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MODERN METHODS IN RENAL AND URETERAL SURGERY.

BY

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In no department of surgery has the application of new principles and the use of new methods been of greater clinical value than in the extension of our resources in determining the pathological and functional variations in the kidney and ureter.

Until within comparatively recent times we were limited in the examination of the kidney to inspection, palpation, and the analysis of the combined urines from the two sides, together with the subjective symptoms of the patient. It is now a matter of wonder, not that unfortunate surprises and accidents were occasionally met with, but that they were not more common. To the many who contributed to the perfection of the cystoscope, and whose names you are all familiar with, we are indebted for our ability to inspect the interior of the bladder, to note the alterations in the position of the ureteral orifices, and to recognize foreign bodies, new growths, etc.

The value of the cystoscope was immeasurably enhanced when it was so modified and improved that we were enabled to pass the catheter along the ureter to the kidney. We can now determine whether the ureter is patent, narrowed, or obstructed, whether one or two kidneys are present, and their functional value.

Only second in value in modern surgery of the kidney is the X-ray apparatus. The use of this method in the diagnosis of calculi in the kidney and ureter requires experience and skill, but it is daily becoming of greater value.

For a time if it showed a stone distinctly, well and good, but if not, the absence was only regarded as negative evidence. To-day by carefully arranging the position of the patient, by using a soft tube and

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a well adapted diaphragm, Kümmell is able to say with his large experience that the X-ray will show a stone, if present, in every case, regardless of its chemical composition, and in stout or thin patients. The value of the X-ray is not only in demonstrating the presence of a stone but its situation as well. To accomplish this, more than one plate should be made. It is found that calculi generally remain in one position and therefore constancy is an important element in the diagnosis. The shadow of a renal calculus is generally a little away from the spinal column and about the level of the second lumbar vertebra or just below the 12th rib. Variations in position might suggest a horse-shoe kidney or a dilated pelvis with the stone in the lower part. In one of my cases the stone was shewn to be in the ureter, and I was able to go directly down upon it, without opening or disturbing the kidney. This rendered the operation more simple and safe. In another instance two oxalate calculi were distinctly shown in the kidney itself. We have found it advantageous to read the plate in a dark room, placing it in a frame in front of a good light. Kümmell sometimes uses an opera glass to get better definition.

I have not had any satisfactory results from the use of the segregator. I admit that my experience with it has been very limited. On several occasions I attempted to use Luy's pattern, but failed. On two different occasions, gentlemen professing to know how to use it and expressing faith in its efficiency visited my clinic and were afforded an opportunity of demonstrating its value. In both cases complete failure was frankly admitted by the operator.

In the following cases the ureters were catheterized by Dr. R. P. Campbell, late Medical Superintendent of the Montreal General Hospital, and I wish here to acknowledge my indebtedness to him, and to express my appreciation of his skill in this work, and his care and accuracy in carrying out the various examinations and tests of the urines removed. The catheterization of the ureters has been done as a rule, under local anæsthesia. If ether is given the flow of urine is temporarily so nearly arrested that, to get enough for examination, the patient must be returned to bed with the ureteral catheters in situ. It is obvious, therefore, if serious difficulty in finding the openings is encountered that no help can be obtained from the use of methyblue, as recommended by Castaigne or of indigo-carmin as recommended by Voelkers and Joseph. As a rule the operation is unpleasant and disagreeable, but not unbearable if the bladder and urethra are normal. The cystoscope and catheter are, of course, carefully sterilized and the bladder thoroughly washed out.

By catheterization of the ureters one determines in the first place whether the patient, has one or two kidneys. Congenital absence, although not common, does occur.

Dr. Gillies while pathologist at the Montreal General Hospital found, at autopsy, one kidney congenitally absent, in two cases. The need of deciding this point before doing a nephrectomy has, in the past been regarded by some surgeons of sufficient importance to justify, if necessary, a preliminary abdominal incision.

Another great gain by catheterization of the ureters is the material aid obtained in the differential diagnosis, not only between the two kidneys, but between one or both and the bladder.

To illustrate I will briefly relate the history of a man, aged 39, who was sent to me as a case of tuberculous cystitis. That there was a cystitis was proven by the presence of blood and pus in the urine, the frequency of micturition which occurred about every 30 to 90 minutes, night and day, and by the pain that immediately followed the act. That it was tuberculous was shown by the constant presence in the urine of tubercle bacilli.

A cystoscopic examination revealed a bladder whose walls were hyperæmic but otherwise little altered from the normal, save at one point on the left side high up, where were seen two small ulcers, with borders just touching at one point and one or two tubercles at the base of the trigone. The view left one with the impression that the bladder was not alone responsible for the condition and that probably the infection was a descending one from one or both kidneys. Four years previously the patient had felt a severe pain in the left kidney, but it never recurred, nor was any feeling of distress felt in the left loin afterwards.

Dr. Campbell found great difficulty in catheterizing the ureters in this case. The patient was unusually sensitive, the bladder was small and bled easily. Success was only achieved under general anaesthesia. The little ulcers seen high up on the left wall were found to mark the entrance to the left ureter, into which a catheter was passed. The right ureteral orifice was so displaced forwards and to the left that the catheter could not be introduced. The bladder was again washed, a catheter passed and the patient returned to bed with the left ureteral catheter in position and allowed to remain for two hours. We then had the urine from the left kidney coming through the ureteral catheter and that from the right passed into the bladder from which it was removed, as it collected, through an ordinary catheter.

On examining these urines the following conditions were found:—

R—Amt. 75 c.c. Acid. Sp. gr. 1025. Yellow. Mucoid matter. 1.7 per cent of urea. A trace of albumen. No sugar. Calcium oxalate. A few pus and blood cells. No tubercle bacilli. L—Amt. 20 c.c. Neutral. Sp. gr. 1008. Pale. Flocculent precipitate. 0.3 per cent of urea. No sugar. Epithelium. A good deal of pus. Pus and blood cells, and tubercle bacilli.

It was now quite clear that the chief disease was in the left kidney, that the disease was tuberculous, and that the kidney was functionally of little value. It was also demonstrated that the right kidney was functionally active, was sufficient alone to keep the blood at the normal density; in fact that the man was really living with his right kidney. It is obvious that any error, the result of admixture, would improve the showing. No evidence of tubercle could be found in any other organ. Nephrectomy was performed, no disturbance whatever followed, and he is now, four weeks after operation, going about with a good appetite, gaining in weight and able to hold his urine $2\frac{1}{2}$ to $3\frac{1}{2}$ hours, without the slightest discomfort. The last examination of the urine failed to find any tubercle bacilli. At the operation the ureter was felt as a tense, tight cord. This shortening due to the changes in the ureteral walls had elevated the left side of the trigone, thus changing the position of the ureteral opening, which made the operation of catheterization so difficult. Hurry Fenwick has described a similar condition. The kidney was excavated at both poles by tuberculous abscess cavities, and the central portion was occupied by large masses of cheesy material. Without ureteral catheterization it could not have been determined definitely that the bacilli were of renal origin, or if so, from which side, with sufficient certainty to warrant nephrectomy.

In another case, male;—pain felt in the left side. The urine contained pus, no blood, and there was a history suggesting tuberculous epididymitis. A cystoscopic examination was made and the ureters catheterized with the following results. About the left ureter was a small ulcer, and the urine coming from it could be seen to be more turbid than that from its fellow.

Right.—Clear mucous sediment. Sp. gr. 1009. Yellow. Alkaline. 2 per cent of urea. A few blood and epithelium cells. No bacilli. Left.—Turbid purulent sediment. Sp. gr. 1004. Very alkaline. .25 per cent of urea. Blood and pus in quantities. Tubercle bacilli present.

A tuberculous disease of the left kidney was demonstrated and the kidney was removed. It was found to be little more than a big pus

sac, very little secreting tissue remaining. From the operation the man recovered nicely without any disturbance in the function of the right kidney and without any evidence of renal inefficiency. Six months later he died of miliary tuberculosis.

It need only be mentioned that in examining for renal calculi, the confirmatory evidence of blood from one kidney alone is of considerable value in interpreting the radiograph.

When there is sufficient evidence of disease in one kidney to call for its removal, it must be determined that the other kidney is not only present and free from active disease, but that it is able to do the work usually done by two.

Several tests may be applied to determine this point. One of the most reliable is the specific gravity taken, with proper precautions as to amount of liquids consumed, and on more than one occasion.

The induction of renal glycosuria, based upon the discovery of von Mchring is of value as an indication of renal efficiency, but we have not found it always trustworthy. This I quite think may have been due to faulty technique particularly in the preparation of the solution. After a subcutaneous injection of 1 to 1.5 mg. of phloridzin the healthy kidney excretes urine containing sugar after 15 or 20 minutes, whereas a sugar reaction is shown much later on or not at all by the diseased kidney. It is of confirmatory value, but speaking from a very limited experience we would not be inclined to place unlimited confidence in it.

Cryoscopy of the urine and of the blood as an indication of renal efficiency has been brought prominently before the profession by Kümmell. Many clinicians, particularly on the Continent, have made use of this test, and with somewhat varying results. I obtained the Beckman apparatus for determining the freezing point, seven years ago, and since then it has been used more or less in the Montreal General Hospital. Some of you may remember that three or four years ago Dr. Turner reported the results obtained in a series of, I think, one hundred cases. The technical difficulties in its use became at once apparent, and I am satisfied account in part at least for the discrepancies that have occurred and the widely differing estimates that have been placed upon its value. Dr. Campbell has used it in a number of cases and with such care and precision that his results have been uniform and of value. Solutions freeze at a temperature lower than their solvent, and equality in osmotic pressure may be inferred directly from the identity of the freezing points. I cannot outline the principles of this test better than by quoting from a recent article in *Surgery, Gynecology, and Obstetrics* by Kümmell.

He says:—"The idea on which the method is based is that the function of the kidney must be considered as one of osmosis, or in other words, that the work of the kidney may be calculated from the product of the gland, i.e. from the urine and its source, the blood, or rather the blood serum, and that these two fluids, the solvent of which is water, are subject to the law of osmosis. By osmosis we understand the changing relations between two chemically similar solutions of different concentrations, which have for their purpose the equalization of these differences of concentration. The equalization of the difference of osmotic pressure between the blood, i.e. the serum and the urine takes place in the kidney. By virtue of its two antagonistic functions—the secretory activity of the glomeruli and the resorptive power of the convoluted tubes—the kidney, aiming in two directions, undertakes the regulation by the differences in tension, which are constantly being influenced by the metabolism, the heart's action, etc.

"This ingenious theory, which is built on Van't Hoff's teachings of osmotic pressure, although not new, was expounded by A. von Koryani, to whom the honour of having created a new method of examination in applied medicine is due. Koranyi found, as had already been shown by others in the physiological laboratory, that in man there is a marked constancy in the osmotic concentration of the blood while the kidney function remains normal, and that, on the other hand, there is an increased concentration of the blood if there is kidney disease. He found, further, that with the increase of the osmotic concentration of the blood there was a corresponding decrease in the osmotic pressure of the urine. Everything was interpreted from the premises that while the kidney function is normal, all nitrogen-containing molecules will be excreted by the kidney, while if there be a disturbed kidney function a retention of nitrogenous compounds in the blood will occur."

We have practised cryoscopy of the blood in only a few instances. Cryoscopy of the urine we have found to be a valuable confirmatory sign, generally agreeing very closely with the indications derived from specific gravity and the percentage of urea, although the presence of albumen does not alter the freezing point to the same extent as it changes the specific gravity. A normal freezing point of the blood in a patient with one useless kidney would seem to indicate definitely that the other kidney had normal functional power.

The same information regarding the quantity of inorganic matter present in the urine, especially of the salts, may be determined by estimating the electrical conductivity. Reinger, Gebbert and Schall have constructed a convenient apparatus for this purpose. It is especially

useful when we have only small quantities of urine to work with, say 1 to 2 c.c.

In one young man 30 years of age, Dr. Campbell was able to show that both kidneys were diseased and contained tubercle bacilli. A very satisfactory result was obtained in a young woman 29 years of age, who came to Canada two months before admission to Hospital. She had suffered from backache for 7 weeks, and been unable to work for 3 weeks.—The pain, always relieved by rest, had never been severe.

She was emaciated and presented in the right loin a mass continuous with the liver. Her temperature was normal and her pulse 132. The urine from the left kidney was normal save for a trace of albumen. The catheter could not be made to enter the right ureter, the orifice of which was surrounded by an ulcer. From its opening, however, could be seen issuing spurts of turbid urine, increased by pressure over the mass in the right side. It was removed from the bladder for analysis by catheter.

Phloridzin 1 mg. was given subcutaneously with the following result:

Right:—Acid. Sp. gr. 1015. Urea 2 per cent. Albumen. No sugar. A few pus cells. No tubercle bacilli. Left:—Acid. Urea 2.25 per cent. A trace of albumen. Sugar present. A few pus and blood cells. Sufficient urine was not obtained from the left side from which to get the specific gravity. The high specific gravity on the right side was, in part, due to the pus present.

A diagnosis of pyonephrosis was thus demonstrated. The presence of a grayish ulcer at the right ureteral opening in the bladder made it highly probable that the condition was a tuberculous pyonephrosis and nephritis, although only one or two doubtful bacilli had been found in the urine. The left kidney being normal, and the right kidney being of little value, nephrectomy was advised and performed. The diagnosis of tuberculous pyonephrosis was confirmed. The patient did extremely well, there being no change in the quantity of urine excreted even during the first twenty-four hours after the operation. The albumen disappeared from the urine almost immediately. A subsequent examination showed the ulcer in the bladder completely healed.

In the following case we were called upon to make a most careful estimate of the patient's ability to undergo a major operation. A man 61 years of age presented a tumour in the left loin the size of a child's head. It was moveable, smooth, not tender, and apparently associated with the kidney. It was said to have been present only about three months and had been growing rapidly. The patient stated that, some years before, he had met with a coaching accident in Milan and

injured his left side and had passed blood in his urine for several days afterwards. During the past three months blood had appeared in the urine from time to time in sufficient quantity to be easily recognized macroscopically. The rapid growth, the great size of the tumour, its mobility and the appearance from time to time of hæmaturia led to a diagnosis of tumour associated with the kidney, possibly malignant and probably a hypernephroma. The man was in delicate health with markedly sclerosed arteries, and a very weak irregular heart action. He had consulted several physicians at home and in the United States, all of whom had made clear to him the gravity of an operation in a man of his years, and he came to Montreal very anxious to have the tumour removed, if possible, and willing to take any ordinary hazard. On catheterizing the ureters the one in the left side failed to deliver any urine until the catheter was introduced to the renal pelvis when 2 c.c. of clear yellow fluid coming in drops, not spurts, was secured in 15 minutes, while the ureter on the right side delivered 10 c.c. in spurts in the same time. In all about 50 c.c. was secured from the right and 10 from the left. On examining the urines the following results were obtained:—Right.—Amt. 50 c.c. Sp. gr. 1014. Reaction acid. Colour pale. Urea .5 per cent. Trace of albumen. No sugar. Freezing point 1.15. Left.—10 c.c. Sp. gr. 1008. Alkaline. Darker. Urea .1 percent. Large quantity of albumen. No sugar. Freezing point 0.8.

Microscopically a few traumatic blood discs were found in both sides. It was thus seen that the left kidney was secreting little or nothing. What little there was in the pelvis of the left kidney had few of the characters of urine. It was evident that the right kidney was functionally good and in fact that the man was already living with his right kidney alone. Therefore, if the kidney was removed one would have nothing to fear of renal insufficiency. Nephrectomy was performed. The diagnosis was confirmed. The patient made a perfectly smooth recovery. The tumour proved to be a carcinomatous growth, a true Grawitz tumour. The recurring hæmorrhages were due to the perforation of the renal pelvis at one point and the projection in of a portion of the tumour.

In the following case the value of catheterization as a therapeutic as well as a diagnostic agent is well illustrated. A lady, 60 years of age, had for several years recurring attacks of severe renal colic in the left side, the attacks being sufficiently severe to require rather large doses of morphia for their relief. She was admitted to the Hospital with a view to having the stone removed from the left kidney. An attempt

to catheterize the ureters was unsuccessful, and the patient found the operation so disagreeable, and protested so strongly against a second attempt being made, and the diagnosis seemed so clear that nephrotomy was performed. The kidney was found surrounded by a dense mass of inflammatory tissue and adhesions. On an attempt being made to clear the surface of the kidney the hæmorrhage was profuse. On opening the kidney the pelvis was found to contain a large quantity of phosphatic debris, which was washed away as carefully as could be. It was not possible to pass a catheter down the ureter into the bladder. The inflammatory adhesions were so numerous and dense that one could not outline with anything like certainty the confines of the kidney, the pelvis or the upper part of the ureter. Two cysts of considerable size were evacuated. The patient did well, but urine continued to flow from the wound in the back. It was thought quite possible that the ureter might be blocked by phosphatic debris. A catheter was passed through the bladder and left ureter to the pelvis of the kidney, and under ether the wound was reopened, and considerable quantity of phosphatic sand was washed away. After this operation the urine continued to come through the back in such quantities that it was evident that very little passed *per via naturalis*. This view was borne out by the recurrence of symptoms of colic and the presence of phosphatic gravel in the bladder. In a few days very little urine was excreted from either kidney and it was feared that the patient would succumb to anuria. Two specimens were collected, one from the bladder and one from the back. Very little urine came from the right kidney through the bladder, apparently because of obstruction in the right ureter.

Right.—Turbid. Quantity too small for sp. gr. Albumen. Urea, 2 per cent. Freezing pt. .78. Left.—Turbid. Sp. gr. 1008. Trace. Urea 1 per cent. Freezing point .24.

Pus present in both specimens. That night no urine came from the bladder. Both ureters were now catheterized, and warm mild antiseptics used to wash out the pelvis of the right kidney. The patient's condition immediately improved, and the right kidney excreted 12½ ounces of urine in the following 24 hours, the quantity gradually increasing to normal. For four weeks matters continued in this state when the patient was again seized with chilly sensations and rise in temperature. The right pelvis was again washed out, after which the temperature became normal. At the end of another week another cessation of urine from the bladder occurred. The catheter on this occasion struck an obstruction about 2 inches up the ureter on the right side

which was gradually overcome with evacuation of a quantity of pus. The pelvis and ureters were re-washed and no further trouble occurred. Large quantities of water were given by the mouth. An examination of separate urines showed slight difference in favour of the left kidney which all the time was excreting through the wound. It was quite clear that both kidneys were functionally impaired, and that the two were required to keep the blood of the normal density:—

Right.—Sp. gr. 1006. Clear. Floc. present. Neutral or slightly acid. No albumen. Urea 1.3 per cent. Left.—Sp. gr. 1006. Clear. Floc. present. Ditto. Trace of albumen. Urea, 1.3 per cent. A few pus cells on both sides.

Nephrectomy was therefore considered inadvisable and an expectant policy determined upon. She did well, gaining in weight and health generally for four months. The escape of the urine of the left kidney through the wound continued.

A further examination at this time showed:—

Right.—Clear. Sp. gr. 1015. Acid. No albumen. Freezing point 1.05. Left.—Pale. Sp. gr. about 1005. Alkali. Albumen present. Freezing point .6. Pus present.

It was thus evident that, whatever had been the case before, the left kidney was now doing but little work. The annoyance from the constantly escaping urine from the wound in the back was very great. It seemed impossible to get the left ureter free from recurring blocking with phosphatic debris, and the kidney was therefore removed. The operation was performed, and without the slightest disturbance to the urinary balance.

Reasoning from less fortunate cases it seems probable that on two occasions the washing out of the pelvis warded off an acute pyelitis if not uræmia.

The following is a very interesting example of the conservative influence of cystoscopic examinations. A man was brought to the Hospital with a history of a very severe renal colic persisting almost without interruption for 72 hours. During that time he had been under the influence of morphia and chloroform the greater part of the time, both night and day. The pain had all the characteristics of a renal colic on the right side. The pain occasionally passed down into the right thigh and right testicle. During a forced inspiration the lower pole of the right kidney could be palpated, and was found to be extremely tender. There was no special tenderness along the course of the ureter. On examining per rectum the tenderness on the right side was so great

as to suggest the possibility of the condition being one of a pelvic appendicitis.

In looking into the bladder with a cystoscope a stone was seen occupying the right ureteral orifice, and when the point of the catheter was brought against it he would cry out with pain. He was put back to bed and given moderately large doses of morphine and copious draughts of water to drink. For some hours after the examination the pain was pretty severe, and then disappeared and did not return while he was at the Hospital. Before leaving, the bladder was examined again, and the right ureteral orifice was found empty. The edges were swollen and pouting and the mucosa around ecchymosed, a complete picture of the effects of traumatism. The stone could not be seen and although the man had been warned to be on the watch for it, I think it must have escaped during the time that he was pretty thoroughly under the influence of morphia.

Other instances illustrating the conservative influence of ureteral catheterization are seen in two or three cases that Dr. Campbell has examined where there was reason to suspect a calculus. In one instance I may say that an exploratory incision in the right kidney had been determined upon. On catheterizing the ureter, both sides were found alike and normal.

Any variation between the two sides is a deviation from the normal as taught by Casper. The urine from the two kidneys in health is similar in all its characteristics, in acidity, specific gravity, colour, freezing point, electrical conductivity, and the two kidneys have equal power to excrete methylene blue, indigo-carminc or phloridzinc.

In the three cases in which renal calculi and renal disease were excluded as the result of examination of the separate urines, the subsequent history has confirmed the findings.

The cases of tuberculous cystitis associated with renal tuberculosis that I have reported confirm the views so ably advocated by Rovsing that in the majority of cases the kidney precedes the bladder infection. The latter is generally a descending lesion. The little ulcer so constantly found around the vesical orifice of the ureter is an indication of the side involved, and this without any exception, in the cases that I have observed. The thickening and shortening of the ureter noted by Hurry Fenwick and so conspicuously present in one of my cases is probably, as taught by Adami and the German School, a secondary and ascending infection from the ulcer at the vesical orifice of the ureter; the infection being carried up very largely by the lymphatics.

After a tuberculous kidney is removed, not only the system and bladder are saved from further infection, but the remaining kidney

is relieved. It has fewer and less toxins to excrete. The albumen, if present, disappears, and it does its work without that handicap.

THE TREATMENT OF RHEUMATISM AT CALEDONIA SPRINGS.

BY

E. S. HARDING, B.A., M.D.

Caledonia Springs is situated five miles from the Ottawa river on the line of the Canadian Pacific Railway, and almost half way between Ottawa and Montreal. Unlike most of the spring resorts in different countries, no town has grown up in the neighbourhood, and this has probably been altogether due to the monopoly of ownership of the springs, and to the lack of natural attraction about the locality. The country about is flat and uninteresting—an almost level plain interspersed with meadows, bogs and woods. The soil is almost pure clay for some distance around, and the roads of a certain smoothness in dry weather, become slippery, soft and adhesive under the influence of rain. The streams running to the Ottawa river are sluggish and are discoloured by their windings through fields of clay and dark bogs of peat. In spring under the influence of the freshets, the streams quickly overflow, and large tracts are converted into shallow lakes. The wooded slopes of the Laurentians, rising boldly on the north side of the Ottawa relieve the landscape of its flatness, and the beauty of the river itself at this point is well worth the drive of five miles.

The climate is that of the Ottawa valley in general, being slightly more humid than the surrounding places on account of the stretch of impervious clay. The temperature is about two degrees below that of Montreal, and the nights, even in hot weather, are usually delightfully cool. Breezes spring up quickly but are seldom violent and do a great deal to temper the heat of a hot summer day. The thunder storms are not heavy nor frequent.

The character of the geological formation along the Ottawa valley seems to be favourable to mineral springs, as a chain of these exists along the course of the stream. The better known are at Eastman and Casselman near Ottawa, Plantagenet and Caledonia (several springs) lower down, and at Maisonneuve, and Varennes, near Montreal. Although differing greatly in ingredients they are all fairly strong in mineral salts.

Caledonia Springs have been known for their curative properties since 1803. A hotel was in existence for the accommodation of health-seek-

ing pilgrims as early as 1830, and probably even before. A good sized hotel was built in 1836 and the reputation of the waters even at that time extended through Eastern Canada and the Northern New England States. Since that time the history of the place tells of regular advancement interspersed with various important events—horse races, walking contests, miraculous cures and hotel fires. Many interesting stories are told of the old days. People are still living who have known the place since 1840, and many have made almost annual pilgrimages for 30 or 40 years. Until about 10 years ago, the trip from Montreal was an arduous undertaking. First, by train to Lachine, then by steamer through Lake St. Louis and Lake of Two Mountains to Carillon, again a ride on the cars over the famous narrow gauge to Grenville, thence by boat, to L'Original and finally by means of a stage-coach ride of 14 miles the destination was reached. With such a trip on perhaps a rainy day, the faithful rheumatic pilgrim must have believed great things of Mecca. Now the main line of the Canadian Pacific Railway runs through the property and ten trains a day with modern telephone and mail service make it almost a suburb of the city.

At Caledonia Springs there are four distinct and well marked springs constantly flowing. These differ in amount of flow, mineral ingredients and contained gases. Three rise within an area of fifty yards and the fourth is about two miles distant. Some salts are common to all and the uniform temperature of the water is 45° F.—said to be the average temperature of the locality.

The distant spring is known as the Duncan. The water is of the alkaline—saline—carbonated group. It is much the strongest in the amount of chlorides contained and especially sodium chloride. The action of this water is strongly aperient and its use is confined entirely to cases of constipation. The taste is rather bitter, but this is lost when taken hot.

The Gas Spring is also an alkaline-saline water and derives its name from the presence of carbonic acid gas. The carbonates of magnesium, calcium and sodium are present. In taste it is most pleasant. Its therapeutic use is derived mostly from the presence of carbonic acid and the carbonates, making it of value in gastric conditions.

The Saline Spring is a mild saline-alkaline and is the most popular of the waters, being the one largely bottled and shipped. It has an agreeable taste, although, to the newcomer, the faint odour of hydrogen sulphide is noticeable. The flow formerly exceeded 15 gallons a minute, but the outlet having been raised it is now only 7 gallons a minute.

Therapeutically, it is the general purpose water, but is most useful in uric acid conditions.

The Sulphur or White Sulphur is alkaline-saline, sulphated and sulphuretted. Its taste is at first rather strong on account of the gas, but one soon learns to like it. It contains 1 cubic inch of H_2S in a gallon. It owes its therapeutical properties to the presence of the sulphur and is largely used in rheumatism. If taken in large quantities at first, its action is quite severe, often causing vomiting, headache, and constipation.

One feature of these waters, sufficient in itself to make them popular, is the absolutely pleasant taste compared with most mineral waters. Visitors who have been at many springs, praise this quality very highly.

Besides the four springs, there is an Artesian well, 175 feet deep, from which flows the strong alkaline sulphur water, used in the baths. No complete analysis of this water has been made.

In speaking of the action of the Caledonia mineral waters, it will be as well to pass in review the various salts which they contain. Dr. James K. Cook, in his work on "Mineral Waters of the United States," succinctly says that the "most frequent and most important component in all mineral springs is indisputably water." It may seem superfluous to mention the therapeutical action of water, but if there is not an ignorance of its properties, there is undeniably a great lack of appreciation of its merits. I merely mention its action as a diuretic and its power to increase peristalsis when taken cold.

The strongest mineral constituents in the Caledonia waters are the chlorides, the first of which is sodium chloride. The physiological actions of these salts which I wish to emphasize are:—the function of regulating the absorption of body fluids and of exudates; the action in the stomach where they combine with lactic acid, liberating hydrochloric acid, thus aiding digestion and increasing the amount of pepsin; the action in the secreting glands of the gastro-intestinal tract increasing the flow of gastric juice, bile, pancreatic juice, and intestinal fluid, promoting appetite, aiding digestion and helping exudation. Therapeutically they are of value in gastric, hepatic and intestinal disorders and especially in atonic dyspepsia.

The most important constituents of the waters, in relation to rheumatism are probably the alkaline carbonates, which are present as the salts of magnesium, calcium and sodium. Their action is important. Given before meals the flow of gastric juice is excited, given after meals the acidity of the stomach is neutralized. They are quickly absorbed and render the blood more alkaline. They are diuretic, acting directly

on the renal epithelium. They are quickly excreted in the urine, rendering it alkaline, and thus increasing its power of holding uric acid in solution. They are recommended in acid dyspepsia, with eructations, pyrosis and flatulence, also in fever, rheumatism, gout, vesical irritation, gastro-intestinal catarrh, engorgement of the portal system, and conditions of uric acid, gravel, and calculi.

The bromides and iodides of sodium and potassium are present in the waters in small quantities. Iodides are said to be active as alteratives in mineral waters even in very small quantities. Alumina and silica are practically inactive. The salts of soda have no action on the heart and do not increase tissue waste.

The salts of potassium are slightly depressant to heart and muscles. They lessen blood pressure, lower temperature and promote excretion of inflammatory products. Both salts tend to dissolve mucous secretions and exudations. Calcium chloride promotes secretion of urine, perspiration and mucus.

Of the gaseous constituents, carburetted hydrogen is non-medicinal. Carbonic acid gas promotes flow of saliva, allays nausea and gastric irritation, and aids digestion. It tends to render the fluids of the body alkaline, and promotes diuresis. It is very sedative to the stomach. Hydrogen sulphide has a doubtful action on the system. Dr. Moorman, of Virginia White Sulphur Springs, claims it is an alterative equal to mercury. Empirically it has attained a wide reputation in rheumatism, gout, hepatic congestion and pelvic disorders.

Zatloukal, of Carlsbad, sums up the action of alkaline-carbonated waters on the system as follows:—They are purgative, causing a loose movement; are diuretic, rendering the urine alkaline. They cause an increase of gastric juice, thereby dissolving mucus, accelerating the digestion and increasing the appetite. The alkalinity of the blood is increased, facilitating assimilation. The free acids occurring in the stomach are neutralized, aiding to dissolve and liquefy the thick and indurated mucus which results from imperfect and slow digestion. The mucus and irritating faecal matters retained in the intestines are removed. Circulation in the portal system, and in the lymphatic system of the abdomen, are stimulated and by this activity the diseased matters are dissolved and carried out of the system. The secretion of bile is augmented and diluted, promoting solution of gall-stones and their subsequent passage. He further claims that there is a separation and diminution of sugar in diabetes. Taken warm, they stimulate the circulation of the blood, and secretion and absorption are hastened. Taken cold they are relaxing and increase peristalsis. The effects are greater on an empty stomach.

Regarding the advantage of rendering the urine alkaline in cases of rheumatism, Brissel's experiments showed that normal urine was fully saturated with uric acid, and on being cooled to 60 F. deposited about half of it. But after taking warm alkaline water the urine contained much larger quantities of uric acid and on being cooled to 60 F. did not deposit any, but was capable of holding still more in solution. He showed that this urine would dissolve three times as much uric acid as normal urine. Some additional actions might be mentioned that have been observed at Caledonia Springs. It is remarkable how quickly the habit is formed of drinking large quantities of the waters and people frequently have to be restrained. There is undoubtedly an increased thirst acquired by drinking these waters—paradoxical as it may seem. This is accounted for by the salty taste and the slight inhibition of the flow of saliva by the carbonates; further, the depleting action of watery stools and the diaphoresis of the hot baths create a systemic demand for fluid; a reflex stimulus is also present from the cool refreshing taste of the water and the constant example set by others. An increased appetite is almost universal from the first day. A disinclination for activity or energy is common and rather detrimental. The purgative action follows the drinking of the hot water in the morning, resulting in from one to three pappy, usually watery, evacuations before or soon after breakfast. During the rest of the day there is no movement. The diuretic effect is variable, depending upon the amount of watery excretion by the bowels and skin. It is most marked towards evening after drinking the cold waters. An action of the Caledonia waters that I have not seen commented upon in reports from other springs is that upon the alcoholic. There is a marked inhibition of the taste for liquor.

Untoward or toxic actions of the waters are occasionally noticed, the principal of which are headache, malaise, constipation, oedema and gastro-enteritis. They are usually caused by taking the sulphur water too soon or in too large quantities, sometimes aided by a too hot initial bath. The person feels a dull depressing headache with malaise, loss of appetite, furred tongue, feeling of oppression, and bloating. Where there is also constipation, oedema may be quite extensive, showing early in the face. The condition is sometimes refractory to treatment. These symptoms, however, are practically never seen where the rules of treatment are carefully followed, and I do not remember of seeing them except at the beginning of a course.

Gastro-enteritis at the beginning or during treatment is far too common, but its cause is not always apparent. The attack is frequently

quite severe, and at times almost seems epidemic, but is seldom refractory to treatment. The possible causes are:—indiscretions in diet (both in quantity and quality), the drinking of cold water in too large quantities or too soon after meals, sudden changes in climatic conditions, or the sudden liberation of quantities of uric acid in the system by the alkaline waters and hot baths without sufficient excretion. A mild attack early in treatment seemed to have beneficial after results. A curious result sometimes noticed on drinking the waters is an obstinate constipation. To avoid this a free action must be obtained at the beginning of treatment.

The other important agent in the treatment of rheumatism with mineral waters is the hot bath. The absorption of mineral ingredients in the waters of the baths is generally conceded to be very slight, the therapeutic value being due to the action on the skin and on the circulation. On entering a bath from 95° to 106° F. the first feeling is depression, soon followed by a sense of comfort and relaxation. From mechanical pressure and stimulation the blood is first driven to the internal organs. Then follows increased respiration, quickened pulse, rise of the body temperature, lowering of blood pressure and hyperemia of the skin. The chlorides and carbonates tend to soften the skin and stimulate it, dissolving at the same time the secretions of the sebaceous and sweat glands, removing the adherent epidermic scales and the obstructing masses of secretions. The fatty exudations are saponified, the ducts opened, the capillaries flushed and the glands stimulated. The increased pulse and respiration mean increased metabolism throughout the body, and there is an increased excretion of gaseous material. Brissel has shown that the douche bath has greater effect than a plain one, the changing force of water alternately contracting and dilating the superficial vessels. The same writer has demonstrated that the excretion of urea and uric acid in the urine was greatly increased by these baths.

In some experiments in hot baths, made at the Springs, in which the water was gradually heated from 100° to 106° F. the pulse increased from 66 to 140, the respiration from 14 to 19, and the temperature (taken by mouth) from 98° to 102° F. This increase of temperature is interesting since Dr. Haig claims that fever renders the blood more acid and deposits uric acid in the tissue, while the result of baths shows an opposite effect as regards the excretion of uric acid in the urine. The temperature returns to normal within a few minutes after the bath, but the accelerated heart action may continue for an hour or two. The degree of perspiration induced by hot baths

differs greatly with different individuals—some finding it difficult to induce even a mild diaphoresis. I have seldom, if ever, however, seen this in a rheumatic patient.

In endeavouring to induce a diaphoretic action in the baths various expedients have been found useful. Drinking a glass or two of water while in the bath will start perspiration, and especially if taken hot; gentle massage during the bath, and exercise just before, have the same effect; beginning with a moderate temperature and gradually heating the water is better than entering a hot bath; moist air in the room also makes diaphoresis easier. Of untoward effects of baths, headache is the most common. To overcome this the feet are first submerged in hot water, and during the bath a towel wrung out of cold water is kept applied to the head.

I have never seen a rash or irritation of the skin caused by the baths even under excessive use.

Very little need be said concerning the cold, tepid and warm baths. The cold bath is used a great deal for a tonic and stimulating effect, and in a great many conditions the hot bath is followed by a cold spray or submersion with great benefit. A cold bath should never be given beyond the point at which a quick reaction takes place. Beyond that point there is a feeling of lassitude and a sense of persistent chill which is difficult to throw off. The warm bath is sometimes useful as a hypnotic.

The regime of treatment for those coming year after year to Caledonia Springs, mostly past sufferers from rheumatism, who take the waters for about 2 weeks, is as follows:—

Having risen early, they slowly take while dressing from 2 to 6 glasses of saline water, as hot as possible. A period of half an hour or an hour elapses before breakfast, during which some exercise is taken. Breakfast should be light, if the patient intends to take a bath in the morning. Two hours after breakfast, from 10 to 11 o'clock, is the favourite time for the bath. A glass or two of cold water is usually taken before, or at bath time. The first bath of the course is taken at 95° F. for 15 or 20 minutes. Subsequent baths are taken every other day, or two days out of three, and the water is heated to 100°, or more, if necessary. After the bath the patient goes to his room and lies between blankets, resting there about an hour. This hot pack usually brings forth a copious diaphoresis, starting on the face and gradually including the body, being free enough at times to roll off in drops. It is not exhausting, and the patient frequently drops off into a comfortable doze, and at the end of the time feels rather refreshed. After the flow of

sweat has entirely ceased, the patient rises and takes a rub down with cold water or alcohol in order to close the pores and avoid any danger in subsequently going outdoors. He then rests quietly in his room until lunch time, when he is free to spend the afternoon as he chooses. During a period of baths the softened and opened skin is easily induced to perspire during exercise and considerable care must be taken to avoid all exposure to currents of cool air.

The afternoons are spent resting or taking light exercise in games and other amusements, but all the time possible is spent in the open air. The cold water from the springs is taken as prescribed at intervals of half an hour or more, but not less than two hours after meals. Quantities and intervals differ according to whether the directions are for gas, saline, or sulphur. Dinner is taken at night from 6 to 7.30, not to my mind a good arrangement, but one that is enforced by the dictates of fashion. During the evening music, cards, billiards, bowling, etc., fill in the gap before the early bed hour. Noise and music stop at ten o'clock, and eleven usually sees the house in darkness,—deep slumbers being the order of the night in spite of the reputed power of the gas water to provoke unpleasant dreams. I have always discouraged any drinking of the cold waters in the evening, believing that the gastric heat maintained by the body should not be interfered with after the heavy evening meal. Outdoor exercise, gaiety, freedom from care and a general air of brightness are encouraged. The veranda (the feature of the hotel) is the centre of life and becomes conducive to ready acquaintance and a spirit of camaraderie, but unfortunately the "touch of nature which makes the whole world kin" leads readily to the discussion of common ailments—a topic which should be entirely tabooed. The regular hours, outdoor life, pleasant surroundings and strong hope of cure, play no inconsiderable part in the therapeutic effects.

Before speaking of the treatment of rheumatism, I would first like to mention one or two other conditions in which the Caledonia waters have given good results. Perhaps they are all more or less dependent upon or allied to the uric acid diathesis.

Dyspepsia.—Cases of neurosis of stomach, acid dyspepsia with flatulence, and atonic conditions have given good results. The treatment is rational, consisting of a copious allowance of hot saline in the morning with cold gas water sipped at intervals during the day. A free action of the bowels and brisk exercise are essential. The diet is restricted but liberal, and the baths are tonic in character, that is,—a cold rub down in the morning, or a tepid bath ending in a cold shower.

Catarrh of the Gastric Tract.—I have been surprised how readily these cases generally improve under the influence of the hot saline water. Cold water is restricted or denied, and the sedative baths are ordered. Later a more tonic treatment is advised.

Chronic Constipation.—Hydrotherapy is, I believe, the rational treatment that effects a cure in this condition, and many cases have been successfully treated at the Springs. Temporary results are easily obtained by various expedients, but obstinate cases of chronic constipation are very numerous and very difficult to treat satisfactorily. The treatment I have used at the Springs is as follows:—The patient rises early, takes a cold sponge bath and while dressing drinks from 3 to 6 glasses of hot Duncan water (the strongest saline of the group). This change from hot saline to hot Duncan in the morning is sufficient in moderate cases. After dressing comes some sharp exercise,—a brisk walk, a short run, gymnastics, or an outdoor game. Then one or two glasses of cold saline taken at the spring, followed by a walk and a quiet interval before breakfast. Thus the principal part of the treatment comes before breakfast and a free action of the bowels takes place in the forenoon. Physiologically the action is almost entirely upon the intestines; the hot saline promotes the glandular secretion both of the portal system and of the intestines, at the same time dissolving viscid accumulations of incomplete digestion and of mucus; the cold water taken later stimulates peristalsis and probably the bulk of fluid materially aids; the muscular movements act in the same way by external pressure and stimulation of the walls of the intestines. The appetite increases and a liberal diet is allowed. During the day, exercise, bringing the abdominal muscles into play is recommended, and from 6 to 8 glasses of cold saline are taken. Hot baths are not indicated at the beginning as they tend to lessen peristalsis, but cold tonic baths are useful, especially the shower and douche. Should the first day's treatment not be effectual, it is necessary to give an efficient purgative that night. The severer part of the routine is relaxed as the bowels become regular, and an effort is made to effect regular action under conditions of ordinary life. One patient was under my care who had given up a political life, relinquished a large business, travelled to many resorts, and consulted many authorities seeking relief from chronic constipation, with no permanent results. The condition would return as soon as he took up the routine of business life at his home. In following up the results of some cases I wrote to him and received this reply:—"I may say that during the two weeks I spent at Caledonia Springs, I derived more benefit than during the two months at different times that I spent at Carlsbad."

Chronic Eczema.—Several cases have done well under treatment, but the number has been too small for definite conclusions.

Hepatic Cirrhosis.—Two alcoholic cases came under my notice, in one of which there was general improvement in the symptoms. The other case on arrival presented marked ascites, and on paracentesis being recommended, he promptly left for the city.

Vesical Irritation from Hyperacidity cleared up very quickly under treatment.

Lingual Ulcers.—An interesting case of lingual ulcers in a rheumatic came under observation, in which a previous diagnosis had been made of uric acid origin. They had always proved very resistant to both local and constitutional treatment. Several small ulcers appeared during the early part of the stay, but quickly healed without local application. The cure seemed complete and the condition has not since returned.

Alcoholism.—Patients taking the cure seem to lose the desire for alcoholic drinks. Cases of habitual drinkers carrying away untouched bottles of whiskey are numerous. When acute symptoms have been present, following a more or less prolonged bout the recovery was quick and the weakness soon overcome. One case distinctly failed, but the patient made no effort on his own account, and refused control.

Rheumatism.—The reputation of the Caledonia Springs has been earned almost exclusively from their effect upon rheumatism. The sceptic or the ultra-conservative practitioner should spend one day on the veranda gleaning the histories of treatment from the many habitués of the place to become convinced of a certain efficacy of the waters. To the scoffers it can only be said that they refuse to see results from the patients' point of view and decry the treatment because there is exaggeration in the advertisements, and a tendency for patients to elect their own treatment without authority from their medical advisers. These are two evils, yet they should not lead to a condemnation of Spring resorts, nor obscure the benefits of such places. I have tried to show that there is no faith cure in the use of mineral waters and baths, but that results are obtained from a definite physiological action. The practical thing is for physicians to become acquainted with the action of various mineral springs and make a judicious recommendation to their patients.

It is impossible in this paper to discuss rheumatism and its allied diseases, or attempt classification. Three broad divisions will best suit our purpose viz:—Rheumatism, Arthritis deformans and Gout. Three broad divisions of Rheumatism are also necessary, viz:—articular, mus-

cular, and neuralgic. Dr. Haig, of London, in his book on Uric Acid, states that arthritis is due to the irritant action of uric acid on the fibrous structures of the joints. He says that an attack of rheumatism is dependent upon an increased quantity of urica and uric acid in the system due to lessened alkalinity of the blood—upon this a chill, which lessens the acid excretions of the skin and increases the blood acidity, deposits some uric acid in the fibrous tissues—an injured joint having the preference. The irritation then causes fever and fever causes a still greater degree of acidity and consequently a greater deposit. The cartilages and fibrous tissues of the joints are less vascular and less alkaline than other tissues and consequently are the seats of election. But other fibrous tissues are involved as the great lumbar fascia (lumbago), the sheaths of the great nerve trunks (sciatica), fibrous tissues of the pelvic organs in women, and the fibrous tissues of the heart (pericarditis and endocarditis). It is well to remember this theory of etiology, that acidity added to incomplete oxidation or assimilation is the prominent factor.

Acute Articular Rheumatism or Rheumatic Fever is not very common at the Springs but the cases that have come under my observation have made good recoveries. As these cases generally respond satisfactorily to treatment with salicylates, alkalines and rest in hospital and private practice, a long series of cases would be necessary to demonstrate that better results can be obtained by treatment at the Springs. I believe this would be shown by fewer complications, quicker recoveries and better after-results. Most authorities agree that the heart complications are fewer when the system is alkalized early in the disease. One feature was thoroughly impressed upon me in treating these cases, and that was the greater comfort of the patients. Inflamed rheumatic joints are painful to move but the patients welcomed the time for their daily bath, and once in the water they were happy. It is surprising with what freedom they would move the joints under water. Hot douches upon the swollen joints were also sedative. Movements and hot douches were encouraged, tending to quicken absorption of the uric acid into the circulation, knowing that the drinking of the alkaline carbonated waters had rendered the blood alkaline enough to take up more of the acid and that the increased diaphoresis, diuresis and purging were sufficient to quickly eliminate it. In fact, large quantities of the mineral waters internally are necessary for secretion and excretion of the increased amount of final products resulting from the increased metabolism caused by the baths. At the termination of the bath I found it added comfort to the patient in cases of hyperpyrexia to

cool the water down until it had an antipyretic effect. A few hours of comfort and often a refreshing sleep followed the bath. Diaphoresis was encouraged but the patient was given cold sponging at night. Salicylates were only exhibited where there was constant hyperpyrexia or excessive pain causing insomnia. As the fever subsided, the patient was wheeled out into the sun and slight exercise encouraged as early as possible.

Sub-acute and Chronic-Articular Rheumatism brings many patients to the Springs with painful, stiff or swollen joints. The treatment consists of the morning hot saline, sulphur water during the day, temperance in eating, hot baths and physical exercise. In the baths, massage and hot sprays were used and movement encouraged. Under the influence of the baths the stiffened joints relax and much more movement is possible. These patients are encouraged to take as much exercise as possible, unless specially contra-indicated. Nearly all cases soon show improvement and the percentage of cures is large. Advanced cases with osseous proliferation or structural disintegration could, of course, only be ameliorated. A large number of chronic cases return annually for a fortnight's stay, claiming that the course of treatment kept them free from attacks during the winter.

Chronic Muscular Rheumatism presents similar features to the last and the treatment is the same. In the absence of marked structural change one expects much quicker results, but one is sometimes disappointed as some of these cases seem very resistant to treatment.

Neuralgic Rheumatism.—Sciatica, of course, is the most common form of this, but I had several cases of brachial neuralgia where the pain was confined to the shoulder. In these cases there were usually no tender points on pressure, no loss of muscular power and no swelling of the joint, while in some there were no other symptoms of rheumatism. In treatment, I found them as stubborn as sciatica. Hot baths gave temporary but not permanent relief, and often the pain seemed to be increased. Tonic baths were then tried with better success and the best results were obtained by hot sprays on the affected part, followed by a cold shower, or by alternating hot and cold sprays. Quick results were not obtained in these neuralgic conditions but the final results were good. As far as I have heard from most of the cases the cures were complete, sometimes, however, not until after they had left the Springs. Exercise was encouraged, and a general building-up or strengthening treatment.

Arthritis Deformans.—One interesting case was under my care, and I am sorry not to be able to give full particulars, but will mention two

noticeable results. Before coming to the Springs the patient was practically confined to the house, but within a month enjoyed taking comparatively long walks. On returning home for a visit, a retrogression was apparent, being again confined to the house on account of the pain experienced in walking and there was a marked depression of spirits. Recovery to the former improved condition was almost immediate on return to the Springs. After 12 weeks stay, the patient was able to flex fingers to the palm, a thing which had been before impossible. It will be interesting to watch the final results.

Gout.—I have had little or no experience with true gout at the Springs. Undoubtedly the condition would be benefited.

It has been my policy at the Springs, to give little or no drug treatment in conjunction with the waters, believing that it is unnecessary and even undesirable. The aim of treatment has been (1) to improve the condition of the digestive tract, that assimilation may be perfect. (2) To render the blood and urine alkaline, that the power of dissolving uric acid and incomplete products of metabolism may be as great as possible. (3) To stimulate the emunctories and increase excretion. (4) To encourage a good appetite on a liberal but restricted diet. (4) To compel the use of the muscular system by exercise. (6) To improve the mental tone by bright surroundings. As regards diet, the patient is forbidden alcohol, sweets, very rich foods, and any excess of fresh meat. As regards exercise, the grounds are well supplied with the apparatus for games of all kinds, from rope quoits to golf, and activity becomes much greater when under the stimulus of a competition, and the excitement of a contest is stimulating.

One drawback to successful treatment of chronic cases was the rooted belief of people that they should not stay more than two weeks. I recently read with pleasure an article by Dr. F. L. Satterlee, of New York, on Rheumatic Poison and its Treatment. Allow me to quote from his paper. "The diet lists for rheumatic patients, promulgated for many years without much correction, are in my judgment entirely false and far too restrictive. . . . My experience shows that it is only necessary to cut out of the diet red meats and alcohol, and to reduce to a minimum articles containing sugar. . . . Exercise is needed not only to increase the oxidation of waste products, but also to promote their elimination. . . . Let the patients throw away their crutches and canes and strive to use every muscle until it works normally." Again, he says: "I must emphatically condemn the use of certain drugs and medicines which have appeared for many years in our text-books as specifics. . . . (Use) the alkaline treatment which is as old as medicine

itself and in which we not only have a very successful method of treatment but good reasons why it is the best that can be adopted."

In closing I wish to say a word about the future of the Caledonia Springs. They have recently come into possession of the Canadian Pacific Railway Company, and probably no better fate could have befallen them. These springs are favourable for the establishment of a large resort in which to "take the waters" and many benefits could be derived in making them popular. Undoubtedly, they rival in many qualities some of the well-known European resorts. It is no slight advantage to have near at hand a suitable place where cases requiring treatment at such resorts can be confidently sent. To gain the confidence of the medical profession it is necessary that the therapeutical or medical claims should receive every consideration. The Springs are primarily a resort for health and it is to be sincerely hoped that the Company will develop them with this in view. In one way they have already done this by opening a hotel for the winter treatment of cases—a season of the year when rheumatic affections are so common. Establishing a second hotel with lower rates will also bring the means of treatment to a larger class. A word of praise should be given the present manager, who has for years been in touch with the records of the Springs and who appreciates and considers first the comfort and care of the guests who are there for their health. In the past, guests have been free to use the baths and waters according to their own judgment or according to the abundant advice which is so freely given by friends. This has been detrimental to the best interests of the Springs and we hope it will soon be changed, and that all will be under medical supervision. Resorts like this soon draw many who are not seeking relief from ailments, but merely distraction or amusements and some tact is necessary to fuse the different elements. However, no one disputes that the patient has first rights, and I feel sure that his interests will always predominate.

CYSTOPEXY FOR FALLING OF THE BLADDER.

BY

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Among the many causes of cystitis there is one which has received very little attention in the text books, namely, cystocele or falling of the bladder. This condition generally accompanies falling of the uterus, but may occur alone. The cause of cystocele is a difficult labour,

in which the head pushes the bladder before it, although it must be said that it is more frequently due to the too early use of the forceps. With this instrument the head may be dragged down with great force, tearing the bladder away from its attachments to the back of the pubis and to the anterior abdominal wall, to which it is held by the urachus and the peritoneum.

The accident is more liable to occur if the bladder has not been emptied shortly before the passage of the head. The condition of cystocele is best diagnosed while the woman is standing, when a soft round ball will be felt projecting from the front of the vulva under the pubic arch. If there is also prolapse of the uterus, the cervix will be felt just behind it, while back of that again there may be a rectocele. When the woman is placed on her back, on the examining table, the round mass will become smaller but will not disappear altogether unless the bladder be emptied with a catheter. When the latter is introduced, instead of going upwards and forwards behind the pubic arch, it must be turned downwards and backwards in order to enter the bladder. Moreover, even if the woman has just passed water some more may still be obtained, this being residual urine. The woman herself when complaining of this mass almost always thinks that it is the womb, although I have occasionally found that the uterus was in good position, so that her diagnosis is sometimes misleading.

The following description of the symptoms is taken from one of the latest text books, and is all the notice of this condition that I have been able to find therein. When the cystocele has become at all marked, dysuria is present, and considerable effort must be employed to empty the bladder. Thus another cause for increasing the cystocele is generated. Complete evacuation of the bladder becomes impossible, a little urine is retained and decomposes; an irritable and inflamed condition ensues at the neck of the bladder, followed by *ardor urinae*. As the cystocele increases in size, the neck of the uterus is pulled upon more and more, and the descent of the whole organ facilitated. Thus it is that, once the prolapse is accompanied by cystocele and rectocele, these conditions become causes for such efforts to empty the bowel and bladder as to still further add to the descent. The condition very much resembles that of retention of urine in the male from enlarged prostate, and is due to the same cause, namely, the presence of residual urine.

The remedy advised in most of the text books is drainage of the bladder by a buttonhole fistula into the vagina. This undoubtedly cures the cystitis by draining from the lowest point, and doing away with residual urine, but as it necessitates the woman staying in bed,

and that she should be constantly lying in cloths and pads saturated with urine, the remedy is almost worse than the disease. And there is no end to it, for as soon as the fistula closes the cystitis returns. A catheter *à demeure* is much preferable, while even passing the catheter two or three times a day, as men with enlarged prostate do, gives some relief without the discomfort of a fistula. A better thing still is to cure the cystocele, and for this purpose Stoltz's operation on the anterior vaginal wall has been considered the most effective means for the last twenty years. It is not always successful, as the scar or the adjacent weakened tissue, gradually stretches again and allows the bladder to fall. Reynolds, of Boston, devised an operation three years ago, for bringing the separated pelvic fascia together again in the middle line, and Dudley, of Chicago, has invented still another much more complicated one with the same object in view.

A little more than three years ago, the writer proposed the operation of cystopexy or fastening up the bladder to the abdominal wall as a remedy for cases of cystocele, accompanied by falling of the uterus, causing enough discomfort to justify the slight risk of opening the abdomen. His first case was reported in April or May, 1904, and proved entirely successful. It was performed on an elderly woman who had been treated for a long time with medicine and washing out the bladder, without curing her. In her case, being long past the menopause, the uterus was small and there was no prolapse. Since then he has done cystocele, rectocele, and prolapse of a lacerated and retroverted uterus: namely; first, dilatation; second, curetting; third, amputation of the lacerated and hypertrophied cervix; fourth, posterior colporrhaphy or perineorrhaphy for rectocele following a lacerated perineum; fifth, cystopexy instead of Stoltz's operation; sixth, removal of large, heavy and cystic ovaries; seventh, ventrofixation, requiring altogether from an hour to an hour and ten minutes. As the operation has not received the attention it deserves, judging from the few cases which have been reported by other operators since the writer reported his first case, he now reports this one with the hope that it will be tried by some of the more prominent operators, and if found to be as valuable as he believes, that it may be adopted as a standard method of treating these rather intractable cases of bladder trouble.

The operation is very easy to perform. After the abdomen has been opened rather near the symphysis pubis, the bladder will be seen low down in the pelvis, and must be gently grasped with a bullet forceps, and drawn up as high as it will go without employing any force. Both the peritoneal surfaces on the bladder and on the anterior abdominal

wall are scarified or criss-crossed with a needle until there is slight oozing. A curved needle is then passed through the abdominal wall including all layers except skin and fat, then under the peritoneal and muscular layers of the bladder and out through the peritoneal and muscular layers of the abdominal wall on the other side, bringing after it a chromicized catgut thread, strong enough to last a month. Two or three similar stitches are passed at intervals of half an inch, after which they are firmly but gently tied. This is generally followed by fixation of the uterus about an inch higher upon the abdominal wall, although in one case there was no need for doing it, as the uterus was in good position. Care must be taken not to allow the needle to go through the vesical mucous membrane although there is very little danger of doing this, as the needle can be kept in view all the time as it passes under the transparent peritoneum and muscular layer of the bladder. The larger the area of scarification on the bladder and abdomen the stronger will be the adhesion and the more certain will be the result. No precautions are necessary with regard to emptying the bladder; as a rule the patient can do this without the help of a catheter from the very first.

Case.—Mrs. W. B., aged 53, was sent to the writer by Dr. Pickell, 29th October, 1906, for bladder and womb trouble. She was born in England, began to menstruate at 16, and continued to do so normally until her marriage at 21. She had six children, the last one eighteen years ago. Her first labour was so severe that she had two doctors with her for seven hours, and it was terminated with instruments. She had no miscarriages. She had the menopause at 47. She complains a good deal of bearing down or dragging pains. She is troubled with frequent micturition and sometimes has to pass water every five minutes, having to strain a great deal without passing very much.

On examination, the uterus was found to be retroverted to the second degree. The perineum was not bad enough to cause a rectocele, but there was a marked cystocele which did not go in when lying down. She thought that this round mass was the womb, but the latter did not come out at all. After a week of preparatory treatment her abdomen was opened, and the bladder picked up with a pair of bullet forceps which did not go into the cavity but only through the peritoneum and muscle. After giving a wide and thorough scarification it was attached as above described. Then the retroverted uterus was caught up and attached in the usual manner. The result was very marked. The day after the operation she was holding water for four hours. I have since heard from her physician, who writes under date of 14th

March, that he had called several times to see Mrs. B. but she was out each time. Her husband informed him that she was completely relieved of her long standing complaint, especially the bladder and the old bearing-down pain. He closes by saying: "I think the operation entirely successful."

RUPTURE OF SUBCLAVIAN ARTERY AND BRACHIAL PLEXUS BY DIRECT VIOLENCE.

BY

JAMES BELL, M.D.

D. F., aged eight years and four months, was injured in the following manner on the 5th of January, 1907, while playing in the lumber woods in New Brunswick, where trees were being felled. He was lying face downward with the upper part of his chest upon the rocker of a large logging sleigh when a tree fell, struck the other end of the rocker, and threw him into the air a distance of ten feet. There is no evidence as to how he fell to the ground. He was unconscious for about two hours and was soporose and delirious for the next two or three days. A physician saw him within two hours of the injury and was unable to detect any pulsation anywhere in the arm. The arm was absolutely paralysed from the moment of the blow. On the following day the points of the fingers began to become black, and on the 15th of January, ten days after the accident, when he came to the Royal Victoria Hospital, the forearm was gangrenous, and there was a large patch of ulceration on the back of the arm where a hot water bottle had been applied on his return home after the injury. Sensation was absent up to the line of the shoulder point. There is a good deal of ecchymosis over the front of the chest and the neck, and a strand of cat-gut had been passed underneath the outer end of the clavicle with the view of holding it forward. The clavicle was fractured at the junction of the middle and the inner third. On the 16th of January, the arm was amputated at the shoulder joint. There was no bleeding whatever, except a slight oozing from the muscles. Forceps were applied to the cut ends of the vein and artery, and, after slight manipulation, that attached to the artery dropped off with about an inch of the vessel. There was still no bleeding and a good deal of dissection was required to find the proximal end of the vessel, which bled freely and was ligated. The cords of the plexus were held together by cellular infiltration. There was no injury to the cords at the point of amputation. The boy made an interrupted recovery and has gone home.

There was, while in hospital, evidence of great nervous shock, but the local conditions were entirely satisfactory, and the patient was in all other respects quite well. The extraordinary feature about this accident seems to be that the vessel was not crushed off by the blow, but was torn apart at a point a couple of inches lower. I have not looked into the literature of the subject, but I have had no previous experience of such an injury, and would have considered it impossible if I had not seen it. Upon microscopical examination it was found that the inner coat of the vessel had been torn away for about a half or three quarters of an inch, which allowed, probably, contraction and inturning of the proximal end, and this prevented bleeding. There was no blood clot whatever at the point of the torn vessel.

PUERPERAL CONVULSIONS DUE TO INTRACRANIAL PRESSURE—LUMBAR PUNCTURE—RECOVERY.

BY

H. L. REDDY, M.D., L.R.C.P., Lond.,

Physician Accoucheur to the Women's Hospital, Montreal.

L. W., aged 18, admitted to the Women's Hospital May 2nd, 1906, in the sixth month of pregnancy. On examination she was found to be a healthy, well-developed girl. There was nothing worthy of note, except that the urea was 50 per cent less than normal. Three weeks after admission, œdema of the ankles and frontal headache were noted, and a week later the prodromata of convulsions appeared, severe frontal headache, flashes of light, general œdema and lassitude. She was then given the ordinary treatment given such cases, hot packs, free catharsis, with salines, iron and digitalis, and milk diet. She reacted well to treatment, the urea, nearly always from 500 to 600 grains per diem, only once was as low as $25\frac{1}{2}$ grains. In all she was given six hot packs. During June and July, sometimes a very slight trace of albumin was present, but no casts could be found. Labour came on July 27th, lasting $17\frac{1}{2}$ hours, and was perfectly natural.

July 28th.—Patient slept well during the night, but on awakening complained of severe frontal headache and a thick mist before her eyes. About two hours later she was only able to distinguish light from darkness. On examination by the house surgeon she was found semi-comatose; answered very slowly and deliberately, but rationally, when spoken to; face œdematous; respiration stertorous; pulse hard and full. Before any treatment could be given she had a convulsion. The ordinary treatment for convulsions was then given, bromide of potassium

and chloral by high enema, morphine, oxygen, etc. One convulsion followed another until she had nine, the time between each becoming shorter. On examination after the ninth convulsion we found the pupils did not react to light, pulse rapid, breathing becoming slower, shallow and stertorous, œdema, especially of face, very marked. The patient was comatose and evidently going from bad to worse. Since the urea had been abundant before delivery, and, therefore, it was not an auto-toxæmia, on consultation with Drs. Burnett and Thompson, we decided to do a lumbar puncture to relieve what we believed to be the cause of intracranial pressure. A puncture was made between the third and fourth lumbar vertebræ on the right side, one ounce of clear fluid being removed. The first portion of the fluid was slightly blood stained from the penetration of the parts by needle. The fluid spurted out at first, and we removed all that would flow. In twenty minutes the pupils began to react. In the next hour she had her three last convulsions, and then fell into a quiet sleep which lasted off and on until next morning. When she awakened she complained of headache, but felt better. Vision was returning rapidly, and the pupils reacted. Three hours later the patient was bright and cheerful; pulse, respiration and temperature normal; vision rapidly improving. From this time on she made an uneventful recovery, and was discharged on August 16th perfectly well. A catheterized specimen after the convulsion showed only a slight trace of albumin.

Dr. Kerry's report on the eyes, made two days after the convulsions appeared, is as follows: "Normal in appearance, pupils half dilated and sluggish in action, functions approximately normal. Fundi, veins dilated, slightly tortuous, arteries narrow, disc fairly defined, though somewhat veiled at the margin by œdema of the retina. Physiological excavation nearly obliterated, centre of the disc woolly in appearance. Maculæ large and pale.

The condition corresponds to one produced by raised intracranial pressure; the case furnishing a typical example of so-called uræmic amaurosis. In the more common type of this affection, the visible alterations in the fundus are confined to those described above, and as cases are on record of patients dying of uræmic poisoning within a few days after recovery from an attack similar to the one here described, it would seem as though this condition is not dependent upon the presence of uræmia. As the complex symptoms present in this case can be produced experimentally by a rapid increase of intra-cranial pressure, it seems but reasonable to ascribe its occurrence to this cause, the more so since the rapid recovery can thus be satisfactorily explained.

Examination made two days later showed no change except a slight increase of œdema around the disc.

This case is to me a very interesting one, showing that all puerperal convulsions are not due to autotoxæmia, as the quantitative analysis for urea showed, as well as the symptoms, and the prompt recovery after puncture. I doubt if the albumin had a significance, beyond showing pressure. The puncture is harmless and comparatively easily performed, and doubtless in many cases would relieve symptoms temporarily after a number of convulsions, as I believe fluid will then be found in the cerebro-spinal canal in these cases.

SHOCK SIMULATING CEREBRAL HÆMORRHAGE.

BY

J. ALEX. HUTCHISON, M.D.

Surgeon, Montreal General Hospital.

The patient, G. W., aged 33, a draughtsman, was admitted to the General Hospital, at 7 p.m., on December 6th, 1906. He had been standing on the rear platform of a street car, when the car running rapidly backwards crashed into another car, which was standing still. He was caught, with several other passengers and badly crushed, became unconscious, and was removed to the hospital.

Personal History:—Weak heart for years, not allowed to take part in athletics or to join regiment on that account; fairly active life and never had signs of failing compensation; does not use alcohol or tobacco to excess.

On admission:—Well nourished, healthy looking man; quite conscious and mentally clear; evidently considerable pain, no apparent shock. Extremities warm. Pulse 86, regular, good volume, low tension; temperature 99, respirations 22. Oblique fracture of right humerus about junction of middle and lower thirds; fracture of left femur in middle third; fracture of left tibia and fibula about junction of middle and lower thirds compounded by a large "button hole" opening on front of leg, apparently caused by upper end of lower fragment of tibia protruding through skin. Considerable hæmatoma and a small amount of oozing through wound. Lacerated scalp wound one inch long behind left ear over base of mastoid process surrounded by small hæmatoma; smooth bone at base of mastoid process can be felt with probe; abrasions of forehead and of lower abdomen; no evident injury to thorax or abdomen.

Patient made as comfortable as possible, splints applied to fractures, and scalp wound sutured. At 12-p.m., perfectly conscious and mentally clear. At 4 a.m., began to be rather dull; at 8.15 was stuporose, mild muttering delirium at times. Would only answer a few questions and did not seem to understand all that was said to him; no complaint of pain. Temperature 102 2-5, respirations 38, pulse 140, small, regular. No cough or consolidation of lungs, expansion equal. Apex beat just outside nipple line in 5th space, faintly palpable at apex; first sound loud and booming; no murmurs. Abdomen normal, except slight tenderness on pressure over pubes. Bowels and bladder normal. During the day stupor deepened to coma, from which he could not be roused.

Seen by Dr. Finley at 2.30 p.m. Unconscious; slight movement when pricked with pin; no evidence of paralysis; left eyelid almost completely closed, slight slit of right; pupils equally active to light; cornea on right completely anæsthetic, on left impaired sensation; McCarthy reflex present on both sides. Triceps and radial jerks present; plantar flexion; ankle clonus; knee jerk increased; epigastric present; cremasteric present.

Coma deepened, occasional cough, retention of urine, respirations increased in frequency, pulse steadily failed. A possible surface or sub-dural hæmorrhage was thought of and operation discussed but the patient died at 8.45 p.m., 39 hours after the accident.

Autopsy by Dr. R. C. Patterson, revealed fracture of right humerus and left femur; compound comminuted fracture of left tibia and fibula; multiple superficial abrasions; chronic endocarditis with stenosis of mitral and aortic valves; myocarditis; congestion and œdema of lungs; acute bronchitis; sub-pial œdema; ruptured capsule of spleen with blood in the peritoneum.

I am indebted to Dr. T. R. B. Nelles for the notes of this case.

This case was rather puzzling. A point which presented itself to me was that the stupor answered very well to the rupture of the middle meningeal artery. First of all, there was the unconsciousness for a short time, then a number of hours of perfectly clear mental condition and a slowly increasing coma. There was also the question that there might be pressure on the left side, but this could not be made out with sufficient certainty to warrant interference. One never sees rapid pulse and respirations with a cerebral hæmorrhage and as the respirations were up to 38, I felt that that must exclude this condition. Autopsy showed the brain itself, and the meninges, particularly in the neighbourhood of the meningeal arteries, to be perfectly normal and had an operation been undertaken we could not have interfered with the progress of the case.

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THE DUTTON MEMORIAL.

We take this opportunity of pointing out to our readers the movement to establish in the Liverpool School of Tropical medicine a research professorship of Tropical Medicine as a memorial to Dr. J. Everett Dutton who died in that service. A sum of £10,000 is required, and more than £4,000 has been already subscribed. A strong committee is now at work, under Royal Patronage, and the present appeal makes clear the great services that can be rendered by such a chair. Dutton himself died a victim to tick-fever contracted during its study, after he had already served on four expeditions, aiming chiefly at the solution of the question of sleeping-sickness which, the appeal points out, has caused the deaths of probably 600,000 persons in the last ten years. Amounts of money and cheques may be sent to Mr. A. H. Milne, Hon. Secretary, Liverpool School of Tropical Medicine, Liverpool.

THE CHAIR OF MEDICINE AT MCGILL.

The announcement is made that, in succession to the late Dr. James Stewart, professor of medicine in McGill Medical Faculty, Professors F. G. Finley, H. A. Lafleur and C. F. Martin, are to be professors of medicine and clinical medicine. This will, therefore, involve no marked change in policy or practice, as these three physicians have already carried on the work of that department for several years. A department of medicine has been organised, controlled by a professor at each hospital who shall be jointly responsible for the didactic work, and for the clinical work at the Hospital with which each is connected.

THE NEW FIVE YEAR COURSE AT MCGILL.

The graduates and friends of McGill University will note with satisfaction, that the Medical Faculty has seen its way clear to a declaration in favour of this radical and important change, because change in this direction indicates a strong and responsible attempt to raise, in no small degree, the standard of excellence already attained. The medical course has hitherto been four years, of which the last has consisted largely of clinical work in the hospital wards. The third year has been a combination of laboratory and hospital work, and by reason of the large amount of time necessary for the teaching, in the second and third years, of laboratory subjects, it has long been felt that the magnificent clinical advantages offered in the hospitals would admit the devotion of even more time to bedside work.

The fifth year will be devoted entirely to hospital work, and as far as possible, to a more responsible kind of hospital work than has hitherto marked the fourth year, because it is thought that by the end of the fourth year, the student may, with advantage, depend upon his observations as well as upon facts told to him by his teachers; the cultivating of habits of observation has naturally been one of the main things sought in the course, up to the present, but it is possible to give the student yet wider opportunities for the exercise of this faculty, to urge him to observe, and to leave him more alone in the doing so. It is a matter of widespread belief that at present the student is asked to absorb too much; and the extension of the course will not mean a multiplication by five-fourths of the quantity of his attainment, but rather a betterment in the quality of his work and his knowledge, as well as an increase in its scope.

The step of adding one year to a course already long, cannot be made without a sacrifice, but this has been thoroughly considered. When a college rapidly raises its standard, the first result will be that it will lose a number of students, who will not appreciate the value of the increased investment required, and some others who can afford

a four, but cannot afford a five-year course, for in Montreal, the cost of living is high in comparison with other Canadian cities, where there are medical colleges, and to multiply this cost by five-fourths will turn the scale in some cases, and students will go elsewhere. But this falling-off, in all probability, will soon be compensated; for we understand that in a somewhat similar case, when Harvard University rapidly raised the standard, in demanding an academic course as the matriculation for medicine, the number fell off greatly during the first year succeeding the change, but rose rapidly, and has for some time past, reached the figures which existed before the change. In McGill University, where the Medical Department has not succeeded in paying expenses from an income, of which a great part is derived from fees, the further lessening of this income is a serious matter; but it is a proper standpoint that the quality of the graduate is the first factor, and the ways and means of his training a secondary, though important one. We offer the University our best wishes in their brave attempt to better their name in the true way, namely, by making the graduate of the Medical Faculty as well-trained a man as it is possible to make him.

THE LATE GEORGE ARMSTRONG PETERS, SURGEON.

No one who is conversant with medicine in Canada could fail to appreciate the loss it sustained by the death of Lieut.-Col. Geo. A. Peters, M.B., F.R.C.S., which occurred in Toronto, on March 12th, in his 48th year. We have had, and we have, surgeons in Canada to whom can be well applied the term "great," and whomever each reader may select as individually the foremost, all who knew Professor Peters and his work, will readily admit that he stood in the front rank of three or four of his time. This position has been freely accorded to him for perhaps fifteen years, for when he returned to Canada bearing the coveted title of Fellow of the Royal College of Surgeons, it took but a short time for him to show upon what basis his honours rested, and his early attainment to the Professorial rank in the University of Toronto, was but natural sequence of his merit.

His early life was beset with difficulties, and like many another, he taught school as a means to obtaining his further education; with a keen regard for the value of time, he worked hard all his life, and duty had upon him claims that he never refused. He was thoroughly trained in the laws of his profession, and to a well-based knowledge of medicine, and surgery, he added a dexterous hand and, better than all, a far-seeing and a quickly-acting brain. This showed itself in a far

more than ordinary degree of originality, and he devised some useful procedures of which we shall speak again. Dr. Peters was of a genial disposition, and had a cheery, good-humoured face, and with his students, a bantering way that gave no sting in its application.

Outside his profession, he had many interests, and a host of friends; in his leisure, he was devoted to sport of different kinds, of which the nearest to his heart was the horse. Dr. Peters had an all-round knowledge of horsemanship that would be a credit to any experienced cavalryman; he rode extremely well, was absolutely fearless in the saddle, and had an excellent "hand." It is not to be wondered at, that his stable was generally well stocked, and that he took much relaxation from his horses. He played golf moderately well, and was fond of the game. As might be expected, his love for horses led him into military work, and after some years passed as an officer of the Governor General's Body Guard, he raised the corps known as the Toronto Light Horse, of which he had command, subsequently as Lieut.-Colonel. The Corps was an excellent one, and its excellence depended in no small degree upon Lt.-Col. Peters, for when his health compelled his resignation, the regiment was disbanded.

In the absence of a complete bibliography it is not easy to refer to Dr. Peter's contributions to science, but well-known to all are his method of making plaster-casts by the previous use of a paraffin spray, as well as his method of leading the ureters into the rectum in cases of exstrophy or excision of the bladder. These are but indications of his readiness of perception and originating power. He invented a self-registering rifle-target which bears his name, and has already found considerable favour.

Dr. Peters was born in Wellington Co., Ontario, in 1859, and after studying in country schools, subsequently teaching in a school, he graduated from Toronto University in 1886, being gold medallist in his year, as well as winning the Starr gold medal in the same year. After his term in the Toronto General Hospital as house-surgeon, he became a member of the Royal College of Surgeons, and in 1890 he became Fellow of that institution. In this matter, he was one of the first, if not the very first of Canadians of this generation, to obtain that distinction.

He was shortly after appointed to the surgical staff, and became Professor of Surgery and Clinical Surgery in the University, a surgeon to the Toronto General Hospital, and a surgeon, afterwards a consulting surgeon to the Hospital for Sick Children.

He had many friends in social life, was a member of the Toronto Club, the Toronto Hunt Club, the Toronto and Lambton Golf Clubs,

and it may safely be said that few men will be so missed by so many friends. Dr. Peters leaves a widow, who is daughter of Chief Justice Sir William Meredith, Chancellor of the University, and two young children.

The forty-ninth annual report of the Nova Scotia Hospital for Insane, has been issued. During the year 580 patients were under treatment. The percentage of deaths was 5.8, and of cures 4.2. Dr. Lawlor has been promoted to the post of assistant physician and Dr. G. A. McIntosh has joined the staff. Dr. Hattie, the superintendent, notes the occurrence of several cases of typhoid during the year, and investigation by experts seems to implicate the water supply. Many improvements are in progress, including a residence for the superintendent. The total expenditure for the year was \$80,663, and the income \$48,262. A training school for nurses has been established, and "all nurses are required to be sober, honest, truthful, trustworthy, punctual, quiet, orderly, cleanly, neat, patient, kind, and cheerful." Dr. Hattie's fellow alienists would be glad to be informed where he discovers a supply of nurses possessing these desirable qualities. Such miracles must be rare even in Nova Scotia.

Mrs. Featherstone Osler, the mother of Dr. William Osler, and of other eminent sons, passed away in Toronto, on February 18th. Dr. Osler came over from Oxford to attend the celebration of her 100th birthday in December last, when there were present four sons, one daughter, 24 grandchildren, and 21 great-grandchildren. Mrs. Osler was a woman of great and practical piety, and of unfailing good humour. Those, indeed, whose privilege it is to have known well both mother and son, cannot wonder at Dr. Osler's keen sense of humour, his devotion to the day's task and to his fellow-workers, his intimate knowledge of the Scriptures, or his love for good books. Mrs. Osler was born in Falmouth, Cornwall, and came to Canada with her husband, a missionary, in 1837.

Lord Lister has favoured us with a copy of his Huxley lecture delivered at the request of the Council of the Charing Cross Hospital in 1900. At that time the lecture appeared in current medical literature with the usual inaccuracies, and for reasons personal to Lord Lister its re-appearance has been delayed. In a modest note the author says, "though belated, it may still have interest for some of my pro-

fessional brethren." In this belief we all concur. The lecture contains a fascinating account of the stages by which Lord Lister arrived at the conception of antiseptic surgery.

Hospital staffs are complaining of the advanced tariff on medical instruments that are "not metal," and a petition to the Government in this connexion may be forth-coming. Formerly the price of clinical thermometers, notoriously fragile necessities, was 40 cents. Now the cost is 60 cents, and the advance is said to play sad havoc with the remuneration of junior nurses.

A proposal is on foot in Regina for the erection of a hospital of 60 beds, to be under the care of the Grey Nuns. The Roman Catholics of Regina, who are advancing the scheme, are asking the city council for a free site. An expenditure of close upon \$100,000 is contemplated on the building and its equipment.

Reviews and Notices of Books.

THE BACTERIOLOGICAL EXAMINATION OF WATER SUPPLIES. By WILLIAM SAVAGE, B.Sc., D.P.H., Medical Officer of Health. H. K. Lewis, 136 Gower St., London W.C., 1906. Pages 297, 6s. 6d., net.

This little work of less than three hundred pages is admirable, and deserves a hearty welcome from all English-speaking bacteriologists and students of public health, because it performs the most needed service of bringing together in an impartial and masterly manner the important results gained by English and American workers upon the bacteriological analysis of water. There is an equally sure grasp of the work accomplished by German and French workers—that we do not dwell upon because, through the *Centralblatt für Bakteriologie* and the *Bulletin de l'Institut Pasteur*, foreign results are easily followed by all interested in the subject. It is otherwise with English and American work. During the last decade the most solid and most notable advances in water analysis—the most basal work and that on the largest scale—have emanated from the United States and from Great Britain. In both countries it had been realised that an *impasse* had been reached from lack of uniform methods of examination and description of water bacteria, and independently in both countries those interested constituted themselves into committees for the appointment of standard

methods, standard media for cultures, and series of tests necessary for the adequate description of species examined. It is pleasant to think that the initiative for the establishment of these committees proceeded from the midway of Canada, from Montreal, and from our late colleague, Wyatt Johnston. But unfortunately the good work accomplished in one country has largely been hidden from workers in the other. These long series of tests of different waters and of determinations of proper media and methods have naturally been carried out in the main by those connected with local health authorities, and in the official publications of Boards of Health it is,—jumbled up with reports of all kinds, from death statistics and the registration of embalmers to the percentage of alcohol in patent medicines and the composition of baking powders—that we have to look for the valuable data supplied by the official bacteriologists: not to special journals. We note with satisfaction that the *Journal of Hygiene* has recently established a special section in which note is taken of valuable scientific work buried in these official reports.

The reports of the Medical Officers of the Local Government Board, of the Royal Sewage Commission (the "Royal" referring to the Commission, by the by, not to the Sewage), and of the London County Council are as difficult to encounter in America as, in Great Britain are those of the Massachusetts State Board of Health and the New York Chicago Health authorities. Dr. Savage shows himself as familiar with, and appreciative of, the trend of recent American work, while briefly and critically he affords to American workers a much needed digest of the recent English work, of which that of Houston stands out as the most extensive and valuable. It is this due presentation and careful weighing of the best work of both schools that renders Dr. Savage's work at once so serviceable and timely. His conclusions regarding the presence of the *Bacillus Coli* in water supplies and its significance strike us as sound and deserving of consideration, while his opinion regarding the significance of the *B. enteritidis sporogenes* is that generally held upon this continent.

J. G. A.

AN EPITOME OF DISEASES OF THE NOSE AND THROAT. By J. B. FERGUSON, M.D., New York. 12mo, 243 pages, 114 engravings. Cloth, \$1.00 net. Lea Brothers & Co., 1907. (Lea's Series of Medical Epitomes. Edited by Victor C. Pedersen, M.D., New York.)

The author has presented in concise form the diagnosis and treatment of diseases of the throat and nose. He has planned the book to be

helpful to the under-graduate and post-graduate medical student, and to the general practitioner. All these classes of readers will appreciate the systematic arrangement, the clear directions for examination, the illustrations of instruments and of diseases, and the formulæ for medication. *The Medical Epitome Series*, of which this is the latest volume, covers the whole range of medicine, surgery, and the specialities in original-books written by recognized authorities, and uniformly priced at one dollar.

NERVOUS DISEASES—ORGANIC AND FUNCTIONAL. By M. ALLEN STARR, M.D., Ph.D., LL.D., Sc.D. Professor of Neurology, College of P. & S., Med. Dept. of Columbia University, N.Y. Consulting Neurologist to the Presbyterian and St. Vincent's Hospitals, St. Mary's Free Hospital for Children and to the New York Eye and Ear Infirmary. Second Edition. Lea Brothers & Co. New York and Philadelphia, 1907. pp. 816.

It is always a pleasure to see a new edition of a good book and especially, as it has been thoroughly revised and rendered more complete by the addition of the functional diseases of the nervous system, is this new edition of Professor Allen Starr's work the more welcome.

In the article on *Tabes Dorsalis* we would like to have seen a more lengthy note on Fränkels re-educative treatment of the ataxia, believing as we do that the results of this treatment are in many cases very successful. The author merely refers to it.

In the chapter on Tics and Spasmodic Torticollis, we notice no reference to Meige's work on this subject. The chapters on Functional diseases are certainly a necessary addition and are treated in a scientific manner. Their only fault is their brevity. The book is, throughout, well illustrated with numerous photographs and plates, and the print is good. It is thorough and readable, and can be highly recommended as a text-book to those interested in Diseases of the Nervous System.

SYPHILOLOGY AND VENEREAL DISEASES. By C. F. MARSHALL, M.D., M.Sc., F.R.C.S., Late Assistant Surgeon to the Hospital for Diseases of the Skin. Blackfriars, London; Baillière, Tyndall and Cox. Canadian agents, J. A. Carveth & Co., Toronto, 1906. Price, \$3.00.

As a reliable text-book on syphilis, in all its forms, this work is to be highly commended. It opens with a short history of the disease, a concise review of the general course and its relationship to other diseases and a chapter on the general pathology. It then discusses in detail the lesions produced in the various organs of the body, a chapter in most

cases being devoted to each. Treatment is admirably dealt with and the relationship of syphilis to life-insurance and marriage, heredity, congenital syphilis and the possibility of transmission to the third generation are fully discussed. The work is modelled, as the author acknowledges, upon the classical work of Fournier from which most of the statistical tables are drawn. Plates of the micro-organisms of syphilis and gonorrhœa, and of the microscopical appearances in some of the organs are the only illustrations.

The author believes that in the *spirochætæ pallida* the true organism of syphilis has at last been discovered, and certainly the evidence given is most convincing if it cannot as yet be held to be proven. He is also a strong believer in the possibility of third generation syphilis and adduces some strong arguments in its behalf. The half dozen chapters included in the book on gonorrhœa and simple chancre are very incomplete and this portion of the work does not come up to the high standard of the rest.

INTERNATIONAL CLINICS. Edited by A. O. J. KELIX, A.M., M.D.
Volume IV, sixteen series, 1906. J. B. Lippincott Company,
Philadelphia and London.

This volume of the familiar series covers the whole range of medicine and surgery and the various allied specialities in the thorough fashion to which we are now accustomed. There are twenty-two articles, many of them of high importance, twenty-seven coloured plates, forty-six plates, and innumerable figures. A book of so wide application does not readily lend itself to review. We must be content with commending it highly.

THE ELEMENTS OF THE SCIENCE OF NUTRITION. By GRAHAM LUSK, Ph.D., M.A., F.R.S. (Edin.), Professor of Physiology at the University and Bellevue Hospital Medical College, New York City. Octavo of 326 pages, illustrated. Philadelphia and London. W. B. Saunders Company, 1906. Cloth, \$2.50 net. Canadian agents, J. A. Carveth & Co., Toronto.

One effect of this book, we imagine, will be to promote the investigation of nutrition in laboratories and hospitals. It is this painstaking routine which impresses one in the German clinics, and is so conspicuously absent in America. It is doubtful if the labour bestowed upon the task has been rewarded as yet, with adequate results; but that is a reason for continuing it. The historical introduction is full of interest in its matter and presentation. Fifteen chapters follow with a most valuable appendix. The book is of high scientific and literary value. Every physician requires it, who desires to be well informed.

THE PRACTITIONER'S MEDICAL DICTIONARY. By GEORGE M. GOULD, A.M., M.D. With 388 illustrations. Octavo, 1043 pages. Flexible leather, gilt edges, rounded corners, \$5.00; with thumb index, \$6.00. P. Blakiston's Sons & Co., 1012 Walnut Street, Philadelphia.

The making of a medical dictionary is not a mere matter of industry. Besides labour, it requires heart and intellect. Dr. Gould has supplied all three. In addition to the usual features of a dictionary, the present work contains among other new features the terms of the Basle Anatomical Nomenclature and the standards of pharmaceutic preparations as authorized by the eighth decennial revision of the United States Pharmacopœia. Not all the absurd, newly-coined words which cumber and deface medical writing are included, but those which are likely to be permanent are faithfully recorded.

The author's work has been done with intelligence, and the publisher has equally well done his part. The book is made up in a form suitable for ready reference, complete in text and illustration, and attractive in appearance. It is printed on tough, thin paper; excessive weight and bulk is eliminated, while the dull surface of the paper, together with the employment of new clear type, facilitate ease and comfort in reading. The book will lie flat at any page at which it may be opened.

BIOGRAPHIC CLINICS. Influence of Visual Function upon Health. By GEORGE M. GOULD, M.D. P. Blakiston's Son & Co. Philadelphia, \$1.00 net. Vol. IV. Vol. V.

Volume IV contains studies of the personalities of Balzac, Tchaikovsky, Flaubert, Lafcadio Hearn, and Berlioz. The study upon Balzac first appeared in this JOURNAL. The volume contains, in addition, essays upon the progress of the recognition of eyestrain as a factor in many abnormal conditions; upon the origin of epilepsy, and upon failures in ophthalmic practice. The second volume is fresh from the press, and contains twenty-four chapters dealing largely with cases illustrating the evil effects of eyestrain and demonstrating the effect of proper treatment. Not all ophthalmic surgeons go as far as Dr. Gould; but by his indefatigable efforts during the past ten years there is now a juster appreciation of the significance of eyestrain. Dr. Gould has carried on his propaganda with an enthusiasm and good-nature, which have won esteem for him, even from those who are not yet wholly convinced. He has brought to the task of enlightenment professional knowledge, operative skill, wide learning; and he has fused these together with rare literary accomplishment. The books have the

quality of sincerity, as if they arose out of a man's life. Those who have read these papers in medical journals, will be glad to have them in form convenient for re-reading and for consultation.

AIDS TO DENTAL SURGERY. By ARTHUR S. UNDERWOOD, M.R.C.S., L.D.S., Eng. and DOUGLAS GABELL, M.R.C.S., L.R.C.P., Lond., L.D.S., Eng. Second Edition. pp. 126. Price 75 cents. London; Baillière, Tindall and Cox, 1907. Canadian agents, J. A. Carveth and Co., Toronto.

These little books are well written, and above the average of their class. That on diseases of children, gives short, concise descriptions of the various diseases and their treatment, with numerous tables of differential diagnosis. There is a useful appendix on therapeutic measures and a formulary. The *Aids to Medical Diagnosis* is well arranged. The chapters deal with the infectious diseases and the various systems, with symptoms and combinations of symptoms as sub-headings.

AIDS TO THE DIAGNOSIS AND DISEASES OF CHILDREN. By JOHN McCaw, M.D., L.R.C.P., Edin., Physician to the Belfast Hospital for Sick Children. Third Edition. pp. 383. Price \$1.25.

AIDS TO MEDICAL DIAGNOSIS. By ARTHUR WHITING, M.D., M.R.C.P., Physician to the Tottenham Hospital, etc. pp. 152. Price 75 cents.

WAR WITH DISEASE. By FREDERICK F. MACCABE, M.B., Dublin, Medical Officer, South of Ireland Imperial Yeomanry, Late Civil Surgeon, H.M. Field Force, South Africa. Second Edition. London; Baillière, Tindall and Cox. 1907. Canadian agents, J. A. Carveth and Co., Toronto. pp. 125. Price 50 cents.

This little book consists of five admirable lectures on preventive medicine, delivered originally to British Army Officers and men, and so dealing more especially with military hygiene. They are scientific, and are written in a pleasing and clear style, avoiding, as far as possible, technical terms. The author deals fully with the modern knowledge of etiology, and shows how preventive measures, in the light of that knowledge, are merely such as common sense would indicate. In this edition there are added two lectures, one chiefly anatomical, introductory to the training of an ambulance corps.

Annual Report of the Surgeon-General of the Public Health and Marine Hospital Service of the United States for the Fiscal Year 1906. Government Printing Office, Washington, 1907.

This work, in addition to official reports of the manifold activities of this very efficient department of the United States Government, con-

tains interesting statistics on epidemiology in all parts of the world for the years of 1905 and 1906. In 80 closely printed pages is given a complete detailed account of the yellow fever epidemic of 1905, in the Southern States, and of the measures taken to stamp it out. Very brief mention is made of the remarkable achievement of the Americans in dealing so successfully with uncinariasis in Porto Rico.

A POCKET FORMULARY. By E. QUIN THORNTON, M.D., Assistant Professor of Materia Medica in the Jefferson Medical College, Philadelphia. New (8th) edition, revised. Leather, \$1.50 net. Lea Brothers & Co. Philadelphia and New York.

This well-known formulary has been revised to accord with the new United States Pharmacopœia. It consists of about 2,000 prescriptions grouped under the names of diseases which are arranged alphabetically. Under each formula is a short note as to its particular indications. Neither as to bulk nor contents is the book just adapted to a normal pocket.

Medical News

MONTREAL GENERAL HOSPITAL.

During the month of February, 253 patients were admitted to the wards of the hospital and 223 were discharged. There were 26 deaths, 12 of which occurred within three days of admission. The average daily sick in the hospital was 212, and the highest number on any one day 222. Outdoor consultations numbered 4,084. The ambulance made 117 runs in response to calls. The average number of visitors at the hospital on visiting days was 342.

ROYAL VICTORIA HOSPITAL.

Monthly report for February:—Patients admitted, 275; discharged, 257; died, 17. Medical, 84; surgical, 108; ophthalmological, 14; gynæcological, 36; laryngological, 33. Out-Door Department.—Medical, 723; surgical, 778; eye, 260; diseases of women, 104; nose, throat and ear, 505. Total, 2,370. Number of ambulance calls, 96.

Dr. W. J. Dobbie, lately of the Tuberculosis Hospital at Weston, Ont., takes medical charge of the Muskoka Cottage Sanitarium, at Gravenhurst. Dr. J. H. Elliott, who has held the position for some years, has resigned in order to practice as a consultant on Tuberculosis in Toronto.

At the annual meeting of the Canadian Association for the Prevention of Consumption, it was stated that in Ontario and Quebec during a period of five years, there had been a saving of 816 lives in the last year of the period as compared with the first.

Mr. William Southam, of Hamilton, Ontario, has offered \$15,000 for the erection of a wing for incurable consumptives in connection with the City Hospital.

Dr. John C. Howe, died suddenly of heart disease, on February 15th, at his home in Quebec. He was a graduate of Laval University, and held the office of Medical Inspector of Immigration at Quebec, where he had practised nearly twenty-five years.

Dr. Alex. MacIntosh, of Antigonish, died on February 27th, at the age of 75. He had retired from active practice, but filled the office of Judge of Probate for the County of Antigonish up to the time of his death.

Dr. Daniel M. Johnson died on March 12th, at Tatamagouche, N.S. He graduated in 1875 at Halifax.

Retrospect of Current Literature.

SURGERY.

UNDER THE CHARGE OF GEORGE E. ARMSTRONG.

JOSEPH A. BLAKE, M.D. "The Treatment of Diffuse Suppurative Peritonitis." *Amer. Jour. Med. Sciences.* March, 1907.

The treatment is divided into two phases, the operative and post-operative. The principles of the former are to remove, as rapidly as possible, through a small incision, the origin of the peritonitis, to wash or irrigate the peritoneal cavity, to use as little drainage as possible, and not to attempt to drain the general peritoneal cavity. The patient is returned to bed and put at once in the Fowler position, not, though, as is generally held, for drainage purpose, but because it seems to enhance the patient's comfort and diminish vomiting. The pelvic colon is irrigated by means of two long rubber tubes, the inlet tube being smaller than the return. The writer prefers an intermittent irrigation every

three or four hours during the first forty-eight hours, or a slow irrigation lasting forty to fifty minutes. Morphine is given immediately after operation to secure rest, but is not repeated after the first twenty-four hours. The stomach is generally washed out on the table, and no food given until peristalsis is re-established. Early catharsis is not employed. Irrigation of the peritoneal cavity is performed by means of double irrigators. Its efficiency depends largely upon the fact that the fluid is removed by siphonage as rapidly as it is introduced, that the various fossæ can be cleaned without spreading the infection, that it achieves quickly what drainage does more slowly and imperfectly, and that it produces no traumatism. In general, a drain is inserted just through the abdominal wall to allow excess of irrigation to escape, and prevent suppuration of the wound, so liable to ensue. When dangerous spots remain, as a gangrenous patch on bowel suture line, etc., a drain is led down to the area to keep an open way for subsequent pus formation or perforation. Although an advocate of washing versus drainage, the writer believes that the better results now obtained are due, not so much to either one or other of these procedures, but to the increased rapidity in getting the patient off the table, the use of large quantities of fluid by the bowel, rest for the entire gastro-intestinal tract, and possibly by the Fowler position. The results obtained, considering the class of cases, are good. Of the 78 cases of diffuse peritonitis caused by appendicitis, there was a mortality of 19.2 per cent. Of these 7 were not drained, and 8 were so treated. Two of the cases not drained were cured of peritonitis, one died from some cause not determined, the other from a double pneumonia. Two who were not drained and two who were, were moribund and died within a few hours.

Of the 13 cases of peritonitis due to perforation or rupture of stomach and upper intestine, there was a mortality of 30.7 per cent. Here also drainage and non-drainage gave about equal results. In eight cases of typhoid perforation there was a mortality of 50 per cent. In explanation, it may be said, that when a case is stated not to have been drained it refers to drainage of the peritoneal cavity. It seems to us that the drain introduced just into the peritoneal cavity, is practically a drain to that entire space. The peritoneum is left open at this site, and the excess of irrigating fluid and subsequent exudate find exit through it. It is claimed for the double irrigator, that its efficiency depends upon the fact, that the fluid is removed as rapidly as it enters the abdominal cavity. If this be so, why should there be any excess of irrigating fluid to drain away subsequently? Does not the presence of this excess of fluid suggest the possibility of having spread the infec-

tion? The very marked improvement in results obtained by such surgeons as Murphy, the Mayo Brothers, Munroe, and others since adopting the non-irrigating treatment of the abdominal cavity go a very long way to contradict the advantages claimed for peritoneal lavage. Regarding Fowler's position, we consider it a distinct help in securing drainage. By it, the infectious material is drained away from the most dangerous part of the peritoneal cavity, to the least dangerous, from the diaphragmatic to the pelvic. Since its adoption, we have not had one death from septic pneumonia, whereas, formerly, this was not an infrequent cause of death.

FRANCIS A. GOELTZ, M.D. "Successful Anterior Thoraco-Bronchotomy for a Foreign Body Impacted in the Bronchus." *Annals of Surgery*, March, 1907.

The case occurred in a boy, 6 years and 9 months old, who, while playing, inspired a small metal collar button. He began to cough for a little while and then stopped, and his parents, thinking he had swallowed the button, paid no more attention to it. During the night he had several attacks of coughing, accompanied by dyspnoea and cyanosis. At that time of examination, the breathing was easy, but respiration was limited over the right side. There was some dulness on this side, both anteriorly and posteriorly, and the respiratory murmur was much diminished posteriorly, and almost absent anteriorly. Examination of the larynx was negative, as was fluoroscopic examination of the chest. Through a low tracheotomy wound the button was found to be impacted in the right bronchus, and considerable time was spent in trying to remove it through the wound. Anterior thoraco-bronchotomy was decided upon and performed as follows:—A curved incision was made, beginning over the second rib just beneath the middle of the clavicle, carried downward and inward to within an inch of the right margin of the sternum, and thence outward to the level of the fifth rib, an inch to the inner side of the nipple. The cartilages of the third and fourth ribs were divided about half an inch from their sternal attachments, and an osteo-plastic flap made by fracturing these two ribs. This secured a good opening to the lung which was found collapsed, and, through which the button was easily palpated. There was a slight movement of the bronchus with respiration, which was controlled by an assistant hooking a finger under it. As the over-lying lung could not be rolled backwards, an incision was made through the lung tissue and bronchus down to the button, which was removed by artery forceps. There was practically no hæmorrhage, and the lung wound was not sutured. The thoracic flap was sutured, and the

tracheotomy wound closed, but on account of the great amount of surgical emphysema around the larynx and neck, which developed shortly after operation, a tube had to be inserted to relieve the dyspnoea. The wound in the lung became sealed over in 24 hours, as evidenced by the disappearance of the whistling murmur heard on inspiration, and the pneumothorax gradually cleared up. The case was discharged within three weeks, and 18 months after the operation, the expansion of the thorax was equal and respiratory sounds normal.

ARTHUR TRACY CABOT, A.M., M.D. "A Contribution to the Study of Hydronephrosis." *Boston Med. and Surg. Journal*, Feb. 28, 1907.

Attention is drawn to the difference between a true and a false hydronephrosis about which considerable confusion exists in the profession. In a true hydronephrosis the pelvis of the kidney is distended, and as the tension increases the kidney substance becomes stretched and thinned, forming sometimes no inconsiderable part of the wall of the cavity. In a false hydronephrosis the fluid is contained in a sac outside of the kidney. Both conditions may co-exist, and the writer cites two cases of such a condition, one the result of traumatic rupture of the kidney from a fall, the other of congenital origin, caused by the ureter being looped over an abnormal artery supply to the kidney. In the latter case, repeated attacks of severe abdominal pain began when the child was one and a half years old, and the explanation advanced, namely, that the vertical position, by that time assumed by the boy, caused a kinking of the ureter at the point where it looped over the artery, is a most plausible one. Another case of true hydronephrosis, congenital in origin, is given, in which the obstruction appeared to be due to a valve-like projection at the junction of the ureter with the renal pelvis. Excluding those cases where the hydronephrosis was caused by an obstruction in the lower urinary passages, all the writer's cases have been evidently caused by a moveable kidney, allowing the ureter to become kinked or twisted. He has seen good results follow manipulation and postural treatment, in cases where the distension was of moderate degree. For the radical cure, he has stitched the kidney to the 12th rib and fascia and inserted a bougie to beyond the tortuous portion of the ureter. This last procedure he regards as more important in the cases given than fixation, through acknowledging it as being open to question. He has determined the cause of the limitation of the extravasated blood and urine in cases of renal traumatism and

rupture to be due to the outer fibrous wall of the so-called fatty capsule, and not to inflammatory formation as suggested by Morris.

W. L. B.

PATHOLOGY.

UNDER THE CHARGE OF J. G. ADAMI.

A critical survey of the work done by pathologists during the year just gone cannot fail to be of interest and profit to those who believe in "brain-dusting," or mental house-cleaning, whether annual or quinquennial. As one might expect, nothing much that is new has appeared with regard to the morbid appearances and the treatment of disease, but the really important studies have been made almost entirely from the experimental side. Work of this kind, of the most complicated and arduous nature, has been carried on in practically all civilized countries. While nothing very startling has been advanced, we should by no means be justified in concluding that no progress has been made. Yet, it has been progress of the potential kind, a sort of clearing away the underbrush, we might put it, which, we may confidently hope, has prepared the way for most substantial advances in the near future. To sum up the general trend of pathological investigation, we may say, that hitherto accepted facts have been tried anew in the crucible of experience; the more or less widely-accepted theories have been controverted, confirmed, or re-stated: and most fertilizing suggestions have been brought forward. It seems to me that the following topics, about which the clouds of controversy still hang thick, will prove most fruitful for our consideration in a review of this subject: *arteriosclerosis: malignant new growths: the opsonic theory: tuberculosis: and syphilis.* In the last-mentioned disease particularly the progress has been of the most substantial nature, and augurs well for the future.

Arteriosclerosis.

With regard to arteriosclerosis most of us probably have been resting on the time-honoured theory of Thoma, namely, that the affection is due primarily to degenerative and atrophic changes in the media of the blood vessels, to which is subsequently, or, perhaps more correctly, simultaneously, superadded a thickening of the intima as a compensatory change. While this view was based upon an extended series of observations, there were not wanting those who disagreed with Thoma, regarding the intimal changes as of chief importance. There, was, moreover, some debate as to what constitutes *arteriosclerosis.* Jores, for instance, would restrict the term to those forms of vessel-thickening

in which there is hyperplasia of the intima with a peculiar splitting of the internal elastic lamina. Others, again, use the term in its widest sense to designate, as Lobstein originally intended it to mean, all forms of arterial disease characterized clinically by thickening of the vessel-walls. During the past four years most of the experimental work upon the affection in question has been carried on. In general, it may be said, that the majority of observers agree as to facts of the histological changes occurring in arteriosclerosis, but some disagree on the interpretation of these facts, and on the farther question whether experimental arteriosclerosis can properly be compared with that form of it occurring naturally, as we might say, in man. To clear up some of these points, Dr. Oskar Klotz, working in our laboratories in McGill, has instituted a study, which to my mind constitutes the most notable contribution to the elucidation of this knotty subject during the past year (*Journal of Exper. Med.*, Vol. VIII, 1906, p. 322: and *Brit. Med. Journ.* Dec. 22, 1906, p. 1767). Dr. Klotz has carried out a series of experiments with adrenalin, digitalin, and barium chloride, drugs which increase the blood pressure. He finds, as others have done, that the injection of these substances over a period of time in rabbits will produce arterial disease, consisting of a fatty degeneration and necrosis of the muscle fibres of the media, with, finally, calcareous deposit, leading to a fusiform dilatation of the vessels. In all cases the intima was practically unaffected and was carried over the deeper lesions as a continuous sheet. These phenomena have been variously interpreted as due (1) to increased blood-pressure, (2) to a lack of nutrition of the fibres of the media, and (3) to a direct toxic action of the drug employed upon the muscle-fibres of the media. That increased blood-pressure alone was not the cause was proved by the fact that when the drugs in question were combined with agents, such as nitroglycerine and nitrite of amyl, which lower blood-pressure, the effects on the vessel were still produced, though it is true, to a less degree. Adrenalin, when injected into the skeletal muscles in a strength of 1-1000 produced immediate necrosis of the tissue. Weaker solutions produced a fatty degeneration of the muscle fibres. Klotz concludes, therefore, that the vascular changes produced by the injection of adrenalin are of a degenerative character and due to the toxic action of the drug upon the muscle fibres. He also thinks that the medial changes are primary. The same results were obtained with all the agents employed. That blood-pressure is also an element is proved by the fact that the lesions were most advanced in the thoracic aorta and the first part of the abdominal aorta.

A parallel series of experiments were carried out to determine the action of bacteria and bacterial toxins on the vessels. For this purpose the *B. Typhosus*, the *Streptococcus*, and the *B. Diphtheriæ*, were injected intravenously. The effects of the injection of the first two organisms mentioned were identical. The first part of the pulmonary artery and of the aorta showed warty thickenings of the intima. No aneurysmal dilatation resulted, and there was no calcareous degeneration of the media. Histologically, there was a fatty degeneration of the subendothelial tissue, with proliferation of the connective-tissue into the degenerated area. The internal elastic lamina was split into several layers, between which were proliferating cells. The area involved included the intima and the inner layer of the media. There was no small-celled infiltration. The lesions in question, therefore, differ entirely from those produced by adrenalin, being on the whole productive rather than degenerative. The inoculation of the diphtheria bacillus gave different results, the changes, in fact, being identical with those resulting from the employment of adrenalin. The thinning of the arterial wall, the aneurysmal dilatation, the calcification, were all present, and the lesions were confined to the media.

The conclusions of the whole matter to my mind, after consideration of the trend of all the work done on this subject of arteriosclerosis, are: (1) That the term arteriosclerosis includes a variety of differing pathological conditions, and should be used in a wide sense to designate any and all of those conditions which are evidenced clinically by thickening of the arterial wall: (2) Histologically, we have three main types of lesions, (a) that described by Thoma, consisting of a primary degeneration of the media, (b) the form described by Jores, in which there is a primary proliferation of the intima, (c) the inflammatory variety, of which syphilitic mesarteritis and aortitis may be taken as the type, where there is definite infiltration of the vessel wall by inflammatory products.

With regard to the vascular changes produced by infection and intoxication, it may be inferred with great probability that the character of the lesions resulting depends upon the nature and intensity of the poison. A virulent germ, for example, may produce acute inflammation of the wall, with loss of substance and even thinning of the tissue, as in the so-called mycotic aneurysms. A less powerful action will lead to degeneration of the cells. A milder irritant still will lead to proliferation. It may be, too, as Prof. Aschoff suggests, that in addition to peculiarities of the offending toxins, we may have to take into account special affinities of special vessels or coats of vessels towards special toxins. Finally, it is, perhaps, not too much to say that in the past

clinicians and pathologists have laid too much stress upon the mechanical factors in the causation of arteriosclerosis, blood-pressure, peripheral resistance, elasticity, and what not, and not enough upon the influence of infection and intoxication. It will be admitted, however, that many cases of arteriosclerosis come under the ken of the physician in which the influence of poisons, such as alcohol, lead and arsenic, and of the various infective diseases can be excluded. Possibly, in such cases, if I may hazard a suggestion, we may have to seek the etiological factor in some disorder of internal secretion or, again, it may be in the absorption of bacteria or poisonous substances from the alimentary tract.

Cancer.

A great deal of excellent work is now being done in the study of carcinomata and malignant growths generally, chiefly from the experimental side. Six or seven distinct institutions now exist in Great Britain for the scientific investigation of cancer, besides several in the United States. During 1906, a new Cancer Institute was opened in Heidelberg, under the direction of Prof. Czerny, who has at last seen his aspirations and endeavours crowned with success after much opposition and discouragement. Similar institutions are projected in France. Perhaps the most important research work which has lately seen the light emanates from the laboratories of the Imperial Research Fund and the New York State Laboratories in Buffalo. The investigations going on at present are attacking the problem of cancer on the widest possible lines. Questions of geographical distribution, age, sex, race, heredity are being inquired into. The problem of neoplasia is being approached at present from the point of view of the vegetative and proliferative capacity of cells and of biophysical and biochemical phenomena. And, of great importance, studies are being begun on the the subject of immunity. At present it may be said that the study of cancer by means of animal experimentation is thoroughly scientific and based on solid foundations. The lesions of cancer can be reproduced experimentally and the disease in mice is strictly analogous to the disease in man. It seems also to be fairly agreed that the experimental inoculation of cancer is in no sense comparable to the process of infection. Finally, mice can be rendered immune to inoculation. In the English laboratories, too, the various cancer "cures," Doyen's serum, trypsin, and the like, some of which have been, unfortunately, so much exploited in the lay press, have been tried in the balances and found wanting.

For the past few years the parasitic theory of the causation of cancer has lost ground, and in most quarters is regarded with great scepticism.

Gaylord, who has been the most painstaking and consistent upholder of the infection idea in malignant disease, brought forward some facts at the meeting of the British Medical Association at Toronto which go far to support his view, and which it will be hard for his opponents to explain away. Dr. Loeb, well-known to us here in Montreal, had been making some observations on a cystic sarcoma of the thyroid in a rat which he was transplanting from one individual to another. Two large cages which he had been using had been put away without sterilizing. Subsequently, Dr. Gaylord placed some rats, from different stock from those of Dr. Loeb into the cages. Seven rats in the large cages, which had been there for from twelve to fourteen months, were, later, examined and three were found to have developed tumours, two fibrosarcomas of the abdominal wall and one cystic sarcoma of the thyroid. No other rats in the laboratory, and the number approximated one hundred, living in clean and disinfected cages, developed new growths. In a second observation Gaylord found a cage in which mice were kept, in which no less than sixty tumours developed in the course of three years, in spite of the fact that the location of the cage had been frequently changed, and the stock of mice completely renewed on at least one occasion. The tumours in question were adenocarcinomata.

Clowes (Brit. Med. Jour., Dec. 1, 1906) refers to some very important observations made at various times at the Buffalo Cancer Laboratory, observations which are now corroborated by Bashford of the Imperial Cancer Research Fund. Clowes' work has been largely concerned with the question of the transplantation of tumours, the effects on cancer cells of inorganic disinfectants, and the production of immunity against cancer. In his experiments more than 7,000 mice have been employed. His conclusions are as follows:

1. Primary tumours are only transplanted with great difficulty; after the first generation the yield of tumours gradually increases until a maximum virulence is attained, which subsequently remains fairly constant for a considerable period of time.

2. Increase in virulence of a tumour strain is invariably associated with an increased rate of growth of the individual tumours.

3. The proportion of tumour mice recovering spontaneously in any series is apparently inversely proportional to the virulence and speed of development of the tumours of that series.

4. The larger the dimensions actually reached by a tumour, the smaller are the chances that it will recover spontaneously.

5. All tumour cells appear to be destroyed at a temperature of 45°C. Incubation of macerated tumour material for twenty to thirty minutes at temperatures ranging from 38.5° to 41°C., appears to exert a stimu-

lating effect upon tumours of a low grade of virulence. Under these circumstances larger yields of tumours are obtained than in control experiments. On the contrary, incubation of virulent tumours at these temperatures seems to attenuate them.

6. The resistance of tumour cells to organic disinfectants is very high. It is possible, for example, to destroy the bacteria present in badly-infected tumours by means of potassium cyanide, without seriously affecting the virulence of the tumour on subsequent transplantation.

7. Tumours of high virulence and rapid development have a relatively high potassium and nucleo-proteid content. Tumours of low virulence and slow development show a low potassium and a high calcium content.

8. The chief evidence of the existence of immunity against cancer is as follows: Spontaneous recovery of mice from true tumours actually occurs. Those mice which have recovered are not re-inoculable with tumour material possessed of the same degree of virulence as that previously employed, and exhibit in addition a considerable resistance to subsequent inoculation of far more virulent strains. The re-inoculation of mice which have failed to develop fatal tumours shows a great reduction in the proportion of tumours, and inoculation for a third time has so far been unproductive of a single tumour. The serum of recovered mice apparently exercises a definite though slight effect on the small tumours of other mice when directly injected and also on tumour materials when admixed previous to inoculation. Mice in which tumours are already developing are, with few exceptions, immune to subsequent inoculation, even with a more virulent tumour, indicating the production of immune forces in the serum antagonistic to the development of cancer.

9. The injection of tumour materials incubated at such temperatures as to render development impossible, or of tumour materials previously treated with chemicals at such a concentration as to inhibit development, fails entirely to confer immunity on mice so treated.

10. The treatment of mice with increasing doses of nucleoproteids (extracted from the most virulent tumours) at stated intervals of time has so far failed to confer an immunity.

11. The process of immunizing mice against cancer appears to be analogous to that of vaccination against small-pox, the animals which recover from an attenuated form of the disease developing an immunity capable of protecting in the large majority of cases against injections of a more virulent cancer strain than that originally employed.

Investigations such as these undoubtedly promise well for a distinct advance in the rational treatment of cancer and we shall look to the farther outcome with interest.

Reference has been made to methods of treatment of cancer which have been much vaunted, but have proved failures. Doyen, as everyone knows, discovered in cancerous tissues a coccus, which he called the micrococcus neoformans. This he considers to be the true etiological agent in the production of new growths and, on this assumption, has prepared a serum for the treatment of such cases. A commission appointed to investigate his claims has reported adversely. Paine and Morgan (*Brit. Med. Jour.*, 1906, Vol I, p. 740) treated nine undoubted cases of carcinoma by Doyen's serum without improvement. They inoculated 200 animals with the micrococcus neoformans and found that the injection of this organism produced a simple inflammatory reaction and never tumour-formation. They conclude that the micrococcus neoformans is present in cancers as well as other cocci, but that it has no etiological significance. As to the presence of this microbe in neoplastic growths there can be no doubt, for in this particular Doyen's observation has been confirmed by no less an authority than Metchnikoff, as well as by several others. Doyen's statement, however, that when inoculated into animals it produces tumours has been shown to be incorrect. The significance of the organism has by no means been determined. In this connection it is interesting to note the application of the treatment by means of vaccines to cancer. Sir A. E. Wright, the famous exponent of the "opsonic theory," undertook the treatment of five cases of carcinoma by his method of inoculating a sterilized and enumerated culture of the micrococcus neoformans (*Journal of Laryngology*, July, 1906.). In the first case, in a man of seventy-five, there was an ulcerating growth on the left tonsil, pillar of the fauces, the side of the tongue and wall of the pharynx. There was a large mass of glands behind the angle of the jaw. Microscopically, the growth was a spheroidal-celled carcinoma. Improvement began at once and continued for five or six weeks. The disease then became stationary. This was the most striking of all the cases. Of the other four, two have died, one is stationary, and, one improved. The outcome of these investigations is perhaps not yet.

The Opsonic Theory.

The application of Wright's method of bacterial inoculation to the treatment of cancer, leads us to a consideration of the present status of the opsonic theory. So far as has appeared in the journals, little that is new has been brought forth. This much may be said, however:

that facts are steadily accumulating to prove the great value of Wright and Douglas' discovery. Treatment by the inoculation of bacterial vaccines has been applied to tuberculosis of the skin, bones, joints and lungs: to furunculosis, sycosis: to septicæmia, and malignant endocarditis: to typhoid fever: to pneumonia: to empyema: to cholecystitis: and to Malta fever. The results reported are in general favourable. It seems clear that in the treatment by the injection of bacterial vaccines by the method of Wright and Douglas we have a decided addition to therapeutics and a valuable contribution towards the explanation of immunity in at least certain cases. The opsonic theory may be said to have come to stay and is at last established on a thoroughly scientific and solid substratum of fact. It may be regarded as settled that opsonins are immune bodies contained in serum, absolutely distinct from lysins, agglutinins, precipitins, and antitoxins. They act by sensitizing, or "opsonizing," as it is called, the bacteria, and not by stimulating the activity of the leucocytes. Whether they are specific or not has not yet been satisfactorily determined. We know now, also, that there are opsonizing substances for other bodies besides bacteria (Hektoen. Jour. Amer. Med. Assoc., May 12, 1906. Middleton-Goldsmith Lecture), such as blastomycetes, trypanosomes, and red blood-corpuscles. Hektoen has found, for example, that the serum of convalescents from various infective disease, such as typhoid, pneumonia, and scarlet fever contains opsonins for human erythrocytes, and Eason (Edin. Med. Jour., 1906, Vol. XIX, N.S., p. 43) has described phagocytosis of red corpuscles under the influence of serum from patients with paroxysmal hæmoglobinuria. These observations throw light on the question of blood destruction in many infective conditions and on post-febrile anæmia.

Tuberculosis.

Probably everyone is now familiar with Koch's famous presentation on the subject of infection in tuberculosis. In view of the statistics of the German Hospitals he concluded that primary intestinal tuberculosis was so rare as to be practically negligible and, in addition, went the length of asserting that tubercle bacilli of bovine origin were innocuous to human beings. A storm of protest followed upon the publication of his conclusions and immediate steps were taken in various countries to test the accuracy of his statements, investigations which, from the nature of the case, broadened themselves into the determination of the comparative virulence of tubercle bacilli of various origins for different races of animals, and the paths which infection usually took. The investigations in England of Nathan Raw, among others,

were sufficient to disprove Koch's theory. The most recent work on this subject is that of Prof. E. von Dungern and Dr. Henry Smidt (*Arbeiten aus dem kaiserlichen Gesundheitsamte. Bd. XXIII Heft II, 1906.*) They find out what has been widely recognized before, that the bovine bacillus exhibits in a more or less marked degree a higher pathogenicity for experimental animals than does the bacillus of human derivation. This is true for bovines, sheep, goats, pigs, rabbits, dogs, cats, guinea-pigs, and monkeys. Consequently they point out, the view that man is relatively insusceptible to the action of the bovine bacillus involves the conclusion that he differs in this respect from all experimental animals hitherto studied. They determined to test the matter by experiments on anthropoid apes, the nearest relatives of man, choosing for this purpose two varieties of gibbon, the *hylobates syndactylus* and the *hylobates agilis*. They used cultures of bacilli of the bovine and of the human type, and the virulence was tested both by inoculation and feeding experiments. Three animals were inoculated subcutaneously with human bacilli, three with bovine bacilli, and two with bacilli of the bovine type isolated from pigs. The dose was 10mg., except in one case where it was 5mg. Their conclusion was that the gibbon is susceptible in an equally high degree to all the strains investigated. The infective process followed the same course in all cases. At the site of inoculation there was produced an inflammatory infiltration, which in a few cases showed retrogressive changes, but in the majority led to abscess and tumour formation. From the site of inoculation the infection spread by way of the lymph-channels. Eventually the organisms found their way into the thoracic duct and thence into the blood, the result being that the tubercular foci were found to be particularly abundant in the liver and spleen. The lungs were less affected and in some cases were free from disease. In only one were the bronchial glands enlarged and caseous; in this animal the lungs were markedly affected. The mesenteric lymphnodes were affected in only three cases. The lesions were unlike those found in human miliary tuberculosis in that they consisted of rounded necrotic foci composed of cellular debris, a sprinkling of leucocytes and large numbers of bacilli. In most cases there were no giant cells, nor was there any inflammatory reaction in the surrounding parenchyma. The lesions, in short, were of the most acute type. There was no difference between the lesion produced by the bovine type and those due to the human variety.

Three gibbons were fed with cultures of human bacilli. Each animal was given three successive doses of 0.2, 0.4, and 0.5 grms. Three others were fed with cultures of bovine origin. The first

received 0.1 grm., followed by a dose of 0.2 grm.: the second received three doses of 0.15, 0.1, and 0.2 grm.: the third was given 0.4 grm. and subsequently a dose of 0.2 grm. Generalized tuberculosis could be produced by feeding in the gibbon but the duration of the disease is somewhat longer than after subcutaneous inoculation. Four of the six animals were infected, while the remaining two, which died 51 and 84 days respectively after the first feeding, showed no evidences of tuberculosis. The bovine bacilli proved to be as highly pathogenic as the human type. Again, the lesions were indistinguishable in either case. The formation of typical tubercles, however, with numerous giant-cells and a zone of inflammatory reaction, was more frequently met with in the feeding experiments than in the inoculation ones. This was probably to be explained by the longer duration of the disease, a smaller number of bacilli being able to penetrate the intestine. A point of considerable import is that in the animals fed with bovine bacilli the small intestines showed tubercular ulcers and the mesenteric glands were greatly enlarged and caseous, whereas in the animals fed with human bacilli no lesions could be found in the intestines or mesenteric lymph-nodes. In the latter case the primary lesions were in the lungs. The authors suggest that this difference may be an indication that the two types of bacilli when introduced into the system by the alimentary tract have a tendency to select different portals of entry. More experiments will have to be done to finally settle this point. The general conclusions arrived at by Von Dungern and Smidt are, that the gibbon is equally susceptible to the action of both types of bacilli, and in view of the near relationship of this animal to man, it seems probable, though it cannot be regarded as definitely established that a similar susceptibility to both varieties of the tubercle bacilli may be attributed to man. It may be remarked that these experiments go far to show that the brunt of the disease resulting from infection with the human bacillus does not necessarily fall upon the organ or tissue through which the organism gained entrance, corroborating some views to this effect that have been expressed before. It would look as if the tubercle bacillus of human derivation had the power of passing through mucous membranes without producing a local lesion. This, as all will admit, holds good for the nasal mucosa in inhalation tuberculosis, as well as for the intestinal membrane.

It has been fashionable to hold that tuberculosis of the lungs is due to the inhalation of the specific virulent bacilli directly into these organs. Years ago, however, Aufrecht, Ribbert, and Baumgarten adduced evidence to controvert this. Ribbert is particularly strong in the opinion that infection by inhalation takes place through the

naso-pharyngeal mucosa, thence by the lymphatics of the neck to the peribronchial lymph-nodes, and so to the lungs. In fact, not a few hold now that penetration of airborne bacilli into the lungs is difficult, if not impossible. Vausteenberghe and Grysez state that anthracosis, to quote an almost parallel case, is not produced in animals by making them breathe an atmosphere saturated with soot so long as they are prevented from swallowing the accumulations of the nose and pharynx. The same thing applies to attempts to infect the lungs with tubercle bacilli by respiration. Calmette and Guérin of the Pasteur Institute at Lille confirm these observations and have enquired more particularly into the part played by intestinal infection. It will be noted that their work in certain points corroborates that of von Dungern and Smidt.

Calmette and Guérin have studied the question in kids and goats. The young were suckled by goats whose udders had been inoculated with tuberculous virus, human, bovine, and avian. In the older animals the infective material was introduced into the stomach by an oesophageal sound in order to obviate the possibility of infection through the upper air-passages. The result of these experiments goes to show that kids and goats, are very susceptible to tubercular infection, especially that of bovine origin, and moreover, that they readily contract tuberculosis by way of the intestinal tract. In the young, virulent bacilli, absorbed in small quantity, were retained for varying periods in the mesenteric lymph-nodes and might later infect the lungs. The bacilli in adults, however, produced almost immediately tuberculosis of the lungs. Similar results were obtained in bovines and rodents. In their opinion it would seem logical to infer that a similar state of things may obtain in man, and that von Behring is justified when he states that pulmonary tuberculosis in the adult results from the tardy evolution of an intestinal infection contracted in early life. They find that tubercular bacilli may pass the intestinal wall without producing any lesion. They are then taken up by phagocytes in the chyloferous vessels. Hence, they get into the venous circulation, and the dead or dying leucocytes, carrying the bacilli, and having lost their amoeboid properties have a tendency to become arrested in the capillaries, particularly those of the lungs, which they block as a foreign body. Should these infection-bearing leucocytes pass through the pulmonary circulation they may be arrested in the capillaries of the meninges, joints, kidneys, and other structures. It is noteworthy, that their experiments showed that animals that had recovered from tuberculosis were rendered partially immune against subsequent tubercular

infection, thus suggesting the possibility of successful anti-tubercular vaccination.

Syphilis.

Following upon the demonstration by Schaudinn of a spirillar organism or spirochæte in the lesions of syphilis, a great impetus has been given to the study of this disease in all parts of the world. The general result has been to confirm Schaudinn's work in all particulars, and at the present time the general consensus of opinion seems to be that we have in the *Sp. pallida* the specific organism of lues. It is true that here and there a dissentient voice has been raised, as one would expect and even desire. but the evidence in favour of Schaudinn's contention has not been seriously shaken. A great number of workers have confirmed the presence of the *Sp. pallida* in the lesions of primary and secondary syphilis and in the diseased organs of tertiary syphilis. The histology of syphilitic lesions has been worked over anew. The pathogenesis of the disease has to some extent been revealed. The communicability of the disease to certain species of apes has been amply proved. Finally, we are beginning to see our way to a more rational therapeutics on the analogy of other infectious diseases by means of vaccines and antiluetic sera.

Schaudinn's observations as to the constant occurrence of spirochætes in syphilis has been confirmed by Neisser, Buschke and Fischer, Ehrman, Schlimpert, Beitzke, Danziger, Lipschütz, Petzold, in Germany; Dudgeon, Richards and Hunt, Shennon, in England; Risso and Cipollina, in Italy, to mention by no means all. It seems to be fairly agreed that the spirochæta *pallida* presents distinctive peculiarities of its own and can be demonstrated with comparative ease in primary and secondary cases, and with more difficulty in the tertiary stage. For diagnostic purposes, scrapings may be taken from the primary sore, cutaneous papules and condylomata, and stained for the organism by appropriate methods. Material from enlarged glands may be removed by a syringe, or, again, smears may be made from the blood. In the last mentioned procedure examination should be very thorough, as the organisms appear to be scanty in the circulating blood. Most authorities point out that while a positive result is conclusive in favour of syphilitic infection, a negative finding by no means excludes the disease, owing to the comparative difficulty of discovering the spirochætes, which may be few and far between, to say nothing of the difficulty of staining them. In lesions other than those of syphilis the spirochæta *pallida* has not been found.

The distribution of the organisms is of interest. Ehrmann (Deutsche med. Woch., 1906, S. 1115) in two cases of chancre, in which the prepuce was indurated and excoriated, found that spirilla could be demonstrated in the nerves of the skin and subcutaneous tissue. They were to be found in the lymph-spaces and connective tissue enclosing the nerve bundles, within the nerve sheath and even between the nerve fibres. The organisms could be traced for some distance centripetally along the lymphatics and lymph spaces, thus indicating the possible line of transmission.

Schlimpert (Deutsche med. Woch., 1906, S. 1037) has investigated this aspect of the subject in the lesions of congenital syphilis in the newborn. Spirochaetes were found in great numbers in the interstices of the connective tissue, particularly in the neighbourhood of the vessels, in the walls of the vessels also, but rarely in the blood stream. An intracellular position is the exception. Buschke and Fischer (Berl. klin. Woch., Jan. 1, 1906.) also, in an earlier communication, had noted this relationship to the vessels. They found the parasites in the walls of the vessels attached to the endothelial cells, whence they could be traced into the surrounding tissues. In the skin lesions the organisms were found in great numbers, lying definitely coiled up both within and around the capillaries. The spirochaetes, as numerous observations have shown, are practically universal in distribution. They are, as might be expected, found in greatest numbers in the liver, often, also, in the spleen, in the kidneys, in skin lesions, less abundantly in the blood. They have also been demonstrated (Schlimpert) in the stomach, mesentery, mesenteric glands, gall bladder, common bile duct, peripheral nerves, thyroid gland, thymus, tonsils, tongue, and buccal mucosa, in the heart muscle (Danziger, Buschke and Fischer), lungs and adrenals (Danziger). These various researches would seem to indicate that the infective agent in syphilis is carried from the point of entrance by the lymphatics into the nearest lymphnodes and eventually to the blood, whence it is spread to all parts of the body, finally localizing in the tissue spaces of many different structures.

In the case of tertiary lues, Tomaszewski (Münch. med. Woch., 1906, S. 1300) demonstrated, in five out of ten cases examined, the *spirochaeta pallida*. The organisms were, however, very few and were only discovered after hours of work. This fits in, it may be remarked, with what we already know as to the infectiousness of syphilis in the tertiary stage.

It will, perhaps, be opportune at this point to refer briefly to other views in regard to the etiological factor in syphilis. Flagellated

micro-organisms, provided with a nucleus and refractive ectoderm, have been found in the blood of various animals by more than one observer, but notably by Klebs and Dohle, Lösdorfer and Stassano. Such bodies were at first confounded with degeneration products of the red corpuscles but have been more recently determined with much probability to be protozoan in character. These organisms go by the name of cytorrhcytes and have been found in vaccinia and small-pox (Councilman, Magrath, and Brinckerhoff) and by Siegel in syphilis. Siegel thinks that such bodies can easily be differentiated from the products of cell-destruction. Siegel in 20 cases of syphilis examined found what he calls the cytorrhcytes luis in all, not in the first stage, but during the period of cutaneous efflorescence. They disappeared when mercurial inunction was practiced, nor could they be detected in healed cases. The organism could be inoculated into rabbits, and white mice. Siegel was enabled to grow the cytorrhcytes on human blood-bouillon and ascitic fluid bouillon. Apes could be inoculated with the organism and presented the lesions usually regarded as characteristic of experimental syphilis. Wechselmann (*Deutsche med. Woch.*, 1906, S. 219), however, got similar lesions in a macacus monkey when inoculated with the blood of a rabbit not infected with syphilis. He suggests that the lesions were due to the action of a foreign blood, or else to blood parasites existing within the rabbit. Siegel's views are not accepted as yet by any other pathologist of note, nor have his observations been confirmed. Possibly, there may be some relationship between the cytorrhcytes and the spirochæta pallida, but this is for many reasons unlikely. No one as yet has made out more than one phase of development in the life history of members of the spirochæte family. It would be curious, however, if the popular classification of certain eruptive disease into the "pox" and the "small-pox" should prove to have a scientific foundation.

The place of the spirochæte in Nature is still under consideration. We know now, however, that there are a great many of these spirillar organisms, some of which are pathogenic and some not. In the former group we can place the spirillum of Obermeyer, the spironema of Schaudinn, and the spirochæte of African "tick-fever." Other spirochætes have been found in the skin and mucous surfaces, in ulcers, ulcerating new growths, fæces, and stomach contents, the best known of which is the spirochæta refringens, which are apparently harmless, or, as yet, have not been proved to be pathogenic. It is a matter of some interest that a spirochæte, resembling the spirochæta pallida, has been found in frambœsia or yaws (McLennan: Neisser, Baermann, and Halberstädter), a disease which has many analogies

with syphilis. Neisser and others, working in Batavia, make out, however, the following differences between syphilis and yaws. Like syphilis, yaws can be transmitted from man to the higher and lower apes, but unlike syphilis it cannot be transmitted from one ape to another. Again, animals infected with syphilis are also susceptible to frambœsia. Hence, it is concluded that these two diseases are etiologically distinct.

The question whether spirochaetes are to be regarded as animals or plants has attracted some attention. The frequent association of the *spirochaeta pallida* with the cytorrhœtes in the blood of one and the same individual has suggested to some (Schütz. Münch. med. Woch., 1906, S. 543) that these two organisms may represent stages in the life-history of the same individual. The cytorrhœtes is generally regarded as protozoon in nature, while by many the *spirochaeta* are thought also to be protozoon and related to the trypanosomes. Unfortunately as yet, it has been impossible to cultivate the *spirochaeta pallida* on artificial media. Beer (Deutsche med. Woch. 1906, S. 1192) has succeeded in keeping it alive for thirty-three days in a moist preparation ringed about with vaseline and wax. He concludes that the *spirochaeta pallida* is anaerobic, and, moreover, could not detect any division of the organism or any multiplication. Koch, on the contrary found signs of division in the case of the spirochaete of "tick-fever." Considerable evidence has accumulated to show the relationship of spirochaetes to the bacteria. Borrel found that the *spirochaeta gallinarum* possessed many lateral flagella. Shortly after, Zettnow (Deutsche med. Woch., 1906, S. 376) demonstrated diffuse flagella in the *spirochaeta* of fowls and of African relapsing fever. Novy and Knapp (Journal of Infect. Diseases, Vol. III), working with the spirillum Obermeieri, conclude that spirochaetes are bacterial in nature. There is no evidence of a nucleus, blepharoblast, undulating membrane, or flagellum, structures which are readily seen in trypanosomes. A single long flagellum was found at the end of the sp. Obermeieri but it was unlike that seen in the known protozoa. Spirochaetes when inoculated into the blood multiply rapidly, and can be detected in eighteen hours; while the growth of trypanosomes is much slower, requiring four days or more. Again, when trypanosomal blood is heated to 45° the organism is killed and disappears in less than thirty minutes. The spirochaete under the same conditions remains alive longer and when dead does not alter its form. Immune sera, too, are not readily produced by protozoa and, moreover, are weak and possess but little or no germicidal action. Novy and Knapp could, however, produce a high degree of immunity with the spirillum Obermeieri, and the blood of

hyperimmunized animals was intensely germicidal. Finally, rapidly-growing trypanosomes have an avidity for air, while spirochaetes appear to be indifferent to it.

On the experimental side, Neisser, with his associates (*Deutsche med. Woch.*, 1906, S. 1, 49 u. 97), has continued his studies on the transmissibility of syphilis to the lower animals. Syphilis can be communicated from man to the higher and lower apes and from one ape to another for a series of transfers. Whether the virus obtained from the higher apes is more virulent than that obtained from the lower apes was not definitely settled. The more recent the material used for inoculation, the more likely was one to get infection. The degree of infectibility appeared to depend on the amount of specific virus introduced. Only once did Neisser succeed in inoculating with material from a tertiary lesion, but even this qualified success is of great significance. By passage through animals the virus was rendered more powerful. The poison becomes generalized after 54 days. In a later communication (*Ibid.* S 493), Neisser finds that all syphilitic lesions, including the tertiary, providing that they are not necrosed or suppurating, contain the virus of syphilis and will produce typical primary effects when inoculated into apes. Syphilitic material taken from three cases of congenital syphilis, when inoculated, would reproduce the disease.

Indications are not wanting that in the near future we may be able to attain to a rational treatment of syphilis on the lines of active immunization. Spitzer (*Wiener klin. Woch.*, 1906, No. 38) inoculated twenty persons suffering with syphilis with material taken from primary sores with the idea of bringing about active immunity. In seven, secondary manifestations had not appeared after two years. The injections caused neither local nor generalized manifestations. The experience of Metchnikoff and Roux at the Institute Pasteur is also striking and suggestive. An assistant in the laboratory was accidentally infected with syphilitic virus from an infected macacus. A Javanese macacus was inoculated from the assistant and became infected, the primary sore appearing in one month. In the ulcer formed Schaudinn's organism was found in great numbers. The assistant suffered no farther inconvenience and did not develop other manifestations of syphilis. Subsequently an aged woman, at her own request, allowed herself to be inoculated with virus taken from a macacus. No lesions of syphilis had developed after six months. While so few observations are, of course, inconclusive, they at least strongly suggest that the syphilitic virus is attenuated for man by

passage through the macacus, and further research may perhaps serve to show the efficacy of a syphilitic vaccine or attenuated virus in the prophylaxis of this disease. In this connection it may be mentioned that Metchnikoff and Roux have proved the efficacy of mercurial inunctions in aborting syphilis. Ointment of calomel (25 to 35 per cent.) if well-rubbed into the point of inoculation within an hour of infection will abort the chancre. Curiously enough sublimate does not seem to have this effect. A medical student, four macacus monkeys, and one chimpanzee, were inoculated with material from hard chancres. The student and one macacus were given an inunction at the point of inoculation of calomel ointment for eight minutes. A second macacus got the same treatment after twenty hours. Two other macacus monkeys were kept as controls. The two controls developed the primary sore in seventeen days. The macacus treated after twenty hours developed a sore in thirty-two days. The student and the first monkey did not develop a sore or any of the after manifestations of syphilis.

Glancing over the work done in regard to syphilis we find that it is a most hopeful field, and there is every likelihood that we have at last solved some of the more important problems connected with this widespread and perplexing disease. The pathogenesis and treatment will no doubt soon be placed on a thoroughly scientific basis.

ALBERT G. NICHOLLS.

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

The tenth regular meeting of the Society was held Friday evening, February 15th, 1907, Dr. F. G. Finley, president, in the chair.

OPERATED CEREBELLAR CYST WITH RECURRENT SYMPTOMS.

G. D. ROBINS, M.D. This case, a boy of six, was presented to the Society for fuller diagnosis. The patient was operated on by Dr. Archibald with relief of all the symptoms accompanying a cerebellar lesion. The symptoms, however, now showed signs of recurrence and the case was brought up for discussion.

W. F. HAMILTON, M.D.—Dr. Robins and Dr. Archibald are to be congratulated on the accuracy of their diagnosis in this case. I saw the patient at their request, and, so far as I could decide at the time, the diagnosis resolved itself, in the highest probability, into a right-sided cerebellar lesion, chiefly because of the situation of the pain, the

right-sided sixth nerve paralysis and also by reason of the deafness which, while not conclusive, was at all events suggestive of a lesion on that side. With respect to the views held in explaining the condition, it seems to me that the suggestion of trauma at birth is the most likely one, and inasmuch as all the cyst wall was not taken away, the recurrence may be due to a continuance of the pathological changes going on there with secretion and retention of fluid. With regard to the "cracked pot note" mentioned as having been elicited I would like to have some information.

F. R. ENGLAND, M.D.—I would like to ask what the after-treatment of the cyst was, and what was done with the part which was not removed surgically.

G. D. ROBINS, M.D.—With regard to the cranial percussion I would say that one could immediately elicit in this case a high pitched somewhat tympanitic note which we regarded as of the 'cracked pot' type. With regard to the 7th and 8th nerve being pressed upon I did not get a sufficiently clear view of the nerves themselves at operation to state definitely as to this, but clinically there was undoubted evidence of pressure upon the right facial nerve. The patient developed a right facial palsy, within two or three days from the operation, which took several weeks to clear up.

H. S. BIRKETT, M.D.—I would like to ask if, at the time of operation, the exact extent of the cyst was definitely determined, also if the 7th and 8th nerves were in any way pressed upon. The ear symptoms to me appear rather anomalous—a case presenting such definite cerebellar symptoms as this did without some involvement of the 8th nerve is not compatible with the present condition. Why the symptoms should be purely of an obstructive form is more than I can explain and it seems to me that if this cyst were so large as to press upon these nerves we would find more definite symptoms not only in the 8th but also in the 7th.

E. W. ARCHIBALD, M.D.—The cyst was egg-shaped; it represented evidently a ballooning out of a limited area of the pia-arachnoid. It extended so far anteriorly that I could not dissect it completely away, but contented myself with cutting and tearing off as much as possible of the wall after evacuation of the fluid; and at the conclusion there was still left small fragments which I could not reach. I closed the dura but apparently insufficiently, as the swelling at the back of the head points to the escape of cerebro-spinal fluid, under the skin and soft parts.

E. W. ARCHIBALD, M.D.—Clinically speaking, it is not uncommon at all for the 8th nerve to suffer under pressure and the 7th nerve to

escape. In drying up a little blood far anteriorly the facial was irritated, as was evidenced by facial spasm; and in fact the child suffered from a marked degree of facial palsy for a couple of weeks afterwards.

HEART SHOWING FOUR AORTIC CUSPS.

P. G. WHITE, M.D., showed this specimen.

JOHN McCRAE, M.B.—An interesting question in connexion with this specimen is whether the condition is congenital or the result of inflammation. The fact that one of these valves has ruptured some time long past, that there is aneurysm, and that these valves are thickened, all point to an extremely severe inflammatory change, and suggest inflammation as the cause of the formation of a perfect fourth cusp. On the other hand congenital cases are quite definitely known, and I do not suppose that a more definite pronouncement can be made upon this case. Looking at the specimen without bias, it seems to me that the evidence is slightly in favour of the inflammatory rather than the congenital origin of this fourth cusp.

P. G. WHITE, M.D.—On examining the specimen thoroughly both Dr. Duval and I were of the opinion that it must be congenital for two reasons,—first, the greater part of the extra flap is of the same structure as the other three cusps. It is true that some inflammatory change has taken place, somewhat altering its shape; but this is limited to one corner; then again on measuring the free border of this cusp it is found to correspond exactly with the measurement of the free border of the three cusps. For these reasons its congenital nature seems convincing.

NOTES ON THE PATHOLOGY OF ADENOIDS WITH REPORT OF CASES OF ADENOID TUBERCULOSIS.

E. HAMILTON WHITE, M.D., read the paper of the evening. Seventy-five adenoids from the Nose, Throat and Ear Department of the Royal Victoria Hospital had been examined, five of which were definitely tuberculous. In four of these the tuberculosis was regarded as primary in the adenoid. In the paper the significance and importance of tuberculosis in these tissues was especially dealt with.

F. R. ENGLAND, M.D.—I wish to congratulate Dr. White on his excellent paper, and, I think, if it is read carefully, a great deal of practical good may be gained. I was impressed by the fact that Dr. White considers adenoids and hypertrophied tonsils as symptomatic and only an index of a general lymphoid state. Accepting this view of the condition, our duty must not stop with removal of the adenoids and enlarged tonsils; we must get at the general condition and treat the

patient constitutionally; we must recognize this tendency to lymphoid hypertrophy and treat it early, before the case comes to operation.

An interesting question dealt with in the paper was the function of adenoid tissue and especially the function of the tonsils.

It was held that they are not only absorbent glands but that they are capable of exercising a protective influence against systemic infection by taking up and overcoming the tubercle bacillus and other pathogenic organisms. This would seem to be a very important matter and deserves careful consideration. If the tonsils are exercising a protective influence against systemic infection it becomes a very important question to what extent they must be hypertrophied or diseased to warrant their removal. Recently the tonsils have been considered as the infecting focus in certain cases of typhoid fever. Who can say that they may not frequently stand as sentinels and protect us against disease?

W. S. MORROW, M.D.—Many of the points discussed this evening are points about which I have questioned myself recently. I cannot close my eyes to the fact that one sees remarkable improvements following operations on adenoids and tonsillotomies. I have often asked myself how it was, if these lymphoid structures acted more or less as filters and destroyed the germs that it was a good thing to remove them, as is certainly the case. The paper read by Dr. White has done much to make things clear to me. I was interested in the suggestion that the tonsils in taking in bacilli may possibly produce antitoxines that protect the body against tuberculosis elsewhere. This recalls to my mind the statement of a Breslau professor who, in referring to medical superstitions, remarked that one was the idea that tuberculous adenitis was likely to be a precursor of tuberculosis elsewhere. He asserted that people with tuberculous glands in the neck, for instance, are not more subject to tuberculosis in the lung or elsewhere than those without enlarged glands. There has been nothing in my experience to contradict this opinion.

JOHN McCRAE, M.B.—About the question of tuberculosis invasions there are two or three facts which I have lately come across which are of interest. Pathologically speaking, the finding of a tuberculosis higher than the neck is not frequent. So difficult is it to get the tonsils out from the body incision; two or three facts are of interest, based upon the study by Dr. Adami and myself of some 1,000 autopsies at the Royal Victoria Hospital; tuberculosis, past or present, existed in 41.7 percent, which I think may be taken as a fair estimate of the population of an American city; there were 94 cases of latent tuberculosis and 150 cases of healed tuberculosis amongst those thousand people. Where

caseous and calcified glands are in question, we found it an interesting point that the lung was affected very much in advance of any other region. So much so that in cases where the tuberculosis was healed or latent, the lung lesions were very much more frequent than those of the abdominal and thoracic glands combined, which is rather different from what one is led to expect: and yet so carefully have the thoracic glands been examined that as far as they are concerned, we may lay a good deal of certainty upon these figures.

E. HAMILTON WHITE, M.D.—In the matter of etiology I was unable to give any very definite cause of hyperplasia in the adenoid. The matter is as yet wholly in debate, and my object was rather to bring before you the views that had been suggested than to urge the importance of any single etiological factor. Hereditary predisposition and a low vitality would seem very important, but there is no single etiological factor to explain all cases. Each varies in the combination of the factors leading to enlargement and in some the cause is quite unexplained. As to whether in removing the tonsil or adenoid we remove a protection against infection, we can definitely say that we do not. After removal of a tonsil the site is covered over by mucosa, probably much less penetrable than that of the tonsil, certainly no more so. The tonsillar reaction to infection is inflammatory and this is equally present in the walls of the tonsillar fossa. There no longer remain the crypts and pockets which harbour infection, and prevent it being carried away by the mouth secretions.

H. S. BIRKETT, M.D.—This paper is largely a pathological one, and I had hoped that those directly interested in the subject would have opened the discussion. Some two years ago, when the subject of tuberculosis of the lymphoid tissue was under discussion, I thought that perhaps in the large amount of material at our disposal some facts might be gained along this line. Dr. White was good enough to undertake this and the result of his arduous work has been very satisfactory, results which seem to me to make a plea for the more general recognition by the general practitioner of the lymphoid tissue as a channel of infection, not only as it exists in the pharynx, but also in the naso-pharynx. I think when this source of infection and the conditions met with in these regions are more generally recognised that we will meet with fewer conditions as a result of absorbed material. To exemplify: one only has to consider the number of cases of cervical adenitis for which operative interference is undertaken: in the majority the tonsils are considerably enlarged and if not enlarged they are pocketed and contain caseous material. This morbid process is met with almost as frequently

in the lymphoid tissue of the vault of the pharynx as in the faucial tonsils. Such cases, when operated on, do not always result in the absorption of the inflammatory products as evidenced by the enlarged cervical glands, because, I believe that the tubercular deposit which has found its way through these channels of infection is definitely located within the glands, where, however, the glands are enlarged and removal of adenoids or tonsils is followed by improvement. I believe that the condition is simply one of absorption of the toxins rather than the actual tubercle bacilli. Another important focus of infection which is very generally overlooked is a form of angina attacking the supratonsillar fossa which on examining in the usual way nothing is to be seen of the centre of infection, because it lies well within the supratonsillar fossa and is covered by the anterior pillar of the fauces. If this pillar is carefully retracted one will frequently find a large mass of caseous material lying in the fossa and the removal of this source of infection is very often the result of the patient being free from attacks of a similar nature. These attacks evidence themselves by some general symptoms, attacks of so-called grippy throat, very often associated with articular pains and sometimes regarded as the starting point of articular rheumatism. Another point to which I wish to refer is a condition to which Boulay and Heckel have given the name "adenoidism." This condition is simply the absorption of toxins from the retained secretions in pockets in the tonsils and very often from the same pathological conditions found in the vault of the pharynx. In many cases the adenoid is of very small proportion and upon its removal a very marked improvement in the general health of the patient takes place, so that I believe in many of these cases where the adenoid tissue is not sufficient to obstruct nasal respiration, the improvement in the patient's general health after removal is not due to the establishment of nasal respiration as is most generally accepted, but to the removal of a possible centre of infection.

UNUSUAL VENTRAL HERNIA.

G. E. ARMSTRONG, M.D.—I would like to make mention of rather an unusual case of ventral hernia, fuller details of which I intend to publish later. The patient was a rather stout woman 53 years of age. The hernia was known to have been present for some time. Five years ago she was in the Montreal General Hospital under my care for carcinoma of the breast. The breast was removed, and there was no sign of recurrence found at the autopsy. Hernia was present at the time she was in the Hospital, but she refused to have anything done for it. The day before admission to the Hospital she did a hard day's

work ironing, and then, apparently, took a hearty supper. About 11 o'clock that evening she complained of severe abdominal pain. Her physician saw her at 2 o'clock the following morning, recognized the gravity of the condition and brought her to Montreal by the first train. Vomiting was constant—the vomitus consisting of a dark brownish fluid. Enemata were at first returned clear, and later were retained. When she arrived at the Hospital she was moribund, cold surface, feeble pulse, unable to answer any questions, restless, and distressed. The hernia was about the size of a Rugby foot-ball, very tense, dark in colour, large prominent veins running across its surface. On making an incision, gas and a quantity of the same dark fluid poured out through the opening. The sac contained 7 or 8 feet of small intestine, the cæcum, ascending transverse and descending colon, the sigmoid and the whole of the stomach except the cardiac end. The lesser curvature of the stomach was perforated just to the right of a vertical line drawn down from the cardia. The perforation would just admit the end of a finger. The whole of the lesser curvature and gastro-hepatic omentum seemed bruised and ecchymosed. Quantities of imperfectly masticated onions and potatoes were found in the sac, and poured out through the opening in the stomach. At the autopsy there was no evidence whatever of gastric ulcer, and it would seem that here we have an instance of gastric perforation not due to ulcer, but to the chafing against the sharp border of the hernia ring. The immediately exciting cause very likely was the taking of a hearty meal after a hard day's work, and the acute distension arising from the imperfect digestion of this badly masticated food.

P. G. WHITE, M.D.—The opening through which this hernia came was in the middle line due to a separation of the recti muscles and 5 cm. above the umbilicus. The pyloric half of the stomach was within the sac and was ruptured along the lesser curvature, the rupture being entirely within the sac, and the peritonitis, which was acute, was limited entirely to this part. The tissue around the rupture was very dark and looked somewhat gangrenous, but this was due to the staining of the tissue by the black contents of the stomach. The edges of the rupture showed microscopically absolutely no inflammatory change and there was no evidence whatever of gastric ulcer.

The eleventh regular meeting of the Society was held March 1st, 1907, Dr. F. G. Finley, president, in the chair.

Dr. W. F. Hamilton presented a living case of enlarged heart in a boy aged eleven.

MINERAL SPRINGS IN THE TREATMENT OF RHEUMATISM.

E. S. HARDING, M.D., read the paper of the evening, dealing chiefly with the springs as found at Caledonia, Ontario. This paper appears on page 250 of this number of the JOURNAL.

RIDLEY MACKENZIE, M.D.—We are indebted to Dr. Harding for bringing before us this interesting account of these waters. I had the pleasure of visiting these Springs, and have used one of the waters for quite a long time. The influence of these waters on the alcoholic is most interesting.

J. ALEX. HUTCHISON, M.D.—We owe something to Dr. Harding for bringing this subject before us in this scientific way. I do not think anything of this kind has come before our Society in recent years, and it certainly is a subject deserving our attention.

W. F. HAMILTON, M.D.—I was interested in Dr. Harding's paper and was watching for any remarks he might make regarding the untoward effects of the excessive use of these waters, particularly the sodium chloride spring being followed by œdema. It would be interesting to know whether such cases were at all associated with the renal disease, with respect to the treatment of arthritis and arthritis deformans. I think I recognise in his remarks a reference to one of my own cases, a young lady I had treated and who had decided to go to Caledonia Springs. On her return, I was greatly pleased with the change in her joints, and certainly it was a most salutary one. While we all recognise that these cases are progressive, yet some mitigation of their suffering is at all events to be encouraged. The effect of these waters on the alcoholic is most interesting.

F. G. FINLEY, M.D.—I think that most of us appreciate the fact that many rheumatic cases are greatly benefitted by this treatment, yet one hesitates to advise individuals to go to such springs unless a competent doctor is in charge to regulate the treatment.

E. S. HARDING, M.D.—I wish to thank the members for their kind attention. As to the œdema I did not particularly note the renal conditions, but attributed it to the gastric disturbances which came on early in the course of the treatment with constipation. One rather interesting feature was the frequency of gastro-enteritis, but whether this was due to the waters or to hotel environment, etc., I could not determine.

JAMES BELL, M.D.: "Rupture of the Subclavian Artery and Brachial Plexus by Direct Violence." The report of this case will be found on page 267 of this number of the JOURNAL.

J. ALEX. HUTCHISON: "Fatal Perforating Gastric Ulcer and Shock Simulating Cerebral Hæmorrhage." The report of the latter case will be found on page 270 of this number of the JOURNAL.

F. G. FINLEY, M.D.: The case was rather a puzzling one to me; the man was pale, as if he had hæmorrhage, but we were unable to find any evidence of it. The abdominal condition, which probably caused the death, the hæmorrhage from the spleen, really gave no symptoms of trouble there.

F. R. ENGLAND, M.D.: I think the gross injuries received were quite enough to account for death; the severe shock and the breaking of so many bones would suffice, to my mind, to explain the fatal ending.

With regard to the case of the fatal perforating ulcer, one feature of interest, it seems to me, is the rapidity with which it proved fatal, within 30 hours. We are all familiar with gastric and duodenal perforations in which patients come to us with a general peritonitis 24, 48, 60, and even 70 hours after, and on many of them, even in these late stages of this condition, we operate and have recoveries. What struck me was, that although this man had had no evidence of perforation for five or six hours, presumably after his meal, that he had had large doses of Epsom salts, or some other saline, given repeatedly in the belief that he had intestinal obstruction, and taking that fact in connexion with the fact I have mentioned that many cases recover from operation after much longer periods, one cannot help thinking that this may have had something to do in bringing about such a rapidly fatal result. In recent military campaigns it has been noted that men have recovered even after being shot through the stomach and intestines, and this is accounted for by the fact that these men on the march have been in a comparatively fasting condition, and that these wounds had temporarily closed before anything was put into the viscera to escape into the peritoneal cavity. This impresses me all the more because a very near relative of mine died under similar circumstances, within less than 20 hours. The symptoms were sudden and acute and very active treatment was adopted, the administration of violent cathartics, even croton oil, and persistent enemata. In my personal experience of these cases, I do not know that I have ever had occasion to see perforations end so rapidly as in that case and the one Dr. Hutchison has reported to-night. In both these rapidly fatal cases a great deal had been given by the mouth, in the nature of purgatives.

DR HUTCHISON: In the case of shock, I quite agree with Dr. England, that with a myocarditis and endocarditis, and such very severe injuries there must have been severe shock, and all this was ample cause for death, apart from the question of cerebral hæmorrhage or rupture of spleen. One would also expect definite local paralysing conditions from hæmorrhage of the middle meningeal artery.