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SURGICAL TREATMENT OF INTUSSUSCEPTION.*

BY N. SENN, M.D., PH.D., CHICAGO.

Professor of Practice of Surgery and Clinical Surgery in Rush Medical College; Attending Surgeon Presbyterian Hospital.

Intussusception of the bowels is an accident which gives rise to a well-recognized mechanical form of intestinal obstruction, which, like hernia and internal strangulation, should be subjected to early surgical treatment. Early recognition of the existence of invagination is therefore of the greatest importance for successful treatment, as the prospects for successful reduction by ordinary surgical means diminish with the development of secondary pathological conditions at the seat of invagination. Many of the artificial invaginations which I made in animals were reduced spontaneously within a few hours, and in order to study the effects of invagination I had finally to resort to suturing at the neck of the intussusciens in order to permanently retain the invaginated portion. Reduction was resisted after a time either by the swollen oedematous intussusceptum, or by the adhesions at the neck of the intussusciens, or between the serous surfaces throughout the invaginated portion of the bowel. From these observations I have come to the conclusion that reduction by gentle but efficient distention of the bowel below the invagination would succeed in the majority of cases if this procedure were practised before

either of the two principal conditions which cause irreducibility have had time to make their appearance.

Medical and Dietetic Treatment.—A strict attention to diet and avoidance of cathartics are important elements in the early treatment of invagination in limiting the invaginating process. After invagination has occurred further descent of the bowel is effected by the increased peristalsis caused by the partial obstruction. If the stomach is distended with food, a salt-water or mustard emetic should be given to empty this organ, after which the patient's diet should be limited to such articles of food as are digested and absorbed by this viscus. If the obstruction has existed for some time and intestinal contents have reached the stomach, the fluid should be removed by using the siphon stomach-tube, after which the organ should be washed out with a mild antiseptic solution, as a one per cent. solution of boracic acid or a saturated aqueous solution of salicylic acid. The administration of cathartics of any kind and at any stage of the affection is to be strongly condemned, as the increased peristalsis following their use could not but increase the invagination and aggravate the secondary pathological conditions. The main object of treatment from the beginning should be to place the whole gastro-intestinal canal in a condition approaching perfect physiological rest. In acute cases the stomach should be emptied as described and stomach feeding restricted to the use of beef tea, peptonized milk, koumiss, and other equally digestible

*A paper read before the Ontario Medical Association.

articles of food. Rectal injections of infusions of belladonna, nicotiana, cicuta, and other narcotics, as recommended in text-books of only twenty years ago, are not only dangerous but absolutely useless in effecting reduction or modifying the intensity of symptoms. The internal use of opium was strongly recommended by De Haen, Heberden, Howship, Abercrombie, Schoulein, and others. This drug exercises no special curative effect, but places the intestinal canal, and particularly the affected segment, in a condition most favorable to arrest further invagination; and should spontaneous reduction or disinvagination by surgical interference not be accomplished, the affected part is placed in a condition most favorable for a spontaneous cure by sloughing and elimination of the intussusceptum. The opiate should be given in small and frequently repeated doses until the desired effect—the arrest of the violent peristalsis—is accomplished. With the appearance of peritonitis, the doses of opium must be increased to subdue the intense pain. If signs of exhaustion become apparent, the use of stimulants is indicated. Champagne, cognac, whiskey, and subcutaneous injection of camphorated oil, are most serviceable in meeting this indication during the later stages of the disease.

Distension of the Colon.—As soon as the existence of an invagination is suspected, the large intestine should be emptied of their contents by the administration of a copious enema, the patient being placed in the knee-elbow position, as advised by Hegar. Forcible distension of the colon with warm water is recommended in nearly every text-book of surgery since first suggested by Hippocrates as a means of correcting the mechanical difficulties in ileo-cæcal, ileo-colic and colic invagination. Warren, Schillbach, and others, report successful cases treated by this method. It is generally advised that the patient should be held in the inverted position during the time the injection is made. Useful as this measure may prove under favorable circumstances in reducing an invagination below the ileo-cæcal valve, it should never even be attempted if the invagination is located above this point, as numerous experiments on animals have satisfied me that fluids cannot be forced beyond the ileo-cæcal valve, if this is in a normal condition, without inflicting serious injury in the

bowel below the obstruction. The following experiment among others will serve to illustrate the therapeutic value as well as the dangers which attend this method of reducing an invagination:

Experiment 1.—Adult cat. Two inches of the ileum were invaginated into the colon and fixed by two fine silk sutures at the neck of the intussusciens. For two days after the invagination the stools were scanty and contained mucus and blood. On the third day the abdominal cavity was reopened by an incision along the outer border of the right rectus muscle, and the invaginated bowel drawn forward into the wound. No peritonitis. The invaginated segment was very vascular, and the neck of the intussusciens covered with plastic exudation. The sutures were removed and the rectum and colon distended with water for the purpose of effecting reduction. As soon as the colon had become thoroughly distended the adhesions gave way with an audible noise, and complete reduction followed in such a manner that the portion last invaginated was first reduced. After reduction had been accomplished, the injection was continued to test the competency of the ileo-cæcal valve. As soon as the cæcum was well distended the fluid passed readily through the valve into the small intestine, showing that the valve had been rendered incompetent by the invagination. The force required to overcome the adhesions in the reduction of the invagination was sufficient to rupture the peritoneal coat of the colon in three different places, the rents always taking place parallel to the long axis of the bowel. The animal died on the following day with symptoms of diffuse peritonitis.

A number of years ago I had succeeded in reducing an ileo-cæcal invagination by this means of effecting reposition. The patient was a child, two years of age, which, without any apparent cause, was suddenly attacked with symptoms of intestinal obstruction nearly two days before. The symptoms during this time pointed to invagination. The stools were scanty, mucus tinged with blood, each passage preceded and attended by distressing tenesmus; occasional attacks of vomiting; tympanites slight. Rectal injections had been given which brought away the fecal matter below the

obstruction. A distinct sausage-shaped swelling could be felt in the region of the transverse colon, extending as far as the splenic flexure. While the child was held in an inverted position, warm water was injected into the rectum with an ordinary David-on's syringe. The ascending colon could be distinctly felt after distension, when suddenly in continuing the injection something was felt giving way, and the swelling disappeared quite suddenly. A normal passage from the bowels followed, and the child recovered without any further untoward symptoms. As will be shown further on, distension of the colon with water as a mechanical means of effecting disinvagination in its efficiency and safety is inferior to rectal insufflation of hydrogen gas or atmospheric air, and should be abandoned as a therapeutic measure in the treatment of invagination.

Manual and Instrumental Reposition.—As early as 1856 Kade succeeded in reducing a colic invagination in a woman by the introduction of the arm up to the elbow into the rectum and colon. This method of reposition would, of course, only be applicable in the treatment of adults and in invaginations within reach of the hand. The reduction of invagination by the use of an œsophageal sound, or, better, by a strong whalebone probe, the point protected by a sponge, should always be done with the greatest care and gentleness, for fear of inflicting an irreparable injury of the intestine damaged by secondary pathological conditions. It is said that Nyssen reduced successfully a low invagination by the use of an œsophageal tube. As in manual reduction, the use of such instrumental aids should be limited to invaginations in which the neck of the intussusciens can be reached in this manner, or as a preliminary effort in facilitating means by which complete reposition can be accomplished. For instance, in ileo-cæcal and colic invaginations, when the intussusceptum protrudes from the anus, a partial reduction by some such means is necessary before disinvagination can be completed by rectal inflation.

Rectal Insufflation of Hydrogen Gas.—Distension of the bowel below the obstruction with filtered air or hydrogen gas is the safest and most efficient means of reducing an invagination that has not been rendered irreducible by

great swelling of the intussusceptum or inflammatory adhesions. This method of reduction is far superior to rectal injections of fluids in overcoming the resistance offered by the invaginated portion of bowel on account of the greater elasticity of the substances employed, which makes it possible to exert an equal degree of reduction force, minus the force required in forcing a column of fluid as far as the seat of invagination. I prefer to use hydrogen gas to atmospheric air, as this substance is not only aseptic, but possesses important inhibitory antiseptic properties, qualities which would be of the greatest importance should the bowel be ruptured in an attempt at reduction. If atmospheric air is used, it should be filtered before it is injected. As gas can be readily forced beyond the ileo-cæcal valve, this method is applicable in the treatment of invagination in any portion of the intestinal canal; and as distension of the intestine below the seat of obstruction may prove successful in correcting the mechanical difficulties due to other causes, it should be resorted to both as a diagnostic and therapeutic measure in the beginning of all cases of intestinal obstruction in which a positive diagnosis of other forms of obstruction cannot be made without it. The *modus operandi* of this surgical resource can be most forcibly shown by the following experiment :

Experiment 2.—Large adult cat. Six inches of the ileum were invaginated into the colon. Frequent bloody discharges until the third day, when the abdomen was reopened and the neck of the intussusciens exposed to sight, so as to observe directly the mechanism of disinvagination by rectal insufflation of hydrogen gas. As soon as the colon was well distended, the adhesions at the neck of the intussusciens began to give way, and complete reduction followed under the continuous elastic pressure from below. The abdominal wound was again closed and dressed in the usual manner. The animal recovered completely, and was killed twenty-four days after the first operation. Abdominal wound well united. In the ileo-cæcal region, numerous adhesions around the portion of bowel which had been invaginated and subsequently reduced. As the force necessary to rupture the adhesions and to reduce the bowel produced no injury of any kind to the intestine below and at the seat

of invagination, this experiment would tend to prove that insufflation can be practised successfully in cases of invagination of several days' duration. This procedure should be employed as early as possible, in fact as soon as an invagination is suspected, as the results will be most satisfactory when it can be used before the invaginating process has been arrested by traction of mesentery, œdema, and inflammatory swelling of intussusceptum or plastic adhesions. I am almost convinced that its proper use within a few hours after the accident has occurred would be followed by almost uniform success, and at this stage would be attended by little or no risks. To rupture the peritoneal coat of a healthy intestine by inflation requires from eight to twelve pounds of pressure to the square inch, so that even an intestine weakened somewhat by the secondary lesions would not yield under a pressure sufficient to reduce the invagination. Before the inflation is made, the bowel below the obstruction should be thoroughly emptied by a copious enema. The patient should be placed in such a position that will afford most room in the abdominal cavity. If the hips are elevated, or, still better, if the patient is inverted, the abdominal viscera will gravitate towards the chest and thus render the inflation of the bowel below the obstruction much more easy and efficient. Rectal insufflation of hydrogen gas in the reduction of an invagination should always be made under the influence of an anæsthetic, administered to the extent of complete muscular relaxation. The pressure upon the rubber balloon should be uninterrupted, and should never exceed what will produce two pounds to the square inch in the distended bowel. Disinvagination by this method is effected by two distinct forces. In the first place, the steady elastic pressure of the gas distends the bowel between the sheath and the returning cylinder of the intussusceptum, which makes traction upon the neck of the intussusciens, while the column of gas by its elastic pressure against the apex of the intussusceptum acts as a direct reduction force. In order to accomplish the desired mechanical effect in a most satisfactory manner, the inflation must be made slowly and continuously, as when these precautions are observed there is less danger of rupturing the bowel than when rapid inflation is made under

the same pressure, but with interruptions, and the object of the inflation is more surely realized. The return of the gas is prevented most effectually by an assistant pressing the margins of the anus against the rectal tube. A small gutta percha female syringe makes the best rectal tube. A sudden diminution of pressure always distinctly felt by the assistant who compresses the balloon indicates either that disinvagination has been effected, or that a rupture of the intestine has occurred. It is exceedingly important that the surgeon should satisfy himself of the existence of a rupture, if this accident has occurred. The best way to recognize this complication is to continue the inflation under a pressure of not more than a quarter to half a pound to the square inch. If the invagination has been reduced by the inflation, the intestine above it will become gradually distended by the gas and the tympanites takes place first over the middle of the abdomen and above the pubes, ascending gradually as the inflation is continued, the area of dullness remaining the same but being transferred higher up. If the intestine has given way the gas escapes into the peritoneal cavity, and the existence of the accident is proved by the appearance of a uniform free tympanites with disappearance of liver dullness. In a recent case there is no danger of rupturing the bowel under a pressure of two pounds to the square inch; and in cases where the tissue of the intestinal wall yields under this pressure, the pathological conditions are such that a laparotomy is the only proper remedy; and the occurrence of the accident renders the indication for the performance of the operation imperative, without adding materially to its danger.

The value of rectal insufflation of air or hydrogen gas is well shown by the following two cases which recently came under my observation:

Case 1.—The first case was a child, two years of age, which had been quite ill for two days. The attack was sudden, attended by pain in the abdomen, occasional vomiting, slight distension of the abdomen, and tenesmus. Small quantities of fecal matter came away with the injections that had been frequently given to correct the constipation. The tenesmus was usually followed by small mucous discharges tinged with blood. An elongated swelling could be plainly felt in the region of the transverse

colon, and extending down to near that sigmoid flexure. A positive diagnosis of ileo-cæcal invagination was made. The child was placed at once under the influence of chloroform, and while held in the inverted position air was inflated from a large rubber balloon. On carefully watching the effect of the inflation, it could be distinctly observed that the descending colon at first became very prominent, and after this the swelling was forced higher up and gradually became shorter, when suddenly the resistance was overcome, and air rushed through the ileo-cæcal opening into the lower coils of the small intestine. The child was now laid on its back and the abdomen was carefully examined, but no swelling could be found. The place previously dull on percussion, corresponding in location to the invagination, was now resonant, a positive proof that the invagination had been reduced. Within a few hours the child had a number of copious stools and made a speedy and permanent recovery.

Case 2.—An infant, six months old. The child had been perfectly well until six hours before it had been brought to me for examination and treatment. I found a colico-rectal invagination, the intussusceptum projecting from the anus at least six inches. It is evident that this extensive descent of the colon had taken place within six hours. The mucous membrane presented a swollen, œdematous and almost livid appearance. The tenesmus was constant and severe; the stools were frequent, but very scanty. The child was at once taken to the hospital, where it was chloroformed, and being held in inverted position the prolapsed portion was pushed upward beyond the anus, after which the invagination was readily reduced in a few minutes by rectal insufflation of air. The invagination did not return, and the child remained in perfect health.

Colostomy.—Two indications for the formation of an artificial anus might arise in the treatment of colic invagination: (1) In acute cases, when the general symptoms are so grave as to positively contra-indicate a laparotomy. (2) In irreducible chronic cases, when the lower portion of the colon is invaginated into the upper part of the rectum, where it is impossible to make a resection through the rectum or establish an intestinal anastomosis by lateral apposition. Ac-

ording to the location of the invagination, the operation is made either in the right or left inguinal region; in the former instance the opening being made in the cæcum, and in the latter in the descending colon. After exclusion of the obstruction from the fæcal circulation by this procedure, the patient may not only go on to recovery, but the obstruction is occasionally removed later spontaneously by disinvagination or sloughing and elimination of the intussusceptum. Dubois ("Enterotomie Pratiquee in Extremis,"—*Journal de Med. de Bruxelles*, December, 1878) reports a case of colic intussusception where the invaginated portion could be felt in the region of the sigmoid flexure through the abdominal wall. Colostomy was performed above the seat of obstruction, and the patient not only recovered, but four months later the permeability of the intestinal canal was restored spontaneously, although the artificial opening had not closed.

Enterostomy.—The formation of an external intestinal fistula or enterostomy should only be resorted to in irreducible iliac, ileo-colic, and ileo-cæcal invagination when the patient is in such a collapsed condition that more radical measures are inadmissible. As in the majority of cases, the primary seat of invagination is at or below the ileo-cæcal valve; the artificial opening should be made in the right iliac region. Should the invagination be located higher up in the intestinal canal, and an empty collapsed coil of intestine present itself in the incision, it should be pushed aside and search made for a distended loop. An enterostomy is justifiable even when the patient is in an almost pulseless condition as this operation is attended by little, if any, shock, as it could be done in a few minutes, and, if necessary, without an anæsthetic. Emptying the bowel above the seat of obstruction will bring immediate relief by removing abdominal distension, and by favorably influencing the invaginated part by taking away the hydrostatic pressure above the obstruction, which in itself is a potent cause in maintaining vascular engorgement and inflammation. Langenbeck ("Verstellung eines Falles von Geheiliter Enterotomie,"—*Verh. der Deutschen Gesellschaft für Chirurgie*, 1878) saved the life of a patient suffering from invagination of the colon by enterostomy. The invagination had advanced so far

that the apex of the intussusceptum could be felt in the rectum. He performed Nelaton's operation and the patient recovered. Nine months after the operation both the invagination and the artificial intestinal fistula remained. The intestinal fistula in such cases is only made to meet the urgent symptoms caused by the obstruction, and if the patient survives the operation and the invagination is not removed spontaneously subsequently is to be followed by radical measures with the intention of restoring the continuity of the intestinal canal at the seat of obstruction by reducing the invagination, enterectomy, or intestinal anastomosis.

Laparotomy.—Remembering that the general mortality of invagination is seventy per cent., and in children less than eleven years of age spontaneous cure by sloughing and elimination of intussusceptum does not exceed twelve per cent., it becomes plain that in cases where reduction is not accomplished by rectal insufflation, as described above, a laparotomy is indicated in all instances where the general condition of the patient is such as to justify such a procedure. There is absolutely no excuse in postponing the operation, as every hour adds to the exhaustion of the patient from the obstruction and adds new dangers, arising from the complications, which are surely to develop at the seat of obstruction. A radical operation undertaken at a time when the pulse is in a fair condition and before septic inflammation has reached the peritoneal cavity holds out a fair prospect of a satisfactory result. It is true that the experience of the past in the operative treatment of invagination is not such as to inspire confidence, but it must not be forgotten that almost without exception the abdomen was opened as a last resort, after the patient had become completely prostrated by the disease, or after the invagination had given rise to irreparable local conditions. Instead of discouraging operative interference, the statistics collected so far are the strongest possible arguments in favor of early operative interference where simpler measures, faithfully carried out, have failed.

Ashhurst ("Laparotomy for Intussusception,"—*American Journal Medical Sciences*, July, 1874, p. 48) brought together, with more or less detail, the histories of thirteen cases in which laparotomy had been undertaken for the relief

of intussusception. Of this number, five recovered and eight died. As the result of a careful study of his cases, he has come to the conclusion that the operation is not admissible in patients less than one year of age, as all operations up to that time done in children less than a year of age proved fatal. He also advises against an operation when the symptoms present, and particularly the existence of intestinal hemorrhage, render it probable that the tightness of the intussusceptum will lead to sloughing of the invaginated portion, as he claims that under these circumstances an operation would almost surely fail, while there is a fair hope that separation of the invaginated mass might lead to spontaneous recovery. Against the special contra-indications of the operation advanced here, it can be said that experience has abundantly shown that cure by spontaneous elimination of the intussusceptum seldom, if ever, takes place in very young children and infants; consequently, the hopelessness of the situation in such cases, where legitimate efforts at reduction have failed, can be advanced as the most logical argument in favor of operative treatment, as the patient and surgeon have nothing to lose and everything to gain. Knaggs (*The Lancet*, June 4th, 11th, 1887), after reporting an unsuccessful case of abdominal section for invagination that occurred in his own practice, gives the results of thirty-seven operations, including his own. Of this number, eight recovered and twenty-nine died. In many of these cases peritonitis had set in before the operation was performed, and this condition and not the operation was answerable for the subsequent fatal issue.

Sands (*New York Medical Journal*, June, 1887) has tabulated the records of twenty-one cases of laparotomy for intussusception, eight of which have occurred since the publication of Ashhurst's paper. Of twenty cases in which the result of the operation is given seven recovered, and thirteen proved fatal, thus showing a mortality of sixty-five per cent. After a study of these cases, he came to the conclusion that the prognosis after operation is also influenced by the age of the patient; thus, of twelve cases of patients two years old or under, three recovered and nine died; of seven cases sixteen years old or over, four recovered and three died;

showing that the mortality of the operation, as would be expected, is greater in infants than in adults. Sands remarks very properly show that the mortality depends more on the condition of the intestine than the age of the patient. In taking all cases together, he has found that the mortality of the operation is fourteen per cent. in the easy, and ninety-one per cent. in the difficult cases.

Braun (*Verh. der Deutschen Gesellschaft f. Chirurgie*, 1885) tabulated fifty-one operations performed since 1870; that is, operations done under antiseptic precautions. Of this number, eleven were cured and forty died. In twenty-seven of these cases disinvagination was effected, and in twenty-four it was not; of the former, eighteen were children and nine adults. Four children recovered, while fourteen died. Seven adults lived and two died. Resection of the invaginated portion was practised twelve times with only one recovery. An artificial anus was established in nine cases, followed by death in every instance.

The largest number of operations for invagination has been collected by Treves (*The Lancet*, December 13th, 1884). He gives the general mortality in one hundred and thirty-three recorded cases as seventy-two per cent.; where reduction was easy it was thirty per cent., and when difficult ninety-one per cent. No one can look over these tables without noticing that the mortality was greatly influenced by the time which had elapsed since the invagination occurred and the local conditions of the parts involved, as when reduction was easy the results were much more favorable. This fact alone should convince us that laparotomy should be resorted to without delay as soon as a faithful attempt at reduction by rectal insufflation has demonstrated that reduction cannot be accomplished in any other way. The operation should be done as a first, and not as a last, resort.

As in cases of strangulated hernia, the obstacles to reduction become more serious and persistent as time advances, and the danger is augmented in proportion to the time which elapses until reduction is attempted. In reference to the time when the operation should be done, I can only caution against delay and make at the same time the positive statement that as in cases of strangulated hernia it should be done

as soon as it has been shown that reduction is impossible by the employment of simpler measures. The age of the patient should not enter into consideration in deciding upon the propriety of an operation. Sands (*Op. cit.*) operated successfully upon an infant only six months old, where the ordinary treatment by injection and insufflation had been only partially effected in accomplishing disinvagination. The cæcum and appendix vermiformis and a small portion of ileum remained firmly fixed in the sheath, and it required considerable traction force to release them.

Godlee (*The Lancet*, December 16th, 1882) performed abdominal section successfully for invagination in a child nine months old, four days after the commencement of acute symptoms. In this case the invagination had progressed so far that the apex of the intussusceptum protruded at the anus.

Mr. Hutchinson (*Medical Times and Gazette*, November 29th, 1883) narrates the particulars of a successful abdominal section for intussusception in a child two years of age. The invagination had commenced in the ileo-cæcal region, and during the course of one month had advanced so far that the distal end of the intussusceptum was extracted several inches at the child's anus. As rectal injections failed in reducing the bowel, the abdomen was opened by a median incision below the umbilicus, and the intussusception was then easily found and as easily reduced. The child made a rapid recovery.

Preparations for Operation.—Instruments, ligature and suture materials should be on hand to make a resection or an intestinal anastomosis, should it be found, inexpedient or impossible to reduce the invagination. As the operation should follow immediately after an unsuccessful attempt at disinvagination, it is advisable to make the necessary preparations for the operation before the insufflation is made, so as to lose no unnecessary time and complete what is to be done while the patient is under the influence of the anæsthetic. As rectal inflation may become necessary to assist the reduction by taxis, the necessary apparatus should be on hand and ready for use. Several sizes of decalcified perforated bone plates must be on hand for making an intestinal anastomosis, should this become

necessary. A large quantity of hot sterilized water, aseptic sponges and aseptic gauze compresses must be provided for, and the necessary stimulants for inhalation and subcutaneous use should be within easy reach, and be used promptly should shock threaten life during a prolonged operation. Should it become necessary to operate in a private house during the night, a good petroleum lamp or a number of tallow candles will furnish the requisite light.

Incision.—As a rule, to which there should be no exception, the incision should be made in the median line, as it furnishes the most ready access to the invagination, and enables the operator to apply the various surgical resources with the greatest facility. For special indications, a lateral incision may become necessary during the course of the operation. If the swelling has not been previously located by palpation or insufflation, it is usually not difficult to find the invagination after the abdomen has been opened. As soon as the invaginated part has been found, it should be brought into or as near to the wound as possible for careful examination, as the subsequent action of the surgeon will be guided by the local conditions of the invaginated segment.

Disinvagination.—This should always be attempted if, on examination, the neck of the intussusciens and the external cylinder show no evidences of gangrene. The pathological conditions which resist reduction and which must be overcome have already been pointed out. In recent, and especially very acute cases, the oedematous swollen intussusceptum offers the greatest resistance. The same measures should be resorted to to enable reduction, as in the preliminary treatment of a phimosis or paraphimosis. *The oedema and inflammation swelling should be removed before any efforts at reduction are made.* This can be readily accomplished by steady, uninterrupted manual compression of the invaginated portion. Instead of making direct manual compression, it is better to surround the affected segment of bowel with a large flat sponge and make the pressure over this, which will secure a more equal and uniform effect. Prolonged compression also results in an arrest of peristaltic action in the intussusciens, which also favorably influences the disinvagination. As soon as the swelling has been

reduced in this manner, reduction is attempted by making gentle traction upon the bowel above the neck of the intussusciens while counter-traction is made upon the sheath just below the apex of the intussusceptum. The sheath and middle cylinder are often thrown in folds which, by making only traction upon the entering portion of the intussusceptum, are increased and become a serious difficulty in the way of reduction. The traction upon the sheath at the point designated prevents this folding and materially facilitates the process of disinvagination. The hand that makes counter-traction should be used at the same time in making pressure against the apex of the intussusceptum; this can be done most effectually by stretching the sheath over it, thus bringing into harmony two reduction forces at each end of the affected segment of bowel, aiding each other in effecting disinvagination. Should these different methods of taxis produce no effect, inflation is practised; and as soon as the bowel between the returning cylinder and the sheath has become expanded, the efforts are repeated. The utility of combining inflation with taxis in the reduction of an invagination which had resisted the usual methods became apparent to me in the following case, which came under my observation only a few weeks ago.

The patient was a child nineteen months old. Symptoms of obstruction had developed suddenly three weeks before the child was admitted into Milwaukee Hospital for operative treatment. The obstruction never became complete and at no time was the vomiting distressing. Discharges from the bowels frequent, of a seromucous nature, and often stained with blood. Tenesmus not constant, but at times quite severe. Copious injections had been used frequently, but with no effect either in procuring an alvine evacuation or in effecting reduction. At the time the patient was brought into the hospital, the abdomen was slightly tympanitic, a sausage-shaped swelling could be distinctly felt in the region of the transverse colon; face of a deathly pallor, and pulse almost imperceptible; temperature, subnormal. The diagnosis of invagination was plain, but I was somewhat in doubt whether at this stage it would be prudent to make an attempt at reduction by rectal insufflation. As it was evidently a case of ileo-

cæcal-invagination, I decided to give this latter procedure a faithful trial; and in case it should not succeed, follow it at once by laparotomy. The child was placed under the influence of chloroform, and while held in an inverted position the insufflation was made by using a large rubber balloon for this purpose. Only a limited quantity of air could be injected, which had the effect of dilating the descending colon, and, at the same time, apparently reduced the length of the intussusceptum. I did not use the amount of pressure I would in a recent case, as I feared that the disease, which had existed for three weeks, had resulted in textural changes of the intussusciens which might have resulted in such weakening of the intestinal wall as to yield under a comparatively safe degree of pressure. After making a gentle but prolonged attempt with this method of reduction and not finding any evidences that unfolding at the neck of the intussusciens was taking place, I opened the abdomen at the middle line between the umbilicus and pubes, and had no difficulty in at once finding the invagination. The cæcum and ascending colon with the lower end of the ileum had become invaginated into the transverse and descending colon. The apex of the intussusceptum could be distinctly felt above the sigmoid flexure. The parts were greatly swollen, and were at once subjected to firm manual compression, which had a decided effect in reducing the swelling. Traction was then made in the manner described above, but had no effect in starting the disinvagination. Inflation was now made and it could be distinctly seen that the space between the returning cylinder of the intussusceptum and the sheath became distended, and the same manipulations repeated, assisted by the elastic pressure, succeeded in forcing the intussusceptum in a backward direction, the adhesions between the serous surfaces giving way as reduction proceeded.

Examination of the bowel after reduction of the invagination showed two small rents of the peritoneum, one corresponding with the neck of the intussusciens and the other below this point; these were closed by a few Lembert sutures. The whole operation, including the insufflation, did not last more than an hour, and the child seemed to recover from the immediate effects in a satisfactory manner. Copious stools

followed. Six hours after the operation the child laughed and played with a doll. Six hours later symptoms of collapse set in, and death followed within an hour. As no *post mortem* was made, it is somewhat difficult to explain the immediate cause of death. It must remain an open question whether the child died from delayed shock, septic peritonitis, embolism, or thrombosis of the pulmonary artery. If firm adhesions about the neck of the intussusciens between the opposed serous surfaces of the two inner cylinders resist reduction, these should be carefully separated before traction is made. Rydygier suggests that this should be done by inserting the index finger. Any one who has had much experience with such cases must have observed that the neck of the intussusciens grasps the bowel very tightly, and that any such efforts as the introduction of a finger would be almost certain to result in a rupture of the bowel. If the treatment, as above directed, does not effect reduction, the presence of firm adhesions must be suspected. Rupture of the bowel has been frequently produced by using too much traction force in attempting reduction, and such an accident should always be avoided by handling the affected segment with the utmost care and gentleness, and by the careful removal of the causes which resist or retard the process of disinvagination. The adhesions should be separated by inserting between the serous surfaces a small, straight, blunt-pointed scissors, or, still better, a Kocher's director, passing it around the whole circumference between the inner and middle cylinders. When the adhesions have been separated, the efforts at reduction by traction and inflation are repeated. After reduction has been effected, the sheath and invaginated portion are subjected to a careful examination. Small circumscribed patches of gangrene must be covered by stitching over them the peritoneum in a transverse direction to the long axis of the bowel with a few Lembert sutures. If the peritoneal coat has given way the rent is always longitudinal, and should be sutured in the same direction. Roser has suggested that before closing the external incision the affected segment of bowel should be sutured to the abdominal wall for the purpose of preventing reinvagination. Under proper after treatment it is not very likely that reinvagination will take

place, and such method of fixation might subsequently result in another form of intestinal obstruction. The fear of recurrence of reinvasion is, however, not entirely unfounded, as Senator reports a case of colic invagination in which it occurred nine times in seventeen days. As a long mesentery is one of the anatomical conditions which permits an invagination to take place, and which favors its recurrence, shortening of this structure suggests itself as the simplest and safest procedure to prevent reinvasion. This can be done in a few minutes by folding upon itself the mesentery belonging to the affected segment of bowel, making the fold parallel to the bowel, and maintaining it by a few catgut sutures. Should repeated but gentle attempts at reduction fail, one of two courses of treatment must then be pursued: (1) The establishment of an intestinal anastomosis. (2) Resection of the invaginated portion with or without circular enterorrhaphy.

(To be continued.)

QUERY: WHAT IS A PATHOLOGICAL CELL?*

BY A. B. MACALLUM, B.A., M.B.,
Lecturer on Physiology in the University of Toronto.

It is customary on the part of pathologists to speak of cells in certain conditions as being pathological, or to explain certain cellular phenomena and types of structure as due to pathological conditions. This, of course, assumes that there is a common understanding on the part of pathologists as to the meaning of the term "pathological." There is, however, no such accepted definition, and the absence of it renders inevitable a large amount of confusion. An instance, to illustrate this, was furnished by the statement made recently by a prominent pathologist, that when epithelial cells are in a pathological condition (*e.g.*, in carcinomata) it is not surprising that structures are found in their interior such as some, within the last two years, have described as parasitic, and that the structures in question are the result and not the cause of the pathological condition of the cells. Here it is taken for granted that the words "pathological condition" carry a precise and definite meaning; whereas if we substitute for

"pathological" the word "abnormal," we see that the given statement carries no more reasoning weight than does the following: These non-normal, intracellular structures are present because the cell is abnormal in structure or function. Here is seen an example of play on words, and the necessity for determining what we mean by the word "pathological" is demonstrated.

Perhaps I ought not to be so bold as to attempt a definition of the term "pathological cell." I know, furthermore, that a true definition must be broad enough to cover all conditions of the cell which vary from the normal, and such an essential point leads at first sight to the belief that any such broad definition must be of little value in the close application to individual cases; nevertheless I think we can seize on one principle, that of nutrition, and employ it in elaborating a definition which will be easy of application. This principle is made use of hereafter with special regard to the occurrence of neoplasms, but I believe it has as great a bearing on all abnormal conditions, although, owing to our lack of knowledge of cell metabolism, we may not now be able to extend its application.

All conditions, physical or chemical, which directly affect a cell, influence those processes on which the vital phenomena of the cell are dependent; in other words, influence its nutrition. The latter may thereby be enhanced or diminished, in the case of unicellular organisms, with no further result than that their vitality is increased or diminished; but in multicellular organisms, enhanced nutrition of one cell or of a group of cells out of the whole means the predominance of that cell or group of cells and the consequent overthrow of the nutritional equilibrium, while a diminished nutrition means, other things being equal, as regards a similar group of cells, the nutritional predominance of the remaining cells of the organism.

Before trying to apply this principle in the explanation of the occurrence of neoplasms, we may glance at some of the characters of their cells, and examine some of the explanations offered therefor. As in other cases, the application of the word "pathological" to the condition of the neoplastic cells gives to many pathologists a satisfactory explanation of their occurrence, while others again have been content to refer their vigorous growth to the embry-

*Read before the Toronto Pathological Society, Feb. 28th, 1891.

onic character of the cells, or to the supposed persistence of portions of embryonic tissue. The latter explanation is no more reasonable than the former, since no generally understood character is supposed to belong to embryonic tissue except its vitality. Lately, however, Minot has pointed out that the embryonic cell is richer in nuclear material and poorer in cell protoplasm than that of the adult organism. It is now generally recognized that the vitality of a cell depends in large measure, if not wholly, on its nucleus. Putting these facts together, it might be assumed that neoplastic cells are, like embryonic cells, rich in nuclear material and poor in cell protoplasm. My own observations lead me to conclude that in neoplastic cells (of, *e.g.*, carcinomata and sarcomata) the special nuclear material, "chromatin," is abundant, but here the parallel between neoplastic and embryonic cells ceases, for the former are, as a rule, rich in cell protoplasm. The only common point between the two classes of cells is the fact that they have both an abundance of chromatin. Cytologists are also, in the main, now agreed that the vital activity, in short, the vitality of a cell depends on the amount of chromatin present in it. That the chromatin of neoplastic cells is abundant, is readily proven by the fact that cell division, which is dependent for its occurrence on the amount of chromatin present, is very frequent, and the divisions are (in sarcomata) frequently so hastened that several stages and divisions are "telescoped," that is, *e.g.*, instead of a cell dividing into two others, four, six, or eight cells are simultaneously formed from it. Nothing can more clearly indicate than this latter fact the correctness of the conclusion that we must refer the vitality of a neoplastic cell to its chromatin, for when a cell instead of forming two daughter cells, as almost always is the case, gives simultaneously rise to four, six, or eight cells, the only inference possible is that in such a cell there is enough chromatin to supply, not two, but four, six, or eight daughter cells at once. It may be mentioned that it is almost wholly in neoplasms (sarcomata) that one finds such multiple divisions. In carcinomata the division is very rarely multiple, but that it is extraordinarily frequent is enough to show that the chromatin is abundant.

Having then determined that in neoplastic

cells there is abundance of chromatin, the abnormal condition of such may be referred to this abundance. What is the cause of this? Have these neoplastic cells inherited or retained from the embryonic condition this abundance of chromatin, as would appear to be postulated by the theory of Cohnheim? As we have just seen, an embryonic cell is rich in nuclear material, *i.e.*, chromatin, and poor in cell protoplasm. Abundance of chromatin in a cell means a capacity for division and multiplication, which immediately manifests itself. Why should an embryonic cell with this capacity persist with its powers dormant—as is supposed to be the case in the carcinomata—till past mid-life of the individual? It might be said that the chromatin in a carcinomatous cell is chemically different from what it is in an embryonic cell, but to assert that is to admit that carcinomatous cells are not embryonic in character. Any other answer to the objection is equally destructive of the theory of the Cohnheim school. Rejecting, then, Cohnheim's explanation mainly on the ground that neoplastic cells are not embryonic in character, and because of the *credo* involved in the application of it, we must look for some other which can be built on the basis of observed fact. We need not go farther for such than the acceptance of the principle above stated, *viz.*, that a cell or a group of cells in an organism is pathological only when the nutrition of such cell or cells is enhanced or diminished beyond that of the surrounding cells, and beyond that usually found in the cells of such localities. I have already frequently referred, in the meetings of this society, to the elements in carcinomatous cells, which are considered by some to be parasitic, by others to be secretions or productions of the cell substance; I propose now to show how the principle just enunciated is exemplified in the case of epithelial cells possessing these intracellular elements. These intracellular elements are sometimes merely masses of chromatin, at other times they are simply leucocytes. It is possible to trace a connected history between these chromatin masses and the enclosed leucocytes; in other words, the latter may, in the interior of an epithelial cell, degenerate and break down, and form chromatin-holding bodies. What effect this has on the cell can be seen when the nucleus of the

latter is examined, but I found the clearest evidence on this point furnished by my studies on the pancreas of amphibia. In nearly every case where a pancreatic cell had swallowed the chromatin of a neighboring disintegrated cell, the nucleus was more or less enlarged and its chromatin increased; the amount of enlargement and of the increase of chromatin varying apparently with the amount of the chromatin assimilated. I have already described this in a published paper* and will not, therefore, refer more fully to it. In carcinomatous cells we find a similar enlargement of the nucleus and an increase of the chromatin when chromatin masses are present in the cell protoplasm; and just as in the pancreatic cells the nuclear chromatin is reinforced from the assimilated chromatin, so here the abundant chromatin is derived from the contained disintegrated leucocytic elements. The latter point was shown very clearly in preparations from a carcinoma of the prepuce.

Now, whether the chromatin of an epithelial cell is to be increased in quantity will depend on its capacity for overcoming the contained leucocyte. I have already touched on this point in a communication to the society. I am unable to say why a leucocyte enters the interior of another cell; that they do is a demonstrable fact; that they break down in the interior of epithelial cells is as readily demonstrable. It is a reasonable inference, from all the facts at our disposal, that the chromatin of the disintegrated elements is assimilated by the nucleus of the containing cell—providing that the latter retains its original vitality. Such epithelial cells thus acquire a vigor beyond that of their neighbors; the nutrition of the surrounding cells is deranged, more leucocytes wander into the part, some of which contribute in like manner to increase the vitality of some of the cells; in the end the cells become so vigorous that they merit the name malignant, and thus form the primary neoplastic cells. Klebs has stated that there is a direct transference of nuclear material from the leucocytes to the neoplastic cells. I have never seen any instance of such, although I am prepared to admit that it is possible.

What has been said here of the carcinomatous cell is equally true of the other neoplastic ele-

ments; of this I have satisfied myself by observations on the cytology of round, spindle, and giant-celled sarcomata.

Given, then, in a tissue any condition comparable to a minor state of inflammation which lasts for some time, we may expect that some of the cells may become—in the manner described above—neoplastic. It does not matter what is the cause of this inflammatory condition so long as it is more or less chronic; the cause may be parasitic, or it may be a projecting tooth, the pressure of a clay pipe, the presence of soot particles, etc. The inflammation is never very marked, but it is sufficient to bring about in the tissue affected the presence of leucocytes, which contribute to the origin of the neoplastic cells.

I cannot take up here all the points which this aspect of the question presents, but I hope to have again an opportunity to develop these views at fuller length.

As already stated, the nutrition of a cell may be diminished, and when a number of cells, as, for example, those forming an organ, are so affected, *atrophy* may result. Sometimes this lessened nutrition becomes normal, as in the case of the superficial epidermal cells of the skin. On the other hand, the nutrition of every cell in an organism may be diminished, as in starvation. A similar condition is present in every cell of the body in *anæmia*, *chlorosis*, etc., a condition the reverse of that in which the neoplastic cell occurs. In the latter chromatin is abundant, but in the former it is manifestly deficient; I say *manifestly*, because the hæmoglobin of the blood is diminished; and as it is derived from the chromatin, it is evident that there is not by any means as much chromatin in the cells of anæmic subjects as there is in the normal cells; hence the *hypoplasia* of chlorosis.

Just as there is an increased supply of chromatin to neoplastic cells, so there may be an excess of cellular or protoplasmic material in neoplastic as well as in other cells. The history of the chromatin supply is, however, more clearly traceable, and its effects directly on the cell more readily demonstrable.

Why leucocytes so contribute to the formation of neoplastic epithelium past mid-life, and to the production of connective tissue tumors before that period, is difficult to say. We may put such problems on the same plane with the ques-

*Contributions to the Morphology and Physiology of the Cell
Transactions of the Canadian Institute, vol. 1, part 2.

tion why an individual is liable to diseases in early life to which afterwards he is completely immune.

I have developed here, so far as the limits allow, what I consider as the proper meaning of the term "pathological cell." The view here taken accords well with the generally received opinion that there is no marked line of separation between the physiological and the pathological states; for if the physiological depends on proper nutrition of cells and organisms, then the pathological condition must depend on a deviation from the normal nutrition, and this deviation may at times barely pass beyond the neutral line.

I do not claim that I am advancing a new principle. I think the question of nutrition in pathology has before this been discussed fairly and fully, but its importance has not, I believe, been dwelt on. I claim only that it affords a satisfactory explanation of the occurrence of neoplasms, and that its application to other abnormal cellular conditions will be made when our knowledge of the nutrition of the cell as a whole is much more extended than it is now.

NOTE REGARDING EXPLORATION OF THE FEMALE BLADDER.*

BY J. F. W. ROSS, M.D.

Exploration of the female bladder has been surrounded by an amount of difficulty that can be readily dispensed with. Some recommend vaginal incision as a means of exploration, and this is carried out under an anæsthetic. A cutting operation is required; a fistulous opening remains through which the urine flows, and the patient is inconvenienced. These openings tend to close without difficulty and can be readily closed by subsequent operation. Different methods of urethral dilatation have been from time to time advocated and carried out, with varying success. The endoscope has been highly lauded and serves a good purpose in experienced hands. The same applies with even more force to the electrical cystoscope. I have used all these methods and have been impressed with the usefulness of them all. One day having a class of students examining a woman with symptoms of growth in the bladder, I was able,

without difficulty, to explore the bladder without any cutting operation, without any previous dilatation, without an anæsthetic, and without any temporary or permanent inconvenience to the patient. Having carried out this procedure in several other cases during the past year, I now heartily commend it to the profession. It may be as old as the hills or older. When one is told that a speculum has been dug up among the ruins of Pompeii, one fears that much that is new to this generation is new to this generation only. No doubt the surgeon uses his little finger in entering a sinus before he endeavors to insert his index finger, if the sinus is small. But that fact does not cover the point I wish to make before this Association. The fact is that the first finger, owing to its circumference, is on the very verge of the danger line, while the little finger is removed, by virtue of its lesser circumference, several tenths of an inch further toward the side of safety. When this is so the little finger only should be used, provided it serves every other purpose. The procedure is as follows: Cocaine may be first used as an intra-urethral application. The patient lying on the back with the knees drawn up upon the abdomen, the little finger, with pared and soap-filled nail, and oil smeared, is gradually pressed through the urethra. If unable to enter, previous rapid dilatation may be done with Ellinger's or Palmer's cervical dilator, so that the tip of the finger enters the narrowest part of the meatus. This dilatation should be very limited, and the little finger must be a small one—such as the great majority of surgeons are blessed with. Any of the other fingers are about twice as large in circumference as the little finger. A slight tearing of the meatus upwards towards the clitoris will be produced, but can subsequently be remedied by a little stitch with a fine needle and fine silk. The patient will complain of pain as they do if a catheter is passed, but I have not found this to be excessive, and it is of short duration. The finger gradually finds its way in, but cannot reach far except by means of a special manipulation. The urine should be drawn off before the finger is passed. The first, second and third fingers are all flexed on the palm, and the hand (the right) pronated until by bending the body over slightly the ulnar edge of the arm is toward the ceiling of the room, the upper arm

*Read before Ontario Medical Association.

at an angle of 90° with the body, and the elbow at an angle of about 145° . The hand is pressed straight upwards, and by holding the fingers as stated it enters between the tuber ischii and allows of easy upward distention or invagination of the perineum. The whole finger thus enters the bladder, the orifices of the ureters can be readily felt, the whole bladder wall can be explored in a few moments, and the patient suffers no inconvenience. I have demonstrated this to a few. My friend, Dr. Barker, one of the house surgeons of the Toronto General Hospital, explored a woman's bladder on April 15th, 1891, in this manner, when the patient was under an anæsthetic. We had just examined another case with the electrical cystoscope and Skene's endoscope, without an anæsthetic; the symptoms were reflex, and we found great tolerance on the part of the bladder. But in the second case it was impossible to fill the bladder with more than two ounces of fluid, owing to the violent contractions occurring even under chloroform. We gave the anæsthetic to endeavor to overcome this, because it is difficult to use the cystoscope unless at least four ounces of fluid are in the organ. The cystoscope now failed to work satisfactorily, and I determined to explore with the finger. This soon showed its superiority over cystoscope, endoscope, or any other instrument. A finger can find more in a few moments than any of these artificial aids. The orifices of both ureters were felt; the bladder wall was smooth and not encrusted; no ulcerated spots could be felt, and no stone or growth was present. Dr. Barker passed his finger for the first time into the female bladder *ante mortem*; he was thoroughly satisfied that every part of the organ could be explored with the little finger, if not distended with fluid, and with the greatest ease. The external split bled a little, but a stitch soon checked the flow of blood. The patient suffered no inconvenience. As I have said before, I have done the little operation in my gynæcological clinic at the Toronto Dispensary without either cocaine or anæsthetic. I have found that if the patient is turned on the side the perineum is more readily indented, but the parts fall away from the finger, and have therefore concluded that the best results can be obtained in the dorsal position, with knees flexed quite up on the abdomen, and the patient

brought near the edge of the examining-table. If a stone be found in such a case, I should open from vagina into bladder and remove it. To my mind, it should never be removed per urethram. Incontinence of urine will occasionally occur from the over-distension required, and it is an incurable disease, and a sort of "living death" affection. Incontinence of urine, surgically produced, is a blot on our art that cannot be effaced. With the careful introduction of a properly-prepared average-sized little finger, I do not believe that incontinence can be produced. A number 16 English sound has a circumference of $\frac{11}{16}$ inches. My little finger has a circumference of $\frac{3}{16}$ inches, and my first finger of $\frac{2}{8}$, or $\frac{1}{4}$ inches more. Every trifling increase in size adds to the danger, just as it is the last straw that breaks the camel's back. If the little finger is smaller than the index finger, it should be employed.

Simon found that dilatation might be carried to 6 or $6\frac{2}{10}$ cent. without danger of incontinence; the greatest dilatation of my little finger is $4\frac{6}{10}$ cent., while that of my index finger is that of $6\frac{2}{10}$. In girls under and about the age of puberty this question of the circumference of the fingers is of still greater importance, because the urethra is smaller. Simon says that where incontinence is of comparatively little importance (where he finds such cases I do not know), a circumference of $6\frac{2}{10}$ to 7 cent. may be inserted. As few index fingers will go below this figure, I consider that they should never be used—not as long as a surgeon has a little finger left on either hand.

Now, as to the relative reaching power of index and little finger—the perineum catches between the index and second fingers with the radial side of the arm uppermost; the perineum catches between the little and ring fingers, with the ulnar side of the arm uppermost. I measured Professor Howard Kelly's fingers and found, by means of a foot rule pressed up between index and middle fingers and little and ring fingers, only a difference in the reaching power of index and little finger of $\frac{1}{8}$ of an inch; in my own cases the difference is $\frac{2}{8}$ inch. You may test your own fingers for your own satisfaction. This little point may have been written up before now, but I have not seen it. Perhaps one would find it among the books of 200 or 300

years ago—books with which we are too ill-acquainted.

You may use this method of exploration without fear, without cutting, without any after trouble, and perhaps even without chloroform. What you find is definite, and you have no further misgivings as to the presence of thickened walls, or encysted stones, or encrusted walls, or ulcers, or new growths. There is no electrical apparatus to get out of order.

I must apologize for bringing such a trivial matter before you. Its only merit is that it is a practical point.

[I find that, given a movable uterus and a Goodell's dilator, one can, under chloroform, explore any uterus with the little finger in a few minutes. Much more forcing and pressure and a rougher manipulation is necessary to get the index finger past the internal os, even when the blades of the dilator have been separated one and a half inches.]

THE DOSAGE OF TUBERCULIN.

BY PROF. RAMSAY WRIGHT, M.A., B.SC.

Guttman and Ehrlich report in the last number of the *Deutsche Medicinische Wochenschrift* the results of two months observation of the new scheme of dosage adopted by them in the Moabit Hospital, Berlin, and referred to in my letter on page 277 of THE CANADIAN PRACTITIONER.

Beginning with $\frac{1}{10}$ of a milligramme, daily injections increasing by the same quantity are administered till one milligramme is reached, after which the lymph is given only every two days, the dose being increased, however, on each occasion by $\frac{2}{10}$ of a milligramme until 2-3 milligrammes are arrived at, when it is considered safe to advance by increments of $\frac{5}{10}$ milligramme. By this method a dose of one centigramme is reached in about six weeks, and may be persisted in for some time, to be followed, according to Koch's advice, by a gradual descent to a few milligrammes and by a subsequent gradual rise.

The authors claim that this dosage permits the physician to determine the sensitiveness of any particular case to tuberculin (the limits of variation in this respect are very wide), to avoid the weakening febrile reactions to which many unfavorable results have been attributed (the

temperature rarely exceeds 38° C. = $100, 4^{\circ}$ F.), while it does not diminish the curative effects of the lymph on tubercular tissue, as can be observed, e.g., in the larynx, but rather favors the avoidance of too intense local reactions.

It is advisable to depart from this scheme in those cases (often hectic) which prove so sensitive to the lymph as to react beyond 38° C. with small doses, by returning to the initial dose of $\frac{1}{10}$ milligramme and advancing very cautiously to the higher doses which appear to be most active therapeutically. In the less sensitive cases also, where there is no rise of temperature with the initial doses, and where the condition of the patient indicates that the tuberculous process has not advanced far, doses of one milligramme may be reached much more rapidly than by the first-mentioned scale.

Thirty-six cases, of which eighteen were male and eighteen female, thirteen initial and twenty-three more advanced, have been treated by the above method for two months, with the results that thirty-two have gained in weight, the males an average of 6 lbs., the females an average of 8 (improvement as the result of improved nourishment was eliminated by keeping the cases in hospital 1-3 weeks before beginning the treatment). In eleven cases the physical signs were materially improved (complete clearing up of dullness is not to be expected, for the healing process is one of cicatrization). In many cases the sputum is diminished in amount and improved in character, and in four of these the bacilli have disappeared entirely; finally, in most of the thirty-six cases the subjective improvement is very marked. The majority of the cases are so far improved that they could, in part at least, follow their avocations; some indeed have been discharged to permit of this, while several of the cases may be regarded as having entered upon a phase which must lead to a definitive cure. The dosage recommended removes all danger from the treatment of outdoor cases.

FISSURED NIPPLES.—Dr. Barton C. Hirst (*Univ. Mag.*) suggests the following application:

R Bismuth subnitrat.
Olei ricini, aa ʒj.

The nipple, and adjacent skin must be carefully cleansed and the ointment then rubbed on liberally.

Selections.

TWO CASES OF INGUINAL HERNIA IN INFANTS CURED BY REGULATION OF DIET ALONE.

BY JOHN THOMSON, M.B., F.R.C.P. EDIN.

The following cases appear worth recording on account of one lesson which they teach :

CASE 1.—H. M., æt. 11 weeks, seen first on 15th March, 1889. A delicate, feeble infant, with a small right inguinal hernia, which had appeared three weeks previously. His mother was in the habit of giving him the breast constantly night and day, and feeding him with "biscuit meat" twice daily. He was always crying and slept very little. Some cough. Extreme phimosis, but no pain on micturition.

Treatment: Local treatment of the rupture and circumcision were deferred on account of the child's weakness. The mother was told to stop the "biscuit meat," to supplement her breast-milk with diluted cow's milk, and to give the breast and bottle at regular intervals.

Progress: 22nd March: Has cried much less; sleeps better; hernia as before.

5th April, 1889: Keeping better; hernia quite gone.

May, 1891: No return of the hernia has taken place. Some weeks after last note the child was circumcised on account of pain on passing water.

CASE 2.—J. C., æt. 4 months, seen first on 30th March, 1889. A poorly developed, emaciated baby, with an inguinal hernia on the right side (the size of a large hazel-nut), and extreme phimosis. Cries day and night continually when not sucking the breast; gruel given regularly; no pain on micturition; constipation.

Treatment: Stop gruel and give milk and barley water at regular intervals. Application of truss and circumcision deferred on account of weakness.

Progress: 10th April: Cries very much less; rupture has been away for a week, but returned to day.

19th April: Hernia seen again to-day for the first time since last note.

September, 1890: No return of hernia since last note. The phimosis remains as before.

May, 1891: The hernia has never returned, and as the phimosis has not caused any symptoms it has not been operated on.

Remarks: In these two cases the usual surgical treatment by trusses and circumcision was deferred until the patients should recover from the wretchedly weak condition in which they were, and so become able to bear it. In both, surgical proceedings were found unnecessary (as far as the hernia was concerned) owing to the rapid disappearance of the condition which followed recovery from dyspepsia and consequent cessation of crying. They are, I think, interesting as enforcing the importance of not neglecting the regulation of the diet as a subsidiary part of the treatment in ordinary cases of hernia in babies.—*Edinburgh Medical Journal*.

BELLADONNA IN LABOR.—Dr. Asher, of Lithgow, New South Wales, advises the use of belladonna in the early stages of labor, having found it of immeasurable benefit, saving considerable pain to the patient and materially diminishing the expected period of the labor. In primiparæ, after a prolonged period of pains of more or less intensity, and with but little dilatation of the os, as well as in the more intense condition of a completely rigid os, where, with extreme contractions, no dilation whatever occurs, he has given large doses of belladonna with marked effect. He usually prescribes a reliable tincture of belladonna in doses of twenty to thirty minims every hour, or oftener; and satisfactory dilatation usually follows the first or second draught.—*The Australasian Medical Gazette*.

VIRCHOW'S SEVENTIETH BIRTHDAY.—Several of the pupils and admirers of Rudolph Virchow have united in appealing to the medical profession of the United States and Canada for contributions to the fund which is being raised in Germany, England, and, it may be said, throughout the world, as a testimonial to be given to Professor Virchow on his seventieth birthday. The German committee proposes that the fund shall be used in procuring a large, gold portrait medal to be presented to Professor Virchow.—*New York Medical Record*.

DR. J. C. CUTHBERTSON, formerly of the *Cincinnati Lancet and Clinic*, has been appointed editor of *The Journal of the American Medical Association*.

THE
Canadian Practitioner

A SEMI-MONTHLY REVIEW OF THE PROGRESS
OF THE MEDICAL SCIENCES.

Contributions of various descriptions are invited. We shall be glad to receive from our friends everywhere current medical news of general interest.

When a change of address occurs please promptly notify the Publishers, THE J. E. BRYANT COMPANY (Limited), 58 Bay Street.

TORONTO, JULY 16, 1891.

INCREASE OF POPULATION IN
NORTH AMERICA.

Recent statistics connected with census returns show certain facts which are creating considerable interest among our neighbors in the United States. The 1st census of the State of Massachusetts proves that the increase of population among the Americans proper is growing less from year to year. In this class more than 20 per cent. are childless, while among foreigners, now living in that country, only 13 per cent. are childless. In the former class, those who bear children generally have small families; in the latter, large families are the rule rather than the exception.

These facts are, of course, not new; they have been recognized for some time, but the evil—if evil it be—is growing. Some think that the boasted culture of the better classes is largely responsible for this condition of decreased fecundity. The educated women direct their energies in the direction of high educational attainments at the expense of their physical strength. A short time ago we referred to the address lately delivered at Albany by Dr. Potter, of Buffalo, which showed the great dangers of modern systems of educating young girls between the ages of fourteen and twenty. The inordinately high pressure put on girls in the various schools is undoubtedly bringing about a deterioration in the physical strength of a large number of such pupils. But fond parents are slow to perceive the evils of such pernicious methods, and physicians, in many cases, pay too little attention to the subject.

Political economists in the United States are

studying the census returns carefully with reference to the effects of these facts on the *great American people*. The question is asked—whither are we going? Will the Americans soon be crowded out of their own country by the rapidly increasing foreign element? Some think that New York may well be called "New Cork." *The Medical Mirror* asks: "What will the end be?" and adds—"Inviting, as we do, the off-scourings of all creation to come to our land of the free, ceasing to procreate ourselves, the query may well be presented, where will America be a few years from now? Serious questions present themselves, and the best thinkers of the country may well put on their thinking caps."

THE INTER-CONTINENTAL AMERICAN
MEDICAL CONGRESS.

We have before referred to the proposed formation of an Inter-Continental American Medical Congress. At the last meeting of the American Medical Association, held at Washington in May, it was decided that such a congress should be permanently organized, and a committee was elected to complete the necessary arrangements. This committee, under the chairmanship of Dr. Charles A. L. Reed, of Cincinnati, is now working actively, and desires the hearty co-operation of the profession in all parts of North and South America.

No decision has yet been reached as to the time and place of the meeting of the congress. It is proposed by some that it shall be held in Chicago in 1893, during the great "World's Fair." These matters will be decided, and the permanent officers elected at a meeting of the general committee, to be held at St. Louis, Mo., October 14, 1891. At the same time a constitution, which is now being drafted by the officers of the committee, will be submitted for adoption.

We must congratulate Dr. Reed and his committee upon the energy and vigor they have already shown in the work of organizing. We think the idea of holding such a congress is a happy one, and have no doubt that the undertaking will be a success in all respects. We understand that a cordial invitation will be extended to Canadian physicians to lend their assistance, and we hope it will receive a favorable and hearty response.

CANADIAN MEDICAL ASSOCIATION.

The twenty-fourth annual meeting of the Canadian Medical Association will be held in Montreal, under the presidency of Dr. Thomas Roddick, on Wednesday, Thursday, and Friday, September 16, 17, and 18. The former meetings of this society held in that city have always been exceedingly pleasant and interesting. The physicians and surgeons of Montreal have ever been warm supporters of the organization, and always entertain their visitors in royal style. The last meeting held there will be long remembered by those present as one of the most pleasant and successful medical gatherings this country has known.

The committee of arrangements have already done much work in the way of organizing. Those who are willing to read papers or present cases are requested to communicate with the secretary, Dr. H. S. Birkett, 123 Stanley Street, Montreal, as early as possible. The various railway and steamboat companies have promised to give return tickets at considerably reduced rates. More definite information on these points may be obtained from the secretary.

We hope that Ontario will send a goodly number to the meeting. We regret that the time selected will not suit certain members from Toronto, who have other engagements for that week, but we trust these will not be many. Apart from such considerations, no more suitable season of the year could be found for a meeting in Montreal, as the weather then is usually pleasant and nearly all have returned from their summer holidays. We expect to give further particulars in a later issue.

LONGER COURSES IN MEDICINE.

It is somewhat remarkable that cheap and inefficient medical schools should have been allowed to exist so long in the United States. While there are some admirable institutions, the great majority are still below par, especially in the matter of their requirements from students. We are glad to see that those excellent teaching bodies, the University of Pennsylvania and the Harvard Medical School, are contemplating a new departure in lengthening their course from three to four sessions.

Harvard has already completed its arrange-

ments for a course of four years, consisting of four sessions of nine months each, the rule to come into effect September, 1892. This will undoubtedly be one of the most complete medical courses given in the world. We hope that this grand old institution will be well supported under the new regulations.

Meeting of Medical Societies.

TORONTO MEDICAL SOCIETY.

May 21st.

The President, Dr. Spencer, in the chair.

Dr. Thomas McKenzie presented two

BURSÆ PATELLÆ REMOVED FOR LONG-STANDING BURSITIS.

The walls of the bursæ were very much thickened; the patient had suffered for some years, and she presented two very large tumors over the knee, the largest being as large as a medium-sized orange. The bursal sacs contained a small amount of fluid. They were dissected out after making a semi-lunar incision along the outer margin of the patella.

Dr. Peters, who had assisted at the operation, considered the treatment adopted the only one which held out a hope of cure. The lateral semi-lunar incision brings the scar away from the middle line and point of pressure, and is therefore most advantageous.

Dr. A. A. Macdonald presented some specimens of

PHTHISICAL LUNG, NUTMEG LIVER, AND ULCERATED INTESTINE,

removed *post mortem* from a patient who had been in the Toronto General Hospital suffering from advanced phthisis.

Dr. Powell exhibited a surgical instrument case, the covers of which could be used as trays to hold antiseptic fluids.

Dr. Spencer narrated the history of a case of

ABSCESS OCCURRING IN TYPHOID FEVER.

During the course of the fever an abscess developed in the right hypochondrium, reaching nearly to the iliac crest. It came on during convalescence; the temperature registered 104-105 for ten days. After a copious evacuation from the bowel she improved. Was it possibly an abscess of the liver? Dullness was present

over front and back. There was no pus nor albumin in the urine.

Dr. McPhedran thought the abscess might have had its origin in a mesenteric gland, afterwards rupturing into the bowel; this is borne out by the fact that the enlargement occurred rapidly, more so than it would have done had it been in the liver, another possible source would have been the gland at the junction of the great and small gut, as sometimes occurs after typhoid fever; or it might have been a case of appendicitis.

Dr. Powell referred to a case of abscess formation occurring during pregnancy, and discharging by the vagina after delivery. Its origin was obscure.

May 28th.

The President, Dr. Spencer, in the chair.

Dr. N. A. Powell exhibited a specimen of

HORSE-SHOE KIDNEY.

The kidneys are united by their lower extremities by a thick fleshy band which appears to be kidney substance. The ureters lay in front.

Dr. A. A. Macdonald narrated a case of sup-
posed

FAT EMBOLISM OCCURRING AFTER SIMPLE FRACTURE

Three weeks and two days ago a strong, active young man fractured the right thigh below the middle. Poroplastic splints were applied with extension. Four days ago, whilst using the bed-pan in the morning, he felt movement and grating at the seat of fracture. He was troubled with a slight cough, and whenever he coughed rubbing and grating was felt. He then felt faint and sent for Dr. Macdonald, who found him at mid-day very faint, pale, and somewhat blue; he seemed to get a little better, but in the afternoon, about three o'clock, he had a severe attack of dyspnoea. Dr. Baines saw him at this time, and found him very exhausted, pale, with a bluish tinge; respiration, 40; pulse, 130; extremities cold, pain across the chest. When Dr. Macdonald saw him at four o'clock he looked so bad that it was thought he was going to die. Nitrite of amyl caused flushing of the face and he vomited; stimulants were freely used. It was first thought that the attack might be hysterical, then it was considered that there must be some obstruction in the circulation.

Dr. Primrose, who saw him at 9 p.m., suggested that the condition might be due to fat embolism, and in this diagnosis Dr. Macdonald was inclined to concur. The patient recovered gradually from the attack.

Dr. Primrose said that the clinical phenomena presented in this case suggested to him fat embolism affecting the pulmonary circulation as the cause. The patient was a strong young man, apparently in excellent health, before the accident. Symptoms of embarrassment in the breathing first manifested themselves at nine in the morning, and gradually increased, with some remissions of relief, until at 6 p.m. the dyspnoea was intense. He was seen by Dr. Primrose first at 9 p.m., twelve hours after the onset of symptoms; he had then improved somewhat, but at that time the pulse was 132; temperature, 97.6; respiration, 34. His respirations were shallow and hurried, his lips were dark, and his face had a slightly cyanotic aspect. An attendant was constantly fanning him. The least exertion tired him exceedingly. During the two hours Dr. Primrose was with him there was some improvement in his condition; this was very gradual, but he breathed more easily at 11 o'clock than he had done at 9.

The diagnosis seems to lie between fat embolism and pulmonary strombosis. The only point which militates against the idea of fat embolism is that the condition occurred late, namely, three weeks after the accident. Fat embolism usually manifests itself either immediately after fracture or within the first three or four days, and is due to the laceration of tissue and the setting free of fat, more particularly from the medulla of bone; this is absorbed by the veins or lymphatics, and is carried as a large number of minute oil globules to the right side of the heart and pumped on into the pulmonary circulation, where it impedes the blood stream so greatly that intense dyspnoea is the result. The fact that this occurred three weeks after a fracture seemed to throw doubt on the possibility of its being fat embolism, unless there had been some cause for the setting free and absorption of fat. It was noted, however, that there was a cause present in this case; there had been pretty extensive movement at the seat of fracture, the patient experiencing a grating sensation at the point of contact of the fragments. It seems,

therefore, feasible to suppose that this permitted the setting free and absorption of the fat. At such a late date venous thrombosis is more common. This is due to a thrombosis occurring in the veins of the neighborhood; a clot is set free from this and causes an embolism which reaches the right side of the heart and the pulmonary circulation, and dyspnoea results. The cases which Dr. Primorse has been able to find recorded of thrombosis have nearly all proved fatal, they have occurred about the sixteenth to the twentieth day, and have occurred in people above middle age. Then, again, the blocking of a vein in the limb in this way usually causes oedema, of which there was none in this case. Venous thrombosis and embolism is more likely to prove fatal than fat embolism, although Erichsen records a case in which the symptoms subsided in a few hours. There is evidently some possible source of error in the diagnosis of these cases. Thus Verneuil records a case of a man, æt. 60; fracture of both bones of the leg; developed symptoms three and a half weeks after the accident of pulmonary embolism, and died; the existence of a clot was suspected, but the vessels *post mortem* were found entirely free of clot. There is no record of any minute examination of the lungs, and this case therefore might very possibly have been one of fat embolism. That pulmonary embolism does occur, however, at times, has been proved by *post mortem* examination; thus Shanley Boyd records a case of fracture of the metatarsal bones, followed by thrombosis and embolism, and death. Clots of *autemortem* formation were found plugging the pulmonary artery.

Hamilton explains the effect of fat emulsion in the following way: The white corpuscles are of lighter specific gravity than the red, and in consequence pass to the periphery of the blood stream; whilst the red, which are about the same specific gravity as the plasma, pass in the axial stream. In the capillaries the white corpuscles exercise a considerable amount of friction against the vessel wall, and if they are much increased in number will impede the circulation very considerably. They may even bring it to a standstill. Foreign materials may be introduced into the blood which will act in the same way, as evidenced in the effect of air, aspirated into veins wounded at the root of the neck, or the

absorption of fat causing fat embolism; this may cause complete blockage of the capillary circulation in the lung. Minich states that fat embolism *invariably* occurs after fracture, except in children, but not sufficient to cause symptoms.

The fat may be absorbed by the veins or lymphatics; according to Wiener, the intervention of the lymphatic glands does not prevent absorption.

The urine may, or may not, contain fat after the occurrence of fat embolism; the presence of fat usually occurs late, some ten days or a fortnight after the symptoms, when the fat is eliminated by the kidneys from the system. Fat embolism has occurred in other conditions besides fracture, *e.g.*, rupture of the fatty liver, extensive injury to the subcutaneous fat, etc.

Dr. Cameron had brought a case before the notice of the society some years ago. The condition, which proved fatal, occurred after a fracture of the rib. Minich and Scriba state that the nearer the fracture be to the heart, the more likely is fat embolism to occur. The assumption that Dr. Macdonald's patient suffered from fat embolism is a fair one, but the occurrence of such symptoms in the third week is consonant with venous thrombosis. The fact of its occurring late, however, in this case, is not a powerful argument against the possibility of its being fat embolism, because the movement at the seat of fracture might have allowed absorption of fat to occur. The condition of fat embolism in the pulmonary circulation rarely proves fatal; it is only when the emboli reach the brain, more particularly the medulla, that a fatal result is apt to ensue. Patients who die late, of "shock" so-called, have often in reality succumbed to the effects of fat embolism. Gamgee has shown that the amount of fat in the blood may be enormously increased without giving rise to symptoms.

Dr. Peters considered that at least one-half of the capillaries of the lung must be obstructed before death is caused. Scriba found that fat occurs in the urine on the third day, due to absorption of fat consequent upon the pressure of inflammatory effusion at the seat of injury. The fat again appears in the urine on or about the fourteenth day, when it is eliminated from the pulmonary capillaries. The case reported

is interesting, but the symptoms are more nearly those of venous thrombosis.

Dr. Graham's impression was that the fracture must be severe and comminuted in order to cause fat embolism.

Dr. Primrose considered that it was not necessary to have a severe and extensive comminuted fracture, as evidenced by the fact that a large number of the cases recorded appear to have occurred after fracture of the neck of the thigh bone. The amount of fat absorbed must be enormous; Scriba found that it was necessary to inject an amount of fat three times the weight of the fat contained in the medulla of the femur in order to produce death in animals.

Dr. Macdonald considers that nothing short of a *post mortem* examination would prove the nature of the case beyond a doubt. In answer to Dr. Cameron, he stated that there had been no hæmoptysis in this case.

Dr. Peters narrated the history of a case of

RUPTURE OF A DEEP VEIN IN THE LEG.

The clinical history will be found at page 297 of THE CANADIAN PRACTITIONER.

Dr. A. A. Macdonald narrated the history of a case of

CONCEALED HEMORRHAGE.

A young primipara had complained of pain constant in character, above the pubes, lasting for about two weeks previous to labor. The doctor was summoned the night labor set in, and found that the pain had become much worse, and the patient was blanched; pulse was feeble and volume poor; the os had barely commenced to dilate, and there was no "apparent hemorrhage." She was watched carefully, and, as the condition did not become any worse, the labor was allowed to proceed without interference until ten o'clock the following morning, when, the os being fully dilated, forceps were applied and a child delivered. A large number of clots came away with the placenta. There was found in the placenta a clot of blood which had become effused into the placenta itself, and had become partially organised. Tarnier records similar cases, and states that the danger to the mother is not great. The patient under Dr. Macdonald's care, however, was undoubtedly in a dangerous condition.

In the discussion which followed, Dr. Machel

referred to fatal cases which have recently been recorded. Dr. Graham asked if it were possible in a healthy woman for sufficient hemorrhage to occur into the uterus to cause fatal results, when the child and placenta were there.

Dr. Macdonald believed that the bleeding, under the circumstances mentioned by Dr. Graham, might be sufficient to cause death.

The Treasurer, Dr. W. J. Greig, read his annual report; and the following officers were elected for the ensuing year:

President, - DR. A. A. MACDONALD.

1st Vice-President, DR. N. A. POWELL.

2nd Vice-President, DR. G. A. PETERS.

Recording-Secretary, DR. J. M. MACALLUM.

Corres.-Secretary, - DR. G. A. FÉRÉ.

Councillors, - { DR. R. A. REEVE,
DR. H. MACHELL,
DR. B. SPENCER.

PATHOLOGICAL SOCIETY OF TORONTO.

February 28th, 1891.

The Society met in the Biological Department of the University of Toronto. The chair was occupied by the Vice-President, Dr. A. McPhedran.

PAGET'S DISEASE OF THE SKULL.

Dr. Thomas McKenzie presented a gross specimen and microscopic sections from a woman who died of pneumonia, æt. 70. The following outline of her history had been received from Dr. Varden, of Galt: "Mrs. M. Father died at 79, mother at 94. No hereditary disease in any of the families. She married at 22, and had three daughters and two sons, two of which died in infancy; the others are still living and well. Her brothers and sisters were healthy and all lived to be old. She came to Canada forty-nine years ago, and was then healthy, erect strong, and active. During her first winter here she took a severe cold and lost the sense of smell. Four years after she had a miscarriage and was confined to bed for six months, and to the house for one year. The doctor in attendance said that a portion of the placenta had been retained, and kept up a constant flooding for six months. She never got strong after this, but was subject to frequent fainting spells and headaches. She also complained of pain in the

eyes, and was prone to be very irritable. Her appetite was good. Her head commenced to enlarge and her back to become deformed about twenty-five years ago; about this time she passed through the menopause. Dr. McKenzie has attended her on three or four occasions during the past four years; she had repeated attacks of bronchitis, and one severe attack of dysentery shortly before she went to the Home for Incurables in Toronto. Her memory was always good. The increase in the size of her head was steady and almost imperceptible in its evenness of development for 22-25 years."

Dr. McKenzie stated further that there was angular curvature in the lumbar region and an exaggerated dorsal curvature. She had chronic bronchitis, but this did not much inconvenience her. Her memory was very fair, though defective for recent events, and she was quite intelligent up to the last. When fresh, the calvarium weighed $36\frac{1}{2}$ ounces. The brain was small and weighed only 36 ounces. The floor of the brain case appeared as though it had been pressed upward; no depression, however, existed on the base of the skull, and the apparent elevation was evidently due to overgrowth of bone. There was marked curvature of both the dorsal and lumbar regions. There were no changes in the long bones or in the bones of the face. The case had been diagnosed as hydrocephalus, and this was favored by the external appearances during life. Sections through the fresh and decalcified bone show marked increase of fibrous tissue, the bone is rarefied to the periosteum, osteoclasts are very numerous, and the haversian canals are almost wholly destroyed, only a few retaining circular laminae about them.

Dr. G. A. Peters said he had seen four specimens of this disease in the College of Surgeons Museum, England. Associated with the skull specimens were the long bones, which showed similar thickening and deformity. The compact tissue of the bones is rarefied. The fact that this patient showed no symptoms of compression agrees with what Paget observed in his five cases. Three out of the five died either of carcinoma or sarcoma. An increase in the curvatures of the spine was present in some cases. Butlin's microscopical report showed that the whole structure of the bone had been absorbed, and it was all laid down again on a larger scale,

the haversian canals being much enlarged. This was shown better in the long bones than in the skull. He thought Dr. McKenzie's specimens showed evidently a condition of rarefying osteitis. The round cells in the fibrous tissue he regarded as those of the red marrow.

Dr. A. B. Macallum said the disease should not be called rarefying osteitis, for the specimen shows that development of bone has gone on to a certain point. Haversian spaces are present, but no haversian canals. The number of osteoclasts is probably not greater than in normal bone. The osteoblasts apparently have not their normal power of bone deposition. The aggregations of round cells he regarded as inflammatory, not as marrow cells.

Dr. I. H. Cameron said the bone was certainly rarefied. The cause might be a neoplastic or an inflammatory one. The fact that in other cases neoplasms had been common might lend support to the former view.

Dr. John Caven asked why are the osteoclasts present? They are usually present in inflammatory conditions, but there is really little inflammation here. Possibly the condition is neoplastic and the osteoclasts are taking on a phagocytic action.

Dr. McKenzie replied, in regard to the osteoclasts, that they are evidently producing a condition normal in the long bone, but abnormal in the skull; namely, taking out the centre while the periphery increases in thickness. There is no evidence of a general inflammatory condition.

QUERY: WHAT IS A PATHOLOGICAL CELL?

The communication read by Dr. A. B. Macallum appears at page 326 of THE CANADIAN PRACTITIONER.

Dr. John Caven spoke of the pathological cell in neoplasms. Why should the karyokinetic cells here be asymmetric? In Zeigler's "Beitrag" the fact is mentioned, and he had verified it in his own study, that a considerable number of cells show asymmetrical forms in nuclear division. Must there not be some other element to account for this besides the supply of chromatin?

Dr. I. H. Cameron remarked that if Dr. Caven's observation applied to a simple pathological cell, the asymmetry would mean anæmia of the cell or absence of sufficient pabulum.

Dr. G. A. Peters said that Dr. Macallum's theory gave a very good explanation of the activity of sarcomata and carcinomata where there is mere overgrowth, but it did not explain adenomata, for instance, where there is some definite plan to the growth. Here one would think there must be some nervous control. This theory has been advocated by Dr. Parsons, Mr. John Marshall, and Dr. Macallum.

Dr. Macallum, in reply, said that in regard to the unequal division of the nuclear chromatin, the results of his own studies agreed with those referred to by Dr. Caven. The asymmetry, he thought, was due to the abundance of the chromatin not yet assimilated and the necessity for the cell to divide to make room for it. Chromatin granules were to be seen among the loops of the filament. In the testes of amphibia one sees different varieties of cell division; at certain times of the year chromatin is abundant, and then there is asymmetry of the nuclear division. The same phenomenon has also been observed in keratitis. He held this theory only tentatively.

Dr. John Caven presented the following specimens. (1) Remnant of patent urachus. A small sac at the upper surface of the bladder, lined with a mucous membrane identical with that of the bladder, the muscular coat having not closed in. (2) Double ureter on both sides. The ureters all enter the bladder separately. (3) Intestinal diverticula in the rectum, sigmoid flexure, and descending colon. They are thin-walled and contained fecal matter.

Drs. Cameron, Nevitt, and Olmstead reported having seen cases similar to the last in old people with constipation.

KIDNEY, URETER, AND BLADDER, WITH CALCULI.

Dr. John Caven showed these specimens for Dr. H. C. Scadding. The substance of the kidney, pelvis, ureter, and bladder contained a large number of calculi, varying in size from that of a small pea to a hazelnut.

Dr. Cameron, who had been present at the autopsy, reported further that the vermiform appendix was wrapped up in the great omentum, to which it had become adherent. Its lower portion was hard and firm, and on removal it was found to contain an oval mass of impacted fecal matter.

MICROSCOPICAL SPECIMENS.

(1) Paget's disease of the skull; sections stained with hæmatoxylin and eosin, by Dr. T. McKenzie. (2) Encephaloid cancer of the breast, and (3) miliary tubercle of the lung, by Dr. John Caven.

Personal.

DR. FENWICK has resigned his position on the active staff of the Montreal General Hospital, and has been placed on the consulting staff.

DR. GEO. E. ARMSTRONG has been appointed a surgeon on the active staff in the place of Dr. Fenwick.

DR. F. R. ENGLAND has been appointed physician to the Western Hospital, Montreal, in the place of Dr. Trenholme, deceased.

DR. A. LAPHORN SMITH has been appointed Professor of Gynæcology in Bishop's College, Montreal, in the place of the late Dr. Trenholme.

DR. F. E. WOOLVERTON, of Hamilton, was married, July 2nd, to Miss Zimmerman.

DR. W. W. KEEN, of Jefferson Medical College, recently received the honorary degree of LL.D. from Brown University.

Obituary.

SIR PRESCOTT HEWETT, F.R.S., F.R.C.S.—This highly distinguished surgeon died June 22nd, at the ripe age of 79, full of honors. He showed great industry and ability as a student in St. George's Hospital, where he afterwards taught anatomy and pathology before he was made a surgeon. He had to struggle many years before he attained eminence, but finally his success was exceptional. In 1882 he became a baronet, and was Sergeant-Surgeon to Her Majesty, and Surgeon-in-Ordinary to the Prince of Wales.

MR. JAMES R. LANE, formerly well known as a surgeon in St. Mary's, St. Mark's, and the Lock Hospitals, died June 6th. He suffered for many years from locomotor ataxy.

DR. W. A. LAVELL, son of Dr. Michael Lavell, the well-known warden of the Kingston Penitentiary, died suddenly at his home at Smith's Falls, July 2nd. He received his education at the Royal College of Physicians and Surgeons of Kingston, and graduated in 1881.

H. W. SUTTON, M.B. Lond., F.R.C.S., died from pneumonia, following influenza, June 9th, at the age of 55. He was connected with the London Hospital for twenty-four years, and was highly distinguished as a profound pathologist, a great physician, and a most successful teacher. His work with the late Sir William Gull, on "Arterio-Capillary Fibrosis," and his last book on "Medical Pathology," were well known and highly appreciated.

Births, Marriages, and Deaths.

BIRTHS.

COTTON.—At 260 Spadina Avenue, on June 8th, the wife of Dr. James H. Cotton, of a son.

MARRIAGES.

FERGUSON-BELL.—T. A. Ferguson, M.D., to Lizzie, second daughter of Mr. E. H. Bell, both of Toronto.

STRUTHERS-BARR.—On the 17th ult., Robt. B. Struthers, M.D., Sudbury, to Miss Harriett E. Barr.

DEATHS.

HUNTER.—On January 12th, at 116 Dovercourt Road, Mabel Renwick, eldest daughter of Dr. John and Mrs. Hunter, aged 10 years and 10 months.

Miscellaneous.

ROTHERHAM HOUSE.—Dr. Holford Walker's Private Hospital, situated on Isabella St., Toronto, is in admirable condition. Great attention has been given to the sanitary arrangements, which are as perfect as modern science can make them. The furnishings and equipments are complete in all respects. There is a trained staff of nurses for medical and surgical cases, and all facilities exist for treatment by massage and electricity. The equipments and facilities referred to are not excelled in any of the private hospitals on this continent; and Dr. Walker's experience in his former large general practice, and his more recent experience with Dr. Weir Mitchell and Mr. Lawson Tait, make him well qualified to successfully conduct such an institution.

---Canadian Medical Association---

TWENTY-FOURTH ANNUAL MEETING

16th, 17th, and 18th September, 1891.

The Twenty-fourth Annual Meeting of the Canadian Medical Association will be held in Montreal, on Wednesday, Thursday, and Friday, 16th, 17th, and 18th September, 1891.

Members desirous of reading papers or presenting cases will kindly communicate with the Secretary, as to the title of paper or nature of case, as early as possible.

Arrangements are being made with the various Railway and Steamboat Companies whereby Members can obtain Return Tickets at considerably reduced rates.

H. S. BIRKETT, Secretary,

123 Stanley Street, MONTREAL.