæcologists in Florence, Vienna, Prague, Dresden and Berlin.

PERTALOZZA of Florence. Having heard that he was doing a large amount of good work, I left the beaten track and went to Florence to see him. He received me most courteously and invited me to come next morning, which was Tuesday, at seven o'clock to see some operations. He has an immense clinic, being in sole charge of 40 gynæcological and 80 obstetrical beds. Ten of the latter are reserved for isolating infected cases coming from outside. Among his own cases he has had no death from sepsis for several years. The first

operation was abdominal hysterectomy for multiple fibroids in a woman who had also prolapse of the vagina; he left a small portion of the cervix to which he afterwards stitched the upper part of both broad ligaments in order to draw up the vagina. He used isolated silk ligatures for the two ovarian and two uterine arteries, and he operated very quickly. The silk was prepared by first soaking it for 12 hours in ether to extract the fat, and then sterilizing it in steam for two hours after which it remains indefinitely in 2 per 1000 sublimated alcohol. As it appeared to be particularly good, I took down the address of the manufacturer: Bouti, silk manufacturer, Porta Rossa, Florence. He afterwards removed a cervix which had been left after hysterectomy two years before, and which had now become cancerous. Some of the old silk ligatures were found encysted and calcified. He then took me over his hospital and showed me about 20 patients convalescing from laparotomy. I would strongly advise those who intend to visit gynæcological clinics in Europe to spend a few days with this talented gentleman.

SCHAUTA of Vienna. During my short stay I was unfortunate in not seeing him operating, but this was amply compensated for by seeing his first assistant, Dr. Schmidt, perform a vaginal extirpation of the uterus and appendages for pyosalpinx. He opened the anterior vaginal fornix first and then the posterior, sewing the peritoneum carefully to the vaginal edge, in order to avoid hæmorrhage, after which he placed just six silk ligatures on the broad ligaments, completely controlling the bleeding, of which there was almost none. By cutting off the lower half of the uterus he obtained more room for the difficult task of detaching and bringing down the densely adherent appendages. I spent another profitable evening with

DR. GUSTAVE KOLLISCHER, second assistant to Professor Schauta, who is quite celebrated for his work on the bladder. He catheterized the ureters, and gave me a fine view of the bladder with the catheter in the ureter, by means of his cystoscope, which is a modification of Nitze's and Brenner's. I was so pleased with its easy working after seeing it used on several cases, that I procured one at Leiter's, instrument maker, Vienna. It has many advantages over examination by speculum, the principal one being that it does not require any dilatation nor external light. All you have to do is to draw off the urine, fill the bladder with clear warm water, introduce the cystoscope and touch the button for connecting the current from a little 5-cell battery, when the whole of the bladder is beautifully lighted up, and the smallest foreign body, as well as the openings of the ureters, can be easily seen. There is a small channel adjoining the optical apparatus through which the elastic bougie is passed, and can be guided into either ureter. He also showed me a beautiful little curette for removing granulations, and also little scissors for cutting off polypi, and forceps for seizing calculi. He told me that he had removed several wandering silk stitches from the bladder, which had ulcerated into it after laparotomies and vaginal fixations.

PAWLIK of Prague received me very kindly, and put me in a good humor by mentioning many of my papers. Speaking of electricity, he said he had employed Apostoli's method in a great many cases, and with very good success in arresting hæmorrhage, in diminishing the size of fibroids, and in expelling some of them from the uterus, but he had given it up, because he could not be sure of the result in any given case. He removed a large ovarian cyst by the abdomen, using catgut for ligature and burning instead of cutting off the tumor in order to avoid adhesions to the bowel, and also to lessen risk of sepsis. He closed the abdomen with two rows of burned catgut and a third of superficial silk sutures. He prefers the abdominal route for fibroids and pus tubes. I saw them using 3 per cent. of ichthyol in

glycerine in the out-patient department. Pawlik is a great linguist, and speaks English, French and German perfectly, besides three other languages; but what he excels in is catheterizing the ureters. He showed me the instruments which he used twenty years ago in Vienna, where he told me the proceeding was employed for the first time, and by him. His skill in using the ureteral catheter is wonderful; he seemed to introduce it into the bladder and up into the uterer with one gliding movement. No dilator; no endoscope; no artificial light; not even by sight, but merely by the sense of touch. I asked him to measure the catheter, and it was found to be 32 centimetres long. In a case of pyonephrosis he first injected 200 grammes of water to distend the bladder and then introduced the ureteral catheter, and injected 130 centimetres of 1-3000 nitrate of silver solution, which he gradually increases after some days to 1-2000. Sometimes he uses sublimate solution. The patient told him when her kidney was distended, and on removing the rubber pipe the solution spurted out of the catheter. On making intermittent pressure on the kidney the liquid could be made to spurt out in jets. He also showed me the woman from whom he had removed the whole of the cancerous bladder.

LEOPOLD of Dresden. As my train did not get in till 9.30 a.m., and I did not reach the hospital until 10, I was too late to see him operating, which he begins every morning at seven o'clock. He is a firm believer in total extirpation of the uterus whenever both ovaries and tubes are severely diseased. He gave me his recent paper on the results of 67 such cases, with a mortality of one-and-a-half per cent. Also another paper giving results of 100 cases of removal of the uterus by the vagina for myoma with a mortality of 4 per cent.

OLSHANSEN of Berlin. I studied under him ten years ago, and was pleased to see that he had not aged at all since then. He gave me a kind welcome, and invited me to an operation next morning at eight. When he has several operations he commences sharp at seven, so one has to rise at 5.30 or 6 to be there in time. The case was a woman of 65, who had a bleeding polypus, which, on removal and examination a few days before, was found to be cancerous. He opened the two pouches and sewed the peritoneum to the vagina. He used nothing but catgut throughout, but he always ties three knots on the arterial ligature. The ligaturing of the broad ligament was greatly facilitated by his having the best needle I have ever seen, known as Olshansen's "Unterbrudungsnadel," and much superior to Deschamp's. As he trusted entirely to catgut I asked him how it was prepared: 1st, Soaked for six hours in sublimate water, 1-1000; 2nd, The water is removed by soaking for 24 hours in sublimate alcohol, 2-1000; 3rd, Matured for several months in absolute alcohol, and used directly from that. After the operation he took me over his wards and showed me a great many cases convalescing nicely from laparotomy. In the latter he closes the abdominal wound with four layers of catgut in fat patients or three in thin ones. He objects to through-and-through silkworm gut for fear that it will lead pus into the peritoneum; although another operator, Landau, told me of a woman having died on the sixteenth day owing to being closed up by layers of catgut; the pus could not get out, and so broke into the peritoneum, which would have escaped to the skin if she had been sewed up with through-and-through stitches. Olshansen dresses the abdominal wound with a very little iodoform and a single little strip of gauze, over which collodion is painted so as to completely seal the wound, and this remains undisturbed for twelve days. I saw several of these first dressings removed and they looked very well; the catgut was all absorbed, and the knots could be brushed off. As I thought the buried cat-

gut would cease to hold the wound after a few days, I asked him if he ever saw hernias? He replied that they would happen in spite of any method of suturing. I told him that I used silkworm gut and left it in a month. He does ventrofixation by passing a silkworm gut stitch around each round ligament near the uterus and fastening it to the abdominal fascia and leaving it buried there. I saw him introducing a pessary and sending a woman away who was brought for operation with a freely movable retroverted uterus, which he first replaced. Next day he did abdominal section for an ovarian tumor with twisted pedicle, and another case of pus tubes and ovaries also by the abdomen, taking great care to wall off the bowels with quantities of sterilized gauze. No one here flushes the abdomen with water, and they have also abandoned constant irrigation in vaginal work, using instead great numbers of little gauze sponges which are thrown away as fast as used. Olshansen did not remove the uterus, but carefully closed all bleeding points, and left it in. On the walls of the operating room he has two cards: NOLI TANGERE and FAVETE LINGUIS. He told me he was going to get another one with "Not to expectorate," in Latin. He showed me two cases of eclampsia, of which he has about 60 a year, sometimes as many as six at a time. As is well known he is the first authority in Germany on obstetrics, and is accoucheur to the Empress.

MARTIN of Berlin still stands at the top of the gynæcological ladder in Germany. He operates at his private hospital every day at twelve, which is a great boon for visitors, as it enables us to see two or even three other operators each day, and he did two or three a day during the whole week. The first was a vaginal hysterectomy for cancer of the cervix, using catgut for the broad ligaments. It would have been a very difficult case for anyone else, but was quite easy for him. The second case was vaginal fixation in a lady who had been wearing a pessary for retroversion for many years without being cured. He is the quickest operator I have ever seen, only taking ten minutes for this pretty operation. The same running catgut suture went through vagina and peritoneum, and the fixation stitch was of catgut. The third case, was one of cystic ovaries, in which he opened the abdomen by the vagina brought out the ovaries, found them diseased, removed four-fifths of them, and carefully sewed up the remainder with catgut, and put them back again. After closing the vaginal incision he did an anterior and posterior colporrhaphy on the same patient. Next day he did vaginal hysterectomy for a small fibroid, which was difficult on account of the senile atresia. I made particular enquiries whether he had ever known of a case of post operative hæmorrhage, and he replied, not for several years, because they tied it tighter. Next day he did two vaginal fixations for retroversion with fixation. He was greatly aided by an instrument I have never seen before, consisting of a forceps, the posterior blade of which was a stout uterine sound, and which being introduced was used as a lever to lift uterus forwards while he was opening the vesico-vaginal plica or fold. He then detached the appendages and removed them, and after carefully closing the torn surfaces on the back of the fundus, he attached the uterus at the level of the internal os to the vaginal wound. The bad results of pregnancy following the operation in the early cases to fastening the top of the fundus to the vagina, the uterus thus being held upside down. In another case he brought out the appendages, emptied some cysts in the ovaries and replaced them, and then did vaginal fixation. The next day I saw him cauterizing an inoperable cancer. It consisted of a sharp porcelain tip heated by platinum wire, and was supplied with current from a small storage battery not larger than a cubic foot. It was

quite portable and only cost \$60, including a cystoscope and a head lamp for operating on dark days.

LANDAU of Berlin is one of the leading teachers there. He is assisted by his brother, and he has a large and handsome private establishment in the Phillip Strasse, near the Charite. The pathological department is looked after by Dr. Pick, who speaks English fluently. He has a beautiful method of preparing specimens which are first hardened in 4 per cent. of formaline and then stretched on wire netting. They have the specimens of every case both macroscopical and microscopical, from whence they have removed everything, even down to curettings and vaginal discharges systematically indexed for ready reference. I have never seen anything like it anywhere. Dr. Pick gives a course of microscopy to physicians. I saw Landau remove large, double ovarian tumors which Dr. Pick took sections from, and mounted and stained while the operation was going on, and showed us in a few minutes carcinoma. Landau used silk to tie the pedicles, and through-and-through silver wire for the abdomen. Another day I saw him remove pus tubes by the vagina in a case of retroversion with fixation. He split the uterus up the middle with his scissors, and after digging out the pus tubes he put two or three clamps on the broad ligament on each side and cut them off. I was very favorably impressed with the method in this case. But immediately afterwards he did another patient in whom the pus tubes were much higher up in the pelvis, and he had tremendous difficulty in getting them out by the vagina, and I felt sure that he could have done it much easier by the abdomen.

DUHRSEN of Berlin seems by common consent to be acknowledged as the ablest among younger men of note. He is not much over forty, but his large private hospital at 35 Schiffbauerdamm filled with important cases, and maintained at his own expense, testify to his ability and energy. He received me most courteously and patiently answered my very numerous questions. He showed me a patient from whom he had removed the uterus by the vagina for hæmorrhage, due to hæmophilia, which interested me particularly, because three years before she had come to him for the same thing and he had employed *Sneguiroff's* steam cure, which cooked the woman's membrane so well that she did not menstruate at all for three years. He kindly set it going for me. It is a little boiler fitted with a thermometer so as not to let it get hotter than 125° Centig., and the steam is conveyed into the uterus by means of a double catheter during a quarter to four minutes. The cervix must first be thoroughly dilated, and there must be a rubber tube over the steampipe so as not to burn the cervix, which would cause a stricture. He is an enthusiast for vaginal laparotomy, and claims to be the inventor of vaginal fixation for retroversion, he having published his first fifteen cases before anyone else published one. I was very much opposed to the operation before coming here, but since I have seen Duhrrsen doing three in an hour, as well as several other operators doing it very quickly, and after hearing its manifest advantages I have been most favorably impressed with what I have seen of it. He opens into the peritoneal cavity in two minutes or less, hooks out the ovaries, tubes and uterus, destroys all cysts by ignipuncture, replaces them, passes a silkworm gut ligature through vagina, peritoneum, uterus, and out again on other side, through peritoneum and vagina. This is left untied until he has sewed up the opening in the peritoneum with a running catgut, and the vagina with another row of catgut, after which the fixation ligature is tied. I made many enquiries about Alexander's operation, but nobody here does it. When I told Olshansen that I could generally find the round muscle with my eyes shut, he invited me to do the operation on a

case, but on examination her uterus was found to be fixed, and therefore unsuitable. Next day I saw Duhrrsen remove the vermiform appendix and double pus tubes by the abdomen, which he does in about 25 per cent., and by the vagina in 75 per cent. Next day he removed a pair of very angry gonorrhœal pus tubes by the vagina. There was recent peritonitis. As she was a young woman he left the uterus and one ovary. This was a very nice case, as he did it very quickly and all outside of the vagina.

MACKENRODT of Berlin is one of the coming great men, if not already one. He appears to be under 40 years of age, and is a fine operator. I saw him doing a Cæsarean section and subsequent total extirpation of the uterus for cancer. The child, about eight months, was taken out alive, and did well. There was hardly any bleeding. As soon as the child was removed through the opening in the uterus he put on two ligatures on each side, and a few temporary ones on the uterine side and cut between them until he came to the uterine arteries, which he tied. He then separated the bladder and freed the uterus until he had it and the vagina like one tube free almost to the vulva. He felt for the large cervix and cut the vagina below it, not with a knife, but with a large cherry-red electrical cautery, his object being to prevent it from infecting the peritoncum. The current measured 17 amperes, and was obtained from the street. The asepsis of himself and assistants was most thorough, spending 20 minutes by the clock in disinfecting their hands. He and most of the assistants here stand on the patient's left, so as to use their right hands.

KOBLANOK of Berlin is Olshansen's first assistant, whom I saw removing a large fibroid by the abdomen. The case was an easy one, but he did it beautifully.

GUSSEROW, whom I was anxious to see, did not operate while I was in Berlin. Neither did Nagel, his assistant.

In closing my letter from Berlin, I must truly say that I have seen more here in one day than I have ever seen in any other city, and I cannot speak too highly of the kindness with which I was received by one and all. Nearly every day I was up before 6 a.m., in order to get to Olshansen's by seven, and from there I went to Landau's, and from there to Duhrrsen's or Mackenrodt's, and from there to Martin's, where I remained till nearly two, by which time I felt that I had seen enough for one day. As all these places are within a few minutes of each other, Berlin offers especial advantages for a first graduate course. My next letter will speak of Sanger, Zweifel and Jacobs.

INTESTINAL OBSTRUCTION.—DIAGNOSIS AND TREATMENT.*

By A. P. CHALMERS, M.D., Oil Springs.

Intestinal obstruction, used synonymously with intestinal occlusion, intestinal strangulation, ileus, is, in my mind, one of the most important abdominal lesions calling for immediate surgical interference, and on account of its prevalence I selected this subject for discussion at this Association. I do not think that the human race is more subject to the malady to-day than it was centuries ago, but rather the profession is more wide awake as to its diagnosis, which accounts for the number of cases that are reported as compared with those of years ago. Intestinal obstruction may be divided into

* Read at Lambton Medical Association Meeting, Wyoming, May 11, 1898.

two classes: First, acute; second, chronic. As the former is the more frequently met in general practice, I shall deal more fully with it. The acute form comes on without any forewarning, whereas the chronic form comes on slowly and is usually due to stenosis from some organic disease, as cancer, contraction of typhoid dysenteric, or syphilitic ulcers.

Acute obstructions, not the result of organic disease of the intestinal wall, depend on some mechanical cause, by which the lumen of the bowel is obliterated. This may occur from the following causes:

1st. Congenital malformation by which internal strangulation takes place in Meckel's diverticulum, or impaction of the bowel into an opening in the mesentery or omentum or some other anomalous pouch.

2nd. Bands, which may be either acquired or congenital, may cause obstruction, either by direct pressure across the bowel, or strangulation of the entire coil.

3rd. Faulty adhesions, which may occur in ectopic gestation, appendicitis, pelvic cellulitis, or any other peritoneal inflammation.

4th. Volvulus and intussusception.

5th. Impaction of gall stones.

6th. Enteroliths.

7th. Intestinal worms.

8th. Hardened fæces and foreign bodies.

Although it is rare to get congenital malformation above the anus and rectum, yet it is sometimes found, the most frequent site being the ileum. These are divided into two classes: 1st, excessive closure of the vitelline duct; 2nd, incomplete closure of this duct. Incomplete closure may result in a fistulous opening with the umbilicus. Excessive closure of the duct may cause constriction of the ileum, marked or slight, and total occlusion by mucus, obstruction from foreign bodies, gall-stones and enteroliths.

Foreign bodies very seldom become impacted until they reach the rectum or anus; nevertheless, irregular or elongated bodies will become impacted, especially in making sharp turns, in which case the mucous membrane undergoes an inflammatory change, which causes contraction of the circular muscular fibres of the bowel. Bodies as large as the lumen of the small intestine may pass through unless they become obstructed through inflammatory changes of the mucous membrane. Enteroliths formed about gall-stones are the most frequent causes of acute obstruction in this class. Enteroliths chiefly consist of phosphates combined with animal matter, or they may be entirely vegetable in origin mixed with fæcal matter, or may be composed of medicinal substances, such as benzoin, chalk or shellac. Senn reports a case of obstruction by enteroliths where thirty-two enteroliths each had a nucleus of a cherry-stone. Virchow also reports a similar case. These bodies are usually found in the cæcum or large intestine, and old age predisposes to them. Therefore, if the patient is old, and has had a previous history of having had gall-stones, there is great suspicion that the obstruction is due to enteroliths. They are more frequently found in the female than in the male.

It is rather difficult to demonstrate how these calculi gain an entrance into the bowel. The most probable, which has been shown in many autopsies, is by a fistulous opening between the gall-bladder and duodenum. This opening is made by an ulcerative process and takes a long time.

Intestinal obstruction from worms is very rare, although several cases have been reported. Wyeth reports a case in which he successfully removed a large mass of lumbricoids from a child. Adhesion with flexion of the bowel is a very common cause of obstruction met with at the present time, which may

be accounted for by the large amount of abdominal surgery done as compared with years ago.

Acute obstruction may be caused by adhesions causing a sharp bend in the bowel, met with in appendicitis, pelvic cellulitis, salpingitis, or other peritoneal inflammations. The seat of this obstruction is usually in or near the pelvis, and as a rule it is the small intestine that is involved. A coil of intestine of limited area becomes attached through peritoneal inflammation so that the free movement of the bowel becomes limited. The passage of the bowel contents around the coil is possible until the adhesions become too firm, and the proximal end becomes unusually distended. Finally the loaded bowel not only tightens the kink, but presses it firmly against the resisting surface, whereupon complete stenosis takes place and the phenomena of obstruction ensues. Although obstruction is complete there is no organic narrowing of the lumen of the bowel; indeed, after the bowel is freed it is found nearly as distensible as ever, unless adhesions have been so extensive as to injure the external coat.

Obstruction by Band or Cord.—This form of obstruction acts similar to that of adhesions, only the adhesions act like a traction diverticulum, the adhesion being on the opposite side pulling away from the mesentery, while the band or cord compresses the intestine, external strangulated hernia being excepted. It is usually caused by peritoneal inflammation, occasionally by a loop in the mesentery. This lesion may be found in any part of the intestines, but is most usually found at the ileo-cæcal valve or pelvis. About eighty per cent. of all cases are found in the small intestines, and are more common in the male than in the female.

Intussusception is that form of obstruction when a segment of intestine becomes enfolded into the lumen of intestine with which it is continuous, grasped and held by it so that a permanent telescoping of intestine within intestine results.

It is an anomaly most frequently met in early childhood, more than fifty per cent. of cases occur before the tenth year and the greater portion of these before the second year. No portion of the intestine is exempt from it, but the ileo cæcal junction is the site of most frequent occurrence.

By invagination of intestine within intestine we get a mass composed of three cylinders of intestine, together with the mesentery of the invaginated portion, with the mucous surfaces of the outer and middle cylinder opposite each other, and the peritoneal surfaces of middle and inner cylinder opposite. The invaginated portion is termed the intussusceptum, the ensheathing cylinder intussuscipiens, that farthest in advance the apex, the firmly-grasped portion of entering intestine and mesentery the neck.

Compression of mesentery at the neck causes venous obstruction with œdema and blood extravasation into the walls of the intussusceptum and hæmorrhage therefrom. Following this we get localized peritonitis between opposing peritoneal surfaces, which renders it irreducible, and later gangrene and septic peritonitis. Obstruction may be due to narrowing of the apical orifice by the dragging of the mesentery and by the thickening of the invaginated wall by congestion and exudation. The narrowed canal may be obstructed by mucous polypus or by ingesta. The nature of the case depends greatly on the age and location of the lesion. The younger the patient and the higher up the lesion the more acute the course.

Volvulus.—In this form of obstruction we get a loop of intestine twisted upon itself so tightly as to completely obstruct the fæcal flow, and produce vascular engorgement of its own substance. It is due to a long lax mesentery, and found most frequent in old age.

Chronic intestinal obstruction may be caused by faecal accumulation without any organic disease of the intestine. In such cases large masses collect in the caecum or ascending colon, and may be of such a nature as to allow a small amount of faeces to pass the obstruction, and thus lead the patient to believe that there has been a movement in the bowels. Such cases are frequently met in general practice. I will here relate a very interesting one that I met in my own practice about two months ago. I was called to see the patient twelve days after her confinement. She gave a history of having had a very easy delivery; bowels moved on third day, but very constipated; moved twice after that with similar results. Patient said she never felt better until she got up, when she was seized with chills, fever, and sweats. I was called to see her, and at first diagnosed the case as puerperal septicæmia, temperature 104° , pulse 120; very bad odor from breath. I curetted the uterus with negative results. Uterus was fairly well contracted. The following day I called again, found temperature 106° , pulse 140, wild delirium and cyanotic; breath still very offensive. I concluded there might be faecal accumulation, so gave a very large enema, which brought away some very hardened feces. Following this I gave a very large dose of mag. sulph., which in a short time gave very gratifying results. A tremendous amount of hardened faeces came away. Temperature dropped to 100° , pulse 98, and patient took a good sleep and made a speedy recovery. In this case there is no doubt but that the patient was being poisoned by ptomaines due to the faecal accumulation.

Symptoms characteristic of acute obstruction are: Pain, which is the first and most important symptom, comes on suddenly and paroxysmal; temperature subnormal, pulse rapid and thready. Vomiting begins very early. First it consists of the contents of the stomach, then bile and regurgitated contents of the small intestine, and finally faecal, particularly if the obstruction is in the large intestine. Distention of the bowel begins very soon after the commencement of the pain and vomiting. Tenderness is usually present, first local, then general. Obstipation is complete, although flatus and faeces may be passed from the bowels below the stricture. After one or two evacuations of this kind nothing will be passed per rectum. With the onset of the acute symptoms collapse may set in, making in a few hours any surgical interference almost hopeless. In other cases a week or two may elapse before symptoms of collapse set in. Such a case came under my observation three years ago. The patient, a strong, robust man, had all the marked symptoms of complete intestinal occlusion. Early in the trouble I informed him that there was nothing short of surgical interference that would save his life, but he absolutely refused, saying "he would rather die than be operated on." He retained all the symptoms of acute obstruction for fifteen days before the symptoms of collapse set in.

In some cases physical examination may show a distinct tumor. In volvulus, *e.g.*, the affected coil may be felt as an ill-defined resistance through the abdominal walls; in intussusception a sausage-shaped tumor; in others nothing more than a general distention. I think it quite immaterial what form of obstruction exists, as when the surgeon is satisfied of his diagnosis of an acute obstruction, his duty is to remove the cause without delay, and the only mode of so doing is by opening into the peritoneal cavity. My plan is to inform the patient that death is his fate without surgical interference, and if he don't wish to comply to that there is no need of professional attendance. The more violent the onset the more severe the pain, and the earlier the appearance of the vomiting and distention the more apt the lesion is to be located in the small intestine. Faecal vomiting is not always present, and

when present it is not always diagnostic, as it will occur in the paresis from general peritonitis. There is usually violent peristalsis, although this may in some cases be absent in both acute and chronic obstruction. It is more frequently found in chronic obstruction than acute, as in the former the bowel wall is thickened and abdominal wall thinned.

Treatment.—The only medicinal-treatment I would give would be morphia, or opium, to allay pain, and increased peristalsis. Cathartics are serious things to tamper with; the only case I would recommend them would be in faecal accumulation, in which case there is nothing better than mag. sulph. or an enema of warm water with ℥ iij. of castor oil in it. If diagnosis is certain of intussusception try massage of the abdomen, and an enema of warm water or gas, with patient inverted; but if there is any doubt as to diagnosis give surgical interference the benefit of the doubt and leave palliative treatment alone, as there is great danger of rupturing the bowel.

The radical treatment is early operation, but unfortunately this is often left for the last resource, and thus proves of no avail, which accounts for the large mortality in cases operated on. There is not the slightest doubt but that the mortality from this malady would be very small if all cases were operated on within at least four or five hours after the occurrence of the accident. I shall here quote a case of interest which is sufficient to establish the above statement as being authentic. Patient, a lady aged thirty, had a severe attack of typhoid fever last November, from which she had made a slow but good recovery, only that she was troubled with constipation and occasional pains in the bowels. In the month of March a messenger was sent in great haste for me to go and see her, as they thought she was dying. On arriving I found her suffering tremendous pain in abdomen, which came on while she was asleep. Temperature 96°, pulse 130, small and thready; distended abdomen, and vomiting. I at once suspected intestinal obstruction, and called in Dr. A. K. Sturgeon, of Petrolea, in consultation, who also diagnosed it as above. We advised an immediate operation, which was complied with, and which I did that evening. Before operation, temperature 97°, radial pulse 140°, scarcely perceptible, easily compressible, and all other symptoms of severe collapse. Before giving the anæsthetic I gave her a hypodermic of strychn. sal. 1/30, and while she was being anæsthetized a similar dose, together with several hypodermics of ether and whiskey. On opening into the abdominal cavity I found the small intestines tremendously distended and congested, and large intestine collapsed. After withdrawing a portion of small intestine I found a volvulus, which had become quite gangrenous in appearance and punctured. On washing it in a normal salt solution it appeared to regain its color. I sutured puncture with Lambert suture, flushed the abdomen with normal salt solution, and closed abdomen. After operation, temperature 98°, pulse radial, could not be felt. Patient rested nicely. I had the nurse give hypodermics of strychn. sal., 1/40 gr., every two hours, which was kept up for thirty hours, when radial pulse became perceptible and of a good character. Patient passed gas on second day, and on the third had a free movement of the bowels; wound healed and bowel functions became normal. Unless there be some definite reason for a special incision, the median line should always be selected as the field of operation. Make the incision free below the umbilicus, if required carry it up through the umbilicus. On entering the peritoneum make the opening small at first, to ascertain, if possible, the nature of the obstruction, then enlarge the opening as is required. In all serious abdominal lesions in which the peritoneum is involved, free fluid will escape from the opening. The character of the fluid will indicate the nature of the lesion. In non-septic

cases it will be clear; in hæmorrhagic, bloody; in septic, turbulent or purulent. First explore the situation of the more common lesions, which are, in male, vermiform appendix; in female, pelvis, and in both sexes, the sigmoid flexure, the ileo-cæcal valve, coils of small intestine, splenic, hepatic flexures, gall-bladder and stomach. If exploration is much retarded by distention, it is advisable, in spite of danger of infection, to incise and collapse one or two coils. A distended small and a collapsed large intestine will indicate the lesion is not far from the ileo-cæcal valve. Manual exploration of abdomen in cases of intussusception will reveal a sausage-shaped tumor. The most characteristic sign is a tense band of mesentery drawn into the intussusciens with the intussuscepted portion. Having discovered the lesion, grasp it between the two hands, and firmly press from apex towards the neck until you get a marked diminution of size of the tumor. Gentle traction should then be made upon the entering bowel, and any adhesions broken down with finger or a blunt instrument. Violent or long-continued effort should not be kept up, as there is great danger of rupturing the bowel. If the bowel has become gangrenous or perforated, resect that portion and use end-to-end sutures or make artificial anus. In adults use the Murphy button.

Special Selections.

THE CROONIAN LECTURES ON THE CHEMICAL PRODUCTS OF PATHOGENIC BACTERIA CONSIDERED WITH SPECIAL REFERENCE TO ENTERIC FEVER.*

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LECTURE II.

With these preliminary observations we now pass to the consideration of the investigation more recently made on the chemical products of the typhoid bacillus, of the bacillus coli communis, and of a form allied to these, namely, the bacillus enteritidis of Gartner.

These three micro-organisms are in culture closely allied to each other. They all grow in broth, forming a cloudiness and a sediment, not commonly a scum on the surface, although this is present sometimes in cultures of the bacillus coli. The growth on agar is very similar in all three forms, being more fluorescent with the bacillus coli than with the other two forms. On gelatine they grow without producing any liquefaction of the medium. Their differences are as follows: In glucose gelatine and glucose agar the bacillus coli and Gartner's bacillus form numerous bubbles of gas, while the typhoid bacillus, although it grows copiously, produces no bubbles. The bubbles are due to the formation of gas from the sugar present. On potato the bacillus coli gives a fleshy yellowish-brown growth; the Gartner bacillus a slightly colored, and the typhoid bacillus gives a filmy—almost transparent—growth. Milk is coagulated by the bacillus coli, but is not coagulated by the typhoid bacillus or by

Gartner's bacillus. Indol is formed in a broth culture by the bacillus coli, not at all by the typhoid bacillus, and only a slight indol reaction can be obtained, and that not constantly, in cultures of the Gartner bacillus. Some varieties of the bacillus coli do not appear to form indol.

These cultural characteristics are slight, but are sufficient for the purposes of diagnosis, inasmuch as the bacillus coli can always be distinguished from the other two by the gas it forms in glucose gelatine, by its coagulation of milk and by the indol it produces, whereas Gartner's bacillus is distinguished from the typhoid bacillus by the fact that it forms gas in glucose gelatine. In any of the media the growth of the bacillus coli and of Gartner's bacillus is much more copious than that of the typhoid bacillus. The bacillus coli is further distinguished from the typhoid bacillus by not giving the "serum reaction" with the blood of a typhoid patient or with typhoid "antitoxic serum." Dr. Durham states that Gartner's bacillus sometimes gives a sedimenting reaction with typhoid blood or serum. All these organisms are flagellated, the typhoid bacillus containing the most numerous flagella, the bacillus coli the smallest number, and Gartner's bacillus being intermediate. The

* Delivered before the Royal College of Physicians of London.

close similarity in vegetative properties of these three micro-organisms rendered it advisable that they should be investigated together. They probably play very different *roles* in the production of disease. The typhoid bacillus is the cause of enteric fever; the bacillus coli plays a great part in the production of peritoneal lesions proceeding from the intestine and inflammatory conditions connected with the pelvic and other abdominal organs; and the Gartner's bacillus was originally found in the body of a man who had been poisoned by beef which also contained the bacillus. Dr. Durham thinks that it may be the cause of some cases of food poisoning. Both the typhoid bacillus and Gartner's bacillus may therefore be considered as micro-organisms, chiefly infecting the intestinal tract, and the bacillus coli—though it is not known to produce any gross lesion in the intestinal tract—is a natural habitant in that region and may aid in intestinal infections.

THE TYPHOID BACILLUS.

The typhoid bacillus is found in enteric fever, in the intestinal lesions, in the mesentery glands, and in the spleen. It is present, in some cases, in the motions of typhoid fever, and also in the urine, and has been occasionally found in the liver and blood. It is also present in some of the abscesses of remote parts which may be observed in the course of typhoid fever or during its convalescence. It is most readily separated from the spleen, and in the following manner: After the spleen has been removed wholly from the body, it is washed on the surface with boiling distilled water, followed by absolute alcohol. It is then incised with a sterilized knife. By means of a sterile platinum rod inserted into the substance of the spleen, inoculation of broth tubes or the surface of agar plates is made, and within 24 hours there is a copious growth of the typhoid bacillus. Another method is to remove a small

portion of the splenic pulp by means of sterile instruments, and place it in 200 c.cm. of sterile distilled water in a flask which is incubated for 24 hours. The liquid is then brushed over the surface of agar plates, and in 24 hours a copious growth of the typhoid bacillus is obtained.

I have examined four spleens in this manner: one from the Middlesex Hospital, kindly sent me by Dr. Fardon; one from St. Thomas' Hospital, sent by Dr. Hawkins; one from Homerton Hospital, sent by Dr. Goodall; and one from University College Hospital, from a case under the care of Dr. Ringer. With the exception of one case all gave a pure and abundant culture of the typhoid bacillus. The exception showed a great preponderance of colonies of the typhoid bacillus on the agar plate, but one or two colonies appeared rather different to the others, being more opaque and fluorescent. These were separated, and proved to be the bacillus coli. All the remaining colonies, as well as those from the other three cases, gave all the typical reactions of the typhoid bacillus, including the serum reaction (Widal's). The presence of this pathogenic organism is pure culture in the spleen and its invariable presence is one of the arguments in favor of the typhoid bacillus being the cause of enteric fever.

INCREASE OF VIRULENCE OF THE BACILLUS.

In the investigation of the products of a pathogenic bacterium it is not of much value working with non-virulent cultures. None of the ordinary cultures of the typhoid bacillus obtainable in the laboratories will kill an animal. I obtained cultures from various laboratories in England, and found them all incapable of causing death. Although, as will appear, the action of the chemical products of these non-virulent forms are of some significance, yet much progress was

not made until a virulent culture was obtained. Chantemesse and Widal* rendered the typhoid bacillus virulent by injecting 4 c.cm. of a broth culture under the skin of the guinea-pig, and at the same time injecting into the peritoneal cavity 8 to 10 c.cm. of the sterilized chemical products of the streptococcus. The animal died, and the typhoid bacillus was found in the blood, the organs, and in the peritoneal cavity. A culture was made from this in broth and used for a second experiment of a like character, employing rather less of the streptococcus products. When proceeding in this way it was found that less and less of the streptococcus products could be used, the animal still dying, until finally it was found that the culture of the typhoid bacillus obtained could, in subcutaneous doses of $\frac{3}{4}$ c.cm., kill the animal without the aid of the streptococcus products. Similar results have been obtained by using the products of the bacillus coli or of the bacillus prodigiosus instead of the streptococcus products. I attempted this method, using the bacillus coli products, but found that, although the virulence of the bacillus was undoubtedly increased, yet I could not obtain it in a virulent enough condition to cause death of itself. I obtained, however, an extremely virulent typhoid bacillus by utilising cultures made from the spleen of one of the cases examined.

The virulence of the typhoid bacillus as obtained direct from the spleen after death or during the course of the disease, varies somewhat. In one of the cases a small amount of splenic pulp was ground up with salt solution, and 2 c.cm. of this mixture were injected into the peritoneal cavity of a guinea-pig. Death occurred in the course of eight days, and a pure growth of the bacillus was obtained from the peritoneum, but not from

the blood of the heart or the spleen. From another case a small quantity of a similar mixture was injected into two guinea-pigs, and both died in under twenty-four hours, and a pure growth of the bacillus was obtained from the peritoneal cavity and from the blood of the heart. The first of these cases was used for obtaining a virulent bacillus; 4 c.cm. of a four-days-old culture of the splenic pulp in broth were injected into the peritoneal cavity of a guinea-pig; death occurred in twenty-four hours. There was slight effusion into the peritoneal cavity, from which a pure culture of the bacillus was obtained; $\frac{1}{2}$ c.cm. of this effusion was injected into the peritoneal cavity of another guinea-pig. Death occurred in under twenty-four hours, and in the subsequent procedure the effusion from the peritoneal cavity of the guinea-pig was injected into the peritoneum of another, death occurring in twenty-four hours. At the eleventh successive inoculation, 3-16 c.cm. of the peritoneal effusion killed the guinea-pig in two days. At the thirteenth inoculation 1-12 c.cm. diluted in salt solution killed in less than twenty-four hours, and at the sixteenth inoculation half a platinum loopful of a twenty-four-hour-old agar culture injected into the peritoneal cavity killed a guinea-pig in under twenty-four hours.

During the course of these inoculations it was observed that there was almost constantly an exudation of turbid fluid of greater or less amount into the peritoneal cavity. There was occasionally a little lymph on the surface of the intestines, and sometimes there were ecchymoses in the spleen. The peritoneal exudation was highly albuminous, coagulating solid on heating. On microscopical examination it showed large numbers of short rods, more or less actively motile. In the first inoculations some leucocytes were present in the exudation, showing phagocytosis. Later on, however, as the bacillus became

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more virulent, the cells and phagocytosis were not observed, and the exudation consisted simply of a highly albuminous fluid containing enormous quantities of typhoid bacilli, sometimes in clumps, usually singly. As the virulence of the bacillus increased so did the time of death diminish, and at the twenty-eighth inoculation 2 c.cm. of the peritoneal exudation were injected into the peritoneal cavity of a rabbit, causing death in five hours and a half, a result which cannot be attributed solely to bacterial action, but must be ascribed to the chemical poisons present in the peritoneal fluid. This was very evident in the experiment on a rabbit weighing 590 g., which received 0.25 c.cm. of the peritoneal fluid into left marginal vein. Symptoms of collapse soon supervened, and death occurred in two hours and a half. The peritoneal exudation produced by the introduction of virulent typhoid bacilli is therefore highly poisonous, and these properties were investigated.

In all these cases the typhoid bacillus was obtained in pure culture in the peritoneal cavity, whether there was much or little effusion, and it retained throughout its typical cultural characteristics. There was no case in which there was a mixed infection with any other micro-organism, so that the effects were those of the bacillus itself. An examination was made of the distribution of the bacillus in the various organs of the body. In the earlier inoculations during the increase of virulence it was found that although the animal died the bacillus was limited to the peritoneal cavity, and was not present in the spleen or the heart's blood, showing that death was produced by absorption of the poisons formed by the bacillus in the peritoneal cavity, which acted as a sort of living test tube. In the later experiments, however, the bacillus did not remain in the peritoneal

cavity, although its distribution throughout the body was not constant. Thus, in one experiment (peritoneal injection), at death it was found that the heart's blood, spleen, and liver all gave a pure culture of the typhoid bacillus, as well as the fluid in the peritoneal cavity. This was confirmed by the next experiment, but in the one following a pure growth was obtained from the peritoneal effusion and from the spleen, and not from the liver or the heart's blood. There is a tendency, therefore, more with the weak virus than with the strong, for the typhoid bacillus to limit itself in its growth to the seat of inoculation, although a general distribution of the bacillus throughout the body usually occurs with the virulent form. This limitation of the bacillus to the site of injection is well marked when it is subcutaneously injected. Thus in a guinea-pig which received subcutaneously a quarter of a cubic centimetre of virulent peritoneal fluid there was a swelling at the site of inoculation, which ended in a slowly forming abscess pointing in 11 days; a pure culture of the bacillus was obtained from it. The animal was killed on the twelfth day and a pure culture of the bacillus was obtained from the abscess, but the heart's blood, the spleen, the liver and peritoneum were sterile; the heart muscle was not degenerated. Chastemesse and Widal and others have, however, found that infection of the body can occur after subcutaneous injection of the bacillus, and this occurs readily if the process of infection be aided in the manner previously described.

It is interesting to note in this series of experiments the absence of leucocytes in the peritoneal exudation as the bacillus became more virulent; and the formation of an abscess and the limitation of the growth of the bacillus when the virulent virus was injected under the skin.

TOXIC ACTION OF THE PERITONEAL FLUID.

It has been stated that the cause of death when the virulent peritoneal fluid is injected into a rabbit or a guinea-pig was due more to the action of a chemical poison than to the growth of the bacillus, since this occurred so rapidly; in one case in five and a-half hours, and following intravenous injection in two and a-half hours.

The effects of this chemical poison were examined by filtering the peritoneal fluid through porcelain, in a small apparatus improvised for the purpose. In the first experiment $\frac{1}{2}$ c.cm. of this filtered sterile peritoneal fluid was injected into the marginal vein of a young rabbit. A moderate degree of fever followed the injection for several hours. Subsequently the temperature fell to the normal, and no symptoms were observed in the animal, which died at the end of thirty days. The heart's blood was sterile, and the heart muscle showed well-marked degeneration of the fibres—there being loss of striation with longitudinal fibrillation, and the presence of numerous small granules staining black with osmic acid. Other experiments were done in a similar manner, using 1 c.cm., 1.5 c.cm., and 2 c.cm. of the filtered peritoneal. In all cases some degree of fever followed the injection, but no effect was subsequently observed, and that did not occur. The filtered peritoneal fluid was therefore not nearly so poisonous as the unfiltered; evidently the porcelain filtrate had kept back the greater part of the chemical poison, whether this was present in the albuminous fluid or in the bodies of the bacilli.

EXAMINATION OF THE POISON IN THE FRESH STATE IN THE SPLEEN.

Before continuing this part of the subject, we must return to the consideration of the poisons present in

the spleen of typhoid patients. In all the cases examined, as has been stated, the typhoid bacillus was present in large quantities, and in only one was there an admixture with another bacterium, the bacillus coli.

The splenic pulp was rubbed through sterile wire gauze and treated with about 500 c.cm. of sterile normal salt solution. This was allowed to stand a short time, and an attempt was made to filter it through porcelain. This was a matter of great difficulty, only a small amount of the liquid passing through. It was thin and deeply blood-stained. It was injected into the marginal vein of a rabbit on two consecutive days.—4 c.cm. on the first day and 3.5 c.cm. on the second day. No appreciable effect on either the temperature or the body weight followed the injection on either day or on the subsequent two days; but on the fifth day of the experiment the temperature was found to have fallen to 97.6 degrees, and the animal was collapsed and had profuse and mucoid diarrhoea. The temperature remained subnormal the whole of that day, and at 10 o'clock on the sixth day it was 95.4 degrees, and the animal was lying motionless on its side but was breathing regularly. It was killed with chloroform. At the *post-mortem* examination there was subcutaneous hæmorrhage over the lower third of the abdomen, extending down over the upper third of the front of the thighs. In the abdomen there was a soft blood clot, matting together the omentum and the adjacent coils of the intestine. There was no peritonitis. The thoracic organs were normal, the intestines were empty, except the upper part of the colon and cæcum, which contained soft fæces. There was no enlargement or redness of the Peyer's patches or of any other part of the mucous membrane. From the peritoneal cavity was obtained a growth of the bacillus coli, but the spleen contained no micro-organisms.

What is interesting in this experiment is that, following the injection of the poison, there was a period of incubation, during which no effect on the body temperature or the weight was to be observed, and that a fall of temperature, associated with great bodily prostration and mucoid diarrhoea, supervened somewhat rapidly. This fall of temperature and the collapse and diarrhoea observed are, as will be seen, to be ascribed to the action of the chemical poison of the typhoid bacillus.

A more extensive chemical examination of the spleen was made by means of the precipitation of the extract with alcohol in order to obtain any albumoses that might be present, as well as to separate the alcoholic extract. The method has already been described. The amount of albumoses obtained from each of three spleens was 0.652 g., 0.37 g., and 0.369 g. When dried they formed a fine whitish yellow and very light powder, soluble in water, and giving a brownish solution, which gave a distinct biuret reaction. The alcoholic extract was yellowish in color, and was separated from the fatty bodies by precipitation with a large excess of ether. It contained a very large quantity of leucin and tyrosin, which separated out in the form of crystals on evaporation. The final alcoholic extract was a yellowish, sticky, resinous-like substance when dried over sulphuric acid.

The injection of the alcoholic extract into the vein of a rabbit did not seem to produce any effect on the temperature, and no appreciable effect on the body weight. In one case 0.112 g. was injected, and the animal appeared as well after the injection as before; it did not die. There was no diarrhoea, nor were there any symptoms to be noted. The injection of the albumoses also had but slight effect on the animal. In one case 0.2785 g. was injected in three doses into a rabbit weighing 790 g.; a dose of 0.352 g. per kilo. of body weight.

After the first injection of about 0.4 g. there was no effect on the temperature. After the second injection of about 0.12 g. there was a rise of temperature, the highest being 105° during the day. After the third injection on the following day of the same amount there was only a slight rise of temperature, but on the succeeding days it was again normal. No symptoms were produced in the animal by these injections except a slight rise of temperature. This effect, therefore, is a very different one from that observed after the injection of the saline extract in a fresh spleen. It may have been, of course, that the poison was destroyed by the alcohol during the course of preparation. This, however, is unlikely, inasmuch as the manipulation was very rapid, the products being separated within three days, and the action of the alcohol on the albumoses being less than 18 hours.

LECTURE III.

THE PRODUCTION OF THE POISONS OF THE TYPHOID BACILLUS IN ARTIFICIAL CULTURE OF THE MEDIA.

Two different kinds of media were employed in which to grow the bacillus. Ordinary peptone broth was used to determine the presence or not of secretory products of the bacillus; and broth containing no peptone but mixed with some proteid solution—either blood serum, alkali albumin made from the spleen, or an extract of lymphatic gland—in order to determine the presence of digested products of the bacillus. In some cases, liquid blood serum sterilized at 60° C. was used without the addition of broth. The virulent bacillus grows well in ordinary peptone broth, but the growth in solutions containing much proteid is very much less exuberant. This is especially the case with sterile blood serum, and most

commonly the bacilli, after growing for a time, sink to the bottom in clumps and cease growing, although they are still alive and active. It grows much better in a solution containing a small proportion of alkali albumin, but still not nearly so well as it does in broth. The object of growing them in the presence of proteids was to test whether there was any digestive action of the bacillus. In one experiment two test tubes were filled about 3 inches deep with liquid blood serum, which was rendered semi-solid by heating at a temperature of 65° to 70° C. The medium was translucent, and one of the tubes was inoculated with the bacillus, the other being kept as a control. It was observed that the bacillus rapidly grew in the medium, spreading through all parts of it, but that no liquefaction indicative of digestion occurred during incubation, which lasted 102 days. When grown in a liquid medium, however, containing a small proportion of alkali albumin, and especially alkali albumin made from splenic pulp, the virulent bacillus had a slight digestive action, although a very insignificant one. Thus in one experiment, after the bacillus had grown thirty-two days in such a medium, it was found that the solution gave a distinct biuret reaction with copper sulphate and potash, and that the alkali albumin was beginning to be changed into albumoses. This digestive action, although slight, is explanatory of the albumoses found in the spleen in cases of typhoid fever.

POISON FORMED IN PROTEID SOLUTIONS.

If the non-virulent bacillus is grown in a solution containing digestible proteid instead of peptone, a poison is formed which has an action like that of the poison formed in broth. Thus, in one experiment the bacillus was grown in a 1 per cent. solution of serum alkali albumin in broth for twenty-nine days, at the end of which

time it was filtered and the filtrate concentrated, and the proteid separated by alcohol. Some amount of digestion had taken place, as the solution gave a biuret reaction. The solid product obtained was injected in two doses (about 0.3 g.) on successive days into the marginal vein of the ear of a rabbit. Following each injection there was a marked lowering of the temperature and a subsequent rise, but not to the average normal temperature of the animal for some days. Some bodily depression was observed on the first two days of the experiment, and there was a loss of body weight, but there was no diarrhoea, and the animal subsequently completely recovered.

In another experiment the non-virulent bacillus was grown in a solution of alkali albumin made from the splenic pulp, but without adding broth. One flask was filtered after forty-five days, and 10 c.cm. of the filtrate were injected in two doses on successive days into the marginal vein. After the first injection there was only a very slight rise of temperature, which, however, was more marked after the second injection. The animal showed no particular symptoms except a gradual loss of weight, which amounted to 235 g. at death on the twenty-eighth day of experiment. The *post-mortem* examination revealed no naked-eye change in any of the organs or tissues of the body. No cultivations were obtained from the heart's blood; the heart muscle showed no fatty degeneration, and there was no degeneration of the peripheral nerves. Another culture was filtered after fifty-nine days' incubation, and 12 c.cm. were given in two doses on successive days, also into the marginal vein. There was a well-marked rise of temperature after each injection but no diarrhoea was produced, and there was only a slight loss of weight, which was recovered from. The animal died in twenty-four days, and no cultivations were obtained from the heart's blood, liver,

spleen, or peritoneal cavity. There was subcutaneous hæmorrhage in patches in front of the thighs and the caudal region, and the peritoneum contained about 1 cm. of clear fluid. There was no peritonitis, and the organ showed no naked-eye change.

The results of growing the non-virulent bacillus in a proteid solution show that the poisons excreted are of the same nature as that formed by the virulent bacillus in broth. The digestion which takes place in the proteid solution is extremely slight, and the toxic body is thus mainly an excretion of the micro-organism.

Although the toxic products are developed in the presence of digestible proteids, yet they are most evident when the bacillus is grown in peptone broth. In one experiment the broth was inoculated with the typhoid bacillus obtained from the spleen of a case of enteric fever, but before it had been made virulent by passage through animals. The growth was allowed to continue for eleven days, and the broth was filtered through a Chamberland filter. Two injections into the marginal vein were made on successive days. The first injection of about 3 c.cm. resulted in the lowering of the temperature and the production of diarrhœa soon after the injection. The second injection, also of 3 c.cm., produced but little effect, and on the three subsequent days no appreciable change occurred in the animal. On the sixteenth day of the experiment the animal was found to have lost 170 g. in weight, and to have some degree of fever, which, however, did not reappear. It lived for twenty-four days, gradually losing weight until at death it had lost 235 g. At the *post-mortem* examination there was no obvious lesion found in any of the organs of the thorax or abdomen; the intestines were normal, and cultures made from the heart's blood and the peritoneal cavity were sterile, showing that there was no bacterial infection. The heart muscle, examined after standing with osmic

acid, showed degeneration of most of the fibres, there being loss of striation with longitudinal fibrillation and the fatty granules in the muscle cell. This experiment shows several points which will be brought out more fully later on: (1) That a poisonous substance is present in the broth apart from the bacillus itself; (2) that this body produces a lowering of temperature and diarrhœa, as well as a loss of weight; and (3) that at death there was distinct degeneration of the cardiac muscle.

The broth culture from the same stock of bacillus was more poisonous, and produced a more profound effect if the incubation lasted twenty-five days. Thus a rabbit received a single dose of 6 c.cm. of the broth filtrate after twenty-five days' growth. The initial effect of this injection into the venous system was a rise of temperature (the maximum being attained in two hours and a half) and a rapid fall, during which there was profuse diarrhœa, with collapse and labored breathing. This period of depression lasted some hours, and on the next morning was succeeded by a febrile rise, which continued during the whole of the day. On the following day the temperature was somewhat irregular. Subsequently no great change in the temperature was noticed. The weight fell rapidly up to the fourth day of the experiment, when the animal had lost 120 g. Subsequently, however, it regained part of the weight; and at death, on the twenty-sixth day of experiment, the loss was only 35 g. from the original weight. No naked-eye changes were observed on *post-mortem* examination: no cultures were obtained from the organs of the body. The heart showed slight signs of degeneration.

The more virulent the bacillus the more toxic becomes the broth. Thus, after growing for eleven days, the bacillus was killed by chloroform, and the broth mixture centrifugalized, the clear broth being used for the injection; 5 c.cm. were injected in two

doses on successive days (2 c.cm. and 3 c.cm.). An initial depression of temperature followed by fever was observed after both injections, and the animal died in twelve days, with no naked-eye change in the organ of the body, which gave no bacterial growth. There was a very well marked degeneration of most of the muscle fibres of the heart. These results may be taken to illustrate the action of the clear broth without the bodies of the bacillus—that is, of the chemical poison which is present in solution in the broth.

ACTION OF BROTH WITH THE BODIES OF THE BACILLUS.

The toxic action of the bodies of the bacillus itself was tested by killing the bacillus with chloroform. When the culture was sterile, the chloroform was removed *in vacuo*, and the liquid used for injection. In one experiment a thirteen-days-old culture was used, and 4 c.cm. injected into the marginal vein of the ear. There was a great fall of temperature in two and a half hours, and this low temperature continued the whole of the first day of experiment; also on the second day, and on the morning of the third day the mercury of the thermometer would not rise, and the animal died. Soon after the injection there was a slight diarrhœa. During the subnormal temperature the animal became increasingly weaker, the fur becoming ruffled, although there was no diarrhœa. The loss of weight in the two days of experiment was 180 g. There was no naked-eye change in any of the organs, and the blood was sterile. This experiment may be taken as showing the profound effects following the injection of the poison. The great depression of temperature, however, observed in this experiment is not the only effect to be produced. In some of the experiments with a weaker poison no depression ensued, but a well-marked rise of temperature. Thus 3 c.cm. of a broth culture (seven

days' growth) killed with chloroform were injected into the marginal vein of the ear of a rabbit. There was a considerable rise of temperature to over 106° after the injection, which continued during the whole of the following day and the day after. On the fourth day the temperature partly regained the normal limit, and continued afterwards normal. There was a loss of weight up to the seventh day, after which the animal recovered. In this experiment no diarrhœa was produced, and no symptom except that of fever and a loss of weight.

In two or three other experiments with the broth and the bodies of the bacillus these features were noted, but there was not infrequently an initial fall of temperature, succeeded by a prolonged rise, and diarrhœa for a longer or shorter period, was a fairly constant symptom. There is no doubt, then, that the retention of the dead bodies of the bacillus in the broth renders it more poisonous. The effect on different animals varies somewhat. In one experiment 4 c.cm. took two days and a-half to kill; in another experiment 4 c.cm. of the same stock caused death with lowering of the temperature in three hours and a-half. There is also some individual peculiarity in the animals as regards their resistance against the poison.

THE EFFECT OF HEAT.

The effect of high temperature on this poisonous liquid containing the bodies of the bacillus was tested in order to see whether the toxic substances were sensitive to heat or not. In one experiment the broth with the bodies of the bacillus was heated to 60° and 64° C. for ten minutes; 4 c.cm. were injected into the marginal vein and death occurred, with lowering of temperature and diarrhœa, in 2 hours and 20 minutes. This death was more rapid than in the control experiment with the same amount of broth unheated. As marked was the effect of exposing the broth to a higher temperature before injection

Four c.c.m. of a broth mixture heated at the boiling point of water for five minutes were injected into the marginal vein, and death, with profuse mucoid diarrhoea, occurred in $2\frac{3}{4}$ hours. This experiment may be compared with a similar one in which the same amount of broth, but unheated, was injected into another animal, which lived for $2\frac{1}{2}$ days with a great depression of temperature. It may be said, therefore, that this degree of heat not only does not destroy the poison which is in the bodies of the bacillus, but actually brings out its effects. It may be that the heat breaks up the bodies and liberates the poison inside, and after heating some of the bodies of the bacilli may be observed disintegrated under the microscope.

There is no evidence from the experiments that there are two kinds of poison, one extracellular or secreted by the bacillus, and one intracellular, with different actions. The toxic properties of the broth from which the bacilli are separated by means of the Chamberland filter are practically the same, although not so pronounced, as those observed when the broth contains the bodies of the bacillus as well; and this is not an unimportant point, inasmuch as some have made a distinction between the intracellular and the extracellular poisons of pathogenic micro-organisms.

No effect is more marked or more constant in the action of the poison than the production of diarrhoea, which, with the more active poison, is very profuse, lasting a varying time—sometimes hours, sometimes a day—and consists in the passage of liquid motions, with mucus occasionally, but no blood at any time. On a *post-mortem* examination of an animal dying with this diarrhoea, characteristic appearances are almost invariably found. The stomach may be full of undigested food, the cæcum and colon contain liquid faecal matter, but the greatest change is in the small intestine, which is full of slightly turbid, sticky fluid, containing but little food and no bile.

This liquid is simply a solution of mucin, which may be separated by precipitation with acetic acid. The mucous membrane is a little soft on the surface, and there is a very large increase in the number of goblet cells. The Peyer's patches were not apparently altered. The changes described by Sanarelli in the Peyer's patches of the intestines have not been observed by me. The loss of weight is also a constant symptom, and the more virulent the poison the more marked is it seen. It is also in this case progressive. With a smaller dose of the poison, however, the initial loss of weight is regained. No naked-eye change is produced by the poison in the organs of the body.

The effect of the poison, when the death of the animal is slow, in producing degeneration of the muscle fibre of the heart, is well marked. The heart was never found in a state of advanced fatty degeneration, but rather in the earlier stage, in which there is loss of transverse striation of the fibre, with the appearance of longitudinal fibrillation and the presence of numerous granules in the fibre, staining more or less black with osmic acid.

BACILLUS ENTERITIDIS GARTNER.

The experiments with this micro-organism were conducted in the same manner as those with the typhoid bacillus.

A culture was kindly sent to me by Dr. Durham, which gave the reactions previously described as characteristic of the bacillus. It differs from the typhoid bacillus in the fact that it causes gas formation in glucose-agar or glucose-gelatine; but, like the typhoid bacillus, it does not coagulate milk, and it forms but little or no indol in broth. The original culture of the bacillus worked with was toxic, as 5 c.c.m. of a two-days-old broth culture injected into the peritoneum of a guinea-pig killed the animal in under twenty-four hours. The virulence of this bacillus was increased by

passage through animals in a manner similar to that which has been described with regard to the typhoid bacillus; that is, some of the peritoneal exudation from the first animal that died being injected into the peritoneal cavity of a second guinea-pig, and from the second into a third, and so on. The death of each animal occurred, as a rule, in under twenty-four hours. The dose was gradually lessened until a small loopful of an agar culture injected into the peritoneal cavity killed the animal. In the series of experiments the intraperitoneal injections caused the exudation of a highly albuminous fluid containing numbers of bacilli. In the earlier cases there was also an exudation of leucocytes; later on, however, these disappeared. Occasionally there were a few flakes of lymph on the surface of the peritoneum, but only at the early stage of the series of inoculations. At no time was there any exudation of blood. During the series cultivations were made from the peritoneal fluid of each animal to test the purity of the growth, to see whether the bacillus kept its characteristics, and also to study the distribution of the micro-organism in the body. It was found that the growth was always typical and pure, and that when the bacillus became virulent it was found always distributed throughout the organs of the body, being obtained from the heart's blood, the spleen, the liver, and the kidneys and peritoneal cavity in pure cultivation. In this respect the presence of the bacillus of Gartner in the various organs of the body was more constant than that of the typhoid bacillus. The peritoneal fluid was highly toxic. Thus, in one experiment in which the bacillus were killed by means of chloroform and removed by subsequent centrifugalizing, 3 c.cm. of clear peritoneal fluid injected into the marginal vein of a rabbit weighing 470 g. caused death in an hour and a-half, the temperature rapidly falling in half an hour from 102° to 97.4°. The

peritoneal fluid filtered through porcelain is not so toxic as the unfiltered, from which the bacilli have been removed by centrifugalizing. This filtered peritoneal fluid was found to produce fever when injected into the marginal vein of the ear of a rabbit, but when given in two doses of 1.5 c.cm. and 1 c.cm. it did not cause the death of the animal nor any particular symptoms except a rise of body temperature.

GROWTH OF THE BACILLUS IN BROTH.

The experiments done in this way were precisely similar to those performed with the typhoid bacillus. The virulent Gartner bacillus was grown in broth for twenty-two days and the culture was not filtered, but the bacillus was killed by chloroform. Experiments were performed with the clear broth after centrifugalizing, and with the turbid broth, that is with the broth *plus* the bodies of the bacilli. Each animal received the same dose, namely, a single dose of 4 c.cm. into the marginal vein. The result of the injection of the clear broth was a continued and marked depression of temperature during the day of experiment, the temperature next day again rising to the normal. There was diarrhoea soon after the injection of the poison, and there was a progressive loss of weight. A similar dose of the broth, *plus* the bodies of the bacilli, caused a more marked depression of temperature, which lasted till the following morning and most of the following day. Here also there was diarrhoea and a progressive loss of weight. The effect of heat on the broth *plus* the bodies is seen in the two following experiments. Thus the same dose (4 c.cm. of the mixture) heated to 60 degrees C. for ten minutes caused a depression of temperature which was very great and ended in death in 4½ hours. This animal also showed diarrhoea. A similar dose heated to 100 degrees C. for ten

minutes produced also a very great depression of temperature which lasted to some extent, on to the next day. There was well-marked diarrhoea and great loss of weight. It is thus seen that the characteristic action of the toxic products of the Gartner bacillus are very like those of the typhoid. There is present in the broth, from which the bacilli have been removed, a poison which causes a great depression of temperature, and this poison is also present in the bodies of the bacillus, and has an action similar to that of the poison from the typhoid bacillus, namely, it produces diarrhoea and loss of weight.

Like the poison of the typhoid bacillus the virulence of a broth culture containing the bodies of the bacillus is increased by heating the solution at 60 degrees C., so that—as seen in the experiments just quoted—whereas 4 c.cm. of the unheated mixture did not cause death; when heated to 60 degrees for ten minutes, death occurred in 3½ hours, with great lowering of the body temperature. Heating to 100° C. for the same time gives a greater effect than the non-heated mixture, but does not produce death in the same way as when the mixture is heated to only 60 degrees. The effect of heat appears to be to break up the bodies of the bacillus, so that the poison is liberated, making the liquid more toxic.

When grown in a proteid solution containing alkali albumin or serum proteids Gartner's bacillus causes some amount of digestion with the formation of albumoses. This is more marked than is the case with the typhoid bacillus, although the digestion is still far behind that which occurs in the case of the bacillus diphtheriæ and the anthrax bacillus. One result obtained is interesting, inasmuch as the bacillus coli also produces it, namely, that when grown in Marmoreck's fluid Gartner's bacillus produces a partial precipitation of the proteid in the form of a gelatinous clot. In strong solutions containing ser-

um this result, however, was not observed, and it was not so constant as with the bacillus coli.

BACILLUS COLI COMMUNIS.

There is one important difference between this bacillus and the two other forms we have considered (the typhoid and Gartner's bacillus), this is the fact that it is one of the causes of putrefaction of the proteids, it forms indol, for example, in proteid solutions; it is found in foul water, in soil, and it is a constant habitant of the intestines, being found in that region soon after birth. After death it sometimes penetrates the different abdominal organs, and is one of the causes of the putrefaction of the body. These characteristics therefore mark it sharply off from the two other micro-organisms. There are no doubt many different forms of the bacillus coli which differ in minute particulars; some, for example, forming hardly any indol, others coagulating milk slowly. Without, however, entering into the different forms which this bacillus may assume, or into a discussion as to whether they are all modifications of the same form, I may say that the bacillus I worked with was one which was obtained from the spleen in a case of typhoid fever, and which, no doubt, came originally from the intestinal tract. The virulence of this bacillus coli, as obtained from the intestines, varies considerably, and several observers have described an exaltation and an increase in the number of the bacillus in the course of cases of typhoid fever. The bacillus I obtained from the spleen was more virulent than the stock cultures of the bacillus which I had in the laboratory, and which were obtained from different sources; its virulence was readily increased, much more readily than was the case with the typhoid bacillus, and more readily than with Gartner's bacillus. Six c.cm. of a fourteen-days-old broth culture injected into the peritoneal cavity of a large guinea-pig, caused

death in under twenty-four hours; 4 c.cm of a broth culture of the peritoneal exudation of the first guinea-pig was injected into the peritoneal cavity of a second, and killed the animal in under twenty-four hours. In the succeeding experiments 2 c.cm. of the peritoneal fluid were found to kill, 0.5 c.cm. was fatal at the fifth inoculation, and at the sixth it was found that 0.25 c.cm. and 0.1 c.cm. killed the animals under twenty-four hours. At this stage the virulence of the bacillus was considered sufficiently exhausted for experiments to be performed. Throughout, the cultures obtained from the peritoneal fluid were pure, and always gave the typical reactions of the bacillus coli. The results of the injection of the bacillus into the peritoneal cavity were markedly different from those obtained from the injection of the other two bacilli, mainly in the fact that the effusion was bloodstained, more so at first than later on, when the bacillus became more virulent. The bloodstaining was not due to the exudation of corpuscles, but to the coloring matter of the blood being dissolved in the liquid, which was highly albuminous. Numerous petechiæ were also observed, beneath both the peritoneum and the mucous membrane of the ileo-cæcal region and cæcum. No peritonitis was observed at any time. The toxic products of the bacillus were investigated by growing it in broth and in proteid solutions.

GROWTH OF THE BACILLUS IN BROTH.

An early experiment was done with a culture which was not extremely virulent, and which was grown in broth for twenty-three days. The broth was then filtered through a Chamberland filter, and 8 c.cm. of the sterile filtrate were injected in two doses on successive days into the marginal vein of the ear of a rabbit weighing 1,090 g. The initial effect

of the first injection was a fall of temperature in about two hours, which lasted over four hours, the total fall of temperature being 5.8 degrees F. The result of the second injection on the following day was practically *nil*, but on the third day the temperature was subnormal. It then began to rise gradually, and there was some degree of fever on the fifth, sixth and eighth days of experiment, which was markedly increased on the ninth day. On the tenth day there was a fall, and a subsequent rise on the eleventh day, after which the temperature of the animal became practically normal. The animal steadily lost weight during the first two days of experiment, 100 g. the first day, 38 g. the second day, the weight remaining stationary on the third, fourth and fifth days of experiment, after which it slowly regained its normal. The animal exhibited no other symptom; there was no diarrhœa, and complete recovery took place. This result shows that the poisonous products which are formed in the broth by the bacillus coli have the initial effect of reducing the temperature of the body as well as weight, and that subsequently there is a reactionary rise of temperature, which remains at a febrile point for several days.

Other experiments were done with the broth cultures in the same way as those done with the typhoid bacillus and with Gartner's bacillus—namely, after a period of eighteen days' incubation, the bacilli were killed with chloroform, and the injection of the clear broth obtained by centrifugalizing, and of the broth with the bodies of the bacilli, was performed in different animals. In the first experiment, 4 c.cm. of clear broth were injected into the marginal vein of a rabbit, weighing 720 g. In two hours and a half the temperature had fallen 2°, and there was slight diarrhœa. In four hours and a half there was a further fall of 2.5°, and the temperature altogether remained subnormal for over five hours. On the next day it

had regained its normal limit, though the animal continued to lose weight.

In the second animal a similar dose of 4 c.cm. of the broth containing the bodies of the bacillus was injected into the marginal vein. The temperature fell about 1.5° in two hours and a-half, after which it began to rise slightly, and during the whole of the next day the temperature of the animal was febrile. In an hour and a-half after the injection there was slight diarrhoea, and the animal lost 70 g. in twenty-four hours. The temperature remained at about the normal level till the fifth day. On the seventh day it had fallen, and there was slight diarrhoea. On the eighth day there was a fall to 98° F.; and on the ninth day, when death occurred, the temperature was below 95° . The total loss of weight was 210 g. These results were compared with the results of injecting a similar dose of the same stock of broth containing the bodies of the bacillus, but which had been subjected to heat. In the first of these experiments the mixture of broth and bodies was heated at 60° C. for ten minutes. The result of the injection was the cause, in a very short time, of a febrile rise of temperature, which lasted the whole of the day, and was present in the morning of the following day; the temperature then gradually fell to the normal. In an hour and a quarter after the injection there was profuse diarrhoea, and the animal lost somewhat in weight during the first two days of experiment. In another experiment a similar dose was given, after being heated to the boiling point of water for ten minutes. In less than an hour after the injection profuse diarrhoea was observed, and the temperature rapidly fell, the total fall being 7° F. The animal died in six hours.

It is seen from these experiments that the clear broth—that is, the broth not containing the bodies of the bacillus—produces a fall of temperature and loss of weight with some diarrhoea, and that a similar dose of

the broth with the bodies of the bacillus causes some lowering of temperature and a reactionary febrile rise; and that the effect of heating the mixture of broth with the bodies of the bacillus is to increase the poisonous activity of the solution; so that when the mixture was heated to 100° C. it proved fatal to the animal in six hours, with great lowering of temperature. The explanation of this appears to be that the action of heat causes the discharge of the poison which is present in the bodies of the bacillus.

1. The type of action of the poison of the bacillus coli appears to be the same as that of the other two bacilli investigated, in some cases producing a great fall of temperature, and in other cases a rise in temperature.

2. Heating the dead bodies of the bacillus suspended in the broth culture fluid increases the toxicity of the solution, as in the case of the other two bacilli, but in the case of the bacillus coli it requires a temperature of the boiling point of water to effect this; whereas with the other two micro-organisms such a temperature rather diminishes than increases the toxic action. Altogether the mode of action of the poisonous products of the bacillus coli is more irregular than with the other two bacilli, not only as regards its lethal, but also as regards the irregular kind of fever and after-fever produced.

GROWTH OF THE BACILLUS IN PROTEID SOLUTIONS.

As with the other bacilli, very different forms of proteid solution were used as culture medium, liquid serum, serum diluted with salt solution, serum diluted with broth, alkali albumin in broth and Marmorek's fluid. The general result obtained in these culture media was that the bacillus coli digested the proteids present, and produced an abundance of albumoses (a much greater quantity than the typhoid bacillus and Gartner's bacil-

lus), so that at the end of a month's incubation of such a culture, a brilliant biuret reaction was obtained. The digestion of proteids by the bacillus coli is not nearly so marked as it is with the anthrax bacillus or the diphtheria bacillus. A more remarkable effect was observed in the fact that after the bacillus had been growing in a proteid solution for some time, it precipitated the proteid in the form of a clot, and this occurred more particularly in the solutions of diluted serum and in Marmorek's fluid. The results were compared with a control flask which was not inoculated, and which was kept in the incubator alongside the cultures. The precipitation of the proteid in the form of a gelatinous clot was not constant, although it occurred in a majority of cases. It did not appear to be due to any increased acidity of the culture medium, produced by the growth of the bacillus in it, inasmuch as no such increase of acidity was present, the liquid remaining alkaline. The phenomenon appears to be a special action of the growth of the bacillus coli. In some solutions Gartner's bacillus produced the same result. Thus five flasks were prepared containing about 100 c.cm. of Marmorek's fluid, which is a mixture of 1 part of ascitic fluid with 2 parts of broth. Two flasks were inoculated with the bacillus coli, two were inoculated with Gartner's bacillus, one was kept as a control. In fourteen days a copious and soft clot had formed at the bottom of all the four flasks, the liquid in the control flask remaining limpid and unclotted. In none of the similar experiments with the typhoid bacillus was any clot or precipitation of the proteid observed, so that this serves as another distinction between the typhoid bacillus and the two other bacilli. The clotting of the proteid solution is of interest in connection with the experiments of Stillmark, who found that the substance ricin, which is obtained from the seeds of the castor-oil plant, and which will be

discussed later on, also produces a clotting in proteid solutions especially serum. Stillmark used it as an argument in favor of the ferment nature of the toxic body, ricin. —*British Medical Journal*.

THE MANNER IN WHICH PHILIPPINOS POISON ARROWS—
“MALI MALI”—A REMEDY FOR
SNAKE-BITE WHICH WILL NOT
APPEAL TO THE FASTIDIOUS.

(With Admiral Dewey's Squadron, off Manila, Philippine Islands, June 17, 1898.)

A dismal rain has settled down upon the city and the bay, but not even the depressing weather has been able to dampen the spirits of our boys to-day, for the *Baltimore* put out to sea this morning to meet the American transports which are now due from San Francisco. It is hoped that they will arrive before evening, and the marines in the Cavité arsenal and on board the ships in the harbor are full of joyous anticipation and are whiling away the hours by singing “There'll Be a Hot Time in the Old Town To-night.”

There was considerable excitement last Wednesday when it was whispered about that Admiral Dewey was going to send a steam launch commanded by his staff secretary, Ensign Caldwell, past the batteries and up the Pasig River to try to blow up two torpedo boats known to be hiding there. The *Callao* was to tow the launch to the mouth of the river and there await its return. It would have been an expedition fraught with great danger to every one engaged in it, but Lieutenant Toppen, who was to command the *Callao*, and Ensign Caldwell were both fearless and enthusiastic. In perfecting this plan the darkness and the rain were counted on to assist the launch in getting past the batteries and into the river ;

but the preliminary and possibly unnecessary, reconnaissance of the *Callao* on Wednesday was rightly interpreted by the Spaniards, who in their terror sunk an old transport steamer, the *Cebu*, across the mouth of the river, quite regardless of the fact that while they closed the Pasig against the entrance of the launch, they at the same time made prisoners of their own torpedo-boats and rendered it impossible to carry out their plan of making a torpedo attack on the fleet. This they had prepared to do on Tuesday, when they would have been favored by the gale that was blowing, but our ever watchful Admiral sent the *Concord* and the *Callao* to balk their little game.

The local newspapers continue their vituperation of the Americans, and one paper solemnly declares that the recent Spanish victories have completely demoralized us, and that President McKinley and his Cabinet are in a state of panic. What these "Spanish victories" were the paper in question does not say, but when the Americans at Cavité, who are many leagues from a truthful newspaper, hear of another "victory" for the Spanish, their hearts leap in their bosoms at the thought that possibly another Spanish fleet has been blown up somewhere. Even the Spanish soldiers are becoming a little doubtful of these stories of disaster to our navy, as I learned yesterday from a fellow correspondent who, in his assumed character of a German sympathizer, manages to keep in touch with the Spanish officers in Manila.

The insurgents have now advanced to a point within sight of the outposts of Manila. Some of these men are decidedly unprepossessing in appearance, and if those people in America who are clamoring loudly for the annexation of the Philippine Islands could spend a short time in the company of these proposed allies and prospective American citizens, they might wonder whether after all the game were worth the candle. To govern

these semi-barbarians will not be an easy task, for our weapons will not be those which Spain has used so effectively, her power here having been based principally on her ability to work upon the fear and superstition of the native population through her agents, the priests. The American Government has no such agents, and will, therefore, have to depend on other means. In determining this question of government there will have to be taken into consideration the fact that most of the Philippine Islanders are savages who fight with lances and poisoned arrows. I once had the privilege of witnessing the preparation of a number of these poisoned weapons, and as nearly as I can remember the process was about as follows: The poison was made from the bark of two different trees, the names of which I have forgotten. One of the pieces of bark was beaten almost to a jelly, pressed and dried, then moistened and again pressed. Though the man used his bare hands in doing this, he apparently was not injured in any way by contact with the poison. The juice of the bark thus extracted looked very much like pea-soup as it simmered in an earthen vessel over a slow fire. When it had reached the consistency of syrup, a quantity of pulp from the second piece of bark was scraped off and the juice of this squeezed into the syrup over the fire. The juice of the second piece of bark was dark-brown in color and the liquid in the vessel was darkened and changed as soon as the new ingredient was stirred into it. The mixture was then allowed to simmer for some time, until it had attained the consistency of jelly, when it was scraped out of the vessel with a chip and put on a large leaf which had been plentifully sprinkled with ashes. This preparation can be kept a long time without losing any of its strength. To poison an arrow-head a piece of this jelly-like substance about the size of a hickory-nut is warmed and rubbed all over the point, which can be used repeatedly

without the poison losing its virtue. The natives also have daggers with sharp-pointed blades about four inches wide and a foot long, which they call *bararaos*. They are very dexterous in the use of this weapon, and if they can lay hold of an adversary by the hair, they cut off his head with one sweep of the arm and carry it home as a trophy of war.

Among the natives there is occasionally found a peculiar nervous disease called *mali-mali*, the victims of which seem to be impelled by an uncontrollable impulse to imitate the movements of any one they see before them. Sometimes the disease will lie dormant while the victim goes quietly about his work, but if frightened or excited in any way he will immediately begin to imitate every motion of any person who attracts his attention. If a person suffering from this disease becomes angry he shrieks and raves like a maniac, at the same time continuing his mimicking performances. Old women are the most common victims of *mali-mali*, though men are sometimes attacked. Some people believe that the imitation-mania, as it is sometimes called, is always assumed, and that the pretended victims can control their antics if they try, as they are often attacked in the presence of Europeans from whom they hope to obtain alms; but there is no doubt that the symptoms of this disease are generally real, and that such a disease exists is certain.

The natives have a strange cure for the bites of snakes and mad dogs. The first excrement of a new-born infant is carefully preserved and is believed to be highly efficacious as a remedy of snake-bite, but it must be used both externally and internally, and immediately after receiving the bite. I have been informed by a physician who has spent many years in the Philippines that fully a quarter of the children of natives die within two weeks after their birth. He expressed the view that this great mortality is probably caused by the im-

pure air which is always found in the lying-in chambers of the native women. No matter how hot the weather, the doors and windows are hermetically sealed, in order to keep out the evil spirit called the *patianac* which, as I explained in a former letter, is supposed to make all sorts of trouble if it can get access to a woman in labor. But the great mortality among infants has probably a deeper cause than this; it doubtless lies in the constitution of the natives, who do not seem to be of hardy fiber, for if forced to suffer from hunger and thirst they soon sicken and die, and fully half of them have some kind of bronchial trouble.

The old Buddhist belief that the soul leaves the body during sleep is shared by the Philippine Islanders, who are very careful in waking a sleeper to do so gradually and by slow degrees, so that the soul may not be called back too suddenly and rudely into the body which it has for a time deserted. No greater insult can be offered a native than to wake him suddenly or to walk over him as he lies asleep. They dread nothing more than to die during sleep, and their worst curse is "May you die sleeping."

The sense of smell is abnormally developed in the Philippines, and they can tell to whom any article of clothing belongs by simply smelling it. The manner of kissing practised among some of them is peculiar. Instead of pressing the lips together, they press the mouth and the nose against the cheek of the person caressed and draw a long, deep breath. In asking for a kiss they do not say "kiss me," but "smell me."

The natives fear many things, both natural and supernatural, and in the Island Samar the huge bats are regarded by them with feelings of awe that are almost reverential. The caves in the mountains are nearly all inhabited by these creatures, and the natives stand especially in fear of what they call "Calapnitan," or the "Lord

of the Bats." It is great sport to go bat-shooting, and the great, uncanny creatures are game to the end, hissing and snapping at any person who wounds them. In the daytime they may be seen hanging asleep from the branches of trees, but as soon as night comes on they spread their wings and fly about like great vampires, filling nervous people with horror. Bats suckle their young like mice, and I remember that on one occasion I shot a mother bat who was engaged in feeding her family. The little creatures did not interrupt their dinner, but continued to stick to the dead mother until their hunger was satisfied or the milk exhausted.

Food is growing more scarce in Manila every day. Horse meat sells for \$2 a pound, and other meat is now a luxury only within the means of the rich. The insurgents took the blockhouse at Meypajo yesterday, and they have succeeded in effectively penning up the Spaniards in the old walled city of Manila, where they are huddled like sheep, all the Spanish families and hospital patients having been brought inside the walls. It is rumored that torpedoes have been placed by the Spanish in the roads leading into the city, but experience has taught the Americans not to fear the Spanish torpedo. If no more serious obstacle than that blocks our way, the taking of Manila will be easy; but there is Admiral Von Diederichs out in the harbor with his fleet of German warships, waiting, like a vulture for his prey, for an opportunity to snatch his "share" of the prize which Dewey won for America.—*Medical News*.

THE WOUNDED AFTER SIBONEY.

A detailed description of the care of the wounded after the battle of Siboney, as given in a recent issue of *The Sun*, casts some very severe reflections on the war department for its shameful neglect of duty

in preparing for and in meeting the emergencies of the hour. If the report is true, and there seems to be no good reason for doubting it, the army medical department appears in a very unenviable light. It is said that there was a total lack of everything necessary for the proper care of the stricken soldiers. Why this was so it is hard to explain, especially in view of the fact that the war department has constantly declared, in declining voluntary assistance from charitable organizations, that it was abundantly able to cope with any possible emergency in the field. And yet this is the result:

"When the wounded came in, the needs of the hour were overwhelming. The situation cannot be described. Thousands of our men had been hurried to the front to fight. It was well understood that it would be a hard fight. The dead would need only burial, but the wounded would need care. And yet, with the exception of a few stretchers, no preparation had been made—neither cots nor food, and practically no bandages for wounds. Is it strange that surgeons were desperate and nurses distressed?"

Farther on the correspondent says: "It was evident that the medical department of the army had failed absolutely to send hospital supplies, or by this time they would have been landed. On the one hand, it was pitiful. On the other, it was negligence that could have been the result only of incompetence."

The boasted hospital facilities are thus described: "The wounded were carried back from the fighting lines on stretchers, and laid on the ground to wait until the surgeons could reach them. Many were soon beyond the need of surgical treatment. There were four divisions of the army, and each division was supposed to have its hospital. But as a matter of fact there was but one, the first division hospital of the fifth army corps, under Colonel Wood. There were five surgeons, a hospital steward, and twenty assistants, to care for the

wounded—several hundred. They had a number of operating-tables, a small supply of medicines, but few bandages and no food for sick or wounded men. It was comparatively easy to get supplies from the *State of Texas* ashore to the hospital here—but there was no transportation to get them to the front.”

Fortunately for the poor men, there was sufficient of outside aid from the Red Cross and its supplies to balance neglect of preparation in other quarters. Said one of the medical officers, in the desperation of his helplessness: “God knows what we should have done here without the help of the Red Cross—your ship, your surgeons, and your nurses. And there is no other help for us at the front. Our wounded up there must have food, bandages, anything you can let us have in the line of hospital supplies.”

It is right and proper that the surgeon-general should resent any interference with his prerogatives, but he should not directly invite it by making possible such a condition of affairs as here described.—*Ed. Med. Record.*

A CASE OF PUERPERAL SEPTICÆMIA UNSUCCESSFULLY TREATED BY ANTISTREPTOCOCCUS SERUM.

By H. WORK, M.D., Pueblo, Col.

Mrs. W——, aged twenty-five, multipara, in perfect health, of good physique and family history, was taken with “flooding,” September 9th, and expelled a fœtus, which from the description I supposed to be of about the fourth month.

September 18th, she expelled a placenta, which was promptly destroyed. I was called and found the patient's condition apparently good in every way. I made no examination, and was told that daily reports

would be made to me, in order to save expense of visits.

September 27th, I was summoned, as her husband thought she “was having a little fever for some days past.” I found the patient with a temperature of 105° F.; pulse, 120; and the other typical symptoms of puerperal infection. I ordered a large dose of quinine and small doses of calomel.

On September 28th I curetted the uterus and removed fragments of placenta. The temperature fell to 104° F.; pulse, 120. The quinine was continued in twenty-grain doses.

September 29th, the temperature was 105.5° F.; pulse, 130. I curetted again, but found no debris. The patient now had a severe chill, and the temperature soon rose to 105° F. and the pulse to 120.

By October 1st I was able to reduce the temperature to 102.5° or 103° F., and keep it down by constant applications of cold, meanwhile urging food and using stimulants.

On October 2nd I injected ten cubic centimetres of antistreptococcus serum in the evening, the patient's temperature being 102.5° F.; pulse, 130.

October 3rd, a.m., temperature, 104° F.; pulse, 128; p.m., temperature, 104.5° F.; pulse, 135. Violent diarrhœa, with retention of urine.

On October 4th I injected twenty cubic centimetres of antistreptococcus serum, with no apparent effect on the temperature.

On October 5th the temperature reached 106° F. and the pulse was exceedingly rapid and feeble.

On October 6th the patient died from puerperal infection.

I do not care to comment upon this history, except to say with Dr. Siff, who reported a case of puerperal infection in your issue of November 13th, treated by the antistreptococcus serum, “that it requires more than one test to convince a physician of the efficacy of therapeutic agent.”—*N. Y. Medical Record.*

AN ADDRESS ON THE SINS OF THE TEETOTALLERS.*

By W. A. CARLINE, M.D., President
of the Branch.

Ladies and Gentlemen,—My first duty is to thank you for the great honor you have done me in electing me your President. No honors can carry so much prestige as those conferred by members of one's own profession, and of these president of a Branch of our Association is one of the highest.

The subject of my short address is an unusual one at these meetings, but it is one to which I have given some thought, and one which I venture to believe has been left too much in abeyance by the profession. I wish to draw your attention to some of the sins of the teetotalers, and at the outset I must put myself right with you by a little personal explanation.

I have nothing to say against abstinence from alcohol. Professionally, I rarely order it for patients, and then only for a specified period. At the same time I can see no objection to persons taking alcohol, provided they do so in moderation, and because they like it, but not for the purpose of doing them good; that is, always providing they are not people devoid of that self-restraint found in a well-balanced mind. What I have to speak against, however, is the omission of the teetotalers to guide aright, and do their duty to those whom they have won to their cause. Having made a man or woman forswear alcohol, they seem to think there is nothing further to do except to provide them with literature which consists chiefly of abuse of the liquor traffic, or with meetings, whereat the same abuse is dealt out with the addition of music and song. The first thing a

teetotaler requires and the last thing he thinks of is pure water.

I have had twenty-two consecutive numbers of one of the leading temperance papers, the *Alliance News*, carefully examined. In the twenty-two numbers the word "water" was found sixty times; of these thirty-eight are used in the sense of drinking water, of which all but ten occur in quotations. The sole encouragement for the water drinker is contained in the following quotations. December 31st, p. 859, Mr. A. J. H. Crespi, in a letter on substitutes for alcoholic beverages, says:

"Many people clamor for substitutes. Well, I find water very palatable, and coffee and tea I don't like, but cocoa and chocolate are very good. Lemonade I rarely touch, and syrups I don't buy, while soda water I dislike. Some of my friends and guests will take lemonade, others soda water, by the quart."

And again, April 22nd, p. 253, referring to the Atbara war, the following quotation is given of a conversation between Lady Elizabeth Bidulph and Lord Cromer:

"But what about the Nile water?" asked Lady Elizabeth.

"We have Pasteur filters in the camp," was the reply, "and plenty of good tea and coffee, which you will find our troops will be able to fight on."

And on the same page a quotation from the *Daily News* says:

"If there had been any whiskey at hand it might have been impossible to move the whole army without the aid of the London police. The battle was fought on Nile water purified by the Pasteur filter, and then converted into the cup that cheers."

Perhaps the *Alliance News* would consider the following more encouraging to the drinking of water. It is a quotation on p. 207, and appropriately dated April 1st:

"The *Christian Leader* says we have all heard of the captain who with a portion of his crew was cast into a

* Delivered at the Annual Meeting of the Midland Branch of the British Medical Association.

shark-infested sea by the capsizing of a boat, and who, counselling the sailors to keep their legs moving to keep the sharks off, forgot meanwhile to move his own, and was snapped up while warning his men. Something of the same kind has happened to the late Father Kneipp, famous for his water cures. That his treatment did immense good to many is unquestionable; but while commending water to others, it seems that he did not provide enough for himself. He died of cancer in the stomach, and the medical verdict is that he neglected to apply water in sufficient quantities internally to keep his blood in good order."

This is all the encouragement a water drinker obtains in nearly half a year from the *Alliance News*.

Our experience in Lincoln is that in any attempt to improve the water supply the teetotallers are either not in evidence or they are in opposition, and I do not think that our experience is at all unique.

Recently a local society was in communication with the Waterworks Committee about the pollution of our drinking water by the effluent of a sewage farm. The teetotal members of this society were not in evidence, and the teetotal members of the Waterworks Committee were in opposition. This pollution has been going on for years, and was long since condemned by the medical officer of health, but the local temperance societies have never taken any action.

In this connection and bearing on the attitude of the temperance party to a pure water supply, I will quote the following from the *Medical Press*, under date November 24th, 1897:

"One of the results of the recent waterborne epidemics of typhoid fever will be a serious backhanded blow at the advocates of water drinking. The new mayor of King's Lynn is a total abstainer, and at the feast which celebrated his election to the civic headship he found himself unable for conscience' sake to offer them any beverage

stronger than water. As some sort of compensation for his restricted hospitality he fined himself ten guineas in favor of the typhoid relief fund of his native town. There is a grim, satirical irony about his worship's action in this matter that invites a passing reflection. The typhoid fever at Lynn is due to polluted drinking water; at the mayor's feast the guests must drink nothing but Lynn water; the mayor gives ten guineas to help the victims of that contaminated supply. It remains to be seen whether any part of this donation will be required on behalf of those who have partaken of his banquet. The answer to that interesting query may be expected in about a fortnight, more or less. Clearly it is in some cases safer to turn to the brewery than to the water monopolist when one wishes to slake one's thirst."

One almost doubts if the teetotallers are really anxious to put down the use of alcoholic drinks; surely if they were more sincere they would not rest until it was everywhere as safe to drink water as to drink beer.

That you may not be anxious as to the results of the mayor of Lynn's feast, I may inform you that it was reported in the local press that the guests restrained their thirst until the mayor left the table; they then ordered champagne at their own expense. And who can blame them, when the alternative was to drink water that had already caused some 380 cases of typhoid fever? Not to be allowed to touch alcohol, to know that most temperance drinks are harmful to digestion, and to be doubtful of the purity of the water supply puts one indeed in a hard case.

Luckily our Association has come to the rescue, and by a special report on the efficiency of water filters has enabled us to ensure the safety of our own drinking water. But why the British Medical Association? Why did not the temperance societies take the question up years ago? Or why

was it not the British Medical Temperance Association that took the initiative? Such action would, I am sure, have had much more weight with the profession than the heavy breakfast they give at our annual meetings.

Not only do the teetotallers neglect their obligations with regard to the provision of an absolutely safe drinking water, but they actually foster and encourage the use of drinks that are positively harmful.

You as medical practitioners know that your out-patient departments are crowded with chronic dyspeptics, a large proportion of whom are bad-tempered, ill-conditioned teetotallers, who have damaged their stomachs by the constant swilling of cold tea and other tannin-laden compounds—people who, with their eructations and grumbings, are almost as great a curse in a household as a chronic drunkard, for the latter is at all events speechless occasionally.

And where is the warning raised at teetotal meetings or in their press against this very prevalent habit amongst their working-class members. Of course it is chiefly the working-class teetotallers who substitute these tannin compounds for pure water, but not always. An eminent divine, who conducted a Church House party on a short holiday, provided for their chief meal hot meat and tea! And when the Lincoln coffee palace was opened the guests at lunch were offered all sorts of drinks, from teetotal champagne downwards, but water was absolutely tabooed.

Another point in which teetotallers seem to show great weakness is in the naming of their non-intoxicant drinks; for, although we are frequently told that alcohol is the Devil, the majority of their drinks are named after him. We have beers, ales, and stouts innumerable, a drink called "Burton"—evidently in honor of a noble lord—orange, ginger, and other wines, lager and shandygaff, madeira, marsala, champagné, muscat, red alicante, etc.;

but, most curious of all, a drink that not only recalls an intoxicant but also the word-clipping of the drunkard—"isky toddy."

It may be said that the manufacturer is responsible for this; but one may be quite sure that the manufacturers would not use such names if not acceptable to their customers. It looks as if they delighted in playing at drinking, as one did in childhood's days—acting farmers, and pretending the water one drank was gin and the pipes one smoked were real.

I trust my few remarks will be taken in the spirit in which they are made, and not as opposed to the cause of true temperance. I should be glad, and I am sure the profession would be glad, to work with the teetotallers in the cause of humanity, and to receive the assistance of their powerful organization in our attempts to render our water supplies free from contamination, and in our endeavors to get the Legislature to pass enactments for the purpose of protecting the habitual drunkard from himself. But I am afraid, before such co-operation is possible, that it will be necessary for the teetotallers to learn to emulate the Good Samaritan a little more and the Pharisee a little less.—*British Medical Journal.*

THE PRESENT STATUS OF OUR KNOWLEDGE OF THE ETIOLOGY OF CANCER.

Dr. Roncali (*Centralbl. f. Bakt. u. Parasit.*, Vol. XXI, No. 8-10, 1898), in an extensive paper on the above subject concludes as follows:

1. In malignant growths of man and animals, bodies are found in the protoplasm of the cell and connective tissue which do not originate from the cells, but are foreign to animal tissue (Roncali, Sanfelice, Rossi, Doria, Aievoli, d'Anna, Binaghi).

2. These bodies are morphologically identical with the so-called coccidia, which have been found by

various authors inclosed in the cells of epithelioma and sarcoma (Roncali, Sanfelice).

3. These bodies are also morophologically identical with the blastomycetes, which may be met with in the tissues of animals inoculated with organized ferments (Sanfelice, Roncali).

4. These bodies resist concentrated acids and alkalis in the same manner as the blastomycetes, which may exist in the tissue of inoculated animals (Roncali, Sanfelice).

5. These bodies are found less frequently in malignant growths; exceptionally in other pathological processes (Sanfelice, Roncali).

6. These bodies are distributed in certain localities in the new formations of man; they may be found in the periphery of the newly formed tissue, *i.e.*, where the growth is on the increase, but not in the centre of the tumor where growth has ceased and degenerated elements have appeared. Furthermore, its seat is either in the cell-protoplasm, or between the bundles of the base-substance, and exceptionally in the nucleus. From these observations it may be concluded, either that these bodies are merely of accidental occurrence, or that they are closely related to the new formation (Roncali, Sanfelice).

7. These bodies react to a specific method of staining, which affects also the pure cultures obtained from the malignant neoplasms of man and animals (Kaline, Sanfelice, Curtis, Pianese, Corselli and Frisco, Roncali).

8. In examining these bodies, obtained in pure culture from malignant tumors of men and animals, it has been found that they are blastomycetes, and that when inoculated in


animals they penetrate into the cells of the pathogenic tissue and between the fibres of the connective tissue, where they reproduce the same forms of cell-enclosures which are found in the tumors of man and animals, from which these blastomycetes have been isolated in pure culture (Sanfelice, Curtis, Corelli and Frisco, Maffucci and Sirleo).

9. These bodies give the reaction of cellulose in the same manner as the blastomycetes in the tissues of animals, into which they penetrated through inoculation of the pure culture (Binaghi).

10. The lesions produced by a few blastomycetes in the animals experimented upon, vary according to what species the animal belongs to. Mammalia of the higher orders (dogs) are less susceptible to infection by the blastomycetes than those of the lower ones (guinea-pigs, mice, rabbits, rats, etc.). It has been demonstrated that while a few blastomycetes produce infection and widely distributed colonies in the lower classes, only localized colonies may be met in the higher ones; and while they are found in large numbers in all parts of the organism of the lower order, we meet in the higher one the same arrangement of enclosed bodies as observed in the tumors of man (Sanfelice).

11. A few blastomycetes may produce in the animals experimented upon lesions of neoplastic, but not inflammatory, character (Sanfelice, Roncali).

12. Finally, certain blastomycetes, when inoculated in pure culture in the mammary glands of a bitch, may cause new formations epithelial in nature (Sanfelice).

THE

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EDITOR:

BEATTIE NESBITT, B.A., M.D., F.C.S.

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No. 2

THE NOISE NUISANCE.

We are pleased to see that the *Toronto World* has been taking up the subject of city noises.

There can be no doubt that the continuous irritation from all classes of noises, which distract and make difficult continuity of thought and application, are the cause of many cases of neurasthenia in our cities.

Many cities have ordinances against a great variety of noises, which ordinances, as the *World* points out in regard to the city of Berlin, are strictly enforced. There are ordinances in a number of the American cities more or less strictly enforced. In some cities anti-noise associations have been formed. These are without doubt the most valuable of all the anti-associations with which we are blessed or cursed. There is no doubt that the whole tendency of health regulations, and this is undoubtedly a health regulation, is to provide against every preventable source of disease. As we noted some time ago, the ordinance against expectorating in public places and on

the public streets could be very well copied in Toronto.

We feel sure that such an active and efficient health officer as Dr. Sheard should only need the suggestion of the *World* to start the necessary reform. It is one of those subjects about which little need be said. The trouble is perfectly apparent, as we believe the great desideratum of a man of the nineteenth century is rest, and with the row going on in the cities, this is almost impossible, and is certainly most trying to men who have been, through ill-health or prolonged attention to business, brought to a condition very easily affected by this sort of thing.

We consider it the duty of every medical journal in the city to support the *World* in this matter until the nuisance is abated.

The last number of the *Medical Record*, of New York, is just to hand and contains the following letter from Dr. Grandin.

Sir,—“In regard to your timely editorials about street noises, the per-

minent question suggests itself, 'Has not the Board of Health the power to suppress them?' The distinct province of this board is to have supervision over health of the community, and surely the various nuisances you complain of inflict as much damage on the individual, whether sick or well, as many of the diseases which the Board of Health pronounces contagious. A little more zeal in the direction indicated and less in the line of selling antitoxins would be acceptable to the community."

A LABORATORY OF COMPARATIVE PATHOLOGY.

The University of Buffalo have been fortunate in being able to take a step, the most advanced taken lately by any institution in the scientific study of medicine.

The Legislature of the State of New York this spring appropriated a sum of money for the purpose of "Equipping and maintaining a laboratory to be devoted to the study of the causes, mortality-rate and treatment of cancer."

Dr. Roswell Park, the able Buffalo surgeon, has been no doubt one of the leading spirits in the matter. We remember commenting very favorably, in an editorial in this journal a couple of years ago, on an article of his in which he dealt with comparative pathology, and we are satisfied that incalculable good will result from the establishment of such a laboratory, with Dr. Park as director. A circular has been sent out in connection with the subject, the conclusion of which we quote, and we trust that every physician in Canada will as far as possible take advantage of this to assist us to obtain a more definite knowledge of this disease. "The officers of this institution invite correspondence with physicians throughout the country in regard to statistics and all matters connected with this study; they also desire to secure reprints of

all monographs pertaining to this subject for its library. They furthermore particularly wish to learn the names, addresses, and, so far as possible, the methods in use, of the various quacks, charlatans and institutions advertising as curing this disease. Such correspondence will be regarded as absolutely confidential, if so requested. It is desired also to secure specimens of tumors from all varieties of the lower animals, either gross specimens or fragments for microscopical examination. These should be sent securely packed, the former immersed in weak alcohol or formaline solution, the latter in pure alcohol, and will be gratefully acknowledged, or even paid for in exceptional instances. The co-operation of the entire profession is urgently solicited in this study, in order that it may be made more thorough and complete."

THE ONTARIO MEDICAL LIBRARY ASSOCIATION.

The first meeting of the Directors appointed at the annual meeting in June last, was held on the 22nd of July, when the following officers were elected for the ensuing year:

President, Dr. J. E. Graham; Vice-President, Dr. W. J. Greig; Secretary, Dr. H. J. Hamilton; Treasurer, Dr. Herbert Bruce; Curator, Dr. N. A. Powell; Assistant Curator, Dr. W. J. Wilson.

The establishment of an Academy of Medicine, as urgently advocated by Dr. Osler at the annual meeting and reported in our last issue, came up for consideration. As the proposal had the unanimous approval of the Directors it was thought that the scheme merited a full and free discussion and the serious consideration of the three medical societies which are interested equally with this Association. It was therefore hoped that this subject would be brought to the notice of each Society as soon as the autumn meetings are well under way.

For the purpose of making the Association more useful to its members and to the profession of the Province outside of Toronto, it was pretty well decided to have printed a catalogue of the more important and useful works now on the shelves, said catalogue to be distributed among the members.

Heretofore the Library has been open only from two o'clock to six each afternoon (Saturdays excepted). The Directors feel that the opening of the library during the morning hours would be of advantage to some of its members. Henceforth we understand the Library will be open during the morning as well as afternoon. This, we are given to believe, depends somewhat upon the support and encouragement accorded by the Toronto members. We trust that the reading, the progressive, the advanced among our confreres will take steps, if they have not already done so, to identify themselves with an Association which was originated by the profession, is maintained by the profession, and conducted solely in the interests of the profession, and therefore indirectly for the

benefit of the public at large. Of the advantages of joining such an Association as this, we propose to speak briefly in the next issue.

EDITORIAL NOTE.

J. E. STEVENS, on "Things to Look Out For in Manila," in the *Medical News*, gives this idea of the only "Anglo-Saxon medico," as he calls him, in the place at the time, who, he said, had been in the tropics so long that the climate made him forgetful. He would perhaps go into the sick room of a fever-stricken patient whom he had been attending and remark, "Oh, by the way, let's see, what is the trouble with you?" a question which was not always comforting to a sufferer who felt that he was on his last legs. But the old residents all knew that when any one's case was really bad there was no cause for complaint, and felt easier in being the recipients of such questions as the above than when the sturdy doctor gave them more serious attention.

Editorial Abstracts.

TOXICITY OF BLOOD AND URINE IN LEPROSY.

CALLERONE.—Toxicity of the urine and of the blood in leprosy. (*Giorn. ital. d. mal. vener.*, v. 32, p. 556.) In the blood poisons are only present in small quantity, while the urine was less toxic than in normal persons.

TOXICITY OF THE SWEAT IN EPILEPTICS.

CABITTO.—Toxicity of the sweat in epileptics. (*Rivista sper. e fren.* v. 23, p. 36.) During the prodromata the sweat of epileptics, on injection into the circulation of rabbits, shows a distinct toxic action and marked convulsive power; these increase as the attacks approach and persist during

the period immediately following. In the intervals between the attacks the sweat is not more toxic than that of healthy persons.—Abst. from *Rev. des sci. med.*, v. 51, 1898, p. 616.

TOXICITY OF THE URINE AND SPLENIC EXTRACT IN CARCINOMA.

MEYER.—Toxicity of the urine and splenic extract in carcinoma. (*Zeits. f. klin. med.*, v. 23, Nos. 5, 6, 1897). While the toxicity of the urine in febrile phthisis, sepsis and pernicious anæmia is increased, yet this increase does not compare with that in carcinoma. During coma or its subsidence there is a sudden sinkage in urinary toxicity. The toxicity of the spleen

in carcinomatous persons is much increased and especially so during coma. The toxicity of both the urine and splenic extract is much diminished by boiling. On the contrary, in Addison's disease, the urine was less poisonous than in normal persons, while during coma it became as toxic as in carcinoma.

THE EFFECT OF THE MENOPAUSE ON
THE KIDNEYS.

LE GENDRE.—The menopause and the kidney. (*Soc. med. des hôp.*, Dec. 10, 1897.) At the appearance of the menopause in certain women the modification of the menstrual flow can cause a venal congestion, with a train of symptoms as oliguria, albuminuria hæmaturia, lumbar pains, nausea and cephalgia. The author advises local or general bleeding and diuretic medication. In case of floating kidney the congestive symptoms are more marked.

DIPHTHERIA TOXINE.

BELFANTI AND CARBONE.—Contribution to the knowledge of the diphtheria antitoxine. (*Archiv. per le sci. med.*, v. 22, No. 2). The authors find that the antitoxic action is always associated with the globulin of the serum. It may be that there is an antitoxic body which we are unable as yet to isolate from the globulin, or that the globulin of immunized animals, has become antitoxic without changing its character to any extent. Abst. from *Cent. f. bakter. Abt.* I, v. 23, 1898, p. 906.

THREE CASES OF OZÆNA CURED BY THE
SUBCUTANEOUS INJECTIONS OF
THE ROUX SERUM.

MOLINIE.—Three cases of ozæna cured by the subcutaneous injections of the Roux serum. (*Marseille med.*, July 1, 1897.) Six cases were treated by the injection of 10 c.c. of the

diphtheritic serum every three or four days. Of these two are under treatment, one refused to continue, and the other three, aged thirteen, eighteen and twenty years, in which the ozæna was associated with atrophy of the nasal mucous membrane, are cured.—Abst. from *Rev. des sci. med.*, v. 51, 1898, p. 713.

INVESTIGATIONS ON THE PASSAGE OF SOME
MEDICINAL SUBSTANCES FROM THE
MOTHER TO THE FŒTUS.

PLOTTIER.—Investigations on the passage of some medicinal substances from the mother to the fœtus. (*Travaux du lab. de therap. gén. de Prevost, Genève*, 1896.) The chlorate, bromide and iodide of potassium and lithium, mercury, arsenic, alcohol, phenol, sodium salicylate, antipyrine and morphine were found in the fœtus, if given in large doses to the mother, while strontium was not even found in the amniotic fluid. As to quinine, the results were negative.—Abst. from *Rev. des sci. med.*, v. 51, 1898, p. 484.

PASSAGE OF SUBSTANCES FROM THE FŒTUS
TO THE MOTHER.

LANNOIS AND BRIAN.—Passage of substances from the fœtus to the mother. (*Lyon méd.*, March 6, 1898.) Sodium salicylate, post assum iodide and methylene blue, after injection direct into the fœtus, have been found in the urine of the mother, suggesting that the excrementitious products of fœtal life traverse the placenta, and are eliminated by the maternal organism. In case of maternal venal insufficiency these waste products may play a role in the albuminuria of pregnancy.—Abst. from *Rev. des sci. med.*, v. 51, 1898, p. 484.

THEORY OF CHLOROFORM NARCOSIS.

GRUBE.—Theory of chloroform narcosis. (*Arch. f. klin. chir.*, v. 56, p. 178.) In forty thousand chloroformizations at Kharkoff between

1859 and 1896, only three were due to chloroform. In 5 per cent. there was respiratory difficulties during narcosis and in 20 per cent. vomiting, but without complications. It never caused albuminuria but increased any existing albuminuria, and often produced mucinuria, while glycosuria only rarely appeared, and icterus in only one case.—*Abst. from Rev. des sci. med.*, v. 51, 1898, p. 627.

METHYLENE BLUE IN NEURALGIA
SPERMATICA.

DOMINO.—Cure of neuralgia spermatica by methylene blue. (*Berl. klin woch.*, 1897, p. 859). Three cases of testicular neuralgia were cured without relapse by the internal use of methylene blue. The first case had resisted anodyne treatment for a fortnight, and castration was suggested, when methylene blue was advised, and 50 cgm. cured it in a few hours. In none of the cases was albuminuria produced, but in one vesical tenesmus was present for a few hours.

PATHOLOGY OF WHOOPING COUGH.

KELLER.—Pathology of whooping cough. (*Jahrb. f. Kinderh.*, v. 44, p. 53.) Leucocytosis is constant and reaches its maximum with the acme of the cough towards the third or fourth week. There seems to be no regular relation between the intensity of the leucocytosis and that of the whooping cough. The number of lymphocytes reaches 50 to 60 per cent. However, this predominance of lymphocytes over polynuclear neutrophils is the rule in infancy. This leucocytosis may act as a point in the diagnosis of doubtful cases.

PHYSIOLOGICAL EFFECTS OF SUBCUTANEOUS
INJECTIONS OF RENAL EXTRACT.

TEISSIER AND FRENKEL.—Physiological effects of subcutaneous injections of renal extract. (*Arch. de*

physiol., v. 10, p. 108). The glycerine extract of the kidneys of sheep (1 to 10) was injected into patients with interstitial nephritis and intermittent albuminuria with beginning pulmonary tuberculosis and the radial pulse. Density of the blood and the urine were carefully examined. They find that the renal elimination of toxins was increased, and that it acts in place of the internal secretion which neutralizes certain poisons in the organisms. They were thus enabled to save an apparently hopeless case.—*Abst. from Rev. des sci. med.*, v. 51, 1898, p. 507.

THE EFFECTS OF INJECTION OF BILE FROM
ANIMALS DYING OF ANTHRAX.

MORPURGO.—On the effects of the injection of the bile of animals dead from anthrax. (*Arch. ital. de biol.* 1898, o.29, p. 105.) Torpurgo injected the bile of animals, (rabbits and guinea-pigs) which had died of anthrax into normal animals and found that none died of anthrax; he also injected simultaneously with bile, virulent cultures of anthrax and comes to the conclusion that the resistance of these animals was no greater than that of the control, and that ordinarily the bile of rabbits and guinea-pigs with anthrax does not contain sufficient bacilli to produce an infectiou.

EUPHTHALMIN, A NEW MYDRIATIC.

TRENTLER.—Euphthalmin, a new mydriatic. (*Klin. monats. f. augenheilk.*, Sep., 1897.) A solution of 5-10 per cent. dilates the pupil to maximum in about the same time as a 10 per cent. solution of homatropine. It acts less in the aged than in the young. It has the advantage over cocaine in that the action is more intense and leaves the corneal epithelium intact, but its action is slower. The accommodation is less influenced than by homatropine, but the dilatation of the pupil and the paralysis of accommodation disappear more

quickly than with homatropine. No untoward effects have yet been observed.—*Abst. from Rev. des sci. med.* v. 51, 1898, p. 707.

THE PHRENIC NERVE, ANATOMY, PHYSIOLOGY AND PHARMACOLOGY.

MALCHINE.—The phrenic nerve, anatomy, physiology and pharmacology. (*Moscow thesis*, 1897.) In dogs, after section of the phrenic nerves, the diaphragm is paralyzed, and only functions through the intercostals. After section of one, or even of both nerves, the respiration, which is much accelerated, diminishes in depth and force. Stimulation of the central end accelerates and strengthens the respiration, and after a latent period raises the blood pressure, but with very strong or prolonged stimulation the respiration slows to normal. Curare and veratrine paralyze the phrenic terminals in the diaphragm, while aconitine, lobeline, nicotine, physostigmine and morphine merely diminish their excitability, while atropine, on the contrary, is stated to increase it.—*Abst. from Rev. des sci. med.*, v. 51, 1898, p. 417.

CHOLESTERINE AND BILIARY SALTS AS VACCINES FOR VIPER VENOM.

PHISALIX.—Cholesterine and the biliary salts as chemical vaccines for viper venom. (*Soc. de biol. comp. rend. hebdom.*, 1897, p. 1057). Recognizing the fact that the bile of the serpents and mammals can immunize against viper venom, it becomes a question to which of its constituents it is due. The author injected 2 cgm. of sodium glycocholate into guinea-pigs, and found only a slight rise in temperature. If now simultaneously the venom is injected the animal dies, but if the injection of the venom is delayed forty-eight hours, then the biliary salt becomes an excellent vaccine. An ethereal solution or an oily suspension of cholesterine or sodium taurocholate acts similarly. As with

the bile itself, this immunizing property is destroyed by exposure for twenty minutes to a temperature of 120. There are also probably other antivenomous bodies in the bile.

SCURVY.

ALBERTONI.—Contribution to the knowledge of scurvy.—(*Arch. ital. de biol.* v. 28, 1897, p. 369). In protracted cases of scurvy Albertoni finds an absence of free hydrochloric acid in the gastric juice, with diminution of its acidity. This, however, does not hold for all cases and all stages of the disease. It is not due to an absence of Na Cl. from the body, because while the urine contains less than normal it still contains a large amount of sodium chloride. In relation with this diminution of acidity the urine also becomes less acid. No doubt the anæmia plays an important share in this diminution of gastric acidity, for after bleeding animals the secretion of hydrochloric acid may be even arrested. This furnishes a scientific explanation of the use of acid drinks in this disease. He believes that in scurvy the infection is by the intestine. Intestinal putrefactive processes are increased, as shown by the increase of conjugate sulphates in the urine, and with amelioration of the disease it likewise diminishes. It is also improved by the administration of acids. The absence of free hydrochloric acid is not the only factor in its production, and it is uncertain that this increased putrefaction can be explained by the anæmia. As a result of this a large portion of the albumen is decomposed in the intestine, forming bodies toxic to the organism and much of the nitrogen is lost. During the height of the disease the coloring matter of the urine is increased and the amount of urine is diminished. The serum has a yellowish-green color, due probably to a greater dissolution of red corpuscles. The blood, while anatomically about normal,

shows a relative and absolute diminution of iron, and while the potassium is diminished, yet Albertoni lays no importance to it. In the urine the calcium and magnesium is increased, while during the acme the potassium and sodium is diminished. The scorbutic hæmorrhages are active and are associated with fever according to their extent. As in all infectious diseases, to which Albertoni is inclined to group scurvy, the destruction of muscle is increased.

PSEUDO TETANUS BACILLUS OF INTESTINE.

TAVEL.—The pseudo tetanus bacillus of the intestine. (*Cent. f. bakteriologie*, v. 23, 1898, p. 538). In abscesses starting from the intestine, Tavel isolated a bacillus which at times resembled the actinomycosis and at times the tetanus bacillus. As it has been often found in perityphlitis and lends its foul odor to the pus of these abscesses, he thought it played an etiological role in their production. The work of Von Mayer would corroborate this. In forty cases of appendicitis which were examined bacteriologically, she found bacilli in twenty-three while the remaining seventeen were sterile. In sections of the coli communis was found alone twice and associated with other bacteria once, the pneumococcus together with the tubercle bacillus once and in the remaining nineteen Tavel's bacillus. She believed that it was the chief causative agent in appendicitis and that the relapses were due to a temporary increase of virulence. It is a thin motile bacillus 0.5 in. broad and 5 to 7 in. long, somewhat slenderer than the real tetanus bacillus. Both carry their spores at their ends, but the pseudo is distinguished by the spores being more egg-shaped, drawn out at one end. Again the pseudo tetanus bacillus has only twelve flagellæ, while in true tetanus bacillus they are very numerous. It is easily colored with ordinary basic aniline dyes, but like the tetanus bacillus it

is only stained with difficulty by Gram's method. It does not grow on gelatine. It develops its peculiar odor in cultures. It is distinguished from Bienstock's bacillus putrificus coli by being strictly anærobic. 2 to 5 c.c. injected subcutaneously in mice, guinea-pigs and rabbits produce no general disturbance.

ACTION OF ETHER INHALATION ON THE LUNGS.

LINDEMANN.—Action of ether inhalation upon the lungs. (*Cent. f. allg. path.* v. 9, 1898, p. 442.) While actual death during ether narcosis is so much less frequent than during chloroformization, yet dangerous sequences are more common from it. Many surgeons have given up its use on account of action on the respiratory apparatus. Mertens reports that in 180 cases of narcosis, bronchitis and pneumonia resulted in not less than fifteen, and in two death resulted. The disturbances are of two kinds. 1. An acute pulmonary œdema occurring either during or a few hours after narcosis. 2. Purulent lobular pneumonia and purulent bronchitis which may be complicated with purulent pleuritis. That an actual inspiration pneumonia may occur is proved by the fact that if carmine powder is placed in a rabbit's mouth, and the rabbit is etherized, the carmine particles are found in the trachea and larger bronchi. As pneumonia occurs more frequently after ether than after chloroform, one would imagine that changes are induced in the lungs causing lessened resistance and leading to infection. The author found that after long etherization of rabbits râles were heard over the lungs and the microscopic examination of the lungs showed many alveoli to be filled with a serous transudate, the capillary vessels to be dilated so that many alveoli were closed, and associated with this were hæmorrhages in numerous places, so that we have the lungs filled with an excellent medium

for the growth of organisms. This transudation is not a gross anatomical one, for it disappears in a few hours, and is unaccompanied by signs of inflammation. To decide if this œdema was due to a local action on the vascular walls or was only secondarily due to its action on the heart, ether was injected into a tracheal opening; now while the capillaries are dilated yet only a slight transudate is present again after twenty minutes narcosis a rabbit died of heart paralysis, here the lungs were normal saving a few dilated capillaries. Against the view that it is exclusively a local action, is the fact that often the œdema only

comes on when the person is awake when most of the local action is over. Arloing showed that the blood pressure under ether fell, but especially so in the right ventricle; beside this, as Wood and Carter, have proved, there is an action on the vaso motor centre leading to vascular dilatation, so that the heart would be compelled to beat quicker to maintain its pressure. Insufficient heart-action would lead to cyanosis and œdema, which last would be intensified by the local action of the ether; again, the number of blood corpuscles is often increased (Thomas and Lerber), which would speak for an inspisation of the blood.

Physician's Library.

Atlas of Legal Medicine. By Dr. E. VON HOFMAN, of Vienna. Edited by FREDERICK PETERSON, M.D., Clinical Professor of Mental Diseases, Woman's Medical College, New York; Chief of Clinic, Nervous Department, College of Physicians & Surgeons, New York. With 120 colored figures on 56 plates, and 193 half-tone illustrations. Cloth, \$3.50 net. Philadelphia: W. B. Saunders, Publisher. Toronto: J. A. Carveth & Co.

Atlas of Diseases of the Larynx. By Dr. L. CRUNWALD, of Munich. Edited by CHARLES P. GRAYSON, M.D., Lecturer on Laryngology and Rhinology in the University of Pennsylvania; Physician in charge, Throat and Nose Department, Hospital of the University of Penn. With 107 colored figures on 44 plates, and 25 text illustrations. Cloth, \$2.50 net. Philadelphia: W. B. Saunders, Publisher. Toronto: J. A. Carveth & Co.

These volumes, like everything that Mr. Saunders issues, are of the best. We know the height which illustrative and reproductive skill has attained, but much of this class of work

has been out of the reach of the average practitioner on account of the great expense. In this case we have a volume of convenient size, with illustrative representations of latest advancement in art pictorial, and at a price which places them not only in the hands of the practitioner, but in the hands of every student. Their value to the latter is incalculable, as they take the place more fully than anything else of direct observation.

Twentieth Century Practice. An International Encyclopedia of Modern Medical Science. By Leading Authorities of Europe and America. Edited by THOMAS L. STEDMAN, M.D., New York City. In twenty volumes. Volume xiv., "Infectious Diseases." New York: William Wood & Co. 1898.

The fourteenth volume of this monumental work is to hand, and takes up "Infectious Diseases." Over half of the volume is taken up with what we might term "Children's Diseases," and will be found to be a most complete compendium of knowledge on this subject up to date, combined with the experience of the author.

To understand the merits of this portion of the work it is only necessary to mention the following: Frederick Forchheimer, of Cincinnati, scarlet fever and German measles. Dawson Williams, of London, measles and glandular fever. O'Dwyer and Norton, New York, whooping cough. Theodor Rumpf, of Hamburg, cholera nostras and Asiatic cholera. Dillon Brown, of New York, chickenpox. And last, but by no means the least, Jacobi, of New York, on cholera infantum. The bibliography is in most cases very good. We are pleased to note the general improvement on this continent in this respect. It is a great pity that our text books generally do not give complete bibliography. It is said that many of them, more especially the scientific works, are meant for students. It matters very little who they are meant for, the extra trouble in giving the literature would be a boon to everyone. Messrs. Wood & Company are to be congratulated on the uniform standard of excellence which has characterized the "Twentieth Century Practice" to date, and which will undoubtedly be as characteristic to the end.

The Surgical Complications and Sequels of Typhoid Fever. By WM. W. KEEN, M.D., LL.D., Professor

of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia. Based upon tables of 1700 cases. Compiled by the author and by THOMPSON S. WESCOTT, M.D., Instructor of Diseases of Children, University of Pennsylvania. With a chapter on the Ocular Complications of Typhoid Fever by GEORGE E. DE SCHWEINITZ, A.M., M.D., Professor of Ophthalmology, Jefferson Medical College. And as an appendix the Toner Lecture No. V. Octavo volume of about 400 pages; cloth, \$3.00 net. Philadelphia: W. B. Saunders, Publisher. Toronto: J. A. Carveth & Co.

This work, as the title indicates, covers the ground thoroughly in the surgical complications and sequels of typhoid fever. Dr. Keen should receive the thanks of the profession for his careful and thorough work. There has never been anything published that we know of which so fully deals with this subject. The matter is taken up very carefully. All the possible points of occurrence of typhoid bacteria throughout the body are discussed. The total literature for over a quarter of a century has been carefully studied, all cases analyzed and the results tabulated, making it a volume which should be in the hands of every practitioner.

Miscellaneous

PREGNANCY FOLLOWING VENTROFIXATION WITH IMPROVEMENTS IN TECHNIQUE.*

By A. LAPHORN SMITH, M.D., M.R.C.S.ENG.,

Fellow of the American Gynecological Society; Professor of Clinical Gynecology, Bishop's University, Montreal; Gynecologist to the Montreal Dispensary; Surgeon-in-Chief of the Samaritan Hospital for Women; Surgeon to the Western General Hospital.

His conclusions were based upon about 2,500 cases by 41 operators, including 111 cases of his own, reported in reply to a circular letter of inquiry.

1st. That as far as curing retro-displacements is concerned, whether retroflexion, retroversion, antelexion with retroversion, and also prolapse of the uterus, ventrofixation with two

* Author's abstract of paper read before American Gynecological Society, Boston, May 24.

buried silk stitches passing through peritoneum and fascia gives the most reliable results. Failures are unknown when the operation is performed in this way.

2nd. Ventrofixation should be reserved for cases in which abdominal section is necessary for other reasons, such as detaching of adhesions and the removal of the diseased tubes which caused the adhesions. When it is expected that pregnancy may follow some other operation should be chosen, because

3rd. Although pregnancy only followed in 148 cases out of about 2,500, still in 30 per cent. of these, or 36, there was pain, miscarriage or difficult labor requiring obstetrical operations.

4th. When suspensio uteri was performed, that is, the uterus attached to the peritoneum, only a few relapses occurred; but on the other hand the patients were free from pain during pregnancy and the labors were less tedious; neither did they require resort to serious obstetrical operations. The uterus should therefore be suspended rather than fixed to the abdominal wall in all cases in which any part of the ovary is allowed to remain.

5th. A third method, it is claimed by some—namely, the intra-abdominal shortening of the round ligaments—is preferable to either ventrofixation or suspensio uteri. This may be done either by drawing a loop of the round ligament into the loop which ties off the ovary and tube; or in cases in which the latter are not removed, simply to detach them from adhesions and shorten the round ligament by drawing up a loop of it and stitching it to itself for a space of about two

inches. By this means the round ligament develops as pregnancy advances, and the dragging and pain and other more serious accidents which are present in 30 per cent. of the cases of ventrofixation are certainly avoided.

6th. If the uterus is attached to the abdominal wall, the stitches should be kept on the anterior surface but near the top of the fundus; the complications were more frequent when there was too much anteversion than was the case when the anterior surface of the fundus was attached to the abdominal wall.

7th. As large a surface as possible should be made to adhere, by scarifying both the anterior surface of the fundus and the corresponding surface of the abdominal peritoneum, in which case one buried silk suture will be sufficient to keep the uterus in good position.

8th. Several of my correspondents mentioned incidentally that they knew of many cases of pregnancy after Alexander's operation, and that in no case was the pregnancy of labor unfavorably influenced by it. Alexander's operation should therefore be preferred whenever the uterus and appendages are free from adhesions.

9th. The results of Alexander's operation are so good that even when there are adhesions it might be well to adopt the procedure of freeing the adhesions by a very small median incision and then shortening the round ligaments by Alexander's method, after which the abdomen should be closed. This could be done without adding more than half of one per cent. to the mortality, which in Alexander's operation is nil.