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EXCISION OF THE CAECUM FOR CARCINOMA, WITH A  
REPORT OF FIVE CASES.

BY

O. M. JONES, F.R.C.S.  
Victoria, B.C.

This procedure was first resorted to with success about twenty years ago, but until the last eight or ten years the number of operations performed were not numerous. The caecum is a part of the alimentary canal which can be easily reached and, for that reason, can be removed with corresponding ease by the surgeon of the present day.

The reported cases, according to a list recently published by Drs. Cumston and Vandever, in the "Annual of Surgery," do not as yet reach one hundred.

The surgical importance of this disease and its complete extirpation is attracting the attention of surgeons, not only for the excellent results which follow complete extirpation, but also in view of the attention that has been drawn to the tubercular and other non-malignant lesions which too closely simulate carcinoma, and which, by virtue of their clearing up after short circuiting operations without complete removal, have done so much to obscure the prognosis of life in these cases.

Moynihan has directed attention to these non-malignant cases, more particularly with regard to those cases of supposed carcinoma of the rectum which have entirely cleared up after performance of inguinal colostomy. It has been the custom to consider these ulcerated growths of the large gut, particularly in the rectum, as being in all cases of syphilitic nature, but in the light of recent minute pathological investigations, it is only too evident that a much more complex explanation will have to be put forward. Apart from the tubercular local lesions of the large gut and those sclerosing conditions which follow long continued ulceration of the colon from dysentery or some such cause, it seems to be an established fact that chronic ulcerative non-specific lesions

can and do take place in much the same way as in the stomach. Moreover, just as it is a matter of exceeding difficulty to determine, in a great number of cases, without the aid of the microscope, whether a given mass in the region of the pyloric end of the stomach and the lesser curvature is malignant or not, so is it with the large gut.

These five cases, although not including any of these non-malignant conditions, illustrate two most important features in the diagnosis of cancer of the caecum. One case, that of a man, A. K., aged 42, shows how difficult it is to differentiate between an abscess in the region of the caecum, due to the appendix, with the concomitant thickening of the caecal wall, and an abscess in the region of the caecum due to carcinoma, with perforation of the wall of the viscus or with bacterial transudation which culminates in abscess formation. This man, had been operated upon for appendicitis and came under my charge some months later with a faecal fistula which had resisted all attempts at closure. On making an abdominal section I found that there was a hard indurated mass in the posterior aspect of the caecum, and, suspecting carcinoma, I excised the caecum and united the ends of the ileum and ascending colon by a lateral anastomosis. The patient is now alive and well, after a lapse of five years. Microscopical examination showed this growth to be a columnar carcinoma.

The other interesting case is that of a man, C. J., aged 47, who came to me with symptoms of commencing obstruction in the region of the caecum and the formation of a tumour. Abdominal section discovered a growth of the caecum and a number of deposits of what appeared to be malignant growths in the great omentum. These latter were smooth ovoid more or less discrete masses, varying in size from a pea to a walnut. I excised the caecum and united the colon and ileum by means of a lateral anastomosis, and then removed as much of the omentum with the growths as was feasible. By reason of these secondary growths and the macroscopical appearances of the excised caecum I gave a bad prognosis for the future. This man, nevertheless, is now alive and well six years after the operation, with no evidence whatever of recurrence. Careful microscopical examination of the growth in the caecum and the nodules in the omentum reveals the nature of these to be columnar carcinoma.

The following is a short history of four cases which have been under my care:—

Mrs. S.—Operated January 31, 1899. Discharged March 3, 1899. Age 52 years. Married; had 8 eight children. Housewife. Very emaciated.

Present illness:—About 12 months ago complained of griping pains across umbilicus, which came on three or four times a day, especially when she exerted herself. They grew steadily worse and were accompanied by retching and vomiting, especially in the morning.

The pain ceased at night.

Had no appetite and was steadily losing weight. For several months she was treated for indigestion.

In November, 1898, she accidentally discovered a lump in her right side; this was diagnosed as a floating kidney and she was given a belt, but could not wear it. For eight months before she consulted me she had kept quiet on a lounge because as soon as she began to walk the pain returned.

Her bowels had always been regular and nothing abnormal had ever been noticed in the stools. Passed water frequently and in large quantities.

*Physical Examination:*—A large mass, kidney-shaped but twice the size of the kidney, could be felt by deep pressure, distinct and above this lower mass. This point cleared up all doubt as to the diagnosis.

When the peritoneal cavity was opened, it was found to be a carcinoma of the caecum, the great mobility being due to the presence of a well-marked meso-caecum.

Excision of the caecum was performed, and also a few enlarged glands in the mesentery removed. The Murphy's Button was passed on the 8th day. About a year later I saw her and she was then in very good health, but I learned from her relatives that in October, 1900, she died in the Eastern States (exactly 21 months after the operation) of "Cancer of the Blood." A post mortem was made by the attending physician, who said there was no return of the growth in the intestine.

A. K.:—Date of operation, 15th January, 1900. Discharged, March 5th, 1900. Aged 42. Single; farmer.

Present illness:—Three years ago he was seized with a sudden attack of pain and vomiting, which recurred for a day and sometimes two days; bowels were very constipated on these occasions. These attacks came on every 3 or 4 weeks for the first year; they were then followed by diarrhoea of a dysenteric character, blood, mucus and pus often being found in the stools. No history of any previous illness. He was gradually losing weight and always disinclined for work, although previously he had been a hard worker. The colicky pain across the lower part of the abdomen was so severe and frequent that his condition was diagnosed as appendicitis and the appendix removed by the attending

practitioner in January, 1898. Following the operation a fistula formed at the upper part of the operation wound.

In January, 1899, and again 3 months later, an attempt was made by a well-known surgeon to close the fistula, but it remained closed for only a short period after each operation—the last time for two months.

In January, 1900, the patient first consulted me with a fistula in his right side. Over the region of the caecum a somewhat ill-defined mass could be felt, which I thought might be some chronic inflammatory thickening. By dissecting up the skin around the circumference of the fistula, then roughly sewing over the two sides with a continuous suture, the fistula was then temporarily closed.

I now made an incision through the abdominal wall into the peritoneal cavity above the limit of the former incision. The intestine, together with the closed fistula, was freed from the abdominal wall.

A thickened, hardened mass was felt in the caecum, and at its junction with the ascending colon a strictured portion could be seen and felt, evidently the result of a cicatrizing ulcer. It was at this point the fistula formed.

The caecum, together with the portion of the colon, was removed.

The progress of the case was uneventful and the patient allowed to get up in four weeks. He returned to his former employment and is still enjoying the best of health.

C. J.—Admitted. Nov. 27, 1900. Discharged, January 7th, 1901. Age 27. Single. Farmer and farm-hand. Present illness:—Began eight months ago with sharp pain and feeling of soreness in right side. Gradually losing flesh; felt tired, heavy, and had no desire to work. Had night-sweats, and considerable pain at night, for which he regularly took "pain-killer."

The pain, as time went on, became of a more gripping character: in the course of a walk of half a mile he would fall down three or four times. This gripping pain became more and more frequent, so that he could not follow his occupation. His bowels were irregular; usually had no difficulty in keeping them open, and would then have the pain more frequently, and would be bloated; no diarrhoea; never vomited. Appetite good. Four months before he consulted me, he first felt the lump when one day feeling his side for pain.

His family history was of no value, except for the fact that one brother, aged 27, died of "bowel trouble" and "tape-worm."

Physical Examination:—The abdomen was distended and rigid, but over the right iliac region an ill-defined mass the size of the closed fist could be felt; it was resonant on percussion, tender on pressure, and appeared to be immovable.

The case was sent to me as a case of chronic appendicitis, which I at first also thought it to be.

He was kept under observation, in bed for 14 days, upon a liquid diet and having hot fomentations applied, but as the swelling in the side instead of decreasing gradually increased and the griping pains became more severe, and the temperature remained normal, we then suspected that it might be a growth.

An operation was decided upon, and upon opening the peritoneal cavity through an incision over the swelling I found it to be a growth in caecum. The growth was well defined; the colon was empty, and the small intestine greatly distended. From this it was evident that the growth was producing obstruction. I then decided to remove it.

After this was completed, I further examined the peritoneal cavity and found masses of growth in the omentum, and scattered over the peritoneal cavity, and in the appendices epiploicae I ligatured off a portion of the omentum containing a mass of the growth.

Within four weeks the patient was up and walking about. Nine months later he called to see me: he had gained 15 lbs. At the present time he is well and hearty and driving a grocery delivery waggon from 7 a.m. to 6 p. m. There is no sign of any abdominal tumour.

Gastano Sasso:—Operation, January 15th, 1901. Died July 15th, 1901. Aged 61. Married. Labourer. Prematurely old.

Present illness:—For six months he had suffered griping pain in the right side, the slightest effort at work bringing on the pain, and losing weight steadily.

Had noticed a lump in his right side for three months, gradually getting harder and larger. Bowels very troublesome—sometimes constipated for nearly a week, but for the last six weeks had persistent diarrhoea. Vomited occasionally; appetite poor. Temperature 97 to 98.6.

*Physical examination:*—As the patient was emaciated and the abdominal wall relaxed, a hard mass, kidney-shaped, freely movable in its lower part, could be felt in the right iliac region and extending up under the ribs, where it appeared to be fixed. No appreciable tenderness on pressure.

The diagnosis in his case lay between a growth of the liver or gall-bladder or of the caecum.

On opening the peritoneal cavity I found the caecum contained a hard growth, which was adherent above to the liver. The ileum was clamped with two pairs of forceps and the intestine divided between them. By this means the caecum could be readily manipulated, while I removed with the actual cautery the portion of the liver adherent to the growth.

This rendered the whole mass free, so that I was able to remove it in the usual manner.

For ten days some faecal-stained fluid escaped at the site of the wound, after which time the fistula closed.

After the wound had healed he was wheeled out daily in the hospital grounds in a chair, but gradually grew weaker and weaker and died exactly one month from the date of the operation.

A. G.—Operated Nov 3rd, 1903. Discharged Dec. 1st, 1903. Age 42. Married. Fisherman by occupation.

Present illness:—About 16 months ago the patient complained of pain in the pit of the stomach, not aggravated, however, by food, in fact relieved at times after meals. This pain was not accompanied by flatulence or vomiting.

In January, 1903, about 5 months later, the pain increased, and one day a large black tarry motion was passed and for the following weeks the patient felt very weak and ill. Then came colicky pains in the lower abdomen, accompanied by the rumbling of wind and an obstinate degree of constipation.

In June, 1903, another black tarry motion was passed and the general symptoms increased, pain being now referred to the right iliac fossa and the right of the umbilicus.

Patient was losing weight rapidly at this time.

*Physical examination:*—When I examined him I found a large hard tender lump in the region of the right iliac fossa. This was irregular in outline and the right kidney could be palpated on deep pressure in its normal situation above it.

I decided to operate at once and found the region of the caecum was occupied by a large, hard, indurated mass. The small intestine above this growth was dilated and hypertrophied, the ascending colon was collapsed.

Resection of the caecum was performed and lateral implantation of the ileum into the ascending colon carried out by means of a Murphy's Button.

I put a gauze drain down to the anastomosis, which was removed in 4 days. The patient made an uninterrupted recovery and is now, 3½ years later, alive and in perfect health.

The history seems to have been of no value in any of these cases.

The symptoms that were present in all the cases were griping pains. This is what we would expect as soon as the slightest obstruction was produced. The griping pains in some of the cases came on only after exertion and were so severe that they simulated appendicular colic. Loss

of weight was always marked; an irregular condition of the bowels, constipation and diarrhoea. There is no one symptom characteristic of disease of the caecum; but when these symptoms occur, and after a physical examination a mass is found in the right iliac region, the diagnosis of disease of the caecum is almost conclusive.

Temperature was normal, or alternating subnormal in all the cases.

*Physical examination*:—The tumours varied in shape and in the degree of mobility.

The diseases most likely to be mistaken for a growth in the caecum are:

1. Chronic appendicitis, with a large amount of inflammatory thickening. If the previous history is carefully inquired into, it will be usually found that the patient suffered from an acute attack of appendicitis.

2. In another case the diagnosis had to be made between a movable kidney, tumour of the kidney, and cancer of the caecum, but by being able to feel the lower end of the right kidney this doubt was easily cleared up.

3. In a third case, the diagnosis rested between it and a tumour of the right lobe of the liver and a distended and inflamed gall-bladder. It was impossible to be sure of the diagnosis until the abdomen had been opened, because the caecal growth was adherent to the under surface of the liver. The growth and the lower edge of the liver could be felt to move with the respiratory movements.

As a routine practice, I always administer a full dose of castor oil to eliminate the possibility of an impacted faecal mass in the caecum.

I once saw a case that greatly resembled cancer of the caecum, but it disappeared after the administration of a dose of castor oil.

*Operation*:—The only treatment for cancer of the caecum is total extirpation, and the steps of the operation are well described in textbooks on Operative Surgery. The operative technique which I follow differs in some respects from the usual one described.

The abdominal incision is slightly curved from above downwards and inwards, and made nearly midway between the anterior superior spine and the umbilicus. When the peritoneum is reached, the limits of the tumour are carefully examined, to ascertain if it may be removable. The peritoneal cavity is then carefully packed with gauze pads, so as to completely shut it off from the field of the operation; the caecum is pulled up into the wound, and, to allow of its being pulled out still further, the outer layer of the peritoneum covering the intestine is divided close to the iliac fossa. The caecum is then stripped up from its iliac attach-



ments. The ileum is clamped with two pairs of forceps one inch apart, and the intestine divided between them. The contents of the intestine are carefully wiped out with pieces of gauze; the forceps attached to the open end of the ileum is packed around with gauze, and pulled out of the way at the lower angle of the wound. The forceps attached to the intestine containing the growth is left attached until the operation is completed; it serves to prevent leakage from the interior of the caecum.

When the tumour has been rendered free, the mesentery is ligatured off, removing a triangular-shaped piece; the ileo-colic vessels are included in these ligatures. To avoid hemorrhage into the field of the operation, the portion of mesentery removed and attached to the caecum is clamped with forceps as I go along. Having isolated the portion of the intestine to be removed, I clamp the ascending colon with two pairs of clamp forceps, and divide between them. If there are any enlarged glands they can readily be removed.

After the tumour is taken away, the portions of a Murphy's button are secured in the ends of the divided intestine; the edges of the V-shaped portion of the mesentery are brought together, taking great care to bring the mesentery at its insertion into the intestine on both sides into exact apposition. The two portions of the button are brought together and pressed home, and if necessary a new supporting Lembert suture applied around the button. The intestine is replaced in the iliac fossa and a small drain placed on each side of the point of anastomosis in the intestine and brought up through the centre of the wound. These drains are not removed for four or five days, so that, should any leakage take place, a track shall have time to form.

The edges of the incision are brought together with silk worm gut sutures, passed through all the structures included in the edges of the wound.

In two of the cases a faecal-stained fluid escaped at the site of the drains; in both cases it lasted for a few days, the wound closing without any interference being necessary.

Several methods have been adopted for performing this operation, but the method I have here briefly described seems to me as simple and as satisfactory as any of them.

The Murphy button is quickly applied, and saves a lot of time that would otherwise be taken up in tedious sewing. The second-sized button is the one I have always used, and find no difficulty in securing it in the end of the colon without decreasing the size of the colon.

When there has been obstruction, the small intestine is distended and the colon collapsed. This may account for the possibility of being able to apply the button in this situation.

Lateral implantation of the ileum to the colon is the method of all that I should feel more inclined to employ.

The mortality of this operation of excision of the caecum from the recorded cases is still extremely high. This is accounted for to some extent by the prolonged nature of the operation, together with the shock it produces; the mortality amounts to between 30 and 40 per cent.

This high rate of mortality should be greatly lessened by adopting the more simple and time saving method of operation.

#### PATHOLOGY.

Nothnagel was the first to draw attention to the incidence of carcinoma of the colon at the flexures, the caecum, hepatic, splenic, sigmoid flexures and the rectum almost exclusively; he showed, at the same time, that the ascending, transverse and descending colon are very rarely indeed the seat of primary growth. In these five cases of mine the disease seems to have started in all cases in the ileo-caecal valve, or in its immediate neighbourhood. This, however, is what one would expect if we draw a justifiable analogy between the seat of disease in the caecum and in the pyloric end of the stomach. The growth then extends chiefly along the posterior attached wall of the caecum up to the opening of the ascending colon, but exhibits no tendency to progress into or along the wall of the ileum. The infiltration does not appear, in the early stages, to involve the retroperitoneal cellular tissue, but the lymphatic glands are locally involved early in the disease although general lymphatic infection is very late as a rule. In fact, death may and frequently does occur from intestinal obstruction before secondary deposits occur in the liver or elsewhere, and before there is general lymphatic involvement.

The growth in these cases was more hypertrophic than ulcerative, and though the interior of the caecum was uniformly ulcerated over the growth, there was not much destruction of tissue. This factor accounts for the greater prominence caused by the obstruction than by persistent diarrhoea or passage of blood and mucus per anum. The actual immediate cause of obstruction was well illustrated in three of my cases by a swollen fold of mucous membrane just at or above the ileocaecal valve which almost completely blocked the lumen of the gut at that spot. In four of my five cases the appendix was healthy, neither adherent nor kinked.

The increase in the amount of fat around the caecum was well marked, as it is in so many cases of carcinoma of the large gut.

The microscopical character of the growth in my cases showed very typical columnar carcinoma, undergoing in all cases more or less

myxomatous or colloid degeneration. There was, in all cases, a great increase in fibrous tissue, in some places very embryonic in type and interspersed among this, strands and columns of columnar cells in all stages of development and degeneration.

I should like to acknowledge my indebtedness to Mr. R. V. Dolbey, M.S., F.R.C.S., for his careful and detailed examination and report of the pathological specimens, both macroscopical and microscopical.

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THE LIFE AND WORKS OF SIR AIMROTH EDWARD WRIGHT,  
WITH ESPECIAL REFERENCE TO OPSONIC TREAT-  
MENT AND ITS RESULTS THUS FAR.

BY

G. E. J. LANNIN, M.D., C.M.

“The Briton may traverse the Pole or the Zone,  
And boldly claim his right  
For he calls such a vast domain his own,  
That the sun never sets on his might.”

Well may the words of the poet be applied to the world of Medical Science. For more than two hundred years at least there has been a bright succession of men of genius and of eminence in Great Britain who have well sustained the balance against the brilliant and accomplished French savants, and the erudite and profound Germans. Such well known names from England as Sydenham, Bright, Paget, and later Lister; many others from old Scotia, from Edinboro, such as Cullen and John Brown, are all so familiar to us; and from the dear old Emerald Isle in medicine proper we have such names as Stokes, Graves, Churchill, Collis, Tuffinill, and others, and to-day the man upon whom and to whom all eyes have been and are turned in keen expectation is Sir A. E. Wright whom we study to-night, and also to his pupils who have carried the work to the Colonies and throughout the Empire.

Obviously the writing of a portion of a man's biography during his life time is no easy task, especially when he is of so reticent and unassuming a nature as Sir A. E. Wright; and so in his case the collection of material was fraught with no little difficulty, but manifestly, intensely, and pre-eminently interesting to us to-day on account of his modern work in the cure of disease. However, this much we do know.

He was born in Dublin, Ireland; his father was an Irishman and his mother a Swede. He received his early education in Germany; subsequently at Dublin University, where he took his B.A., and was the first gold medallist in modern literature. He afterwards studied law

in London where he carried off the first law prize and studentship at Inns of Court in Jurisprudence and International Law. He also attended the Universities of Leipzig, Strasburg, and Marburg, having won the Medical Travelling Prize. He was Demonstrator of Pathology at Cambridge University in 1887, of Physiology at Sydney University in 1889, Professor of Pathology, the Army Medical School, Netley, 1892-1902. He was a member of the Indian Plague Commission from 1898-1900, and during this visit to India he succeeded in inoculating considerably over 3,000 soldiers against typhoid.

He is a very plain, out-spoken and unassuming man; of rather quiet nature, but of very large and generous heart. He is always a hard worker and is much beloved by the students working in his laboratory with him. He has a very extensive practice in London, so much so that he turns much of it over to his colleagues in order that he may have time for his scientific research work. He lives the simple, plain, frugal life, shuns society completely, and dresses very plainly in the one blue suit, without the pretensions to the long coat and silk hat of his confreres. He devotes his life entirely to his work.

Dr. A. E. Wright was knighted by King Edward VII on May 24th, 1906, and deserved well of the nation as shown by the result of his strenuous efforts to provide a method of prophylactic inoculation against typhoid fever, and for the practical value of his more recent researches on opsonins. The recognition of his life-work made by the Crown only confirms the judgment which has been passed by the profession, not only in Great Britain but abroad, as is shown by the many honors which he has received from foreign learned societies. His distinguished work received the recognition and patronage of Queen Alexandra who was deeply interested in it and ever its constant admirer.

During the South African war he actually had prepared in his own laboratory, at his own expense, the vaccine for vaccinating the whole British force, amounting to over 400,000 doses of vaccine. He is the author of "Antityphoid inoculation," and has made numerous contributions to scientific literature. These are all written in his usual cleancut, clear style, and with his masterly command of language which is unique in itself.

Sir A. E. Wright was the first to point out the role the calcium salts play in the coagulation of the blood, and the methods for increasing or decreasing the blood coagulability. Further, he developed the technique for calculating the coagulation and the coagulation time of the blood. This he accomplished by constructing a series of coagulation capillary tubes of definite size and construction by means of which

he could estimate the coagulation time of the blood, and each of these he called a coagulometer.

He may justly claim to have made contributions to the building up of a scientific system of therapeutics of the disorders of the blood:—

(1) By devising a coagulometer.

(2) Establishing by coagulometrical observations that the blood may often be rendered more coagulable by the ingestion of calcium salts, and in particular of calcium chloride.

(3) Showing that there is a certain determinable optimum addition of calcium salts which cannot with advantage be exceeded.

(4) Showing that an increase of coagulability may be expected from the ingestion of calcium salts in particular where we have to deal with a defect of coagulability dependent upon a diminution of the content of the blood in lime salts.

(5) Suggesting a method of establishing the lime salts of the blood by which the existence of this deficit may be determined.

(6) Demonstrating that internal hæmorrhage and hæmorrhage from operation wounds may be checked or kept under control by the exhibition of calcium chloride.

(7) By demonstrating that calcium chloride will often control or abolish chilblains and urticaria (in particular the form of urticaria which supervenes upon the administration of diphtheria antitoxine and upon the consumption of acid fruits and vegetables).

(8) Showing that the ingestion of blood-decalcifying agents such as citric acid and the administration of soap, is followed by a diminution of blood coagulability and correspondingly increased lymph effusion.

(9) And by bringing out more clearly the fact already demonstrated by Vierordt, that the ingestion of alcohol is followed by a diminution of blood-coagulability.

He says, in the incidental references which have from time to time been made in the medical press to the prophylactic administration of calcium chloride to patients on the eve of operation, and in the reports of a recent discussion in the course of which the efficacy of this treatment in the case of jaundiced persons was debated, he says it appears to have been overlooked that it would be both practicable and appropriate before proceeding to operate in a case where hæmorrhage was feared, to determine whether the patient's blood has acquired the particular degree of coagulability which is desired. Severe intestinal hæmorrhage supervening in the course of typhoid fever is still referred to in medical literature as if it were an unforeseeable and altogether legitimate sequela of the ulcerative processes in progress in the intestine. In point of

fact, and the same applies in connection with many cases of hæmoptysis, the hæmorrhage is inordinate in quantity and is associated with a serious defect of blood-coagulability. Moreover, it is possible to seek warning with a view to providing against the danger. The mere fact of blood flowing profusely from a prick in the finger would of itself convey the necessary warning.

Lastly, he refers to the fact that urticarias supervening upon the ingestion of acid fruits and vegetables (rhubarb) are still chronicled in the medical press as events which refuse to fall into line with any known facts. He has not only shown that decalcifying agents as a class when introduced into the system induce a diminution of blood coagulability, but he has in himself achieved a diminution of blood coagulability and an urticaria by the ingestion of citric acid, and, on the other hand, in the dog, achieved a decalcification of the blood and a diminution of blood coagulability by the administration of soap.

In 1902 from a series of experiments and observation on rabbits, he pointed out and proved that the coagulation of the blood was brought about very rapidly by its admixture with lymph.

He sums up his inferences with regard to the causation of the thrombosis which occurs in connection with typhoid fever thus:—  
“Turning to the problem as to what is the cause of the thrombosis so frequently seen in connection with typhoid fever and scrutinizing the results of the blood examinations to see whether they shed any light upon this problem, our attention fastens on the fact that the quantum of lime salts in the blood of the typhoid convalescents examined was greatly in excess of that in the normal blood. This fact suggests that the increased coagulability during the convalescent stage may be dependent upon an excess of lime salts. Evidence pointing in the same direction is afforded by the circumstance that the blood coagulation times of our typhoid patients, after the content of their blood in lime salts had been brought within the limits of the normal, were longer than those of normal bloods, instead of being shorter as one would expect them to be if the increased coagulability were dependent upon an increase in the albuminous elements which enter into the composition of the fibrin. When we consider whence the excess of lime salts which appears to be present in the blood of the typhoid convalescent can be derived, we recognize that it must be obtained from the milk, which, for the most part, constitutes the exclusive dietary of the patient. Cow's milk contains, 1 part in 600 of CaO, as compared with 1 part in 800 contained in lime water. If we have in the milk dietary the key to the problem of the frequency of thrombosis in the period of convalescence, we have probably obtained a clue also to the solution of

Exhibiting the Effects of the DECALCIFYING TREATMENT in the case of TYPHOID CONVALESCENTS possessing UNDUPLY COAGULABLE Blood.		Content of Blood in Calcium Salts: concentration of ammonium oxalate solution which when added in equal volume to the blood respectively averted and failed to avert coagulation.							
Initials of Patients.	Date of observation.	Notes with regard to dietary and treatment.	Notes with regard to clinical symptoms at date of observation.	Blood coagulation time in tubes at 18.5 °C.	1 600	1 800	1 1000	1 2000	1 3000
J. B.	S-7-02	Milk diet.	Typhoid fever; 4th week, complicated by Pneumonia and capillary bronchitis; acute development of femoral thrombosis.	1' 45"	0	0	Clot.	Clot.	Clot.
	10-7-02	Ditto and citric acid 4 grammes, 3 times.	Pain and swelling in the limb less. No change.	6' 30"	0	0	Clot.	Clot.	Clot.
	11-7-02	" " " " " " " "	Oedema and pain in limb gone; fever continues.	7' 15"	0	0	"	"	"
	13-7-02	" " " " " " " "	No change.	5' 45"	0	0	0	0	"
B. D.	7-7-02	Convalescent diet including milk (2 pts.)	14th day of apyrexia, 22nd day after slight thrombosis.	2'	0	0	Clot.	Clot.	Clot.
	14-7-02	Ditto and citric acid 2.5 grammes, 3 times a day	" " " " " " " "	3' 45" over 15'	0	0	Trace	"	"
	19-7-02	" " " " " " " "	" " " " " " " "	"	0	0	0	"	"
	8-7-02	Convalescent diet including milk (2 pts.)	45th day of apyrexia, 45th day after thrombosis.	1' 30"	0	Clot.	Clot.	Clot.	Clot.
C. D.	15-7-02	Ditto and citric acid 2.5 grammes, 3 times a day	" " " " " " " "	3' 15" 10'	Trace	0	"	"	"
	20-7-02	" " " " " " " "	" " " " " " " "	"	0	0	"	"	"
	S-7-02	Convalescent diet, milk about 2 pts	7th week of apyrexia, 7th day after thrombosis.	1' 10"	0	Clot.	Clot.	Clot.	Clot.
	15-7-02	Ditto and citric acid 2.5 grammes, 3 times a day	" " " " " " " "	5' over 20'	Trace	0	"	"	"
J. A.	19-7-02	" " " " " " " "	" " " " " " " "	"	0	0	"	"	"
	S-7-02	Convalescent diet, milk 2 pts.	3rd week of apyrexia	9' 30"	0	Clot.	Clot.	Clot.	Clot.
	16-7-02	Ditto and citric acid 2.5 grammes, 3 times a day	" " " " " " " "	over 13'30" over 30"	0	0	"	"	"
	19-7-02	" " " " " " " "	" " " " " " " "	"	0	0	0	0	"
F. D.	S-7-02	Convalescent diet, milk 2 pts.	14th day of apyrexia.	9' 30"	Clot.	0	Clot.	Clot.	Clot.
	16-7-02	Ditto and citric acid 2.5 grammes, 3 times a day	" " " " " " " "	"	0	0	"	"	"
	19-7-02	" " " " " " " "	" " " " " " " "	"	0	0	0	0	"
	S-7-02	Convalescent diet and milk	" " " " " " " "	9' 30" 10'	Clot.	0	Clot.	Clot.	Clot.
R. D.	15-7-02	Ditto and citric acid, 2.5 grammes, since 12-7-02, 3 times a day	" " " " " " " "	"	0	0	0	0	"
	19-7-02	" " " " " " " "	" " " " " " " "	"	0	0	Clot.	Clot.	"

certain other problems; in particular the problem of the frequently beneficial effect of a milk dietary on "serous hemorrhage" from the kidney, and the comparative rarity of thrombosis after acute fevers, such as Malta Fever, where a milk diet is not imposed upon the patient. We obtain at the same time indications for the prophylaxis and after treatment of thrombosis, both when it occurs in connection with typhoid fever and when it occurs in connection with other diseases.

The remedial measure which would seem indicated is the exhibition of citric acid. The same treatment, initiated as soon as the danger of intestinal hemorrhage has been surmounted would be appropriate for prophylaxis of typhoid thrombosis. Or, as an alternative, we might, with a view of restricting the intake of lime salts, appropriately undertake a partial decalcification of the milk. It has been pointed out that a partial decalcification is advisable also from the point of view of rendering it more easily digestible, and of preventing constipation. This partial decalcification can be readily effected by adding to the milk from .25 to .5 percent of citrate of soda, from 20 to 40 grains per pint.

Sir A. E. Wright was the first to conceive the practical possibility of antityphoid inoculation. Following the developments of Ehrlich's theory of immunity by careful experiment and the results of the Pasteurian inoculation against anthrax, and Hallkine's inoculations against cholera in India, he conceived the idea of antityphoid inoculation. But this involved serious and great risks; first, the risk of disseminating the germ of the disease; second, that of communicating the disease in a serious form in any case where by mischance he might happen to encounter a patient who possessed an abnormal susceptibility to the typhoid infection.

The difficulty was solved for him when he learned from Professor R. Pfeiffer that he had obtained the specific agglutination reaction to typhoid by the subcutaneous inoculation of a heated typhoid culture. This observation, since it pointed to the continued presence of effective vaccinating elements in the heated culture, immediately supplied the basis for the system of anti-typhoid inoculation which he employed.

By experiment he showed (a) that the typhoid culture is unaltered so far as its immunising properties are concerned, by exposure to the temperature which is required for the devitalization of the bacteria; (b) that the chemical relations which obtain between the protective substances of the blood and the unheated typhoid bacillus obtain also between these protective substances and the typhoid bacillus after it has been devitalized by exposure to a temperature of 60°C., and (c) that inoculation of cultures of typhoid bacilli which have been sterilized by exposure to a temperature of 60°C., induces in the organism an el-



boration of:—1. Agglutinating antitropins. 2. Bactericidal antitropins. 3. Bacteriolytic antitropins. 4. Antitoxic antitropins. 5. Opsonic antitropins.

Regarding anti-typhoid inoculation he says:—"It would seem certain that there exists for every man a particular dose of the typhoid poison which is calculated to develop the maximum of response, and that the incorporation of a dose in excess of this is likely to be followed by a diminution instead of an increase in the bactericidal power. The man who gives the severest reaction to typhoid fever, does not always do the best. The importance of the accurate adjusting of the dose of the vaccine to the capacity of the particular patient, or in the case of large bodies of men to the capacity of the average individual, will have become manifest, and this accurate standardization is particularly necessary where a patient may be exposed to infection within a short time after inoculation for here it will obviously be important to avoid the production of a negative phase of increased susceptibility within the period immediately subsequent to inoculation."

In the case of the employment of excessive doses positive disadvantages might result from double inoculation. Re-inoculation should be resorted to after the interval of a year, more particularly in the case of men who have only been once inoculated."

In the American Yearbook of Medicine and Surgery he reports the results which he obtained in the use of anti-typhoid inoculations at Ladysmith. They seemed decidedly to protect against typhoid fever, only two percent of the 1705 men inoculated acquiring typhoid fever, while 13.25 percent of the 10,529 men not inoculated fell ill with the disease. If typhoid appeared in the inoculated the death rate was about the same as in the uninoculated. The results were thus encouraging so far as protection was concerned. From anti-typhoid inoculation in the Fifteenth Hussars in India, of those inoculated there was a morbidity of .55 percent and a mortality of .27 percent. The morbidity in the uninoculated was 6.14 percent and the mortality 3.35 percent.

In discussing the treatment of Scurvy in the American Yearbook of Medicine and Surgery for 1902, he considers the condition to be one of acid intoxication, when the dietary has been one which contains a large amount of elements producing an excess of acids, and that it is relieved or cured by many substances which contain an excess of bases over mineral acids. He states that the normal alkalinity of the blood is equal to one thirty-fifth normal saline. In his series of cases in the British Army the alkalinity of the blood was found to be very greatly decreased, only 1/70th to 1/200th normal. Treatment caused the

alkalinity to increase rapidly, the most efficient drug being sodium lactate.

In July, 1904, he pointed out a simple method of making slides for blood films, and making a differential count by rubbing the slide with fine emery paper and sliding the other one along it at an angle with the drop of blood, spreading it evenly. He pointed out the possibility of the application of formalin gelatin as an antiseptic and disinfectant protective skin to denuded surfaces, and for the arrest of hæmorrhage oozing.

He studied the micro-organisms found in association with some pathological affections of the mouth, particularly pyorrhœa alveolaris and pointed out that the organism of this disease, known as the *Bacillus Fusiformis*, was in reality *Trypanosoma*-like in nature.

In 1902 he studied and developed the technique for the measurement of the bactericidal power of small samples of blood under aerobic and anaerobic conditions, and on the comparative bactericidal effect of human blood drawn off and tested under these contrasted conditions. This involved first a standardization of the bacterial culture employed, which he accomplished by employing one and the same stock of bacteria, and a young culture of 24 hours age, and by determining in each case the number of bacteria in a measured volume of that culture. This he did by making a measured dilution of the culture by means of a special capillary pipette which he constructed so that he could mix and dilute his cultures one million-fold to ten million-fold, or other dilutions; and then to enumerate them subsequently he transferred a series of measured volumes of the diluted culture, say 10 c.m., to the surface of a solid nutrient media and counted them by deducing the number of bacteria from the number of colonies which develop on the corresponding agar tube, and then reckon back the number in the original fluid before dilution.

Next he constructed specially built capillary tubes by means of which he aseptically drew off a measured volume of blood from the patient and hermetically sealed it. This is then centrifugalized and the serum and corpuscles thus separated. Thus in the method of bactericidal estimation of the blood, a series of measured volumes of undiluted serum are brought in contact with a series of graduated dilutions of the culture, the object being to determine what is the lowest dilution of the culture with which a complete bactericidal effect is exerted. This he did by means of a specially graduated pipette which he made with a spiral and a bulb. He draws up into it a certain definite amount of sterile broth, then the serum and the diluted culture, which are then

mixed thoroughly, and the tube kept at a certain definite temperature for a certain time, and if the serum has not been completely bactericidal and has not killed off all the bacteria a turbidity will be present from their growth. If the serum has been completely bactericidal the broth will be clear. A simple numerical expression for the bactericidal power of the blood is obtained by specifying the number of bacterial culture which is completely sterilized by digestion with an equal volume of serum. This method may also be employed for determining the bactericidal power of any chemical antiseptic. Under anaerobic conditions, he devised a method for measuring the bactericidal power of the blood by preventing the access of air by enveloping the blood in fatty acid-free oil.

The results of his investigations of the bactericidal power of the blood, both anaerobically and aerobically, seemed to show definitely that neither contact with the external air nor contact with ordinary glass surfaces exerts any important influence on the bactericidal power exerted by human blood upon the typhoid bacillus and the cholera vibrio.

By decalcifying the blood with a one percent solution of citrate of soda in physiological salt solution, he avoided the complications introduced by blood coagulation and made it possible to separate the white corpuscles from the blood fluids by centrifugalization, decantation and washing.

The blood, the bacterial suspension, and the soda solution, are mixed and kept for fifteen minutes in the incubator at 37°C. in capillary tubes and the phagocytosis is thus conducted here after which film preparations are made in the ordinary way, stained by Leishman's stain and examined under an immersion lens. By enumerating the bacteria ingested in a number of polynuclear white blood corpuscles and dividing, an average is obtained which is taken as the measure of the phagocytic power of the blood. It is compared, when comparative experiments are made, with the phagocytic power of a normal blood.

The opsonic content of any blood therefore is arrived at by comparing the amount of phagocytosis observed as a result of the activity of its serum with the amount of phagocytosis observed in the case of a normal serum used as control. The figure so observed is termed the Opsonic Index of the patient's blood. If, therefore, we say that a patient's blood has an opsonic index of 0.5 to the tubercle bacillus, what do we mean? Simply that it contains but one half the normal quantity of those opsonins which are essential to a combating of the bacillus tuberculosis.

From these observations he began to ask himself; Why do microbes invade the body; what does Nature do to ward off these microbes, or to

cure the invasion after it has begun? When a microbe is introduced, such as staphylococcus, into the artificial nutrient media employed in the laboratory it increases, and millions of microbes are produced in a very few hours. It is obvious that the blood cannot be such a medium. When you introduce microbes into the blood, they do not proliferate at random in that fashion—there are protective or bacteriotropic substances in the blood that prevent them growing and increasing in the the body. When one considers how the blood differs from the nutrient medium used in the laboratory two outstanding differences will be found. It contains white blood corpuscles and these have the faculty under certain circumstances of picking up the microbes and ingesting them, and killing them. Now the blood fluids are not simply an indifferent medium, as Metchnikoff the author of the theory of phagocytosis thought; the blood differs from the broth not only in the fact that it has white corpuscles but that it also contains substances which act on the bacteria. They act upon them somewhat after the manner of antiseptics. The analogy is not very close, but it is something of that sort. In other words your blood represents a fluid somewhat comparable to weak carbolic acid in which are white corpuscles. These antiseptics in the blood may be partly responsible for keeping the blood free from bacilli but are not wholly so. By a certain technique he found that it was possible to separate the white corpuscles from the blood fluids, to test them separately and see what white corpuscles could really do. So he took white blood corpuscles obtained from his own blood and an emulsion of bacteria, mixed them together in capillary tubes, kept them at blood heat for about half an hour, and watched to see what occurred. He was astonished to find that under these circumstances the white corpuscles did not ingest the bacteria, and therefore it looked as if the white blood corpuscles were of no use. He then mixed with the bacteria and the white blood corpuscles a portion of the fluid of the blood and he found that this influenced the microbes in such a way as to prepare them for ingestion. He found then that when you mix bacteria and white blood corpuscles together the white blood corpuscles have no power of taking up the bacteria; but when you add the fluid of the blood to the mixture of leucocytes and bacteria, the fluid of the blood alters the bacteria in such a way as to make them palatable for the white blood corpuscles. In other words the blood has prepared the bacteria for ingestion.

For this phenomenon he had to find a name, and, spending some time over Greek and Latin dictionaries, he found the word *opsono*, which means, "I prepare for dinner." It must be sharply distinguished

from an almost identical word which means "I advertise or proclaim with a trumpet." These substances which prepare for ingestion are what Sir A. E. Wright speaks of as "Opsonins." It was a question at the time whether the white blood corpuscles or the opsonins in the blood was the more important agent. In order to answer this question he took a patient who was very badly infected with the tubercle bacillus and he contrasted the blood of this patient with what he calls "pool," which means the pool of the blood of all the normal men in the laboratory. With this blood pool as control he contrasted the blood of this highly infected tubercular patient and investigated the question as to whether the patient's white blood corpuscles or the opsonins in his blood were deficient. He found that the white blood corpuscles of his patient were just as active in phagocytosis as were his own normal white corpuscles but that the patient's serum was only half as active as his own serum. Hence if the activity of normal serum for phagocytosis be expressed as 1.0 we must express the abnormal activity of the patient's serum as 0.5. These figures represent respectively what he terms the "Opsonic Index" of the normal person and of the disease.

The question was then,—Does the substitution of another medium for the citrated blood plasma, which bathes the corpuscles, exert an influence on phagocytosis, and do the blood fluids co-operate in phagocytosis by exerting a direct stimulating effect upon the phagocytes or by effecting a modification in the bacteria?

By a series of experiments, mixing heated—or as he called it, inactivated—serum with the corpuscles and bacterial suspension, and also unheated serum, and at the same time doing a series of control experiments, he found that the heated serum, like the salt solution, acts merely as an inert diluent, and that the blood fluids modify the bacteria in a manner which renders them a ready prey to the phagocytes, and the elements in the blood fluids which produce this effect he called the "opsonins."

The question as to whether the unheated serum contains in addition to the opsonins also elements which directly stimulate the phagocytes, that is stimulus, remains for the present unsolved.

The increased phagocytic effect which is obtained with the blood of successfully immunized persons is attributable not to any modification induced in the leucocytes but to an increased opsonic power in the blood fluids. Conclusive evidence of this was obtained by separating in the case of two bloods with little if any conspicuously different phagocytic powers in each case, the blood fluids from the corpuscular elements, and then effecting an interchange of the blood fluids. The leucocytes of the successfully immunized patient exhibited under these circumstances the

smaller phagocytic action characteristic of the blood of the normal individual who served as a control; while the leucocytes of the normal individual exhibited the increased phagocytic action characteristic of the blood of the successfully immunized patient. This is also confirmed by similar results in connection with the tubercle bacillus. By thus bringing about phagocytosis of different organisms and studying the action of the blood fluids under different conditions, he was able to reach the following conclusions:—

1. That the opsonic power of the blood fluids disappears gradually on standing, even when the serum is kept in a sealed capsule sheltered from the light, and in five or six days stands a little more than half of what it was originally.

2. That the opsonic power of the blood fluid is but little impaired by the action of heat until these have been exposed to a temperature of above 50°C.

3. That the opsonic power of the blood serum is diminished when this last has been digested with typhoid bacteria.

4. The opsonic power of the blood fluids is diminished while the phagocytic capacity of the white blood corpuscles is preserved when the blood fluids and corpuscles are separately digested with Dahoia venom. In the anti-opsonic effect exerted by the venom on the blood fluids, we have probably the explanation of the reduced resistance to the septic invasion which supervenes upon viper bites.

5. That it seems probable that the bacteriolytic, bacteriacidal, and bacterio-opsonic effects exerted by the blood fluids, are each in their degree manifestations of a digestive power exerted by the blood fluids on bacteria brought into contact with them, and that we must also always take into consideration the opsonic effect.

By numerous experiments with the blood from different parts of the body, testing its phagocytic power, he has shown that with the ordinary infections and the tubercle bacilli it may be enunciated as a proposition of general application that the invading micro-organisms cultivate themselves in the organism in the regions of lowered bacteriotropic pressure, that is, the mass effect exerted upon the invading bacteria by the protective substances contained in the blood fluids is lowered in these places.

Every patient, at any rate in the early stage—in the uncomplicated stage—who is infected by bacteria under ordinary circumstances has got diminished resistance, and that deficiency of resistance does not reside in his white blood corpuscles, but in the fluids of the blood. Whether he is infected or not depends on his power of resistance.

One is able to explain to himself now, why in a world where we all come in contact with infection, some people take tubercle and some do not, why some get boils and some do not; so we see that resistance is the important thing.

The next point is, What is the good of that unless you can alter it? And when you throw back your thoughts to what has been done in connection with the prevention of infectious disease you will see why inoculation is resorted to. Commonly when one speaks of inoculation he means vaccination, and people that are subject, as we all are, to attack by the small-pox microbe, take precautions through inoculation that they may have a higher resisting power. In order to do this we must first study what happens when the microbe attacks the body. For obvious reasons living bacteria could not be used, but Sir A. E. Wright used bacteria which had been devitalized at a comparatively low temperature—so low that though it was rendered extinct the chemical constitution of their protoplasm was not greatly altered. So he took cultures of bacteria and killed them at 60°C., thus obtaining what he calls a "bacterial vaccine."

Now when a proper quantity of vaccine is put into the body, what happens? When the resistance after inoculation is tested it is found reduced. This is called "the negative phase." The inoculation of a considerable quantity of vaccine thus reduces the resistance of the patient. Then after a time the resisting power increases; that is spoken of as "the positive phase." Later still it falls away and eventually the blood of the patient does not differ very much from the normal.

During the "negative phase" when the curve has gone down, the poisons which have been introduced are circulating in the blood of the person, and the immunization is under the influence of a stimulation. This stimulus will continue to act for days and the material injected will continue to circulate for days.

In other words, after inoculation there occurs first a diminished resisting power; that increased resisting power lasts for a period and then it falls away. Now, when the resisting power has fallen away, the patient is not what he was originally. He has retained the faculty of rapidly manufacturing protective substances again—these opsonins—as soon as he is re-inoculated.

What happens when a second inoculation is given? After the first there occurs the negative phase, and then the positive phase, and on the declining wave of the latter, the patient is re-inoculated. The opsonic power goes down again and then rises higher than before and so on in this step-ladder fashion. One can, however, usually increase the effects

of a primary inoculation by a secondary inoculation, though one cannot do so indefinitely. Here is an inoculation after which the resisting power runs down but after a time the patient is re-inoculated with a large dose; the resistance goes down further and before he can recover, another dose is given and the resistance goes down still further.

So anybody can inoculate with successive doses and reduce the resisting power to anything he likes. It is quite easy by this method to reduce the resisting power of the blood enormously. This is the reason why one cannot inoculate at random without testing the blood every time. After every inoculation the resisting power of the blood lessens and then is increased, and when it is increased you may give another inoculation and keep it up. Wright tried to get only a small negative phase and a fairly big positive phase; when this is falling off he gives another inoculation and so keeps the patient on an average considerably above normal.

The principles of inoculation summarised are these:—After you have found that a patient is infected with a microbe you isolate the microbe in pure culture and then test the resistance of that patient's blood to see whether or not it is able to kill off that microbe as well as normal blood can. If he is not able to do so, you inoculate with the proper vaccine, with vaccine made from staphylococcus, if it is staphylococcus infection, from the tubercle bacillus if it is tubercle infection, and so on. Throughout the whole course of the inoculation one tries to keep the resistance of the patient's blood as high as possible.

Obviously if a patient does not react to the typhoid bacillus, the typhoid would always get the better of him, but we know that in the course of typhoid fever, as in all bacterial fevers, the body makes an effort to throw off the disease; in other words, the body inoculates itself. As soon as the poisons get into the blood the body sets to work to produce protective substances and there occurs the phenomenon which we speak of as auto-inoculation. You may get auto-inoculation progressing favourably as in about four out of five cases of typhoid fever. In fact the patient gets well of his typhoid because he inoculates himself from his bacterial focus and thus produces his own protective substances. In cases in which you have a strictly local infection, however, such as tubercular glands, such as acne, such as all those purely local diseases where you have not constitutional disturbances, the body takes no steps to protect itself, and the disease runs on practically indefinitely. You may find the disease lasting through life, and then you will find the opsonic power low. This is because the bacterial focus is closely shut off from the lymph and blood streams, and consequently no auto-inoculation can take place. In many of those cases where the body is not



inoculating itself, you can inoculate for it and bring about a favourable result.

When some cases get well of themselves it may be due to the fact that auto-inoculations have taken place. When you massage a part, what you do is you knead it and you press out the fluid from that part into the blood or lymph system. If the tubercle bacillus happens to be growing in a knee, your massage is the equivalent of an inoculation from the fact that you are driving out into the circulation fluid infected with the bacillus. In the case of a child who had a tubercular knee, after the first massage there was a lowering of the opsonic power, but the patient came up to normal again. With another massage the same result was obtained; and to show that this auto-inoculation was the same as an inoculation put under the skin, an inoculation was undertaken with new tuberculin, when a series of events similar to that which had followed massage was obtained. It would therefore appear that the tendency of the bacterial disease to get well of itself, is due to the fact that in the course of the disease auto-inoculation is taking place constantly and that you get increased resisting power as a result of this. However, the auto-inoculation that takes place may be very ill-adjusted. Sometimes you get inoculation of much too large a dose, and then you find a diminution of the resisting power instead of an increase. What one has to do is to keep a patient for as long a period as possible, as high as possible above normal. If he should get down much below normal the tubercle bacilli may take the opportunity to spread throughout his body and he may get general tuberculosis. The negative phase has to be closely watched and the resisting power of the patient tested after each inoculation. Such a dose of vaccine must be given that will not reduce the patient's resisting power much (a dose that produces practically no clinical result) and yet large enough to give a good positive phase following a slight negative phase.

When he does an artificial inoculation he puts his vaccine into the subcutaneous tissues. There is very little doubt that this is a great deal more effective in making protective substances than if inoculated directly into the blood stream; furthermore, one does not get poisoning effects if the patient is inoculated into the subcutaneous tissues. Where one does not know what to do with a disease, where the microbes insist on living in the body; where, for instance, after a surgical operation the wounds fail to heal because the microbes continue to multiply themselves, you can find out the microbe, test the patient's resisting power to this particular microbe, and set to work by appropriate inoculations to increase the resisting power of the patient.

I will quote a case reported by Wright and Douglas of furunculosis. The patient had suffered from boils for four years; his opsonic index was 0.6 to *staphylococcus pyogenes* on the first examination, and 1.1 on the second. Dr. Wright inoculated him with 2,000,000,000 dead *staphylococci*. The next day there was a diminution of the quantity of opsonins from 1.1 to 0.78; a few days later the index was 1.4, and while the opsonic power was high another inoculation was given which resulted in first a negative phase, then a rapid reflow, and in a day or two a high tide of opsonic power, equal to twice the normal, was reached. The clinical result was eminently satisfactory. After several weeks of treatment the boils quite disappeared.

The general principles of treating any bacterial invasion after the manner of Sir Almroth Wright and Captain Douglas, are briefly:—

1. Isolate in pure culture the causative micro-organism.
2. Estimate the opsonic power of the patient's blood to this micro-organism.
3. If the opsonic index be at or below normal, prepare and standardize a vaccine from this micro-organism.
4. Inoculate the patient with this vaccine with appropriate doses and at proper intervals, as shown by a systematic estimation of the opsonic content of the patient's blood.

#### THE OPSONIC INDEX IN DIAGNOSIS:

Of what importance, if any, are opsonic methods of investigation in enabling us to arrive at an accurate diagnosis of a given case? Certain general principles have emerged from the study of many cases:—

1. Normal individuals, not subjects of any bacterial infection, present a constant opsonic power to the various pathogenic bacteria.
2. Individuals the subjects of a strictly localised infection, due to any micro-organism, show a lowered opsonic index to that particular micro-organism as compared with a normal person.
3. Individuals, subjects of systemic infection, for example acute pulmonary tuberculosis, show a high opsonic power, or an opsonic power fluctuating from high to low, and Dr. Wright believes that this fluctuating power is due to repeated inoculations by the patient of bacterial products from his own focus of disease, and that it is comparable to what occurs after artificial inoculation, namely, negative phase and positive phase, and so forth.

By far the most important practical application of these principles so far has been in the diagnosis of a systemic pulmonary tuberculosis from other conditions, or in eliminating tuberculosis from our consideration. The following is the opsonic method of the diagnosis of an obscure case:—

A youth, aged 20, with a tentative diagnosis of a general tuberculosis, has symptoms of fleeting pains, especially in the extremities, intermittent rigors and a general feeling of malaise. No physical signs of disease could be found. His temperature was 102° F. His tuberculo-opsonic index was 1.0 so that acute tubercular infection was improbable. Suspecting gonorrhœal infection his opsonic index to the gonococcus was found to be twice normal; the patient owned to a recent gonorrhœa and the diagnosis of a gonorrhœal systemic infection was therefore correct.

This case serves to illustrate how clinical observation is successfully supplemented by examination of the blood of the patient.

The diagnosis of acute phthisis from ulcerative endocarditis and enteric fever presents at times very great difficulties. A number of such difficult cases exhibited the signs and symptoms of acute tuberculosis. Three cases have come to autopsy, two were ulcerative endocarditis and were both diagnosed as such after eliminating acute tuberculosis by the absence of a high opsonic index. One was a case of enteric fever with a secondary pneumonia.

In the diagnosis of the more chronic forms of pulmonary tuberculosis from similar but non-tuberculous diseases, he has used with success the opsonic reaction in, 1. Malignant disease of the lungs. 2. Chronic bronchitis and emphysema. 3. Bronchiectasis. 4. General debility.

The presence or absence of tuberculous infection in these cases is often difficult to establish, but Dr. Wright is convinced that a considerable number may be correctly diagnosed by opsonic methods. As concerns malignant disease of the lungs, by eliminating tuberculosis one case was correctly diagnosed, as autopsy confirmed. In cases of phthisis there are many difficulties, yet he believes these will be overcome and that the tuberculo-opsonic index will eventually prove of material assistance, and from practical experience he knows that opsonic methods are of considerable assistance in determining whether a peritoneal or a pleural effusion is or is not tuberculous. He says: "We have, in the power of raising the anti-bacterial power of the blood, with respect to any invading microbe, out of all comparison the most valuable asset in medicine."

In 1904, from their experimental data with the different organisms and blood fluids and corpuscles, as before described and from other facts elicited by them with regard to the bactericidal action exerted by the human blood on the various species of micro-organisms, Sir A. E. Wright and his pupils classified bacteria thus:—

1. Bacteria which are eminently sensible to the bactericidal bacteriolytic and opsonic action of normal human blood fluids. The *Bacillus typhosus* and the *Vibrio cholerae Asiaticæ*.

2. Bacteria which are in some measure sensible to the bactericidal action of the normal human blood fluids and which are eminently sensible to its opsonic action. The *Bacillus coli* and the *Bacillus dysenteriae*.

3. Bacteria which are absolutely insensible to the bactericidal action of the normal human blood fluids but are eminently sensible to the opsonic action of the fluids. The *Staphylococcus pyogenes*, the *Bacillus pestis*, the *Micrococcus Melitensis*, the *Diplococcus pneumoniae* Frankel.

4. Bacteria which are insensible both to the bactericidal and to the opsonic action of human blood fluids. The *Bacillus diphtheriae* and the *Bacillus xerosis*.

Since that time they, and also our own Canadian workers, have found that the diphtheria bacillus is sensible to the opsonic action of the blood fluids and that a permanent opsonic vaccine can be made against it.

The method of preparation of the vaccine Wright adopted is as follows: To a 24-hour growth of staphylococcus on sloped agar tube, about 10 cc. of sterile physiological salt solution is added; the culture is churned up with this, then let stand in order to allow all the unresolved bacterial masses to subside, and the supernatant fluid drawn off by siphon action into a special form of tube and heated to 60°C. for half an hour. The tube is then incubated for 24 hours in order to allow of a multiplication of any bacteria which may have survived the heating. A sample of the heated culture is now inoculated upon agar with a view to the detection of any surviving micro-organisms at the same time drawing off a sample of the suspension and enumerating them under the microscope. After verifying the sterility of the vaccine, it is now diluted with a sufficiency of physiological salt solution to bring down the number of staphylococci in the cc. to 2,500,000,000. This is what is called standardizing the vaccine. This is done by taking equal volumes of normal blood and the vaccine, mixing thoroughly, and placing on a counting slide. 500 red corpuscles are counted, and in this area the number of organisms also and their proportion noted. We know then that there are 5,000,000 red blood corpuscles to the cubic millimeter, and from the proportion of organisms to them the number of organisms can be easily estimated, and from this the amount of dilution necessary to bring the vaccine to the standard required can be easily calculated. Finally lysol is added, enough to bring the content of the

vaccine in this antiseptic to .25 percent, and the vaccine is sealed in rubber-capped bottles.

Wright defines vaccines as "any substances that on being inoculated into the body will cause the generation of a protective substance."

He includes under this term, Koch's new tuberculin; and whatever vaccine he employs, it consists of a bacterial body.

In inoculating his patient he sterilizes the syringe in boiling oil at 140°C. and the inoculation made into a portion of the body where the skin is loose, as the back of the shoulder or flank in the case of anti-typhoid inoculation. At first the dosage used, generally  $\frac{1}{4}$  cc. was too large and the subsequent symptoms, both constitutional and local, were severe in many cases. With the large single dose employed in the South African war collapse and rigors were not infrequent.

Subsequently the dose was reduced and still quite sufficient to elicit a satisfactory elaboration of typho-trophic elements, and the constitutional symptoms were limited to some headache and two or three hours malaise; then in six hours he sleeps and next day his temperature goes down and he feels comparatively well except in respect of pain at the seat of inoculation.

Certain generalizations have emerged from the investigation of numerous cases:—

1. If the bacterial infection be strictly localised, the opsonic index of the blood, as concerns the particular microbe causing the infection, is below normal. For example, the blood of a patient suffering from furunculosis will probably show an opsonic index of about 0.6 to the infecting micro-organisms, that is to the staphylococcus pyogenes, or the blood of a patient who is suffering from tuberculous glands in the neck, will probably show an opsonic index of 0.7 to the tubercle bacillus. In each case the patient's blood is compared with that of a normal man.

2. In such infections which are not strictly localised the opsonic index in systemic infections tends to fluctuate from high to low. This is well shown in cases of acute pulmonary tuberculosis. One day will show an index of 1.6, and a few days later as late as 0.6.

These two generalizations are of primary importance both as concerns the diagnosis and the treatment of bacterial infections.

The American Yearbook of Medicine and Surgery for 1905 sums up Wright's conclusions with regard to the treatment of Acne, Furunculosis, and Sycosis by inoculations of staphylococcus vaccine, thus: "It is satisfactorily established that chronic staphylococcus invasions can be effectively treated by inoculations of a staphylococcus vaccine; that these inoculations induce the chemic machinery of the patient to elaborate

the protective secretion which is required for the destruction of invading bacteria. Clinical improvement followed improvement in the phagocytic power and the negative phase which supervened upon inoculation revealed itself in diminution in phagocytic power and sometimes in the appearance of fresh lesions.

### THE OPSONIC INDEX AS USED IN THE DIAGNOSIS OF TUBERCULOSIS.

For this purpose old Tuberculin, T.O. has been used in six cases. In four, the index was normal the day before and the day after an injection of T.O., 1 mg. (in one case 0.5 mg.) was given. In Case V. the index dropped from normal to .7 and rose next day to 1.4. No case showed any temperature reaction; none had tubercle bacilli in their sputum. Case 6 was used as a control, he had undoubted phthisis, tubercle bacilli in sputum and crepitations were heard at both apices. His index was 0.7. Twelve hours after inoculation of 0.5 mg. T. O. his index rose to 1.1, and by the fifth day fell to 0.9. His index was kept up by five subsequent injections and he at no time showed any temperature reaction.

The conclusions to be drawn are these: The temperature reaction is not always to be relied on. Old tuberculin, like the new T. R., does not affect the index of healthy people. A normal opsonic index points to a negative diagnosis, but not conclusively as in Case V. A case of empyema at the Victoria Park Chest Hospital, in London, is referred to. The patient's acute symptoms were over but the conditions seemed prolonged indefinitely. On testing his blood twice to culture of pneumococcus obtained his power of resistance was found to be normal yet not enough to kill off the microbes. An inoculation with a vaccine prepared from the patient's own microbe was undertaken, and the opsonic index rose from 1.0 to 2.4. Two more inoculations were made and in two weeks the patient was discharged cured.

Another case refers to a boy who had tubercles on both irides. A high degree of opsonic power was maintained for many months by inoculation with new tuberculin in proper doses and at appropriate intervals. The patient has so improved that his eyes might easily pass for normal and doubtless will get completely well. Another patient, a male, aged 20, was under the care of Dr. Glover Lyon. He developed a right-sided empyema, which was treated by resection of a portion of a rib, evacuation of the pus, and drainage. Seven weeks later in spite of careful surgical treatment the wound was discharging 1-2 oz. of pus every day and a sinus quite four inches long persisted. The pus was

investigated bacteriologically and a pure culture of the pneumococcus of Frenkel was obtained. With this organism the quantity of pneumococcic opsonins present was estimated; that is to say, the patient's opsonic index to the pneumococcus was determined and found to be 1.0 or normal. In spite of the fact that there was no deficiency of the pneumococcic opsonins it was thought well to increase their quantity to a point well above normal for it seemed probable that the thick pyogenic membrane of a chronic empyema would so impede the flow of lymph to the bacterial foci that normal lymph would have insufficient opsonic power to prevent the growth of bacteria there. A vaccine therefore was prepared by inoculating a dozen milk-agar tubes with the pneumococcus which had been isolated from the patient's pus. Having obtained a vigorous growth the colonies were removed from the agar tubes to normal salt solution. This was sterilized at 60°C. and then standardized. The patient was given a quantity of the vaccine containing 100,000,000 pneumococci. On the day following this first inoculation his opsonic index shot up from 1.0 to 2.5, that is to say, he had more than doubled the quantity of his pneumococcic opsonins. During a period of two weeks he had three inoculations, and upon each occasion there followed an exaltation of the opsonic index. The clinical result was very striking. At the end of the first week of treatment there was a diminution of the discharge and a shortening of the sinus; at the end of two weeks the discharge had entirely ceased and the sinus had closed, all that remained was a scab covering the original wound. The patient left the hospital a few days later and went to work at once. He has remained quite well since.

Another case of lupus was that of a girl of 16. This condition began when she was nine months old. She had been scraped by the surgeons nine times, had had X-Ray treatment for two years, Finsen light for months and ultra-violet rays for two months. In spite of all, however, the disease steadily advanced and when Dr. Ross first saw her her face and neck below her eyebrows was almost completely covered with dirty-looking patches of lupus. There was considerable ulceration, crusting and oozing. There were several other patches on her arms and shoulders. So extensive and so chronic was the condition that it was felt the case was almost hopeless. Much to his surprise, however, great improvement followed three months careful inoculations with tuberculin and with staphylococcus vaccine. The latter was used to combat the secondary pus infection which he thought was chiefly responsible for the crushing and oozing. When he last saw her a few weeks ago after a period of six months she was quite a different-looking girl. The lupus

ulceration had healed in many places and the pus infection was manifestly almost controlled. He is hopeful that ultimately the disease may be entirely eradicated.

In a similar way was treated one case of severe tuberculous cystitis the diagnosis of which was determined by finding tubercle bacilli in the urine and by cystoscopic examination. After six months treatment the frequency of micturition and pain both left him and the tubercle bacilli had disappeared from the urine. Nine months subsequently he was in perfect health.

Tuberculous glands as a rule disappear under treatment with tuberculin. Of two such cases, in one the glands diminished rapidly but in the other case the progress was slower; large masses decreased much in size, and at present they are just palpable. The general experience of those who have treated tuberculous glands and also tuberculous disease of the genito-urinary system, such as cystitis and epididymitis is that these conditions are especially amenable to inoculation with tuberculin.

In testing the opsonic effect of tubercular patients, he did not find at the outset in any of his cases an opsonic power equal to that of normal blood. On the contrary there was in each a defect of opsonic power, but this low power seemed to be the *occasion* and not the *consequence* of infection as shown by the following results:—

1. Very low phagocytic indices have been obtained where constitutional symptoms were absent or insignificant.

2. In practically every case it was possible to increase by inoculation of a tubercle vaccine the opsonic power of a patient's blood fluids.

It was also found that the bacteriotropic pressure is always reduced in the actual foci of infection and from this it would be reasonable to expect from the evacuation of abscesses, that the flow of new and active lymph which would follow upon the evacuation of the stagnant and exhausted lymph, would operate in the direction of checking the growth of invading micro-organisms.

With regard to pulmonary tuberculosis considerable investigation into the character of the opsonic index in the different varieties has yielded the following generalizations:

1. Early cases, or more advanced cases that have had complete rest in bed for a time and also sanatorium "cures," show a low or a lowered opsonic index.

2. The more advanced cases show a high opsonic index, or a fluctuating opsonic index.

Obviously only the outlines of the subject have been touched so far; it requires a great deal of effort to find out all that can be found about



therapeutic inoculation. There are very many diseases yet to be tried. In each it is to be seen that if you can find the microbe you can test the patient's resistance, make inoculations and strive for favourable results. When you have to deal with any bacterial disease, let your thought go immediately to the question as to whether or not this can be treated by inoculation.

Opsonic work and research was, however, not doomed to remain alone long in the Old City beside the Thames. Men eager and anxious to learn the new technique and knowledge soon flocked in from all lands to learn from its master, and associate with him in the work. Prominent among those in the front were our own Canadian men, Dr. George Ross, of Toronto and Baltimore, Dr. Hamilton, of the Royal Victoria Hospital and Dr. E. M. von Eberts, of the Montreal General Hospital. They returned carrying with them the new knowledge and eager to carry on the work. Modesty forbids us saying much as to the actual work accomplished so far, or as to its future outlook, more than that it is most hopeful although it is yet in the experimental stage.

Briefly we may say that pyogenic localized infections which have been chronic for varying periods of time and have failed to respond to the ordinary surgical treatment, have healed in a short time after inoculation and many cases have thus been treated with these results. I will quote a typical case which I examined personally and who gave the following history. G. C., aged 19, a clerk, came to the Montreal General Hospital on September 1st with the right axilla, pectoral muscle and dorsum of scapula covered with boils and abscesses. They were opened and drained and lead lotion applied, but they recurred continuously one after another. About September 15th Dr. Hill took a culture of the organism infecting him—which proved to be the staphylococcus albus—made a vaccine and gave him one inoculation. In one week his boils and abscesses were dried and he was given a second inoculation in two weeks when they were all healed and have remained so ever since, so to January 22nd when I saw the patient last. The scars still remaining on this date he was given one more inoculation.

Besides these there are cases of long chronic standing that are gradually improving under inoculation treatment. One in point is J. C., female, who entered the Montreal General Hospital in October 1903. She had then a pyogenic osteomyelitis of one of the metacarpal bones of the left hand. This was excised and the wound healed. Soon after, however, large abscesses appeared in the left axilla; these were opened and drained but broke out in the left breast, then the right breast and later the axilla. Both breasts were amputated and after a

long time the left one healed. Next abscesses broke out last year in her right hip and later in the right knee with open sinuses discharging continuously. Her right leg became flexed at the knee so that it had to be kept on a double inclined plane splint in extension. These sinuses gave her a great deal of pain and discomfort. About December 1st, 1906, inoculations were commenced and her index watched carefully. She has improved and is steadily improving so far; the sinuses do not pain her as they did and are discharging a great deal less and some of them are healing slowly. The skin wound from the amputation of her right breast is also healing.

In our own student body we have one who is at this time undergoing inoculation treatment for lupus and it is fast disappearing and he testifies to the efficacy of the treatment.

Besides this, there has been one case so far of epidemic cerebro-spinal meningitis that recovered under inoculation treatment, and another one of a baby, aged seven months, at present being tried.

In conclusion, gentlemen, we may say we have but touched the fringe of the life and great work which Sir A. E. Wright and his associates have accomplished with their untiring energy, and have but scanned the horizon of a vast subject with a bird's eye view. How vast its magnitude and how far-reaching its results none can predict. As Dr. Osler remarked to us in his clinic at the Royal Victoria Hospital: "We are entering the profession on the verge of an age of great discovery and advancement in medical science." Contemporaneously with Sir A. E. Wright's work, and in fact somewhat in conjunction with him, Professor Ehrlich of Heidelberg, Germany, has succeeded in inoculating 35,000 rats and mice with malignant disease of all types on similar principles, and has experimentally produced and reproduced it in these animals with varying intensity, the results of which have not yet been published. Again we await expectantly and hopefully the results of von Behring's treatment of tuberculosis by inoculation.

Truly our predecessors have and are handing us down a goodly heritage and one rich in knowledge and skill, discovery and progress. They are casting their mantle of honour and responsibility upon us and as men worthy to be physicians it behoves us to put our shoulders to the wheel of progress and as Hunter replied to Jenner: "Not only to think, but to try, to be patient, be accurate to carry on the work," and to contribute in the years to come our quota of medical knowledge to that already given us.

# A PROLONGED FAST—SOME EXPERIENCES AND FINDINGS.

BY

A. A. MARTIN, Med. '08, McGill University, Montreal.

Fasting is perhaps one of the oldest practices of man. His reasons for fasting have been many and varied. Religious views seem to have been the determining factor in the vast majority of cases; but not all have fasted for spiritual reasons only. Many have fasted simply for its physical effect in the hope of being relieved for some disease or affection with which they were afflicted. In those cases where their trouble was due to over-eating it is needless to say they were either greatly relieved or entirely cured, but when it was not due to this it was often attended with unfavourable results.

Some have fasted for the mere notoriety of the fact the most illustrious of whom, from a scientific standpoint, was Succi, an Italian. Whether there have been any who have fasted purely for scientific purposes I am unable to say; undoubtedly there have been some. However physiologists have availed themselves of every opportunity of studying its physiological effects. The observations made upon Succi, Cetti, Merlatti, Dr. Tanner, and other renowned fasters, have added much to our knowledge on the subject of metabolism.

Thinking perhaps it would be more or less interesting and even possibly instructive, and believing that I would not suffer any ill effects from it, I proposed to one of our professors that I would fast, if from a scientific standpoint he thought it would be of any value. He considered that if I cared to do so it would be well worth while. Having secured the co-operation of Dr. A. H. Gordon, Dr. T. P. Shaw, Dr. A. L. Gilday, and Dr. A. C. Rankin, a fast was agreed upon.

It began on December 27th, 1906, at 9 a.m., when I partook of the last meal, which consisted of a little oatmeal, milk and two egg sandwiches, and was concluded on January 5th, 1907, at 6 p.m. when I first took nourishment. From 5 p. m. on the first day, when I was asked to take a teaspoonful of charcoal (to act as an indicator) until 6 p.m. on the last day, or, in other words, a period of nine days, I took absolutely no nourishment whatsoever, in any shape, form, or manner, though I drank freely of what water I desired. I might mention here that during the nine days I drank six litres of water, or an average of about three ordinary tumblerfuls a day.

My weight dropped from 140.2 pounds at the beginning of the fast to 125.9 pounds at its conclusion, making a total loss of 14.2 pounds,

or an average loss of 1.57 pounds a day. My weight after the fast, at the end of the first week, was 139.6 pounds; at the end of the second week, 136.7 pounds, while at the end of the third week it was 138 pounds. To gain the 13.7 pounds, which I did during the first week after the fast you will naturally think that I must have eaten excessive amounts that week. Such is not the case. I ate, it is true, but only of normal amounts, and it practically did not exceed that taken on the second week when I lost over two pounds, or that taken on the third week when I gained a pound. I drank a good deal of water during the first week and that undoubtedly helped much to increase my weight.

It may be interesting to note here that while the specific gravity of my blood was but 1021 on the last day of the fast, it was up to 1043 one week later.

I can only hope to give you but an approximate idea of the psychical or mental effects of the fast; more than that is impossible, for I presume that but few of you have ever experienced anything like it. However, I will endeavour to interpret them as best I can.

My hunger and appetite, needless to say, were ever present with me. I would make the following distinction between the two:—Hunger is the craving sensation occasioned by the want of food, while appetite is merely the desire, normal or otherwise, to partake of food. My hunger began to show itself on the evening of the first day. Next morning, or twenty-four hours after food, it was distinctly well marked, and just how marked I presume that most of you know, having experienced as much at some period or other in your life. If you can just imagine this to continue over eight or nine days you will have a fairly good idea of what my hunger was. With the exception of a slight gnawing sensation experienced for a short time on the fourth day it did neither increase nor abate from the second day onward. However, let me not give you the impression that it was unbearable. It was not. On the contrary, so long as my mind was occupied with something else, even simple matters, such as reading the newspapers, or walking on the streets, etc., I would be wholly unconscious of it, but let it be unoccupied, even for a moment then this sensation would be dwelt upon and magnified.

With my appetite it was somewhat different. It gradually, though very slowly increased in intensity from the very beginning. Why was this considering that my hunger did not increase likewise? I can but suggest an explanation. We all know that there is a peculiar pleasure in taking food, particularly when it is taken under normal conditions. Being continuously cut off as I was from this pleasure there was an

ever-increasing effect of this privation upon me as time went on, leading to a gradual intensifying of my appetite.

During the fast I did not do any studying, nor had I any ambition to do so. I spent most of my time reading light literature; I felt quite capable of concentrating my mind for a short time on any subject, but to do so for any length of time was out of the question. To test my mental capacity during the fast, Dr. Gordon devised a series of adding tests. He had a number of sums, each of which contained a hundred figures, arranged in ten columns, with ten figures in a column, type-written on separate sheets of paper. He noted the speed and accuracy at different times with which I could add up two of these sums.

The following table gives you the results of these tests:—

DATE.	SPEED.		ACCURACY.
	Min.	Sec.	Mistakes
1st Day before.....	5.	—	None.
2nd " .....	5.	7	1
4th " .....	4.	15	1
7th " .....	4.	43	2
11th Day after.....	5.	15	None.

Throughout the fast I slept well, with the exception of a night or two, when I was somewhat restless. At the beginning seven hours a night were quite sufficient for me, but as the fast advanced I required eight, nine and even ten hours sleep. As a general rule I would retire about 11.00 p.m. and arise from seven to nine o'clock in the morning.

Often during the fast I noticed that if I changed my posture suddenly, particularly if I should rise up quickly from lying down, I would experience extreme dizziness, and at times became almost blinded for a moment or two.

If you want a true conception of its physical effects, the only way to get it would be to fast yourself. If you do not care to do this, I would point out that you must not think of hunger alone, or appetite alone, or weakness, or dizziness, or a peculiar sense of weakness in the abdominal region, or the mental incapacity to do extended work, etc., etc., but you must be able to weave all these sensations together in order that you may get a composite expression of them all.

I became much weakened during the fast, it is true, but considering the amount of exercise I took, I regard my strength as having held out remarkably well. I not only walked on an average five miles a day but I also underwent a series of daily physical exercises conducted by

Mr. John Long, Physical Director of the Montreal Amateur Athletic Association. It was not until the third day that I began to show any marked weakness, and then my knees seemed to be the weakest part. On the fourth day the weakness became more general and more marked, and on the fifth day as I moved about I was quite willing to lean on anything at times. I now began to make use of the railing in mounting stairways, etc. After this day I possibly became somewhat weaker but not much, really on the ninth day I thought there was a slight improvement in my strength, at least I moved about with less fatigue.

Mr. John Long, of the M.A.A.A. has the following to say:—

“I took the measurements of the experimenter at the beginning and at the end of his fast and they were as stated below:—

## MEASUREMENTS.

		BEFORE	AFTER	DIFFERENCE.
	Weight.....	140 lbs.	125 lbs.	15 lbs.
Chest..	{ Contracted.....	34 $\frac{3}{8}$ ins.	33 $\frac{3}{8}$ ins.	1 in.
	{ Expanded.....	38 $\frac{1}{8}$ "	36 "	2 $\frac{1}{8}$ ins.
	{ Normal.....	36 $\frac{1}{8}$ "	34 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "
	{ Thickness.....	7 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	$\frac{1}{2}$ in.
Waist.....	29 $\frac{1}{8}$ "	27 $\frac{3}{8}$ "	2 ins.	
Arm.....	{ Fore.....	10 $\frac{1}{2}$ "	10 $\frac{1}{4}$ "	$\frac{1}{4}$ in.
	{ Upper.....	11 $\frac{1}{8}$ "	10 $\frac{1}{2}$ "	$\frac{3}{8}$ "
Leg....	Calf.....	14 $\frac{1}{8}$ "	13 $\frac{3}{8}$ "	$\frac{3}{8}$ "

He appeared to me a strong, well developed young man, of small stature.

The exercises that I administered to him were of a muscular, bending, and stretching nature, varied with slow, quick, and medium movements, accompanied with deep breathing, walking and running.

The time of exercising lasted about fifteen minutes a day, and towards the end of the fast I reduced this time.

The greatest change I observed was on the third day. He appeared dejected, had suddenly lost his alertness of movement, and, to use a slang expression was extremely “dopey.” From this on, with the exception of the last day, he seemed to get slightly worse. On the final day, though brighter and happier looking, was no more alert in his movements.

One of the chief things I observed was that after exercising in a manner that kept his mind occupied in directing his movements, followed by a bath, he appeared and expressed himself as feeling much better.”

With the assistance of Mr. Jacomb, Instructor in the McGill Gymnasium, I was able to make a series of strength tests, namely, lifting, gripping, and breathing tests. The following table will show you the results of these:—

## PHYSICAL TESTS.

TESTS.	Day before Fast.	1st Day.	6th Day.	9th Day.	7th Day after Fast.
Lift. { Bent Back without Kness....	270	370	320	330	270
{ Straight Back with Kness....	475	515	540	540	460
Grip. { Right Hand.....	104	98	96	100	109
{ Left ".....	103	98	89	88	90
Lung Capacity.....	230	228	234	235	212

This certainly reveals unexpected results. All I can say is that they were always done in the same manner, and each time I did my very best.

My weights, measurements, etc., as taken by Mr. Jacomb, may be found in the following table:—

## MEASUREMENTS.

	Before 1st Day.	DURING FAST.			After 7th Day.
		1st Day.	6th Day.	9th Day.	
Weight.....	139.6 lbs.	137.3 lbs.	128 lbs.	125.9 lbs.	139.6 lbs.
Girth, Chest, Con.....	33.8 ins.	33 ins.	33 ins.	32.5 ins.	33.8 ins.
"    "    Exp.....	39 "	38 "	36 "	35.2 "	37.5 "
"    9th Rib, Con.....	31.8 "	29.7 "	28.5 "	28.4 "	29.5 "
"    "    Exp.....	36 "	33.7 "	32 "	32 "	33.5 "
"    Waist.....	30.8 "	29.3 "	27.8 "	27.8 "	30.5 "
"    Hips.....	35.8 "	34.3 "	33.2 "	34 "	35.8 "
"    Rt. Fore Arm.....	10.2 "	10.6 "	10.3 "	10.3 "	10.5 "
"    Lt. Fore Arm.....	10.2 "	10.5 "	9.9 "	10.3 "	10.5 "
"    Rt. Up. Arm.....	12.1 "	12.4 "	12 "	11.8 "	12.1 "
"    Lt. Up. Arm.....	11.5 "	11.5 "	10.9 "	10.9 "	11.4 "
"    Rt. Thigh.....	21.4 "	21.6 "	20.5 "	20 "	21.5 "
"    Lt. ".....	21 "	21 "	20 "	19.6 "	21 "
"    Rt. Calf.....	14.2 "	14 "	13.7 "	13.6 "	14.1 "
"    Lt. ".....	14 "	14 "	13.6 "	13.5 "	14 "
"    Neck.....	14.2 "	14.4 "	14.1 "	13.7 "	14.4 "
Lung Capacity.....	230	228	234	235	212

The physical examinations were made by Dr. A. H. Gordon. The lungs were of normal resonance and the respiratory sounds clear and vesicular throughout. About the only variation noted in the lungs was the change in the lower border of lung resonance. Anteriorly on the

first day it was at the fifth space, by the ninth day it had reached the sixth space. Posteriorly it likewise moved downward from the tenth to the eleventh rib. By the eleventh day after the fast, it had returned to its original position. The respirations per minute varied from twenty-one to twenty-four. Acetone was detected on the breath as early as the second day, giving it a peculiar sweetish odor.

The absolute dulness of the heart remained the same throughout: so also did the upper border of relative dulness, but there were some slight changes in the area of dulness to the left. On the first day it was 9 1-2 cm., or 3 4-5 inches out; on the second day it was 8 cm., on the ninth day 9 cm., while on the eleventh day after, it was again 9 1-2 cm. out from the mid-sternal line. The heart sounds were normal at the beginning, but as the fast advanced the sounds at the apex became feebler and the aortic 2nd higher pitched.

The lower border of the liver was palpable on the first day but was not at any time thereafter. Its vertical dulness in mid-clavicular line measured on the first day 8 cm., on the second day it was 7 cm., on the ninth day it was impossible to percuss out the lower border of liver dulness as it merged directly into that of the abdomen. On the eleventh day after the fast it again measured 8 cm.

The spleen was at no time palpated.

My temperature before the fast was normal, being between 98° and 99°F., but soon after it began to fall and remained low with the exception of but one observation throughout the fast. Roughly speaking, it ranged between 96° and 98°F. As soon as I took nourishment, however, it became normal again.

Indoors I was not conscious of lessened heat production but I was quickly made aware of the fact as soon as I went out into the cold; it was not very cold at that period but still I had great difficulty in keeping warm.

Dr. Gordon also made repeated examinations of the blood, the results of which may be found in the following tables:—

## BLOOD EXAMINATION.

Dates	Red Cells	White Cells	H.G.	Sp. Gr.	Bl. Pr.
1st Day:.....	6,020,000	7000	90%	.....	102
2nd " .....	6,020,000	10400	87%	.....	111
4th " .....	5,940,000	7800	95%	.....	112
6th " .....	6,710,000	8600	.....	1026	105
8th " .....	6,000,000	7600	.....	1031	.....
9th " .....	5,970,000	10200	90%	1021	107
6th " after.....	5,080,000	6600	80%	1043	102.5



Practically speaking there were, from time to time, but slight changes in the number of red blood cells. With the exception of a leucocytosis on the second and ninth days the number of white cells also varied but little. Perhaps the most marked change was found in the specific gravity of the blood. For some reason or other it was over-looked on the first two examinations. On the fourth day it was found to be but 1026; by the ninth day it had gone down to 1021 and by the seventh day after the fast it had risen to 1043.

## DIFFERENTIAL BLOOD COUNT.

Dates	Poly-morph.	Small Monon.	Large Monon.	Transi-tional	Mast-Cells	Eosino-ophile.
4th Day.....	68	22	6	4	..	..
6th " .....	60	30	7	..	..	3
8th " .....	55	18	23	..	3	..
9th " .....	59	32	9	2	1	..
6th " after	58	35	6	1	..	..

The work of the opsonic power of the blood, which was taken up by Dr. A. C. Rankin, may be diagrammatically represented in this chart.

It was unfortunate that thirty-six hours had elapsed before the first blood was drawn. However, even at that time it revealed an opsonic power of .98 (taking 1 as normal), which is regarded by authorities as being practically normal. Blood was withdrawn and examined daily and with but one exception it dropped gradually day by day, until it stood at .7 on the ninth day. The observation on the ninth day took place at 4 p.m., just two hours before taking nourishment. Another, made at the same hour two days later, indicated that it had risen to .8, while one made two days later still, or exactly four days after I began to eat, showed that the opsonic power of the blood had reached one or normal. I might also add that it remained at normal through several observations after that. The organism used was the *Staphylococcus pyogenes aureus*.

Varying opinions have been held regarding the bactericidal action of the blood during a fast. Canalis and Marpingo some time ago pointed out that starving pigeons lost their natural immunity to the infection of anthrax bacillus. In 1899 Metzger and Norris of Columbia University experimented on fasting dogs. They found that a five-day fast did not affect the bactericidal power of the blood of these dogs, tested with typhoid bacillus, in the slightest degree.

The examination of the urine and faeces was done by Dr. T. P. Shaw and Dr. A. L. Gilday. The following tables contain in a condensed form the results of their work.

The diminution in the quantity of urine was due to some extent to the loss of moisture by the skin during exercise and to the small amount of water taken throughout the experiments.

Although there was pronounced acidosis, sugar was never found in the urine.

Ewing and Wolfe in reviewing the literature on this question, say: "Studies of the metabolism of starvation by Luciana, Brugsch, and others, have shown that high proportions of ammonia nitrogen and acetone bodies are found in urine, when symptoms of intoxication are absent. In Brugsch's observations on the faster Succi, the proportion of urea-nitrogen was low, the ammonia was high and acetone and ali-

## EXAMINATION OF FAECES.

	Before	During Fast.			After
	For 2 Days	5th Day	7th Day	9th Day	1st Day
Quantity*	56 Gms.	6 Gms.	10 Gms.	6.5 Gms.	22 Gms.
Consistency	Formed	Liquid†	Liquid†	Liquid†	Semi-Solid
Color	Yellowish	Dark	Black—	Black—	Yellowish
Fats	.784 Gms.	.108 Gms.	.74 Gms.	.188 Gms.	1.430 Gms.
Fatty Acids combined as Soaps	8.344 "	.690 "	1.42 "	.390 "	.506 "
Fatty Acids	1.512 "	.198 "	.32 "	.202 "	.814 "
Total "N" in Faeces	2.08 "	.285 "	.494 "	.482 "	.219 "
% of Fat	1.4	1.8	7.4	2.9	6.5
% of Fatty Acids	14.9	11.5	14.2	6.0	2.3
% of Fatty Acids combined as Soaps	2.7	3.3	3.2	4.5	3.7

\* Dried Faeces.

† Removed by Injection.

phatic acids were abundant, during the period of twenty-nine days when the subject's general condition was excellent, while under similar conditions, observed by Luciani, Succi was able to fence and run actively. Moreover, large amounts of acetone and aliphatic acids may appear in the urine on first day in healthy and fasting subjects. Likewise in diabetes and similar signs of acidosis without other symptoms, may occur, as in von Noorden's case."

"It thus appears that the occurrence of acetone, aliphatic acid and ammonia in excess in the urine when the food supply is deficient, means that the patient is burning his own fats and not necessarily that he is suffering from acid intoxication."

In my case the urea nitrogen was increased, this was no doubt due to the fact that previous to the fast I was living on a vegetable diet. When

\* American Journal of Medical Sciences, May 1906.

## ANALYSIS OF URINE.

	DURING FAST.										AFTER
	Average For 2 Days	1st Day	2nd Day	3rd Day	4th Day	5th Day	6th Day	7th Day	8th Day	9th Day	1st Day
Quality.....	488 c.c.	556 c.c.	313 c.c.	553 c.c.	623 c.c.	540 c.c.	514 c.c.	450 c.c.	440 c.c.	425 c.c.	500 c.c.
Color.....	Pale Yellow Cloudy	Same	Same	Straw Cloudy	Straw Clear	Straw Clear	Straw Clear	Straw Cloudy	Dk. Straw Cloudy	Dk. Straw Cloudy	Straw Clear
Reaction.....	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid
Sp. Gravity.....	1028	1026	1032	1039	1030	1028	1025	1028	1025	1025	1017
Sugar.....	None	None	None	None	None	None	None	None	None	None	None
Albumin.....	"	"	"	"	"	"	"	"	"	"	"
Acetone.....	"	"	Present	"	"	"	"	"	"	Present	"
Oxybutyric Ac.....	"	"	"	"	"	"	"	"	"	"	"
P <sub>2</sub> O <sub>5</sub> .....	1.24 Gms.	1.17 Gms.	1.47 Gms.	2.18 Gms.	2.78 Gms.	2.48 Gms.	2.23 Gms.	1.99 Gms.	1.8 Gms.	1.66 Gms.	.55 Gms.
Urea.....	13.66 "	13.9 "	11.2 "	22.1 "	22.1 "	24.8 "	17.9 "	20.2 "	19.3 "	19.1 "	16.5 "
Urea "N".....	6.36 "	6.4 "	5.2 "	10.2 "	10.2 "	12.5 "	8.3 "	9.4 "	8.99 "	8.9 "	7.6 "
Ammon. "N".....	.16 "	.11 "	.17 "	.56 "	.73 "	.75 "	.46 "	.36 "	.22 "	.08 "	—
Undetermined "N".....	1.14 "	1.2 "	.89 "	1.53 "	1.37 "	1.25 "	1.25 "	1.50 "	1.62 "	1.14 "	—
Total "N".....	7.66 "	7.71 "	6.26 "	12.20 "	12.30 "	14.5 "	10.01 "	11.32 "	10.83 "	10.12 "	9.15 "

I began to fast I had to live on my own tissues and therefore became a carnivorous animal. It has been found by other observers that urea nitrogen is increased in herbivorous animals by fasting. The phosphoric acid was increased following very closely the rise and fall of urea nitrogen. This was observed also in a case of fasting during hypnotic sleep reported by Hoover in Sollomann.\*

On the day before the fast, 56 grammes of dried faeces were passed, representing two days. During the nine days of the fasting period 22.5 grammes were washed away from the bowel. In the movement, during the first day after the fast 22 grammes of dried faeces were passed. During the fast the colour resembled meconium and contained some proteid material, fat, fatty acids, and soaps, etc.

The loss in body-weight may be represented thus:—Total loss in body weight (14.2 lbs.), 6440 gms. Total "N" in faeces, 1.26 gms. Total "N" in urine, 95.34 gms. Total "N" in urine and faeces 96.6 gms. "N" estimated in albumin, 603 gms. "N" estimated in muscle, 2880 gms. Maximum amount glycogen consumed estimated at 200 gms. Totals 3080 gms. Loss in fat, water, etc., 3360 gms.

Now that the fast is over, whether you will regard me as being unwise or not for attempting such an experiment I do not know. I might have been. However, I am certain that I have suffered no ill effects from it. As for the fast itself I think that it has not been wholly unprofitable. If it has done nothing else it has shown that any young person with a good healthy constitution, may abstain from taking nourishment, for a few days at least, without any serious results and I am sure you will have not a few cases in your practice, particularly those with certain digestive troubles, where a fast of one, two or three days, or even more, would be the very best treatment that you could devise. It, perhaps, would not be wise to fast for too long a period, for if the opsonic power of the blood would go down steadily as it did in my case, one possibly might contract some infectious disease.

Appetite for food is one of the strongest appetites that we are called upon to control, an over-indulgence of which is perhaps one of the greatest curses of mankind. The very fact that one can abstain from taking food for a short time without injurious effects, gives one and all of us an excellent opportunity to rigorously decide who is to be master, Appetite or Self.

Again, we generally appreciate the good things of life only when we are cut off from them, and if for some reason or other we are deprived of them, we would learn and learn well to be more thankful for our

\* Journal of Experimental Medicine, Vol. 11, 1897.

\*\* 4.38 gms. of fat were found in faeces.

usual bountiful surroundings. I never was more thankful in all my life than I was at the close of the ninth day of fast when I was privileged to partake of a little food. I candidly admit that there is not very much pleasure in being deprived of it.

As to the direct results of the fast I can truthfully say that I never was on a higher plane, either physically or mentally, than I was for the first few weeks after the fast.

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## TRAUMATIC ASPHYXIA.

BY

CHARLES K. P. HENRY, M.D.

Demonstrator of Anatomy and Assistant Demonstrator of Clinical Surgery,  
McGill University, Clinical Assistant in Surgery, General Hospital,  
Montreal.

"Compression pneumonia"—a term, I believe, first used by Litten—is not uncommon in cases of crushing injuries to the thorax, but cases of "traumatic asphyxia" are sufficiently rare to make the following case worthy of reporting.

H. B., male, aged twenty, was admitted to the Montreal General Hospital to the service of Dr. J. M. Elder, on April 12th, 1907. He was an ambulance case and was admitted directly after the accident from the Longue Point Locomotive Works, where two heavy iron pillars had fallen on him crushing his chest and rendering him unconscious for a brief period.

On admission it was noted that his face, neck and the upper portion of his thorax in front were markedly cyanotic; there was free bleeding from both ears, none from the nose or pharynx and he showed extensive subconjunctival hæmorrhages of both eyes. His mind was clear, he showed little evidence of shock and was suffering pain in his head, chest and legs. The skin of the face and thorax was dusky in hue and was abraded in places. No fractures were made out though the symptoms present pointed to fracture of the base of the skull. There was a tender area over the lower dorsal region with slight skin abrasions and the slightest movements of his legs gave rise to great pain. There was also tenderness in both groins and in the perineum to the right of the median line behind the scrotum was a punctured wound with lacerated edges, not involving the urethra. The temperature was 101°, pulse 98, respirations 24.

An ice cap was applied to his head, the perineal wound dressed and it ultimately healed without suppuration. The cyanosis, which was

altogether limited to the face and neck, not affecting the extremities, persisted and was out of proportion to the rate of respiration. On the day following admission the temperature, which had fallen to  $98\ 1\text{-}5^{\circ}$ , again rose to  $101\ 3\text{-}5^{\circ}$ . Later the respirations became increased in frequency and on April 15th, three days after admission, he showed undoubted signs of right-sided pulmonary consolidation. He had no chill, herpes, or sudden pain in the thorax. His condition grew worse, though not alarming, and on the 21st of April,—nine days after injury and six days after the onset of signs of pulmonary consolidation—aspiration in the right 8th space in the scapular line revealed sero-purulent fluid, a culture from which gave pneumococci.

Thoracotomy was performed by Dr. Elder on the 26th of April under chloroform anæsthesia and the patient nearly died on opening the pleura; he rallied under stimulation, improved for a period but finally died on May 8th with signs of consolidation and pleural effusion on the left side also. At operation the right lung was collapsed. Serous fluid as well as thin pus was present in the pleural cavity; the wound drained well. During the last week he had frequent attacks of dyspnoea and cyanosis with weak pulse and attacks of faintness, suggesting pulmonary thrombosis or emboli.

The autopsy, performed by Dr. Percy White, revealed some interesting conditions, and to him I am indebted for assistance with the pathological portion of this report. There were innumerable small, confluent, sub-pleural hæmorrhages; no ribs were fractured; the right lung was found completely collapsed, the left partially so, especially the lower lobe. There were several abscesses in the right lung, a large thrombus in the pulmonary artery in one place, and three or four patches of greyish white consolidation in the middle and lower lobes. Pulmonary thrombi were also found in the left lung and one large abscess and several areas of subperitoneal blood extravasations. The left prostatic veins were thrombosed and the thrombotic condition extended to the internal iliac vein, which, however, was not completely occluded. There was no evidence of pus about the healed perineal wound.

There was no fracture of the skull and the membranæ tympani were intact. The eyes showed hæmorrhages into the orbital fat, subconjunctival hæmorrhages and a few small ones into the retina. A culture from the heart's blood showed the staphylococcus aureus.

The subpleural, subconjunctival hæmorrhages, those into the retina, from the lining of the external auditory meatus, and the cyanosis of the face, neck and upper thorax, make up a clinical picture that strongly resembles those uncommon cases of "traumatic asphyxia" reported by

Perthes, Beach and others. They are produced by crushes inhibiting respiration for an appreciable length of time, and people crushed to death in crowds and during panics show similar findings to those noted in this case. Compression of the abdomen, according to Keen, has produced traumatic asphyxia also.

The cyanosis of the skin is not due to hæmorrhage into the subcutaneous tissues but is really due to a stasis of deoxygenated blood in the capillaries, and it is considered by Beach and Hueter that the reason for its limitation to the facial and cervical regions is due to the lack of competent valves here.

The infective phlebitis, thrombosis and septic emboli—for cultures of the staphylococcus aureus were obtained from the thrombi in the prostatic veins—evidently began at the perineal wound and produced the septicæmia and pulmonary infarcts which at once broke down into abscesses. At the same time there were small areas of pneumonia in the lungs and the growth obtained from the aspirated fluid was that of the pneumococcus.

Demuth claims that cases of so-called "compression pneumonia" are due to absorption of blood extravasations into the alveoli and of decomposition products, rather than to pneumococcus infection and consequently are not cases of true croupous pneumonia.

The patient recovered from the primary traumatic asphyxia and died of sepsis obtaining entrance by the perineal wound though an apparently clean one.

#### REFERENCES.

- Annals of Surgery*, April, 1904—Beach and Cobb.  
*Keen's System of Surgery*, Vol. 1, p. 909.  
*System of Surgery, von Bergmann*, Vol. 11.

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The control depot receives milk from 76 affiliated dairies, and these from 5,222 individual producers. The sources of milk supply are inspected under the instructions of the Government Inspector of Dairies. Stables, the stock, and the cleanliness of the barns are criticised, as well as the feeding of the cows and milking. Veterinary inspection of the cows is made. The milk is delivered warm from the cows to a local depot, conforming to modern requirements, and is here cooled, tested, and purified. The amount of impurities when the milk leaves the dairies is small, but in the control depot in Vienna it is again purified by straining through close-meshed gauze. It is then pasteurized at 70°C to destroy the germs without changing the milk physically or chemically. After pasteurization a part of the milk is centrifuged for cream. The milk for children is sterilized at 102°C.—*Medical Record*, June 15, 1907.

THE

# Montreal Medical Journal.

*A Monthly Record of the Progress of Medical and Surgical Science.*

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## THE NEW CHAIR AT MCGILL.

We take advantage of the absence of Dr. Andrew MacPhail, who is abroad, to offer him on behalf of this *Journal* and its editorial staff what we might scarcely have gracefully expressed in these columns had he been in his usual position as editor, namely our hearty congratulations upon his appointment to the chair of Medical History in McGill University: the college, too, we congratulate on adding to its staff one who has proven his place in Literature so well as has the author of "Essays in Puritanism" and "The Vine of Sibmah."



## THE EXCLUSION OF TUBERCULOUS CATTLE.

There was a report circulated in the press lately to the effect that one hundred and fifty cattle, which had failed to pass the tuberculin test, had been shipped from the vicinity of Quebec to Montreal for dairy purposes. We learn on the best authority that there is no truth in this rumour, and we are glad of it. It must be admitted that at the present moment, there is no municipal law to prevent it, but this will not be so for long, for at the present time, the sanitary by-laws are being revised, and it is contemplated to include in these one which will prevent the use of any but tuberculosis-free cattle for the supply of milk to the city. It will be a difficult matter to make the inspection of all these cattle efficient, as the present milk-supply is brought from a wide area of country, but the existence of the by-law and of the inspection will be a long step forward.

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## THE SEIZURE OF SPOILED FOOD.

In these days of progress, when over-tired railway employees who fall asleep and thereby cause wrecks are sent to jail, it is surely necessary to put upon trial any person or firm who endeavours to let loose upon the public fifty thousand tins of salmon, much of which is proven to be dangerous to human life, if used as food. We personally know none of the persons concerned, and have at our disposal only the statements made by the daily papers, statements which we have not seen contradicted, and may therefore assume to be true. A shipment of 50,000 tins of salmon was lately seized in Montreal, many tins were examined, and it was destroyed. The persons in authority in that particular branch of the city management did not take any legal measures against the responsible ones, and we have not yet been able to see any good reason for their not doing so. It may be urged that no one knew of the food having gone bad, but it is stated that some of it, at least, bore evidence of having been re-tinned: if this be so, the men who did it should be pursued with the same intensity of purpose to find, convict and punish that is exercised when an ordinary above-board murder is committed. The statement that it was not possible to discover the guilty persons is so puerile that it scarcely needs comment: if a citizen, for example, harbours in his house goods that have been stolen, the law holds that citizen, at least until it knows all that he knows about the case. Why were the consignees of this tinned salmon not held responsible until the law knew all that they knew, that is, until every bit of the condemned material had been traced. Fifty thousand cans are not easily lost sight of, and it is not possible that any one can carry them around in his

pocket: where the clue gets faint, as to the origin of any special shipment of goods, or where books are not forthcoming, the strong arm of the law has a good deal of power in shaking out information that might otherwise be hidden.

Let us suppose things had turned out differently; if, for example, twenty or fifty persons had been poisoned by this shipment of goods, would we fold our hands and say nothing? Is the person responsible for this criminal mistake in the state of the salmon (to put the lightest interpretation on it) the less responsible, because the food inspector was alert, and stood between him and the public? Not at all. The city of Montreal may not be able to have ideal pavements or clean streets or thoroughly-trained firemen, but surely it can have a proper degree of punishment meted out to its law-breakers. It is well enough done to prohibit the egg-cup-full-of-ice-cream-for-a-cent, because the vendor exposed his customers to a possible danger: fifty thousand times more necessary is it to punish the man or the firm who exposed customers to this certain danger, on so great a scale. We believe we voice the opinion of the medical profession, who may be supposed to understand the gravity of the situation, when we say that a grave failure of justice occurred when this offence was allowed to go unpunished. We wish it clearly understood that there is in all we have said no personal animus against the local firm in question: they may be entirely innocent of wrong-doing in the matter: yet they should be held responsible until such time as they are able to show that the real responsibility lies elsewhere.

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#### THE CONTROL OF SYPHILIS.

The problem of the control of syphilis and other venereal diseases seems no nearer its solution than ever. The repeal of the contagious disease act by Parliament in 1886, when as Fournier's remarks "prostitution and with it syphilis regained its freedom throughout the British Empire" and the startling inefficiency of state control in Paris, where according to Leloir 13-16 percent of the male population are affected with syphilis, are evidences of the fact should any be needed. Nevertheless, it is our duty to continue this war to the end; by efficient state control, by instruction to those exposed, by careful and prolonged treatment of the infected and by the arousing of public interest and effort by means of societies, etc. Such is the impression obtained in perusal of Prof. Fournier's papers collected and translated by Marshall, late of Blackfriars and the London Lock Hospital. While the picture drawn is a dark one we cannot but admire the energy of Fournier and

the Society for Sanitary and Moral Prophylaxis in their attempt to combat the evil. This they have done along the above lines, wide spread instruction to young men and students, instruction in the army, instruction to the public in general with various suggestions as to municipal and state control and the carrying out of efficient treatment in hospitals—not prisons—of infected prostitutes. And yet *cui bono*? Are we any better off to-day than in the days of the 15th century when the pox made it first appearance in Europe and was regarded as a Divine punishment and in consequence refused treatment? Happily for the immediate present Montreal has little or no recent syphilis but we do not know what a day may bring forth and such problems as the above deserve our closest inspection and consideration. Would that we could suggest a cure for the malady, this at least we may say. It is no class problem but one to be dealt with by our fathers and mothers, our preachers and priests, our city fathers and law-makers and lastly, perhaps, mostly our own profession.

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Dr. John L. Todd, late of the Liverpool School of Tropical Medicine has been appointed Associate Professor of Parasitology: the creation of the chair, we venture to think is timely in view of the increasing importance of the subject, and we are glad that no applicant could present so good claims as one of the graduates of McGill. Dr. Todd's name and work are too well known to require any introduction to those who have even the most superficial knowledge of the progress of the science of parasitic diseases. The same meeting of the Governors of the University at which these appointments were made also arranged the redistribution of the professoriate of surgery. Dean Roddick, whose long and painstaking services in the chair of Surgery and previously in that of Clinical Surgery date back for thirty-two years, seventeen of them in the major position, retires, and Drs. James Bell and George E. Armstrong are jointly appointed, each with the title of Professor of Surgery and Clinical Surgery. Dr. Roddick has earned repose from the onerous duties of the head of the surgical department, and we wish him many years in which to enjoy it.

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#### CANADA MEDICAL ASSOCIATION.

Arrangements have been completed for the Annual Meeting of the Canadian Medical Association in Montreal on September 11, 12 and 13. The authorities of McGill University have placed the University buildings at the disposal of the Local Committee of Arrangements and it has been decided to have the General meetings of the Association held in the Molson Hall, the Medical Section in the lecture room of the

Redpath Museum, and the Surgical and Pathological Sections in the lecture rooms of the Arts building.

The President's address for which the first evening, September 11th, is reserved, will be delivered in the large hall of the Students Union and will be followed by a reception to the visiting members of the Association and their friends. The Students Union is situated on Sherbrooke street, opposite the University grounds and is admirably suited for such a function. On the evening of September 12th there will be a Smoking Concert in the Victoria Rifles Amoury. A garden party, golf match, and drives to fill in the afternoons after the business of the sections has been concluded, have also been planned.

The staffs of the various city hospitals have arranged to give clinics in the hospital theatres each morning at 8.30 at which members will have an opportunity of seeing rare and interesting cases in the service of the hospitals.

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“TRES FACIES HABET MEDICUS.”

The following is one translation of the above found in Timothie Kendall's Flowers of Epigram published in 1577.

Three faces the Phisition hath  
 First as an Angell he  
 When he is sought: next when he helps  
 A god he seems to be:  
 And last of all when he hath made  
 The sicke diseased well,  
 And asks his guerdon, then he seems  
 An oughly Fiend of Hell.

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## Reviews and Notices of Books.

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MODERN MEDICINE. Its Theory and Practice. In Original Contributions by American and Foreign Authors. Edited by WILLIAM OSLER, M.D., Regius Professor of Medicine in Oxford University, England; formerly Professor of Medicine in Johns Hopkins University, Baltimore; in the University of Pennsylvania, Philadelphia, and in McGill University, Montreal. Assisted by THOMAS MCCRAE, M.D., Associate Professor of Medicine and Clinical Therapeutics in Johns Hopkins University, Baltimore. In seven octavo volumes of about 1,000 pages each; illustrated. Volume I.

Price per volume, cloth, \$6.00, net; leather, \$7.00, net; half morocco, \$7.50, net. Lea Brothers & Co., Publishers, Philadelphia and New York, 1907-1908.

The first volume of the system known as Modern Medicine has appeared, and in reviewing the initial instalment of such a work, one feels called upon to pronounce a kind of prologue. Tempted one is, at first, to say that no pressing need exists at the present day for another large system of medicine, yet it is but justice to hear all the sides of the question stated; and we think that Professor Osler's apologia is perfectly adequate: his standpoint, perfectly clear to those who know him personally, will become evident to others if they accept what he has said in the last few pages of his deeply interesting and forceful introduction: "The Evolution of Internal Medicine." What Professor Osler there states in his creed; a creed that he has believed practised and preached unceasingly—which is embodied in the idea, nay, the conviction that conscientious work and study by the practitioner are the basic qualities of medicine, as of any other art or science. With these, ultimate success, in its highest sense, and the advancement of knowledge are inevitable. Recognizing this, the editor has not hesitated to name as his co-laborers many men of comparative youth, many of whom have come under his personal influence: thus we may be assured that this system will at least be written in Professor Osler's own spirit, and from this very fact it may safely be augured that the book will not fail by the lack of painstaking effort. It will not be surprising, if a medical world, greedy of Professor Osler's own writings, should think that he himself writes too sparingly, but the prospectus issued in advance, has on this point disarmed criticism, if not complaint. The article referred to above, "The Evolution of Internal Medicine," is the only one in the present volume from Professor Osler's pen, and it is a truly delightful, though brief, contribution: the title describes it, and sections V, VI & VII contain, as a kind of addendum, what we have previously spoken of as the editor's creed: forcible, terse, its careful diction does not conceal the enthusiasm of the man who has a message, and we regret that space forbids quotations therefrom. Pages xxix to xxxiv if properly digested and assimilated will, we venture to think, be the most useful half-dozen pages in this, or any system of medicine.

Part I, consisting of Professor Adami's article upon "Inheritance and Disease," is an excellent contribution to the literature of Heredity, a subject on which the author has studied long and thought well. The two historic theories are discussed and a physico-chemical theory of

inheritance is propounded in accordance with the present day knowledge of physiological chemistry.

Part II, by Alfred Gordon, M.D., of Jefferson Medical College, Philadelphia, deals with diseases caused by light-rays, electricity, concentration and rarefaction of atmosphere and heat and cold. Part III, the diseases caused by chemical agents, lead, arsenic, mercury, etc., and commercial gases, is written by Professor Edsall of the University of Pennsylvania, Philadelphia. Both these parts are necessarily much compressed, but present adequately a large amount of information.

In Part IV the opening chapters by Professor Lambert of Cornell University Medical College, New York, on alcohol, opium and cocaine are intensely interesting and well written: the writer speaks favourably of the treatment of chronic alcoholism advocated by McBride of Toronto. Food poisons, by F. G. Novy, of Ann Arbor, are dealt with also in a very interesting way, and comprise many different forms of intoxication. The chapter on "Snake Venoms," by Dr. Hideyo Noguchi, of the Rockefeller Institute, is again of much interest, if necessarily more technical than the preceding ones. "Auto-intoxication," by A. E. Taylor of the University of California, San Francisco, is a large subject, and a difficult one, which excuses the slight confusion that is suggested by the many diverse paragraph-headings. That Professor Taylor himself realises this confusion is very evident, and so we may suppose that the degree of compression required has imposed on him the necessity of treating, side by side, somewhat diverse subjects.

Part V, consisting of the diseases caused by vegetable parasites, other than bacteria, viz., actinomycosis and aspergillosis, is written by J. H. Wright, of Harvard. The term Nocardiosis will be new to many: it signifies the disease caused by various forms of the genus *Nocardia*, which are closely related to actinomyces but not identical with it. Blastomycosis deserves fuller mention than it receives, but perhaps the manuscripts of the article antedates the recent series of cases.

Part VI deals with the diseases caused by Protozoa, and is rightly prefaced by a section on the Protozoa from a biological standpoint by Professor Gary Calkins, of Columbia, which is clear and brief, and a section on "Mosquitos" by Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington. "The Malarial Fevers" are dealt with by C. F. Craig, of the U. S. Army, in a good article of sixty pages, with the necessary illustrations of the parasites. J. W. W. Stephens, of Liverpool, in the article on "Black-Water Fever" considers it a sequent of malaria plus quinine. Col. David Bruce writes very well on

Trypanosomiasis, incidentally relating the interesting circumstances connected with his own discovery in Tsetse fly disease in Zululand. He does not seem to have given a fair share of mention to the work of the Liverpool school in the study of Sleeping Sickness, but perhaps this is from inadvertence: the paragraph on prophylaxis is not adequate. In amoebic dysentery by R. P. Strong, of Manila, the text is excellent, but the plates are scarcely useful.

Part VII deals with the animal parasites, and the name of C. W. Stiles, of Washington, as its author guarantees its quality: his treatment of the subject is quite exhaustive.

Part VIII is a volume in itself, dealing with nutrition, by Professors Chittenden and Mendel, of Yale, who are known as masters on the subject of Metabolism.

In the final part of the volume, T. B. Fletcher, of Baltimore, deals with "Diabetes mellitus and insipidus." In the latter, he points out the frequent co-existence of syphilis. On Gout, his next subject, Dr. Fletcher is an acknowledged authority. Obesity is written by J. M. Anders, of Philadelphia, and Rickets by G. F. Still, of London, while Scurvy is from the pen of Robert Hutchison, of London. The constitutional diseases, in this part, appear to us to be done in absolutely first-class style. A full index of the volume follows.

As a whole, we think there can be little but praise offered to the first volume of Osler's system.

**SURGICAL DIAGNOSIS.** By DANIEL N. EISENDRATH, A.B., M.D., Adjunct Professor of Surgery in the Medical Department of the University of Illinois. W. B. Saunders & Co., 1907.

Without prejudice to the forelying work, it may be said that the perfect book upon surgical diagnosis is still lacking. It has always been a question in the reviewer's mind whether it was really possible to write satisfactorily upon diagnosis as a separate, or rather separated, branch of medicine. Its dependence upon pathology in its broadest aspects, upon physiology and anatomy as well as upon symptomatology is so great that if these relations be given due consideration, the work must become a large treatise, and it is then little more than the ordinary text-book turned backwards; on the other hand, when these relations are not given proper consideration, it takes on too much the character of the mere catalogue.

Eisendrath's work escapes these objections perhaps better than any other that we know of on the subject, save Albeth's small book, which is now slightly out of date. Taking it as a whole, one may say that its

excellence lies in the description of the mechanical means of making a diagnosis, and its lack in the correlation of pathological lesion to clinical phenomena.

The various chapters are given a fairly even consideration. That upon head injuries is more up to date than anything yet written in books of this class; yet, considering the very great importance of the subject and the general lack of proper acquaintance with it on the part of student and practitioner, it is still decidedly insufficient. Here especially is it necessary to bring in a recapitulation of the underlying physiological facts.

The chapter on the abdomen is good on the whole; but one misses a consideration of abdominal pain from the general standpoint, its causes, and its broad relations to visceral disease.

By all odds the best chapter in the reviewer's opinion, is that upon the injuries of bones and joints. The book is especially rich in illustrations; and it is just in this department of Medicine that illustrations are most valuable.

The last chapter deals with special diagnostic methods of examination, such as those of the blood, Wright's opsonic theory, and in particular the late work upon renal function, this last by Kolischer, of Chicago. All these are good so far as they go, but are too cursorily treated.

The illustrations deserve a word to themselves. There are 482, of which 15 in colour, all original. Originality is not always a merit. Yet these are on the whole good; some are really excellent; most are useful; and some are entirely superfluous. Those in colour, speaking generally, are crude, even misleading, affairs.

The lack of bibliographical references, in a book of 776 pages, is a sad lack, though common enough in American publications, especially those of the Western States.

In other respects, the work is entirely commendable.

EDWARD ARCHIBALD.

TREATMENT AND PROPHYLAXIS OF SYPHILIS. By ALFRED FOURNIER, Professor of the Faculty of Medicine, etc., Paris. Translated by C. F. Marshall, M.D., F.R.C.S., late of Blackfriars and London Lock Hospital. Rebman Ltd., London and New York.

It is a noteworthy fact, as Marshall himself remarks, that up to the present few of Professor Fournier's books have been translated into English. *Traitement de Syphilis*—the second edition of which was published in 1902 and which has since been revised and enlarged is a book with which everyone who claims a knowledge of syphilis should be familiar. Few books on any subject are more interesting reading and



none place more clearly a mass of personal experiences extending over many decades of a large private practice. To this is added experiences from the clinics of the famous Hospital St. Louis and other Parisian Hospitals whence the names of Ricord and Dupuytren, through Fournier's association, are brought into close relationship with the present.

Dr. Marshall, himself an author and no mean authority on venereal disease has translated the work so that we venture to say we lose none of the good things of the original. One may actually read the volume without being made aware of the fact that he is dealing with a translation. The original is not a new work but nevertheless fills a space in English medical literature. Naturally we miss the discussion of changes which recent discoveries in microbiology demand but the fundamental laws of treatment and their *raison d'être*, the fruit of an immense experience, are here as in no where else we know.

To this volume Messrs. Rehnman have added a series of papers read by Fournier from time to time before different societies which Dr. Marshall has collected and edited under the title of "Prophylaxis of syphilis." A more thorough broad-minded view of the situation of things as they exist in all large centres to-day would be hard to obtain.

To summarize "The Treatment of Syphilis" is a difficult undertaking. Mercury is the standby which we must never let go and which we should use much as the world has used it but *more faithfully, more intelligently and more extensively*; while ingestive methods and inunction play the main role, subcutaneous medication and research for certain refractory and severe cases and the use of iodides receives the strongest support. Serum treatment is occasionally of service. Lastly, the prognosis depends on the treatment and is consequently worse in some and better in other respects than we may have thought. From a private practice where cases have been under his observation 30 and 40 years he can speak positively in these matters. A favourable outcome demands treatment of from 3 to 4 or more years. R. P. C.

INFLAMMATION, an Introduction to the study of Pathology, being the reprint (revised and enlarged) of an article in Professor Allbutt's "System of Medicine," by J. GEORGE ADAMI, M.A., M.D., F.R.S., Sometime Fellow of Jesus College, Cambridge, Professor of Pathology, McGill University, Montreal. London, MacMillan and Co., Ltd., 1907. Canadian agents, The MacMillan Co. of Canada, Ltd., 27 Richmond street West, Toronto. Price, \$1.50 net.

Professor Adami's article upon Inflammation in the 1896 and 1905 editions of Allbutt's Medicine is undoubtedly the most widely known

and quoted article in English upon that subject, and the service it has rendered to Pathology is very great, especially when it is stated that the views there expressed were in 1896, not universally accepted; more than a little did those very views extend themselves, and they are the accepted ideas of to-day. The present volume is but an amplification of that article, with the addenda rendered necessary by ten years progress. It is in no small degree, a cause of congratulation to the author, that his previous article, written at a time when there was much confusion in our conceptions of inflammation, should stand practically unchanged after ten years. It is not possible here to review this essay in any distinctively critical way, because, influencing pathological views at large as he has, it is scarcely likely that Professor Adams would fail to dominate pathological views at home: therefore we can but say that the reviewer finds himself in perfect accord with the general idea of the work. He can, however, point out certain additions such as references to the Opsonins, and to the hypostatic treatment of inflammation, and especially the views put forward in the chapter upon the principles of treatment, which seem to be not only logical but strikingly original; these views appear in the author's article on Inflammation in Keen's Surgery. The volume is a compact octavo of 240 pages, clearly printed, adequately indexed, and contains a full bibliography of more than two hundred references.

THE DIAGNOSIS AND MODERN TREATMENT OF PULMONARY CONSUMPTION, WITH SPECIAL REFERENCE TO THE EARLY RECOGNITION AND THE PERMANENT ARREST OF THE DISEASE. By ARTHUR LATHAM, M.A., M.D., Oxon., M.A., Cantab., F.R.C.P., London. Third edition. London, Baillière, Tindall and Cox, 8 Henrietta Street, Covent Garden, 1907. Price \$1.50. Canadian agents, J. A. Carveth & Co., Ltd., Toronto.

Those who know Dr. Latham's book in previous editions will remember that it is a treatise which deals especially with the treatment of the disease, by one who is well qualified to speak. The author wrote the Prize Essay on the erection of the King Edward VII Sanatorium; he is a physician at St. George's and assistant physician at the Brompton Chest Hospital.

In the matter of opsonic work in the diagnosis of tuberculosis, Latham takes a conservative standpoint, and states that he has not yet obtained any positive assistance from it. In the treatment of the disease, he considers, like Trudeau, that tuberculin is a decidedly effective agent, but does not believe that the use of it should be regulated by the opsonic

index. He believes also, in the use of Koch's old tuberculin for diagnostic purposes in suitable cases, that is, where none of the well-known contra-indications exist.

One of the most interesting parts of the book refers to exercise and work performed by patients who have partially recovered from the disease. The importance of this cannot be over-estimated, as in the future it may be expected that colonics for tuberculosis patients under national supervision may thereby provide some commercial return for their treatment. The merest beginning has been made at Frimley Sanatorium, and no firmly-based facts are yet to hand, but the attempt is being constantly prosecuted. The principles of open air treatment at home, the treatment of special symptoms, the question of marriage of tuberculous patients and many other interesting things are discussed. We have great pleasure in heartily commending Dr. Latham's third edition.

**THE ESSENTIALS OF HISTOLOGY.**—Descriptive and Practical, for the use of Students. By E. A. SCHAEFER, L.L.D., Sc.D., F.R.S., Professor of Physiology in the University of Edinburgh, etc. Seventh edition. Lea Bros. and Co., Philadelphia and New York.

This well-known text-book more than maintains its former high standard of excellence. The principal advance over former editions is in the account of the nervous system to which about one-third of the book is devoted. There are well selected illustrations on practically every page and for the first time many of them are coloured. The letter press is eminently adapted to the needs of the undergraduate. While not exhaustive it contains for the specialist a well digested and reliable summary.

One slight omission noted was in the description of the auriculo-ventricular bundle. No mention is made of the network of nerve fibres whose presence there is of some interest.

The paper is of good quality and thin enough to allow five hundred pages to be compressed into the space usually required for two hundred.

We recommend this book without qualification.

W. S. M.

**A TEXT-BOOK OF EMBRYOLOGY.** By JOHN C. HEISLER, M.D., Professor of Anatomy in the Medico-Chirurgical College of Philadelphia. Third Revised Edition. Octavo volume 132 pages, with 212 illustrations, 32 of them in colors. Philadelphia and London: W.

B. Saunders Company, 1907. Cloth, \$3.00 net; half morocco, \$4.25 net. Canadian agents, J. A. Carveth & Co., Toronto, Ont.

Professor Heisler's third edition contains a good many additions since the last revision which was made in 1901, and followed by several reprintings. Fifteen or more sections of the book have been completely revised in the present edition. The opening chapter of forty pages is really an excellent setting-forth of the necessary information on the sexual elements, on ovulation, menstruation, and fertilization. It is brief, and bears evidence of much care in the process of evaporation, the essentials remaining in a concise form. Segmentation, the formation of the germ layers and the early differentiation of the embryo are very clearly given, as are also the formation of the foetal membranes. We are glad to see that the most recent views on the decidua and the embedding of the ovum are set forth, because we have had occasion to criticize some very recent books on this very point. When the author comes to deal with the changes in the external form of the embryo, the brevity that is necessary tasks a writer to the utmost, and there is much that will make difficult reading for the student who has not studied serial sections, but, knowing the difficulty of compressing a very great amount of material, we have no criticism to offer upon the way it has been done.

The development of the various systems of the body makes plainer sailing, and here, in general, one notices fewer modifications, although the proper addenda are introduced, and the embryology of some organs has been re-written. The illustrations are numerous and useful and the printing careful and clear, and we can cheerfully recommend Professor Heisler's third edition.

A TEXT-BOOK OF OPHTHALMIC OPERATIONS. By HAROLD GRIMSDALE, M.B., F.R.C.S., and ELMORE BREWERTON, F.R.C.S. Published by Kegan Paul, Trench, Trubner & Co., London, 1907.

In this volume the authors have covered the whole field of Ophthalmic Operations in a very acceptable manner. The descriptions of the various procedures are clear and the accompanying illustrations, though somewhat sketchy, are quite sufficient.

The writers might, perhaps, with advantage have more strongly emphasized the operations which they had found through personal experience to be the best; and omitted certain procedures, for instance, Critchett's subconjunctival tenotomy, which are now generally regarded as obsolete.

The printing and paper are good, but the binding is insufficiently strong. These defects, however, do not seriously mar an otherwise excellent treatise which will prove especially useful to those who are unable to consult the continental works in this field.

W. G. M. B.

A MANUAL OF OBSTETRICS. By A. F. KING, A.M., M.D., LL.D. Tenth Edition revised and enlarged with 301 illustrations in text and three plates. Published by Lea Brothers & Co., Philadelphia and New York, 1907.

This most popular manual of Obstetrics has been rejuvenated and brought up to date. The chapter on "Fecundation and Nutrition of the Embryo" has been practically re-written and the subject is extremely well presented, the diagrams being exceptionally good. Any student making a careful study of this chapter cannot fail to have a very fair comprehension of his work.

The chapters on Pelvic Deformity, Placenta Prævia, and Puerperal Septicæmia, have also been re-written as well as several portions dealing with obstetric surgery.

It is to be regretted that the author fails to describe the operation of Pubiotomy. It is probable that the Tenth Edition will be no less popular than its predecessors.

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## Medical News.

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### THE GRADUATES OF 1907.

The following gentlemen, 73 in number, were admitted to the degree of M.D., C.M., at the recent Convocation of McGill University.

Arthur, J. R., Perth, Ont.; Bailey, G. W., Fredericton, N.B.; Baird, W. S., Lucknow, Ont.; Benvie, R. M., Salt Springs, N.S.; Bernstein, D. H., Montreal, Que.; Blanchard, H. B., Mallorytown, Ont.; Bray, D. G., B.A., Sherbrooke, Que.; Brydone-Jack, F. W., Vancouver, B.C.; Budyk, J. S., Montreal, Que.; Coborn, Josiah, Newton Robinson, Ont.; Covey, H. W., Everett, Mass. U.S.A.; Crowe, H. S., Central Onslow, N.S.; Dearborn, H. F., Malden, Mass., U.S.A.; Denovan, B., Montreal, Que.; Dixon, J. A., Almonte, Ont.; Edwards, W. F., Smith's Falls, Ont.; Eggert, C. A., Atlin, B.C.; Enright, W. E., M.A., Sherbrooke, Que.; Farris, H. A., White's Cove, N.B.; Fraser, S. B., Richmond, Que.; Furse, W. J., Westmount, Que.; Gabie, W. G., Kazabazua, Que.; Garcelon, W. S., A.B., Lewiston, Me.; Girvan, R. G., Rexton, N.B.;

Graham, D. W., Arundel, Que.; Gray, W. E., Campbellton, N. B.; Grier, R. T., Montreal, Que.; Hawkins, Z., B.A., Sussex, N.B.; Healy, J. J. Smith's Falls, Ont.; Holbrook, R. E., Minto, Man.; Holman, W. L., B.A., Summerside, P.E.I.; Hunter, J. D., Victoria, B.C.; Huycke, A. H., Warkworth, Ont.; Keay, Thos., New Glasgow, N.S.; Lake, W., Ridgetown, Ont.; Landry, A. R., Dorchester, N.B.; Lannin, G. E. J., South Mountain, Ont.; Locke, E. E., B.A., Westmount, Que.; Logic, F. G., Chatham, N.B.; MacLachlan, W. W. G., Guelph, Ont.; MacNab, N. A., Montreal, Que.; McCann, J. H., South Framingham, Mass., U.S.A.; McCowen, G. R., St. Johns, Nfld.; McLennan, A. I., B.A., Lancaster, Ont.; McPhee, T. J., Courtney, B.C.; Morgan, J. D., B.A., Montreal, Que.; Muir, W. L., B.A., Truro, N.S.; Noble, E. C., Digby, N.S.; Norton, F. A., Savana le Mer, Jamaica, W.I.; Oulton, M. A., M.A., Jolicouere, N.B.; Peltier, H. G., Fort William, Ont.; Penney, L. T. W., New Germany, N.S.; Peters, H. LeB., B.A., St. John, N.B.; Quinn, F. P., Ottawa, Ont.; Rabinovitch, Max., B.A., Montreal, Que.; Robinson, R. C., Winchester, Ont.; Rublee, O. E., B.A., North Hatley, Que.; Scott, W. H., Edmonton, Alberta; Shankel, F. R., B.A., Hubbard's Cove, N.S.; Shirreffs, S. H., Clarence, Ont.; Sinclair, G. W., Provincetown, Mass.; U.S.A.; Stein, S. F., Kemptville, Ont.; Stephens, G. F., Winnipeg, Man.; Stevenson, A. B., New Glasgow, P.E.I.; Sutherland, R. H., B.A., River John, N.S.; Taylor, G. O., Hillsboro, N.B.; Thomson, J. W., Mattawa, Ont.; Trufant, L. H., A.B., Auburn, Me.; Vesey, E. M., Little York, P.E.I.; Waddell, J. R., Chatham, Ont.; Whitelaw, W. A., Meaford, Ont.; Wilson, A. A., Perth, Ont.; Woodrow, J. B., Beaconsfield, Que.

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### ROYAL VICTORIA HOSPITAL.

Monthly report for May 1907. Patients admitted during month, 288; discharged, 269; died, 22. Medical, 87; surgical, 114; ophthalmological, 22; gynæcological, 28; laryngological, 37. Outdoor Department: Medical, 882; surgical, 818; eye, 314; diseases of women, 136; nose, throat and ear, 407. Total 2557. No. of ambulance calls, 101.

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### MONTREAL MEDICO-CHIRURGICAL SOCIETY.

At the eighteenth regular meeting of the Society, on Friday, June 21st, Dr. F. G. Finley, President, in the chair, the officers for the ensuing year were elected as follows:—President, Dr. Wesley Mills; vice-president, Dr. J. Alex. Hutchison; secretary, Dr. A. H. Gordon; treasurer, A. T. Bazin, M.D.; trustee, Dr. J. A. MacDonald.

The Ontario Medical Association will meet in Hamilton next year. The officers elected for the ensuing year are:—President, Dr. Ingersoll Olmsted, Hamilton; vice-presidents, Dr. H. J. Hamilton, Toronto; Dr. D. E. Mundell, Kingston; Dr. C. E. Casgrain, Windsor; Dr. T. S. T. Smellie, Fort William; general secretary, Dr. C. P. Lusk, Toronto; assistant secretary, Dr. S. Johnston, Toronto; treasurer, Dr. J. Fenton, Toronto; credentials, Drs. W. J. Hackney, Ottawa; Malcolm Stalker, Walkerton; public health, Drs. Emerson Bull, Lambton Mills; J. W. S. McCullough, Alliston; Ira Freel, Stouffville; A. E. McCall, Belleville; publication, Drs. Geo. Elliott, Toronto; H. L. Hutchison, Toronto; by-laws, Drs. James Lindsay, Guelph; C. J. O. C. Hastings, Toronto; A. A. Macdonald, Toronto; H. S. Bingham, Cannington.

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The Toronto Pathological Society, the Toronto Clinical Society, the Toronto Medical Society and the Toronto Library Association have disbanded, and formed an Academy of Medicine. The newly elected officers are:—President, Dr. J. F. W. Ross; vice-president, Dr. McPhedran; hon. secretary, Dr. H. J. Hamilton; hon. treasurer, Dr. D. J. G. Wishart; council, the above mentioned officers and Drs. Irving H. Cameron, H. A. Reeve, H. A. Bruce, J. T. Fotheringham, A. A. Macdonald, H. P. Anderson, W. P. Caven, E. E. King, John Amyot, F. N. G. Starr, R. D. Rudolf and R. J. Dwyer. Chairman of three sections of surgery, medicine and pathology have yet to be elected. These will be added to the council.

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Dr. James Ross, of Dundas, Ont., brother of Dr. J. J. Ross, of Montreal, died of pneumonia at his home during the last week in May. He was much beloved by a large circle of friends, and was widely known. Dr. Ross, who was surgeon-lieutenant-colonel of the 77th Regt., was buried with military honors. We extend to our colleague our sincerest sympathy, recognizing, too, that the profession of medicine has sustained a heavy loss.

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It is stated that Dr. William Bayard of St. John, N.B., still visits patients although he has reached his 93rd year, and that the local medical society is about to congratulate him suitably on the completion of his 70th year of practice. Dr. Bayard is a native of Kentville, N.S., and graduated at Edinburgh in 1837.

The officers of the St. John Medical Society, for the coming year are: President, Dr. T. H. Lunney; vice-president, Dr. C. M. Pratt; secretary, Dr. J. S. Bentley; treasurer, Dr. James Christie; financial secretary, Dr. G. G. Corbett; pathologist, Dr. Wm. Warwick; librarian, Dr. W. E. Rowley.

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A severe epidemic of small-pox has lately been existent and still exists in the Counties of Leeds and Grenville. Dr. Bell, inspector of the Provincial Board of Health, speaks severely of the apathy of physicians and citizens in authority, and states that quarantine regulations have been much neglected.

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Dr. Alexander Primrose has resigned the chair of Anatomy in the University of Toronto, with a view to devoting himself entirely to surgery. The chair is to be filled by Professor J. Playfair McMurrich, of Ann Arbor, who is himself a graduate of Toronto, and an eminent authority upon biology and comparative anatomy.

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Dr. Allan Kinghorn, a Toronto graduate of 1904, has gone to Africa as one of the members of another Liverpool expedition for the study of Sleeping Sickness.

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Dr. D. G. Revell, of the University of Chicago, has been appointed Provincial Pathologist for Alberta, and will begin work shortly in that capacity. He is a graduate of Toronto in Arts and Medicine (1899).

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Dr. W. H. Moorehouse, Dean of the Faculty of the Western Medical College, has resigned, owing to ill-health, and is succeeded by Dr. F. R. Eccles.

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Dr. John T. Carroll, of Vancouver, B.C., died on May 13th. He went to Welland in 1884 and practised in partnership with Dr. Schooley whose death is announced in this column. Dr. Carroll was in his 53rd year.

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Dr. P. W. McLay died on June 15th, at Aylmer, Ont., in his 62nd year; he was born in Glasgow and graduated in medicine in 1870, at Victoria College, afterwards taking qualifications in Great Britain.



Dr. J. M. Schooley, of Welland, Ont., died suddenly on June 4th. He had practised in Welland over 40 years, and his wife had died but ten days before him.

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Dr. George T. Young, of Vancouver, died on May 26th, while on his holidays. He was about forty years of age, and graduated at Winnipeg, where he formerly practised.

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Dr. James Gray who had practiced at London, Ont., was found dead in his bed at Rochester, N.Y. on May 28th. He was forty-five years of age.

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Dr. A. A. Franklin, of Brockville, died on May 16th in his 36th year. He was a graduate of Western University, London, Ont. in 1894, and practised in Chicago.

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Dr. John T. Carroll died in Vancouver on May 13th. He was a graduate of Toronto University, and was in his 49th year.

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Dr. John Hutchison died at Grenville, Sask., on May 5, from pneumonia, in his 54th year.

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Dr. Frederick William Lewis, M.P.P., of Orangeville, died at Toronto, on May 24th. He was 52 years of age and graduated at Kingston.

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Dr. Young of Vancouver, B.C., was drowned in Stave Lake on May 24th.

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Dr. Malcolm, of Fogo, Nfld., died on June 5th of heart disease. He had practised at Fogo for 20 years.

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Dr. A. D. McGillvary of Sydney, N.S., died on May 30th in his sixty-sixth year. He graduated from Bellevue in 1863.

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Dr. C. M. Fairchild, late of Brantford and Burford, Ont., died at Boise, Idaho, early in the month.

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Dr. Thomas W. Walsh, of Halifax, died on May 10th.

Dr. William Claxton, of Verona, Frontenac Co., Ont., died on May 29th. He was a graduate of Queen's Medical College in 1874.

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Dr. Nichol, of Crystal City, Man., died on May 15th.

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Dr. W. M. English, of London, has been appointed Medical Superintendent of the Hamilton Asylum.

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The General Medical Council of Great Britain has announced its recognition of Nova Scotian degrees.

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A class of twenty-four graduated this year from the Western Medical College at London, Ont.

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Dr. C. H. Thomas, of Toronto, has become a Fellow of the Royal College, of Surgeons of Edinburgh.

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Dr. A. A. Small, a Toronto graduate of 1895, has been appointed one of four medico-legal experts for the city of Chicago.

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Dr. J. J. Morris, of Hamilton, was married to Miss Sadie Hyland, of Kingston, on May 15th.

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We extend our congratulations to Dr. H. S. Birkett, on his appointment as President of the American Laryngological Association.

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Of the seventy-four graduates this year at McGill, twenty-one are from the Maritime Provinces, twenty from Ontario, and sixteen from Quebec.

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## Retrospect of Current Literature.

### SURGERY.

UNDER THE CHARGE OF GEORGE E. ARMSTRONG.

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CLARENCE A. McWILLIAMS, M.D. "A Method of Reducing Old Colles' Fractures, Stiffness Following Apparent Contusions of the Elbow." *Med. Record*, May 25, 1907.

A simple and effective method of dealing with fractures of the above variety, in which no treatment has been given, or when faulty position

and limitation of movement render the hand practically useless is suggested by the writer. A large monkey wrench, with its blades well padded, is applied in such a manner as to have the blades entirely proximally situated to the fracture line, the edge of the dorsal blade resting against the posterior projecting edge of the lower fragment. With little force, a refracture is readily produced by twisting the wrench so as to flex the lower fragment upon the upper. There is no traumatism to the wrist structures, and that to the tendons is slight and passes off in a couple of days. In almost all cases this method does away with any cutting operation. The refracture is treated in the usual way with anterior and posterior splints. Injuries to joints are sometimes very puzzling from a diagnostic point of view and a so-called sprain not infrequently causes marked limitation of movement. Even the X-Ray, taken immediately after the injury may reveal nothing abnormal, and yet the same untoward result may occur. Two skiograms are shown of a typical case, an injury to the elbow joint, the first showing nothing abnormal, the second, taken during the third or fourth week shows a fragment of bone in or around the joint. The writer explains this production of new bone and consequent interference with the movements of the joint, as being caused by a tearing or stripping away of a portion of the periosteum which goes on to bone formation. He advises all such cases to be kept under observation, and passive motion instituted at the first sign of any limitation of motion.

P. LOCKHART MUMMERY, B.C., F.R.C.S. "Operation for Removal of the entire Rectum and neighbouring Lymphatic Glands for Carcinoma." *Brit. Med. Jour.* June 1, 1907.

The operation advocated is practically that of the usual excision of the rectum by the perineal route. Here, however, the entire rectum is removed, and the sigmoid colon is brought down and sutured to the skin around the anus. Preliminary colotomy is not performed unless the growth has caused constriction with dilatation above, rendering it impossible to secure proper asepsis of the field. If the sphincters are involved, the growth is removed and a permanent colostomy established. When making a preliminary colotomy, the highest possible part of the colon should be brought down, so as not to interfere with the subsequent bringing down of the sigmoid. The previous unsatisfactory results obtained have been due to lack of securing proper asepsis in the first place, and to the fact that the rectum, the upper portion of which is the part usually brought down, being a fairly fixed organ, does not lend itself to plastic operation, while the moveable sigmoid does. The

advantages claimed for this operation are that the entire rectum and growth, cellular tissue and lymphatics, are removed en masse; that it renders it possible for the operation to be performed aseptically and the wound to be kept clean after operation, that it enables the normal opening of the bowel to be restored in almost all cases that do not necessitate removal of the sphincters, that it permits of the removal of more extensive growths than either the perineal or Kraske methods, and that there is none of the mutilation of the pelvis as in the latter operation, the removal of the coccyx does not seem to cause any subsequent inconvenience. The sphincters soon regain their function, sensation at the anus is established, and the patient is able to tell when the bowel is full and to control the action of the bowels in the ordinary way. The propulsive power of the rectum is, of course, lost, and this function is not readily acquired by the sigmoid, thus necessitating a daily enema. The writer believes this function will be acquired in time and the enema dispensed with.

B. G. A. MOYNIHAN, M.S., F.R.C.S. "Duodenal Ulcer." *Practitioner*, June, 1907.

It is probably no exaggeration to say that, among the advances in our knowledge of the diseases within the abdomen, which have resulted from the more frequent operations in recent years, there is none of greater importance than that which refers to ulcer of the duodenum. Six years ago the writer reported 7 cases operated upon, and in only one was a positive diagnosis made before operation. Up to the end of 1906 the number had been increased to 114, and it is upon the records of these cases that the clinical picture of duodenal ulcer is based. The ulcer is most commonly found immediately beyond the pylorus, in about 90 per cent of the cases. It may occur in any part of the duodenum, may be single, scattered, or exactly opposed, the so-called "kissing ulcer." It may be small, circular, slightly indurated, and cause no stenosis; or it may be large, hard, puckered and adherent, and a high degree of narrowing may result from its cicatricial contraction. It occurs at any period of life. Lister and Spiegelberg found it in infants 3 or 4 days old, and melæna neonatorum, in some cases, at least, has been shown to be due to duodenal ulcer. The oldest case in this series was a man of 73, while the average was 38. It affects men more frequently than women, the ratio being 2 to 1 in the series. Other writers vary between 2 and 6 to 1. It is frequently found to be associated with gastric ulcer, in about 40 per cent, and is probably secondary to it and caused by the digestion of the mucosa by the hyperacid gastric juice. It is a very

striking fact that the part of the bowel affected by the process of ulceration is that with which the food, as it leaves the stomach, is immediately brought into contact. It must also be remembered that the writer has shown peptic ulcer of the jejunum to be a sequela of gastro-enterostomy. A history of hasty and perhaps heavy meals at irregular intervals is not infrequent. The symptoms of duodenal ulcer are, in the great majority of cases, sufficient to enable a diagnosis to be made without any physical examination of the patient, the anamnesis being generally pathognomonic. The pain may be slight or severe, varying from a sense of uneasiness passing on to a burning, gnawing sensation, to that resembling an attack of biliary colic. It comes on usually from one and a half to four hours after eating, the hour or two following a meal being the patient's best time during the day. The pain is referred to the back, to the right of the median line in the upper portion of the abdomen, and may radiate around the right side of the chest. Coming on as it does at a time when the patient should feel hungry, the term "hunger pain," suggested by the writer, is a most appropriate one. Relief following the taking of food varies in time according to the kind of meal, heavy food giving a longer respite from pain, though, of course, with more serious damage eventually to the ulcer. With the pain there is generally a feeling of flatulent distension in the epigastrium, relieved, often considerably, by belching or pressure. In a large number of the cases the patients have been sleek and well-conditioned, not at all the kind one would imagine were subjects of ulcer. As in gastric ulcer, so in ulcer of the duodenum, an attack may be followed by a latent period, when the patient feels perfectly well, and this may be repeated quite a few times without any serious complication. Vomiting is an infrequent symptom in duodenal ulcer and is present only when stenosis has developed, or the patient has not learnt his stomach's capacity. The most serious symptom is hæmorrhage, which may be manifest as hæmatemesis or melæna. Frequently this is the only symptom of importance, the patient giving as his complaint, "attacks of faintness." Questioning generally, however, elicits some epigastric pain and the usual history as given above, and examination of the stools shows melæna to be present. Hæmorrhage from a duodenal ulcer is a more serious and dangerous affair than from gastric ulcer. In the latter, the visible evidence—hæmatemesis—is a fairly good estimate of the amount of bleeding, while in the former, a patient may die from hæmorrhage when the amount of blood discharged from the body is no great quantity. The hæmorrhage in duodenal ulcer is not necessarily more profuse, but it is certainly more apt to continue, to recur, and is less under control than gastric

ulcer. Perforation may occur at any stage in the course of duodenal ulcer, but never without previous symptoms. These symptoms may have been slight, almost negligible, or even neglected, but a reasonably close enquiry will always elicit them. Perforation may be acute, subacute, or, chronic, a classification elsewhere elaborated by the writer. The most important information gained by physical examination is the area of tenderness. Dr. James MacKenzie has shown that this area, marked out by pinching the skin away from the muscles, so as to avoid deep pressure, will indicate the situation of the ulcer. In ulcer of the lesser curvature, near the cardia, this will be in the middle line or slightly to the left near the ensiform cartilage. If at the pylorus, it will be lower down near the umbilicus, if duodenal, it will be a little above and slightly to the right of the umbilicus. Gastric ulcer is much more amenable to medical treatment than duodenal; and the writer regards the latter as a far more serious disease. He advises surgical treatment as soon as a positive diagnosis can be made. This generally consists of a posterior gastro-enterostomy with infolding of the ulcer by a double layer of sutures. He insists upon a strict diet for 3 months following operation and that an alkaline bismuth mixture be taken if there is any indication of persisting acidity. The results obtained have been very good. Eleven cases operated upon for perforation with two deaths, 101 cases for other symptoms with two deaths. The end results have also been good, only one case coming up for a second operation on account of subsequent development of a peptic ulcer of the jejunum.

W. L. B.

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## PATHOLOGY.

UNDER THE CHARGE OF J. G. ADAMI.

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JOSEF SORGO and ERHARD SUESS. "Concerning Experiments with Tubercle bacilli of human origin on Snakes and the Alteration of character of these organisms." *Centralb f. Bakt*, 1907, *xliii*, p. 529.

The authors isolated strains of tubercle bacilli from infected human tissues. The characters of these organisms were compared with strains of the bovine, avian, and amphibian tubercle bacilli. Various cultural and inoculation experiments were then carried out. The authors noted that, by the transplantation of many hundred sub-cultures, spontaneous varieties of the organism would occasionally arise. The varieties became fairly permanent in their characters.

The authors found that there were specific tubercle bacilli for cold-blooded animals, which produced lesions not unlike the human variety. They noted that the human variety was more severe in its effects on cold blooded animals than the strain which was naturally peculiar to these animals. An interesting point was noted in their experiments, that when the human tubercle bacillus remained over an extended period in the cold blooded animals, it altered its characteristics, approaching the cold blooded variety. At times, however, the characteristic properties of the human variety was retained at all times.

The interesting features of their entire experiments are (1), the spontaneous production of new varieties of tubercle bacilli in culture, (2), the infection of cold blooded animals with human tubercle bacilli, (3), the change of the human tubercle bacilli when in a cold blooded host, to a variety more closely resembling that naturally present in these animals.

E. D. ZEBROWSKI. "Concerning the Action of Tobacco Smoke on the Blood vessels of Animals." *Centralb. f. Path.*, 1907 xviii, p. 337.

It has long been assumed by conditions that tobacco smoke has a deleterious effect upon heart and blood vessels. Definite experiments to prove this contention have never been made. Nevertheless, definite symptoms are known to occur on excessive smoking. Other experimenters have demonstrated that the inoculation of nicotine into the circulatory system of animals does produce certain arterial changes. Such inoculation of nicotine, however, does not represent the ordinary course by which the drug gains access into the system. And again, the dosage of the nicotine was far in excess of the amount absorbed from the respiratory system.

The author attempted to make the conditions of the experiment simulate those of ordinary smoking as nearly as possible. In other cases he inoculated the animals with a solution of smoke in water. He found that severe lesions in the arterial system were produced by the ingredients of the smoke. These arterial lesions were identical with those of adrenalin. The author is undecided whether or not another constituent of smoke besides nicotine produces deleterious effects on the circulatory system.

RUPPEL. "The Relationship of Meningococci to Gonococci. *Deutsche Med. Wochen.*, 1906, p. 1366.

The author points out that there is a very great variation in virulence between the various strains of meningococci. Culturally, these

strains show no difference, and all of them show difficulty of growth in fluid media. With repeated transplantation on fluid media, the growth becomes more luxuriant and the virulence likewise increases. By repeated inoculation rabbits can be immunized against virulent cultures. Animals treated with cultures of gonococci are protected from meningococci. Nevertheless, the sera produced by the various strains serve to distinguish the meningococcus from the gonococcus in the agglutination test.

KUTSCHER. "The Isolation of Meningococci from the Nose in healthy persons." *Deutsche Med. Wochen* 1906, p. 1071.

In 1905 the author examined the nasal secretions in one hundred and four healthy persons, and in two cases isolated an organism which could not be differentiated from the meningococcus. During an epidemic of cerebro-spinal meningitis in 1906, the author was able to isolate Gram-negative diplococci from the nose and throat of fifty-six persons not suffering from meningitis. The cultural differentiation of these diplococci from the organism of meningitis was difficult. He claims that four of the strains isolated were true meningococci. The animal experiments also gave results identical with the diplococcus intracellularis. It is shown, therefore, that the meningococcus may be present in a healthy nose and throat without producing disease.

OLMACHER. "The Poison of the Meningococcus." *Jour. Amer. Med. Assoc.*, 1906. Vol. 47. No. 3.

The author by accident discovered the toxicity of the cultures of the organism. The inoculation of the filtered culture or one that had been rendered sterile by the use of trikesol produced fever and collapse within eighteen hours. Smaller doses of the filtered culture produced tetanic convulsions. Cultural fluids which had passed through the porcelain filters were harmless.

The presence of chalk is necessary in the culture medium to ensure a good growth of the organism.

VARIOUS AUTHORS. "The Origin of Anthracosis." *Various Journals*.

Very many papers have been contributed to this subject, and innumerable experiments have been carried out on lower animals to solve the problem. The results of these experiments are then applicable to the subject of tuberculosis, mainly as regards the point of invasion of the tubercle bacilli before reaching the lungs. It is quite probable that the route taken by foreign bodies, such as coal dust and lamp black represented, is also followed by the tubercle bacillus.



As long ago as 1862, Villaret contended that pulmonary anthracosis had its origin in the intestinal tract, and since then there have been quite a number of supporters to this idea. Arnold, in 1885, could not find the presence of lamp black in the mesenteric glands, though much was present in the intestinal tract. This was commented upon by Vansteenberghe and Grysen, who pointed out that dust particles could pass through the lymphatic glands and reach distant parts without leaving a trace of their passage through them.

The greater number of experiments, to prove the veracity of the different contentions, were made by allowing animals to inhale smoke or to inject lamp black. Calmette found that smoke particles do not reach the lung alveoli unless the experiment is carried on for over an hour. On the contrary, Kuss and Lobstein demonstrated the presence of charcoal within the bronchial glands and the lung alveoli at the end of twenty minutes inhalation. Their results are supported by those of Beitzke, who, as a further precaution in the experiments, ligated the œsophagus.

That pulmonary anthracosis may have its origin from the gastro-intestinal tract has also been proved. These experiments have become complicated as the invasion of the dust by the respiratory system and the glandular system of the neck had to be excluded. This was done by introducing the foreign particles into the stomach by gastrostomy. In such cases, a certain amount of anthracosis was produced in the mediastinal gland, but very little reached the lung tissue. It was found that only large quantities of charcoal so introduced would give these results, and that this route was not to be considered in the human.

Lamp black, when introduced into the circulatory system, becomes lodged in the liver, spleen and kidneys with only a very slight amount in the lungs.

In general, therefore, it might be said that animal experiments point to the respiratory system as being the site of invasion of coal dust, and that the alimentary tract plays a very unimportant role.

O. K.

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