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The Bulletin

of the

Vancouver Medical Association

Laboratory Bulletin

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THE VANCOUVER MEDICAL ASSOCIATION

BULLETIN

Published Monthly under the Auspices of the Vancouver Medical Association in the Interests of the Medical Profession.

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EDITOR'S PAGE

Through a regrettable oversight, we omitted, in the last number of the Bulletin, to acknowledge our indebtedness to the Osler Society for the two excellent papers by Drs. W. L. Boulter and H. A. Rawlings which we published in that number. Our readers will get an idea from these of the calibre of the papers read before this Society, the members of which are drawn from the younger generation of medical men practising in Vancouver.

The Society has, we understand, been in existence for two or three years and meets at regular intervals to hear original papers read by its members, two of whom speak at each meeting. We have been privileged to read several of these papers and wish to pay our tribute to the marked excellence of the work done in their preparation and selection. The Osler Society is to be congratulated on the sincerity and high idealism which its members have shown from the beginning, and believing that they are doing constructive and valuable work, we wish this Society long life and ever-increasing success and prosperity.

In one of Kipling's "Soldiers Three" tales, the immortal Mulvaney says, "Sure, the only thrue way to wisdom is through folly, for I've thried it."

In this is contained, very concisely, a great deal of the history of mankind, and the emphasis is on the word "only." It is the answer to Utopias and to dreams of perfect legislation, which shall make everybody good and wise; and, perhaps, even Mussolini will prove not to have been the best friend to the true growth of his people.

All of which is inspired by our reading of Dr. Chisholm's thoughtful article in last month's Laboratory Bulletin, to which we hope all our readers have given the thought and attention it deserves. Occasionally, (this is by the way) we hear a scoffer say that much of the Bulletin is wasted because it is not read. We should hate to think that this were so—and no part of the Bulletin is better worth reading, as a rule, than the Laboratory's contributions. Dr. Chisholm's article is full of "meat," to use a homely but forcible expression. He has put his finger unerringly on the cause of the popular misunderstanding, we had almost written mistrust, of the Public Health service. It is that there has, till now, been a confusion of curative with preventive medicine, through the employment of practitioners of medicine as part time medical officers. It would be equally absurd, as he points out, to expect the captain and crew of a ship, charged with the navigation of the ship, to spend part of their time erecting the lighthouses, buoys, etc., on which they must depend. For, as Dr. Chisholm points out, the medical man's whole training, his whole bent of mind, is along therapeutic lines, and preventive medicine is entirely different—parallel, but never converging or mixing with the curative branch. More and more, the fact is being realized, that the foundation of scientific medicine, as we look forward to it in the days that are to come, must be Preventive Medicine, broad-based, scientifically conceived and administered. The methods by which this

must be done are well understood by the leaders in Preventive Medicine, Dr. Chisholm outlines them, but the principle is beyond doubt. It is the only justification for medicine, in the final analysis. Merely to patch and tinker with damaged and worn-out machinery is, in the long run, so hopeless and forlorn a task, that one would weary of it—but medicine means far more than this. It is to heal the sick before they become too sick, to prevent the disease, that we may not need to cure it, to teach right methods of living, rather than to help the sufferer to an easy death. We have tried the ways of folly long enough, and it is time that we set our feet on the way of wisdom, as shown us by such articles as that of Dr. Chisholm.

* * *

NEWS AND NOTES

Very few adverse criticisms of this year's programme have reached the Committee responsible for the arrangements so we may conclude that the 1930 Session of the Vancouver Medical Association's Summer School was appreciated by those who attended. The registration this year was thirty short of our highest attendance. This falling off is probably due to the fact that a number of men from the Interior of the Province intend to take the trip to the British Medical Association at Winnipeg. There was a larger atendance than usual of men from across the line and these were apparently well satisfied with the medical fare provided, but, as usual, the lack of social entertainment in connection with the School was regretted by our American friends. As the School, however, is primarily run for educational purposes, and is not in any sense a "Medical Convention," as the term is understood nowadays, the absence of the usual social functions is explained.

Through the courtesy of the B. C. Medical Association the Committee was enabled to obtain three speakers from the East under the grant for Post-graduate instruction made to the Canadian Medical Association by the Sun Life of Canada. The men in the distant parts of the Province, who were unable to make the trip to Vancouver, will have the opportunity of hearing addresses by other speakers sent West under the same auspices in the latter part of September.

* * *

The report adopted by the Vancouver Medical Association on June 17th, outlining the terms upon which closer co-operation with the Provincial Association would be acceptable to the local Society was presented to the members at the Annual meeting of the B. C. Medical Association on June 25th and was adopted without any discussion, and the Executive of the Provincial Association was empowered to discuss details and complete arrangements on its behalf with the local Society. A joint meeting of the two Executives was held on July 10th when progress was made and a resolution carried that a joint committee, composed of three members from each Executive, be appointed to work out the necessary details.

A group of men from Vancouver attended the meeting of the American Association for the Study of Goitre which was held in Seattle and Tacoma on July 11 - 12. Among those making the trip were:

Dr. L. H. Appleby	Dr. R. E. Coleman
Dr. C. E. Brown	Dr. E. C. McLeod
Dr. J. Brown	Dr. Hugh Macmillan
Dr. V. E. D. Casselman	Dr. H. W. Riggs

One of the most interesting papers was that given by Dr. O. Kimball, formerly of Cleveland but now of Detroit. He stated that in a survey of school children in Detroit made in 1924, forty-two per cent. were found to have endemic goitre while on a recent survey only one-third of one per cent. were found to be affected in this way, showing the great value of iodine prophylactic therapy. In thirty-six hundred cases of mental defects, eight per cent. were found to be due to congenital hyperthyroidism and these were composed of cretins and also the Mongolian type of idiocy, which he considered to be a foetal form of thyroid deficiency developing in the sixth to seventh week of foetal life. In none of these cases were they able to raise the I.Q. beyond the age of eight years, even in those cases where thyroid extract was given early.

* * *

Dr. Henry Wackenroder has resumed practice after a visit to the Mayo Clinic.

* * *

We congratulate Dr. W. J. and Mrs. Dorrance on the birth of a son who put in an appearance on July 5th.

We also extend our sincere sympathy to the Doctor in the recent loss of his mother.

* * *

Dr. J. A. Gillespie has returned from a trip during which he visited Montreal, Toronto, New York, Chicago and other Eastern Medical Centres. As Chairman of the Hospitals Committee of the Association, Dr. Gillespie reports that in accordance with the report adopted by the Association and printed in the May issue of the Bulletin, the Committee felt it wise to wait until the report of the Hospital Survey Commission was received and all parties had been given an opportunity to discuss same, before taking any action. This report was not received for distribution until June 19th. A sub-committee has been appointed to consider the report and bring in recommendations to the full Committee. This Committee is now at work, but owing to the absence of some of the men during the vacation season, there has been unavoidable delay. While the Committee regrets this delay and is anxious to get the matter finally settled, it is convinced that the attitude of the medical profession is as firm as ever in its opposition to the hospital regulations, and the Committee has every reason to be hopeful that a final solution of this question, which will be in line with the wishes of the Medical

Association and the whole medical profession, will be reached in the early Fall.

* * *

LIBRARY NOTES

Recent Additions to the Library

Yearbook American Coll. of Surgeons for 1930.
System of Bacteriology in relation to Medicine. Vols. 1 and 2.
Otosclerosis, 2 vols. A resume of the Literature to July, 1928.
Transactions of the American Ophthalmological Society for 1929.
No. 3 Canadian General Hospital (McGill), 1914-1919. Fetherstonhaugh
History of Biology. Nordenskiold.
Gastric and Duodenal Ulcer. Hurst.
Harvey Lectures for 1928-1929.
Minor Surgery. Foote and Livingstone, 6th edition.
Transactions Amer. Assn. G. U. Surgeons for 1929.
Medical Clinics North America, for January, March and May, 1930.
Classification of Bright's Disease. Russell, Med. Research Council Report.
Diet and the Teeth. Mellanby, Medical Research Council Report.
Transactions American Proctologic Society for 1929.
Polycythaemia Erythrocytosis and Erythraemia. Parkes Weber and Bode.
Surgical Clinics North America, for February, April and June, 1930.
Physiology. Starling, 5th edition, 1930.
Report of Henry Phipps Institute for 1929.
Transactions American Laryngological Association for 1929.
Medical Annual, 1930.
Section Laryngology A.M.A., 1929.
Mouth Infections. MacNevin and Vaughan, 1930.
After Treatment of Operations. Lockhart Mummery, 5th edition, 1930
Report of Commission on Med. Education and related Problems in Europe
Transactions American Laryn. Rhinol. and Otol Society for 1929.
The Operations of Surgery.....Rowlands and Turner, 2 vols., 7th edition
Transactions of the American Otological Society for 1929.
Mayo Clinic Volume, 1930.
Trauma Disease and Compensation. Fraser, 1929.
International Clinics. March, 1929.
An Autobiography. E. L. Trudeau.
Diseases of the Blood. Paul Clough, 1929.
Tuberculosis Among Children. Myers, 1930.
Dorland's American Illustrated Dictionary. 15 edition, 1929.
Bulletin Ayer Clinical Laboratory, 1930.
Skin reactions and blood chemistry of Normal men and Clinical Patients. Petersen and Levinson, 1930.
The Story of a Surgeon. Sir John Bland Sutton.
Heredity in Man. Gates.
Memoirs of Adami. By Marie Adami.
Diagnosis and Treatment of Venereal Disease. Harrison.
Clinical Atlas of Blood Diseases. Piney and Wyard.
William H. Welch Medical Library. Opening Exercises.
Opium Addiction. Report of New York Committee on Drug Addiction, 1930.
Medical and Surgical Yearbook of Physicians Hospital of Platsburgh. V. 1.

CARCINOMA OF THE LARGE BOWEL

Being an address delivered before the Vancouver Medical Association Summer School by Dr. George T. Wilson, of Toronto

The large bowel is divided arbitrarily into the caecum, ascending colon, hepatic flexure, transverse colon, splenic flexure, descending colon, iliac colon, pelvic colon or sigmoid, rectum and anal canal. Most of these segments are more or less fixed to the posterior abdominal wall, but the transverse colon and sigmoid are each suspended by a meso-colon containing blood vessels, lymphatics and glands. The lymphatics are more numerous in the proximal half bowel than the distal and this is what is to be expected seeing that the latter is for the most part a storehouse. In general, the lymphatics accompany the venous return, but it is important to remember that when the usual passage of lymph flow is obstructed, the next most accessible route is taken up.

About fifty per cent. of carcinomata of the large bowel occur in the colon and the other fifty per cent. in the rectum. About two-thirds of the new growths occur in the recto-sigmoid area. There is a general increase in the incidence of cancer from the caecum to the rectum, but there are more in the caecum than in the transverse colon. The relatively fixed areas of the bowel are more prone to become the seat of carcinoma than the mobile portions, possibly because these are more subject to trauma. About five per cent. of all carcinomata in man are in the rectum. There are about the same number of carcinomata in the large bowel as in the stomach.

The average age of people suffering from carcinoma of the colon is about fifty; while in carcinoma of the rectum the average age is five to ten years higher. There is recorded a case of carcinoma in the transverse colon in a child of three. Men are more commonly affected than women.

We still know very little about the cause of cancer. A history of long continued constipation preceding the onset of the disease is the exception, and in the majority of instances the individual has been particularly free from bowel disturbances. Chronic ulcerative proctitis or colitis do not seem to have much bearing on its production, and although haemorrhoids are a common physical sign of cancer in the rectum, the growth does not develop in haemorrhoidal tissue. Diverticulitis does not appear to develop into a carcinoma.

There are two main types of carcinomata occurring in the colon, the polypoid and the stenosing or ring carcinoma. In the former a mushroom-like mass of variable size grows from one side of the bowel into the lumen which may be completely filled by the tumour; while in the latter, the carcinoma cells encircle the bowel wall and the accompanying fibrosis gives the appearance of a ring-like constriction to the tube. The polypoid type of growth may occur in any part of the large bowel but it is more common on the right side. The ring carcinoma

is almost confined to the region of the sigmoid. In the sigmoid and rectum the polypoid type of adeno-carcinoma is prone to develop colloid changes, in which event a wide area of the bowel is apt to be involved. It tends to spread to the peritoneum where it produces miliary nodules or bulky masses of gelatinous tissue, but the glands are not early enlarged. In the rectum, besides the cauliflower-like mass protruding into the ampulla, there is the local patch of new growth which ulcerates, leaving an excavated area on the rectal wall with a hard indurated edge. Occasionally a solitary polyp in the usual place in the lower third of the rectum becomes carcinomatous; while it is estimated that fifty per cent. of intestinal polyposis develop carcinoma. The carcinoma commences in the intestinal mucosa and generally invades the other coats of the bowel, but for a considerable time the disease is a local one, and it is probably true that the initial glandular enlargement is always of an inflammatory nature. Liver metastases are late. Above the tumour but the early evidences of a growth in the large bowel are extremely and in the late stages, thinned. The caecum may be so distended and weakened from a distant obstruction that perforation occurs. The growth itself may ulcerate into an adjoining coil of intestine or the bladder or into the loin, giving rise to symptoms closely resembling a perinephric abscess.

The signs and symptoms of a carcinoma of the large bowel differ considerably in the different regions. In the right half of the colon digestive disturbances and anaemia are often outstanding symptoms and indeed the appendix has frequently been removed for a carcinoma of the transverse colon. In the left half, obstructive signs are predominant; but the early evidences of a growth in the large bowel are extremely variable. Previous constipation is uncommon, so that when a man past middle age for the first time notices that there is some change taking place in his bowel movements a new growth should be suspected. In some, the first intimation of anything wrong is an attack of pain with the passage of a considerable quantity of blood, and this may pass off leaving the patient quite himself again and with the feeling that everything is well. Some have indigestion with mild crampy pains particularly after meals when peristalsis is stimulated and there may be evidence of slight abdominal distension. Others have periods of constipation followed by diarrhoea, and in another group there is continuous diarrhoea with variable amounts of mucus often stained with blood. The blood may be either mixed with the stool or lying upon it. Occult blood, in the absence of ulceration in the stomach or duodenum, should make one suspicious of a new growth. On the other hand, its absence is not a test of any value. Pain in the lower back and down the legs is a late sign and is due to invasion of the posterior abdominal wall, but pain in the back accompanied by a distressing flatulence may be an early sign. Tenesmus is a most important symptom, particularly in growths about the recto-sigmoid, and if there is frequently the feeling that the evacuation has been insufficient, the probability that a carcinoma is present is very great. In carcinoma of the anterior wall of the rectum pain in the perineum is common. Abdominal distension form ascites usually means

that the peritoneum has been invaded by the growth, although pressure on the main lymphatic trunks may produce it. In the late stages there may be metastases in the lungs and brain and the cervical glands. In about five per cent. of the cases the first symptom is acute intestinal obstruction.

The physical signs are variable, but here again we are interested chiefly in the early changes. The abdomen must be carefully examined for any alteration in its contour and this requires a great deal of time and patience if important signs are not to be overlooked. Sometimes one finds that nothing abnormal can be either seen or felt at the first examination, and at a subsequent visit a well marked spasm of the bowel can be clearly seen and felt. Frequent examinations therefore, in suspicious cases, should be made and the best place to make such is in a hospital. There may be a well-defined tumour present when the patient first presents himself for examination. If this is in an accessible area of the bowel, the enlargement is readily recognized, but if it is situated at either of the flexures or in the vicinity of the recto-sigmoid, it may readily escape detection. The liver should be carefully palpated to determine if possible its size and consistency, and whether there are any nodules upon its surface. The anal region must be inspected for evidence of haemorrhoids, as these are frequently associated with a carcinoma of the rectum. A rectal examination must never be omitted. It is best carried out with the patient lying upon the left side with the knees drawn well up and the buttocks over the edge of the bed. The gloved finger should then be swept around the whole of the rectum, bringing the front of the finger against each part in succession. If, during this examination, the patient is asked to bear down, it is often possible to recognize a growth of the lower sigmoid, as it gets pushed down in front of the upper part of the rectum. In the female a vaginal examination should invariably be made. But the physical examination may be entirely negative and yet the suspicion persists that some form of obstruction is present. The problem may be further elucidated by an X-Ray examination after the adminstration of barium. An opaque enema should be given and its upward passage observed with the fluoroscopic screen and subsequently plates should be made. In addition a barium meal may be given and plates taken and by a combination of the two a correct diagnosis can be made in quite a high percentage of cases. The most difficult area to examine is the recto-sigmoid because of the mobile sigmoid overlapping the growth. If the first examination shows everything clear it need not be repeated, but if in doubt as to whether spasm is responsible for the abnormality, another enema should be given. If the barium meal and the opaque enema stop at approximately the same place, it leaves no doubt about the true cause of the obstruction. It is always advisable to have the enema precede the meal, as the latter in the presence of a sclerosing type of growth, may cause an acute obstruction. In addition it may be difficult to get rid of the barium.

Sigmoidoscopic examination is a valuable aid in obstructive lesions in the rectum and lower sigmoid, but it must be done by one accustomed to making such examinations, as it is not free from danger. It is readily carried out with the patient lying upon the left side with the knees drawn

well up and the buttock slightly elevated. The bowel must be well washed out previous to the examination by several enemata. No anaesthetic is necessary but the instrument must be passed up gently and under direct observation. If the growth cannot be seen it probably means that it can be removed by some form of operation without a permanent colostomy. If still in doubt .there must be no hesitation in advising an exploratory laparotomy.

The main condition which must be ruled out in an obstructive lesion of the colon is a diverticulitis. Diverticula may occur in any portion of the gastro-intestinal tract but the common place for them to give symptoms is in the sigmoid. Inflammation of an acute and chronic character is quite a common complication, and in the latter type may be sufficient to produce a marked narrowing of the canal which, even at operation, is difficult to differentiate from a carcinoma. In each there may be blood and pus in the faeces, and the only reliable method of differentiation is by a barium enema. In the left iliac foss a chronic volvulus of the sigmoid would have to be ruled out and here, if seen during an exacerbation, the distended loop can be both seen and felt. Occasionally a portion of the loop gets caught in a hernia. In the right iliac fossa a hyperplastic tuberculous mass would have to be taken into consideration as well as actinomycosis. The former may present other evidences of tuberculosis, but if not, the fact that the patient has had the tumour for a long time and still looks well would be against malignancy. The latter has a hard wooden feel and is very apt to be associated with fistulae discharging pus with the characteristic sulphur granules. In elderly people faecal impaction may closely simulate a neoplasm but is readily ruled out by repeated enemata. As previously observed, an exploratory incision is always justifiable in cases of doubt and should be strongly urged under these circumstances.

The treatment of a carcinoma of the large bowel varies with the situation of the growth among other things, and for convenience of description we may divide the bowel into four divisions:—

Group I.—includes the caecum, ascending colon and hepatic flexure.

Group II.—includes the transverse colon, splenic flexure, descending colon and iliac colon.

Group III.—includes the sigmoid or pelvic colon.

Group IV.—includes the lower-most part of the sigmoid and rectum.

Except in cases where acute obstruction is present, before any operative procedure is carried out in any of the groups, the general condition of the patient should receive careful consideration and any abnormality corrected as far as possible. Any toxaemia present is largely due to the absorption of noxious products in the bowel on the proximal side of the growth, and these must be got rid of by frequent enemata and mild aperients, such as paraffin oil. If the opening in the growth is narrow, very little of the irrigating fluid may pass at first, but if persisted in,

success is usually attained, particularly if assisted by small doses of morphia and rest. In any resection of a growth in the colon where distension of the bowel proximal to the resection is liable to be a factor, some provision must be made to prevent it. In group I. this is done at the time of resection, while in the others, it is the first stage in the removal of the growth. The anaesthetic is important and spinal anaesthesia is unquestionably the best, provided the operation is not unduly prolonged, in which event the effects may pass off before the work is completed. In debilitated patients a blood transfusion is most helpful.

Group I.

After exposing the growth by a suitable incision the abdomen is examined for glandular involvement and more distant metastases in the liver. If there are no visible implants in the liver and it is felt that the tumour can be safely removed, the next step is its mobilization and it is very important that this should be thoroughly done. The outer leaf of the peritoneum is divided and the caecum, ascending colon and hepatic flexure, together with the terminal ileum, turned inwards along with their vascular supply. Towards the upper end the situation of the duodenum must not be forgotten. The small bowel is divided with the cautery five or six inches from the ileo-caecal valve and the colon cut away a short distance to the right of the middle colic artery and the intervening mesentery with any visible glands is removed. Near the middle colic artery the bowel narrows considerably so that if the small bowel is divided by removing more from the anti-mesenteric border, the two apertures may be very nearly the same. Inasmuch as the ileo-colic artery supplies the terminal portion of the small bowel it is always safest to remove the last portion of the ileum. When the two ends are nearly the same size an end to end anastomosis should be carried out. The field is carefully packed off and the ends brought together without any tension. The fat is carefully dissected back from the cut edge of the colon so as not to interfere with the placing of the sutures, and there must be no doubt whatever about the circulation to the end of the colon. If, at the conclusion of the anastomosis, the wall of the intestine does not bleed when lightly pricked with a needle, the circulation is not sufficient. The fat pads which were stripped back should be tacked down over the suture line which may be further re-inforced by a cuff of the omentum. Leakage is due to necrosis of the edge of the bowel from lack of blood supply or to distension from obstruction by swelling at the anastomosis about the fourth day. The former can only be obviated by scrupulous attention to the vascular supply; the latter is prevented by providing a vent in the area of the bowel proximal to the suture line. At the conclusion of the anastomosis then a piece of small bowel about a foot away is lifted into the wound and a catheter tied in by the Witzel method. It is then drawn through a small hole in the omentum and stitched at a convenient spot in the wound. It is always well to put a drain of rubber tissue down to the site of the anastomosis and a small drain in the bottom of the abdominal wound often prevents the incision from breaking

down. The catheter comes away readily in a week or ten days and the fistula always heals spontaneously. In the after treatment the main essential is rest to the bowel and this is best accomplished by withholding all fluids by mouth for three to four days, sufficient morphia to keep the patient comfortable and a continuous intravenous injection of glucose in saline. For an average man 3000cc. daily are sufficient.

When there is a considerable discrepancy between the ends to be anastomosed, some other plan should be adopted. The end of the colon may be invaginated and the open end of the ileum anastomosed to the side of the colon or both ends may be invaginated and a side to side anastomosis carried out. By the latter method one can be more sure of the integrity of the blood supply and if the openings are made near the invaginated stump, there will be no trouble whatever from pocketing. Its disadvantage lies in the fact that there is more suturing to go wrong and it requires a longer time to perform.

Group II.

In the treatment of cases in this group, a preliminary drainage on the proximal side of the growth is a necessity but what constitutes the best method is debatable. Many are of the opinion that a caecostomy is sufficient, but if by that is meant bringing out the caecum and tying in a good sized tube and dropping it back, then we believe that such is not of much value, for in the great majority of cases the bowel contents pass on to the seat of the obstruction and very little comes out through the opening. True, a considerable quantity may be removed by irrigation, but even this is often unsatisfactory. If it works well, however, it has the advantage of closing spontaneously when its usefulness is over. On the other hand an opening in the caecum can be made an effective one if a good sized button of the wall is withdrawn from the wound and sutured to the abdominal wall. It has the disadvantage in requiring a further operation to close it. Through the caecal opening the large bowel should be frequently irrigated, combined with the use of rectal enemata. Some prefer to include a mild antiseptic in the washings, but as the effect is mainly a mechanical one, normal saline is as good as anything. This procedure should be carried out for ten days or a fortnight prior to the operation for excision. Such an opening, besides serving as a vent to prevent distension of the bowel on the proximal side of the anastomosis and thus diminishing the danger of leakage, aids very materially in lessening the toxaemia from which many of these patients suffer. In addition it has a beneficial effect upon the bowel wall and helps to lessen the fixity of the growth which, in the early stages, is always due to an inflammatory reaction.

Having first both patient and the large bowel in as healthy a state as possible, the removal of the growth may be proceeded with. It is exposed by a suitable incision and a general survey made to determine whether it is removable or not. Besides an examination of the tumour to see if it can be mobilized, the liver should be searched for metastases. Occasionally there are multiple tumours in the colon. Even if there

are undoubted secondaries in the liver, if the general condition of the patient warrants it, excision gives more relief than a palliative operation in those instances where the growth is resectable. Mobilization of the tumour is then commenced and it may have to be dissected from the stomach and adjacent coils of small bowel, or, in certain instances, a piece of either may have to be taken away with the growth in the colon. Adequate mobilization is most important and in this segment of the bowel it is the phrenico-colic ligament which firmly holds the splenic flexure to the diaphragm which interferes mostly with freeing the bowel. When this ligament is divided the bowel carrying its blood supply with it is readily mobilized. In the vicinity of the transverse colon the attachments of the omentum above and below are severed and the growth, including a segment of its mesentery, if present, is then removed with the cautery. If there is a great deal of fat in the mesentery the peritoneal coverings should be lifted off so as to expose the vessels, as by so doing the integrity of the blood supply to the bowel on either side of the resection can be more adequately determined. If th middle colic artery has to be tied, then the hepatic flexure should be removed as well because of its liability to slough. Two procedures are now open, an end to end anastomosis may be done, or both ends closed and a side to side opening made. If the lumen of the proximal and distal segments are nearly the same, the former type of union may be carried out, otherwise the second should be done. In neither instance must there be any tension upon the suture line, and before the anastomosis is begun the ends should lie against each other without any tendency to pull widely apart. On the whole, side to side anastomosis is the safer plan as there the danger of leakage from a small area of necrosis at the suture line is eliminated. As previously remarked, if the opening is close to the invaginated stump there will be no danger of pocketing. The disadvantage lies in the fact that it takes longer to perform. Should the abdomen be opened for an acute obstructive lesion about the splenic flexure, and if the general condition of the patient is fair, the growth may be sidetracked by an anastomosis between the transverse colon and sigmoid. Then in a fortnight or so the tumour, if resectable, may be removed. indeed, such a procedure is advocated as the method of choice by some surgeons.

Group III.

It is in carcinoma of the sigmoid that the Mikulicz type of operation is particularly suitable. The afferent and efferent loops after removal of a segment of the meso-sigmoid are stitched together and the growth is withdrawn through the abdominal wound. The peritoneum is then sutured to the loops and the rest of the wound closed. Forty-eight hours later the growth is removed, close to the level of the abdominal wall, with the cautery. Subsequently a clamp is applied to the spurparating the loops and left on until it comes away, usually in five or six days. If the spur has been divided sufficiently deep, many of these fistulae close spontaneously, but if not, they may be closed by separating the bowel edges from the abdominal wall without opening the peritoneum and suturing them transversely. In a suitable case this type of operation is a very satisfactory one and is the safest method of resection. But the

prime essential is a meso-sigmoid which will allow the growth to be brought out of the wound without tension, so that anything which prevents that is a contra-indication. Usually a fixed growth is a dangerous one to bring out of the wound in this fashion, as the necessary manipulation is sure to traumatize the bowel, the proximal loop of which often harbours infective organisms under these conditions and they may readily enough initiate a fatal peritonitis. Any undue tension is sure to interfere with the vascular supply and produce gangrene of the loop. A very fat abdominal wall is in itself usually a sufficient reason for deciding against the Mikulicz operation. On the other hand preliminary drainage of the proximal colon, with frequent irrigations of the obstructed loop, will greatly increase the number suitable for this procedure in that it will decrease the fixity of the tumour and get rid of the infection in the bowel wall. The best place to make the artificial opening is the transverse colon, as thereby the whole faecal stream can be diverted and the maximum degree of rest is thus given to the sigmoid and adjacent colon. When carried out for the Mikulicz operation this type of colostomy does not prolong the convalescence as it can be closed at the same time that the sigmoid opening is being dealt with. Recently Rankin has reported recurrence in the abdominal wall in twelve per cent. of such cases, but if the tumour is not allowed to come in contact with the abdominal wound and thus permit of cell implant, it is probably true that this complication would not ensue. Gangrene of the withdrawn loop is not necessarily a serious complication either, and in many of these instances the general peritoneal cavity does not become infected. In contradistinction to the Mikulicz type of operation for a carcinoma of the sigmoid, is resection with end to end suture over a tube. This is the operation of choice of many surgeons and when everything goes satisfactorily it is the ideal in that the patient is quickly restored to health. But the danger of leakage is great, particularly about the tenth day and the operation has a higher mortality that the Mikulicz plan. It should always be preceded by some form of preliminary drainage of the proximal colon.

Group IV.

The treatment of a carcinoma of the recto-sigmoid has been considerably clarified during the past decade and it is now quite generally recognized that in this area the only logical procedure is the establishment of a permanent colostomy and the complete removal of the lower sigmoid, rectum and anal canal. The main contention at the present time is whether this should be done by the perineal or the abdomino-perineal route. Miles is the most outstanding advocate of the abdomino-perineal route, while Lockhart-Mummery is a powerful protagonist in favour of excision by the perineal route. Theoretically, the former type of operation is best, in that all obviously involved tissue can be removed, but the main objection is the high mortality. This, in the hand of Miles himself, is twenty-five per cent., and is certainly much higher than that in the hand of most surgeons doing this type of work. It is thus a very formidable operation and one which few patients are prepared to face. On the other hand, Lockhart-Mummery reports a large series of excisions

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by the perineal route with a mortality of only three percent. In this connection however, it is only fair to observe, as Mr. Grey Turner points out that the surgeon with a very low mortality may only be operating on the easy cases; so that it is very difficult to appraise properly the various mortality statistics. That the abdomino-perineal operation is attended with a great deal of shock there is no doubt, but it is also true that if the growth is high up in the rectum and on the borderland between operability and non-operability, the removal by the perineal route is likewise associated with considerable shock, and quite a high mortality. Quite apart from these considerations, if there are enlarged glands above the brim of the pelvis, these can be removed much better by the abdominal route. On the other hand in the perineal type of operation, during the preliminary left inguinal colostomy and exploration for distant metastases, the exact position of these glands can be noted and their removal made certain subsequently. Often times the choice of method is made because the surgeon feels that he can do one type of operation better than the other. An intimate knowledge of the anatomy of the perineum is essential for the perineal operation if the resection is to be done well. It is not difficult to remove long segments of the bowel by this route even up to two feet.

PROGNOSIS AND RESULTS:

As in carcinoma in many other parts of the body, the prognosis in cancer of the large bowel is quite variable. In growths of the right side of the colon, the immediate mortality is less than after resections of the left side, but recently Rankin reports rather better results from left sided growths. In left sided tumours he reports forty-eight per cent. alive after three years, and in right sided, forty-seven per cent. after three years, and thinks that any mortality under ten percent is excellent. Grey Turner's mortality was nineteen per cent. and there is no doubt that the average is considerably higher than that—naturally the older the patient, the higher will be the mortality. But again we wish to point out that the mortality figures vary with the boldness or timidity of the operator. In carcinoma of the recto-sigmoid Miles reports recurrence in thirty per cent. of the cases while Lockhart-Mummery claims fifty per cent. free of recurrence after five years, but recurrence may take place ten years after the operation. Miles on the other hand, claims recurrence by the perineal route in over ninety per cent. of his eighteen cases.

Within recent years the treatment of carcinomata of the large bowel by radium has been receiving considerable attention. Neumann and Croyn of Brussels have been devoting much time and energy in attempting to find a cure in growths of the rectum and it has been taken up by many others. A review of radium therapy in rectal carcinomata has been published in the last edition of the British Journal of Surgery by Gordon-Watson and it is evident from his observations that surgery still offers the best prospect of cure. It is useful, however, in inoperable cases, particularly where the growth is situated posteriorly, in which event the coccyx and a portion of the sacrum should be re-

moved to allow of direct implantation of the needles. But the cancer cell in the rectum, unlike that in the cervix uteri and mouth, is particularly resistant to the effects of radium and up to the present time the results have been disappointing.

It is difficult to get an accurate estimate of the percentage of patients suffering from carcinoma of the large bowel in whom the growth is inoperable when first seen by the surgeon, but it is probably true that in the vast majority symptoms are present for a year before the surgeon is consulted. Radical removal in the early stages of large bowel cancer is attended with excellent results, so that the only hope of improving our mortality statistics rests with the physicians who first see these patients, and until it is recognized that a person past middle age, who commences to have some irregularity of his bowels, has a carcinoma, until it is proved otherwise, there will be little chance of improvement in the treatment of carcinoma of the large intestine.

* * *

THE DIAGNOSIS AND TREATMENT OF PEPTIC ULCER

By Dr. William Fitch Cheney
Clinical Professor of Medicine, Stanford Medical School.

Peptic ulcers vary as to position. They may be situated on one or other side of the pylorus or upon the lesser curvature of the stomach. The ulcers vary also as to size and depth. Hence it is not surprising that different cases may show different disturbances of the gastric function. There are also a number of complications which may at times still further confuse the picture. The methods of examination upon which diagnosis depends are four: Clinical history, physical examination, gastric analysis and x-ray films and fluoroscopy.

1. As regards clinical history the characteristic features are chronicity, or long duration of symptoms; periodicity, or the tendency to spontaneous remissions and exacerbations lasting for days, weeks or months; rhythmicity, or the occurrence of symptoms at a more or less definite time, an hour or two or more after meals, relief temporarily by the next meal and then recurrence; and fourth, the character of the symptoms, with pain predominating, belching, heart-burn, water brash, nausea and at times vomiting and all the discomforts commonly described as "sour stomach." But these symptoms vary as to the time of occurrence after meals, and as to their kind and severity in any given case. While pain is the most common manifestation, this varies in its site, intensity and radiation. Nevertheless peptic ulcer usually presents a history highly suggestive, though never by itself diagnostic.

Delivered before the Summer School of the Vancouver Medical Association, June, 1930.

2. The most noteworthy fact about uncomplicated peptic ulcer is the absence of any objective signs on physical examination. Tenderness is characteristic, over the epigastrium or right hypochondrium; but this is what the patient feels and not what the examiner discovers. There is no tenderness palpable as in appendicitis or neoplasm. In fact the discovery of a palpable mass always makes the diagnosis of ulcer dubious.

3. Gastric analysis affords us evidence more valuable than any other, except possibly X-ray. The fasting contents in peptic ulcer are commonly increased in amount, have an abnormally high total acidity and free HCl, and frequently give the reaction for occult blood. After a test meal, the characteristic finding is hypersecretion and hyperchlorhydria. This is not an absolutely certain condition in every case, but statistics show that it occurs in 80 or 90 per cent. of all peptic ulcers.

4. X-ray examination is very valuable but not infallible and must always be considered in connection with all the other evidence, never relied upon without corroboration. The signs it affords are the outline of the stomach and duodenum and a possible filling defect; the rate of peristalsis, usually excessive in the presence of ulcer; the patency of the pylorus and the stomach's emptying time.

Complications that now and then change the character of the evidence and so confuse the picture are the following:

1. Pyloric obstruction, due to cicatricial contraction in the healing of an ulcer in that region, but often due rather to inflammatory swelling and oedema around the ulcer. The new symptoms that suggest this complication are repeated vomiting of retained food, progressive loss of weight and pain that occurs more or less continuously and not with the usual rhythmic relation to meals. The sign that best indicates pyloric obstruction is visible peristalsis over the stomach, elicited by inflating the stomach by carbonic acid gas (having the patient drink a dram each of soda bicarbonate and tartaric acid in separate solutions). Flicking the abdominal wall over the stomach with the end of a towel will sometimes suffice to bring out these peristaltic waves. When obstruction has occurred, the gastric analysis shows a decreased secretion of acid; and after lavage to remove accumulated food-refuse, X-ray films demonstrate the retention of barium for long periods after it is taken.

2. Haemorrhage from an ulcer may take the form of slight but persistent oozing, colouring the vomitus a reddish brown or appearing in it as brownish flecks; or it may give rise to the vomiting of a larger amount of bright red blood, preceded by faintness and weakness; or the first attack may be so large as to prove fatal, though this is a rare event. In any history of ulcer there may be one or several attacks; but this is always a complication and not a part of the routine course. The blood from an ulcer may never be vomited at all, but pass on down the bowel and be discharged in the form of a dark, tarry stool; or there may be both hematemesis and melaena in the same attack. The

patient's story of one or the other of these events, with the background of a chronic disturbance of digestion furnishes proof enough at the time of what has happened. It is not wise to attempt any thorough physical examination, or to give a test meal or to resort to X-ray examinations for at least one or two weeks after haemorrhage has occurred. At the moment it is better to be content with the history and with inspection of vomitus and stool.

3. Perigastric adhesions are the result of an ulcer approaching so close to the peritoneal covering of the stomach that a localized plastic peritonitis is produced. In such event there is a history of increased frequency and intensity of the pain, which becomes so severe it may require opiates for its relief. Also there is frequently radiation of the pain to the back, under the shoulder blade or near the spine, opposite the pain in front, due to adhesions to the pancreas or gall-bladder or liver or some other viscus. The history suggesting these adhesions is therefore change in the intensity, the constancy and the radiation of the pain. On palpation there is found increased tenderness in the epigastrium or hypochondrium, with rigidity and spasticity of the abdominal wall. The gastric contents show higher acidity because of the reflex hypersecretion from peritoneal involvement, and the X-ray films may demonstrate an out-pocketing defect, warning of threatened perforation. Certainty in the diagnosis of adhesions is not always possible, but usually the picture is clear.

4. Perforation of an ulcer is manifested by intense pain and extreme shock; there is a sudden severe pain and there is profound faintness and weakness. Other organs perforating into the peritoneal cavity, such as the gall-bladder or appendix, may give a similar picture; but the previous history of long-continued stomach trouble usually identifies the cause as a duodenal or gastric ulcer. Examination of the patient shows a tender, board-like abdomen, with pallor, perspiration, rapid and weak pulse and subnormal temperature. The immediate indication is for surgery and laparotomy will determine more accurately the site and degree of perforation.

5. Cancer of the stomach undoubtedly does develop at times upon an ulcer base; though the frequency of this occurrence is much disputed. The history that suggests this change is loss of appetite which has previously been keen; more constant pain, coming on almost at once after food is taken; loss of weight and strength and colour. The fact that the patient has longer history of disturbance of digestion than is usually associated with cancer, does not avail, because the malignant change may be recent but the ulcer history goes back for years. Palpable tumour over the gastric area should always suggest cancer rather than ulcer. Gastric analysis usually shows a falling secretion, but free HCl may remain high even after malignant change has occurred. The character of the filling defect in the gastric wall, shown by X-ray, usually completes the diagnosis.

TREATMENT: The average case does well with ambulatory treatment, without detention in bed and without loss of time from work.

The plan that has been found most serviceable is the use, first, of a simple diet and the following list is the one given at the outset:

7 a.m. Two soft-boiled or poached eggs, thoroughly toasted bread or Zwieback or toasted soda crackers with butter; a glass of milk or a cup of cocoa made with milk and cream. 10 a.m. A glass of milk (about a half pint). 1 p.m. Beef, mutton or chicken, picked into shreds while raw or chopped fine, then made into a meat ball and cooked rare; toast, Zwieback or crackers with butter; a glass of milk. 4 p.m. A half pint of milk. 7 p.m. A bowel-full of well-cooked rice with butter or cream and sugar; or shredded wheat biscuit toasted crisp, with butter or cream; or toasted bread or Zwieback or crackers; with any of these a glass of milk.

With this diet the patient is instructed to take one tablespoonful of olive oil just before each meal; and one to two hours after each meal, depending upon the time his distress begins, to take also one level teaspoonful of the following powder: Bicarbonate of Soda, 2 ounces; magnesium oxide and bismuth sub-carbonate, of each one ounce. After a week or two on this plan, the average case is free from discomfort. If this is so then a second and more liberal diet list is given, such as the following:

May Eat: Eggs, soft-boiled, poached or scrambled lightly; tender beef, mutton or chicken, chewed thoroughly; sweetbreads or brains; any kind of fish, cooked as desired, including oysters cooked in any way except fried; cocoa made with milk and cream; milk as much as desired, with cream; no vegetables except baked or mashed potatoes, unless prepared as a puree; soups of any kind if not highly seasoned, cooked with rice or barley or vegetable, but strained clear after cooking; cream soups made from milk and the puree of vegetables; any cereal, provided that it is cooked soft and husks and coarse particles are removed by the puree sieve; white bread thoroughly toasted, soda crackers, Zwieback, shredded wheat biscuits, served with butter or cream; cream cheese; cooked fruits such as baked apple or pear, or apple sauce, or stewed dried fruits if put through the puree sieve; for dessert, rice pudding, corn starch, blanc mange, custards. *Avoid* course foods, such as hard-boiled or fried eggs; tough meats or meats cooked too long; or pork, veal or ham; vegetables such as corn, string beans, peas or spinach, unless prepared as a puree; coarse cereals such as oatmeal or cracked wheat, unless strained through a puree sieve; all hot breads and fresh fruits; all irritating foods such as very salty, sour, peppery or highly seasoned dishes of all kinds, including salt fish, pickles, salads, acid fruits and drinks and highly seasoned soups; and all stimulating drinks such as coffee, tea and all alcoholic liquors.

With this second list from which the patient may select, he is instructed to continue the glass of milk at 10 a.m. and at 4 p.m. and the alkaline powder two hours after each meal.

If a patient fails to improve on the plan suggested or if the condition from the outset seems unusually severe, then rest in bed is advised,

with milk and cream equal parts, two to four ounces every two hours from 8 a.m. to 10 p.m., with the alkaline powder on the alternate hour. After one week, if all goes well, foods on the first list are gradually added. After two weeks in bed it is usually possible for the patient to be up and about again resuming the first diet and plan described. But if even on this plan improvement does not ultimately occur, then surgery must be considered.

The various complications of peptic ulcer call for special treatment differing from the original plan. When pyloric obstruction has been diagnosed, it is not necessary to consider at once a gastro-enterostomy; but better to try first treatment to overcome inflammation, oedema and spasm, which are often more responsible for the obstruction than is cicatricial constriction. A plan to meet this emergencv includes (a) rest in bed; (b) daily morning lavage with warm solution of bi-carbonate of soda to keep the stomach clean; (c) a diet of equal parts of milk and cream, two to four ounces every two hours from 8 a.m. to 10 p.m.; (d) the alkaline powder of soda, magnesia and bismuth, one level teaspoonful on the alternate hour; (e) tincture of belladonna, ten drops in a tablespoonful of water, three times a day; (f) warm moist compresses to the abdomen; (g) gradual reutrn to the first diet list recommended; or (h) if no clinical improvement follows, then ultimately gastro-enterostomy.

The treatment of haemorrhage from peptic ulcer will be considered on detail in a later lecture on "Hematemesis—its Significance and Its Treatment."

For the cases diagnosed perigastritis, the proper treatment includes rest in bed, milk and cream diet, alkaline powder, warm applications to the abdomen and careful observation for fear of sudden perforation.

If perforation does occur, laparotomy is indicated and should be done as early as possible.

* * *

B. C. MEDICAL ASSOCIATION NEWS

The Annual Meeting of the B. C. Medical Association was held at the Hotel Georgia on June 25th, 1930.

The meeting opened with an address from the retiring President, which was brief but very much to the point and omitted no essentials. Following the general business, such as presentation of the minutes of last Annual Meeting, which were adopted as read, the Auditor's report, reports from Standing and Special Committees and the appointment of a nominating committee who proceeded to nominate officers for the coming year and a subsequent election of officers, the feature addresses of the evening were delivered.

Dr. J. G. Fitzgerald, Professor of Hygiene and Preventive Medicine at the University of Toronto, spoke on "Some of the Possibilities of the Future in the Practice of Medicine" and Dr. Oskar Klotz, Professor of Pathology at the University of Toronto, spoke on "Medical Meanderings in the Tropics."

These addresses were greatly enjoyed by all present, the speakers being authorities in their subjects with their wide range of experience and at the same time admirable raconteurs.

The officers for the ensuing year are as follows:

President ..... Dr. G. L. Hodgins of Vancouver
President-elect ..... Dr. T. McPherson of Victoria
Vice-President ..... Dr. H. H. McKenzie of Nelson
Secretary-Treasurer ..... Dr. W. T. Ewing of Vancouver

Members of Executive at large:

Dr. G. K. McNaughton of Cumberland.
Dr. G. E. L. Mackinnon of Cranbrook.
Dr. S. G. Baldwin of Vernon.

* * *

VANCOUVER HEALTH DEPARTMENT

STATISTICS, JUNE, *1930*

Total Population (estimated)	240,421
Asiatic Population (estimated)	9,335

		Rate Per 1,000 of Population
Total Deaths	156	7.89
Asiatic Deaths	13	16.94
Deaths—Residents only	136	6.88
Birth Registrations	374	18.93
Male 197		
Female 177		

INFANTILE MORTALITY—

Deaths under one year of age	12
Death Rate—per 1,000 Births	32.09
Stillbirths (not included in above)	5

Cases of Contagious Diseases Reported in City

	May, 1930		June, 1930		July 1st to 15th, 1930	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Scarlet Fever	13	0	22	0	2	0
Diphtheria	13	1	14	0	11	1
Chicken-pox	68	0	51	0	9	0
Measles	2	0	4	0	1	0
Mumps	43	0	21	0	1	0
Whooping-cough	136	0	64	2	18	0
Typhoid Fever	2	0	2	0	0	0
Paratyphoid	2	0	0	0	0	0
Tuberculosis	10	19	8	15	4	–
Poliomyelitis	0	0	0	0	0	0
Meningococcus Meningitis	1	0	1	0	0	0
Erysipelas	6	0	4	0	2	0
Smallpox	2	0	0	0	0	0

British Columbia Laboratory Bulletin

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A. M. MENZIES, M.D., OF THE VANCOUVER GENERAL HOSPITAL LABORATORIES

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All communications should be addressed to the Editor as above. Material for publication should reach the Editor not later than the seventh day of the month of publication.

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"THE EPIDEMIOLOGY OF TUBERCULOSIS"

By H. W. HILL, M.D.
The University of British Columbia, Vancouver, B. C.*

The epidemiology of tuberculosis is a very ambitious subject to attempt in a twenty-minute talk, but I shall do my best to bring out a few of the main points as I see them.

Epidemiology, I take it, is the sociology of disease—the natural history of a given disease, not in the patient, but in the community. Etiology mainly deals with the immediate causes of disease as they operate in the body of the victim; epidemiology deals with the remoter causes, operating outside the body; those which allow the immediate cause to impinge on the body of the victim. Etiology studies the disease in the patient, in the pursuit of cure. Epidemiology studies the disease outside the patient, in the pursuit of prevention. Epidemiology is not in this aspect a laboratory subject, despite the great assistance laboratory work can and has given to it. Epidemiology as I conceive it must be studied chiefly out amongst the people. It is only amongst the people that the sequences of human events and the interplay of human life and activities, which permit and control the incidence of the immediate causes of disease, can be threaded out.

Studying the epidemiology of tuberculosis in this way, as far back as we can, and correlating it with studies in other more recently affected races, its natural history in our own white race indicates that there have been three outstanding features of the disease. These are a great decline, beginning many long years ago, in the number of cases—this decline beginning long before modern preventive measures were even thought of as possible or called for; a great rise in the age of tuberculosis deaths, correlating with the decline in cases; and, a present-day prevalence of infection almost co-extensive with the present day population.

We may, I think, safely deduce that tuberculosis, when invading a new population, reaches a vast number of the population, is very fatal,

* Presented at the Salt Lake City meeting of the Western Branch of the (International) American Public Health Association, June, 1930. (Abstract).

attacks and kills the young children chiefly, and then bit by bit, as time goes on, kills fewer and fewer people, at gradually increasing ages, until at last it reaches the stage with which we are so familiar amongst our own people; wide-spread infection, a relatively very low incidence of fatal attacks, and these attacks chiefly in older adolescents or younger adults.

Can we explain these features of tuberculosis and weave them into a coherent story? I shall attempt to do so.

First let me say that epidemiologically, as well as etiologically, clinically and therapeutically, tuberculosis presents all the features presented by any ordinary acute infectious disease such as measles or scarlet fever, typhoid or mumps—except of course that it is long drawn out. Only in this feature of chronicity, not in any other, does tuberculosis depart from the family resemblances common to all acute infections.

Let us compare it epidemiologically with measles. Measles is an acute disease, the infection of which reaches, as does that of tuberculosis, approximately 100% of our white population. Also it attacks chiefly children, as does tuberculosis when first introduced into a race. Also nearly every one infected suffers disease as a result of that infection, again like tuberculosis when first introduced. Our race has suffered both diseases for centuries. Why has tuberculosis died down, while measles is as prevalent as ever? Why have we now an obvious ability to meet and overcome, without disease, the very widespread infection of tuberculosis, while such an ability to meet and overcome, without disease, the equally widespread infection of measles is so rare as to be almost a curiosity?

I believe this striking difference is due to the difference in fatality. Tuberculosis in early days attacked chiefly young children, as measles does now, but tuberculosis killed its child victims as measles does not. In brief, tuberculosis sought out the susceptibles of the race, and eliminated them by early death, before the reproductive age was reached. Measles seeks out its susceptibles also, but does not kill them—they survive to reproductive ages. To the extent that tuberculosis eliminated from reproduction the strains of whites susceptible to it, it left the insusceptible strains to propagate and replace the susceptible strains. But measles fails as a rule to kill the susceptibles it finds. They as a rule recover and go on to reproduction, thus perpetuating, not their acquired immunity of course, but their original natural susceptibility. Were measles 100% fatal, the susceptible strains (i.e., most of us) would be completely eliminated during childhood, and only the relatively very few insusceptibles would survive to carry on the race. In a very few generations, under this rigid system of elimination, the susceptible strains would disappear. As it is, however, the non-fatality of measles prevents it from eliminating itself, and we continue to suffer from it, to the extent of 95% of us, because we continue to be born, 95% of us, susceptible to it.

But tuberculosis, by attacking at first chiefly the lower ages, and killing off these its victims, has done just that elimination of susceptible strains which measles has failed to do. It has not of course worked on the basis of 100% efficiency, but it has succeeded in eliminating susceptible strains to such an extent that only one in thirteen of us now

BURNS,

particularly of the first and second degree, when freely treated with cold applications of

Antiphlogistine

usually heal without pain, suppuration or rise of temperature.

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dies of tuberculosis, instead of one in seven, as it was forty years ago, or one in four, as the much older records indicate, for still earlier times.

Why was this elimination of susceptibles and lessened incidence of fatal cases accompanied by a rise in the age of death?

Obviously, I think, this was due to the gradually lessening opportunity for infection as cases diminished. When tuberculosis existed in almost every family, as it must have done to give the high death rates of earlier days, and as it does now amongst recently infected peoples, every child born ran a great chance of early massive infection from an open case. As cases became rarer the child would not so immediately encounter them; and today, when we have but one or two open cases per thousand of the population at any one time, many a child grows to adolescence before encountering dangerous massive infection. Hence even the susceptible, who die on infection, now escape to later years because they do not encounter dangerous infection until later years.

So far I think I have accounted for our present low incidence of deaths from tuberculosis on an hypothesis that has the advantage of accounting for the undoubted coming down of the disease before modern methods of control went into effect at all. Doubtless, modern methods have hastened the decline, but they are far too recent, too inefficient and cover too small an area to take all the credit.

But the most important and practical point remains to be made. It is this; that if the above hypothesis be correct, it is inevitable that tuberculosis will increase again—there are indeed definite indications that it is already increasing—and only much more strenuous methods than are in vogue now, more strenuous and much more widely applied, promise us any hope of stopping the rise.

Why should there be a rise? Because susceptibles are now surviving to reproductive ages as they did not when tuberculosis was more common, and the children now being born are therefore in larger percentage born of these surviving susceptible strains. Exposed sooner or later to massive infection, these susceptibles will add to our present death rates from tuberculosis as insuscepibles would not. This is as I see it the great problem that confronts those who have to do with tuberculosis today—the probability that we have reached the bottom of the curve, and are about to ascend it again.

If this hypothesis of the epidemiology of tuberculosis be correct, the past history of tuberculosis in the human family has been of necessity a series of waves, waxing as susceptibles increased, waning as they were suppressed by the disease itself; waxing again as susceptibles again increased in proportion as the previous waning of the disease allowed them to survive.

We are then at the trough of the last wave. The hopeful thing is that we are for the first time in human history able through modern knowledge to prevent the heretofore inevitable rise, on the very verge of which we seem to be. It is now or never, it seems to me.

And the method? The prevention of spread from existing foci, i.e., the open cases.

This, as I see it, is the great objective of preventive tuberculosis work today.

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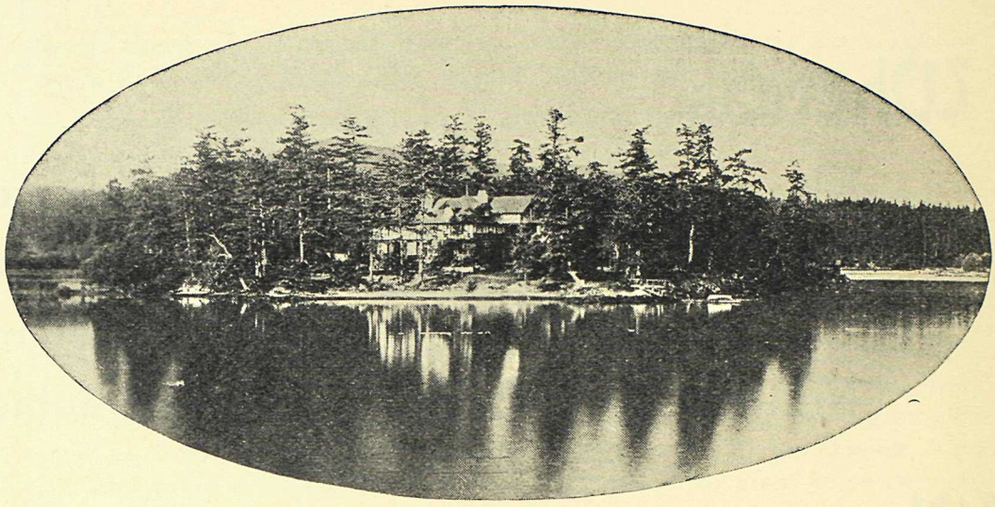

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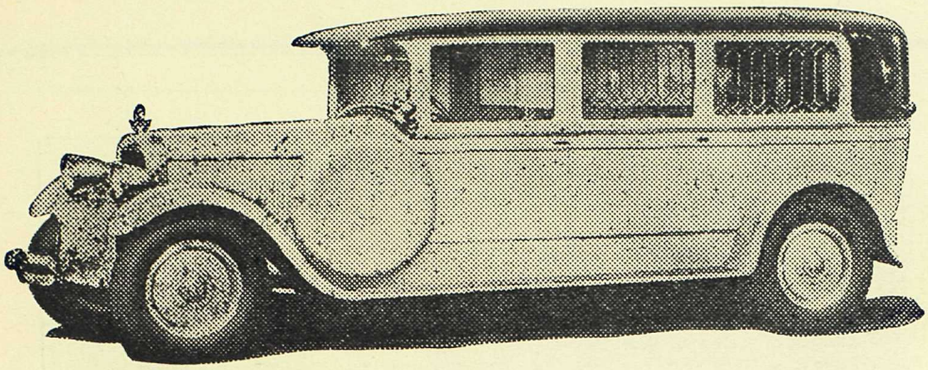

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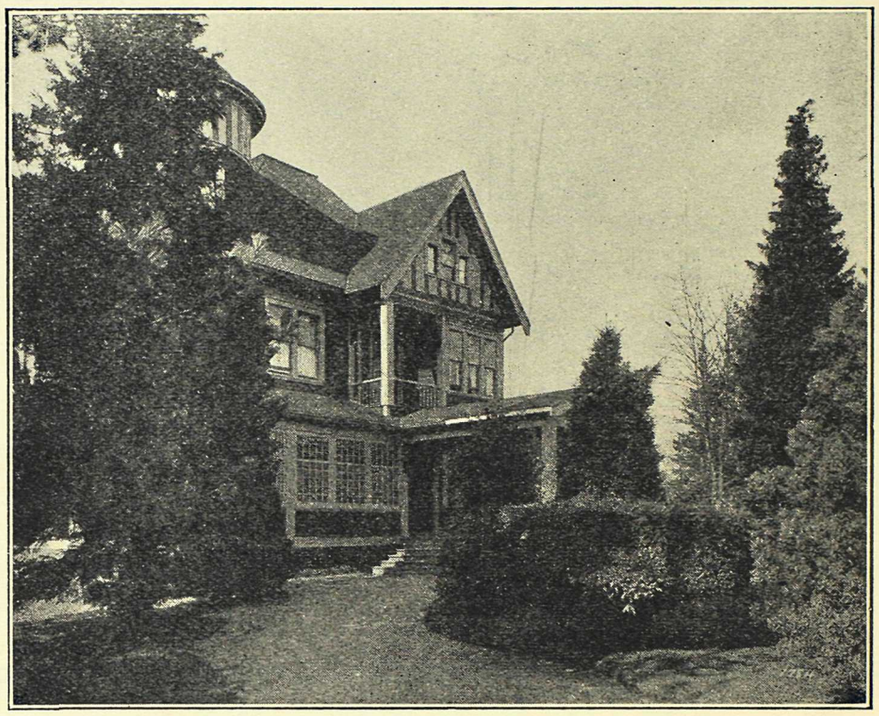

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