Physiologic and Surgical Aspects of Gastric, Duodenal and Jejunal Ulceration*

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"No matter where you may roam, Jack, never forget, never forget your native province by the sea. Xmas 1951—Dad."

THIS inscription appears on the flyleaf of a beautifully illustrated volume of pictures of Nova Scotia, Halifax, the sea around it and the ships on the sea, entitled "Lure of the Sea" by MacAskill[1]. The book was loaned to me to look at during one of the most interesting evenings which I have experienced. Six Dalhousie graduates, who are members of the staff of the Mayo Clinic or fellows of the Mayo Foundation, knowing that I had been invited to give the John Stewart Memorial Lecture this year, invited my wife and myself to be their guests at dinner, following which they told me of John Stewart, of this province and its people, of Halifax, Pictou and Dalhousie.

From Dr. H. N. A. MacDonald I learned of John Stewart's life, character, his association with Lister, his contributions to surgery, to medical education when he returned first to Pictou and to this medical school when he later moved to Halifax. As I listened to the account of this great man's life so earnestly described by a graduate of your medical school I thought of the expression "the lengthening shadow of a man." Then when Dr. J. C. Vibert described the University, told of its founding, its expansion and development, and Dr. J. O. Godden spoke of the geography of the peninsula illustrated by excellent photographs of hills and bays, sea, and ships, and Dr. M. B. Dockerty showed kodachrome slides of the various buildings of the University, it became evident that there had not only been a lengthening of the shadow of a man but a broadening of it as well.

Their enthusiasm and their loyalty so intrigued me that I obtained from our clinic library the Stewart lectures presented previously by my friends, Sir James Learmonth,[2] Rodney Maingot,[3] William E. Gallie,[4] Wayne Babcock[5] and Wilder Penfield[6] in that order of presentation. Having read these with the greatest of interest and profit, I sought out also from our library the first Lister oration given by John Stewart[7] in 1923 under the auspices of the Lister Memorial Club of the Canadian Medical Association. The preface to the oration, presumably written by members of the Club, states: "It was John Stewart who suggested having an address in honor of Lister to be presented every third

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†The Mayo Foundation in Rochester, Minnesota, is a part of the Graduate School of the University of Minnesota.

annual meeting of the Canadian Medical Association." Farther down the page appears the following paragraph:

"The first Lister oration published herewith is very properly concerned with the life and work of Lord Lister himself. Subsequent orations may dwell not only upon the various themes associated with Lister's life but may include also the advances in scientific surgery and medicine."

I think that this might well be your desires for the Stewart lectures.

Professors Babcock and Penfield in their interesting lectures gave a broad coverage of Stewart's life and of the life of his friend, Lister, and Stewart's contribution to the practice and teaching of surgery. These were so well done that I am unable to add anything of importance. Sir James Learmonth, the first lecturer, properly chose to discuss the causes and effects of inflammation while Mr. Maingot extended this discussion to the ulcerations, particularly of the stomach and duodenum.

Professor Gallie reviewed the place that surgery should occupy in the undergraduate curriculum and discussed the education of the modern surgical specialist. The following quotation from his lecture seems especially appropriate at this time: "The establishment of memorial lectureships in honor of our distinguished colleagues of the past is a very beautiful Anglo-Saxon cus. tom. It is one of the many evidences that even in these materialistic days we still love to think that we are members of universities, that we belong to a learned profession, and that tradition is something that we hold most dear."

And Professor Gallie continued: "I am, indeed, delighted to deliver a John Stewart Memorial Lecture because I knew him so well and admired him so much. I venture to think, too, that I am one of the last of your John Stewart lecturers who will have known him in his prime and who will really know what sort of a man he was." What an interesting thing it was that under these circumstances Gallie should choose to lengthen the shadow of a great man and a great surgeon by discussing the place that surgery should occupy in the undergraduate curriculum and the education of the modern surgical specialist rather than to elaborate on Stewart's life.

I regret exceedingly that I did not know John Stewart personally but I have learned a great deal about him and also about Lister. Stewart's "Listerian Oration"[7] is a beautifully written and most interesting account of Lister's life, his ambitions, his accomplishments and his philosophy. By reading and rereading it I think that I am able also to understand in an intimate fashion more of Stewart's life, character and philosophy.

John Stewart was indeed a great man, and remembering the fullness of the description of his life covered in the two preceding lectures I have followed the suggestion which appears in the preface to Stewart's "Listerian Oration" and have chosen to speak on "advances in scientific surgery and medicine." It is my desire to present to you some of the physiologic and surgical aspects of peptic ulceration of the stomach, the duodenum and the jejunum, and the physiologic changes occurring in association with the ulceration and treatment directed toward their eradication which I have observed in more than 30 years' experience in this particular field of surgery.

Significant Physiologic Factors

The physiologic activities of the stomach and duodenum in relation to gastric secretion, gastric motility, and their significance in the development and treatment of so-called benign peptic ulcer are of the utmost importance. The relationship of these to the problem of peptic ulceration after it occurs is pretty well understood but unfortunately the more important relationship of tissue susceptibility and tissue resistance to formation of ulcer is still obscure, if not indeed unknown. Therein probably lies the secret of prevention if not of permanent cure by nonsurgical therapy.

Physiologic Objectives of Present-day Treatment of Peptic Ulcers

Present-day treatment of benign gastric and duodenal ulcer is directed toward reduction of gastric acidity and the relief of gastrospasm. Both of these objectives are obtained when the patient is given mental and physical rest away from his work, preferably in bed in a hospital. Under these conditions the effects of cerebral stimuli carried through the vagus to the stomach are decreased and gastric secretion is lessened and gastric acidity is reduced. A soft bland diet decreases gastric motility by making it unnecessary for the musculature of the stomach to work so hard to force the food through the pylorus and past a duodenal ulcer, if one is present. producing partial obstruction by spasm, edema and fibrosis. In addition to the previously mentioned methods of reducing cerebral stimulation of gastric acidity through the vagi, long-acting antispasmodics and sedatives are used and intragastric control of gastric acidity is accomplished by frequent feedings, by the use of such antacids as aluminum hydroxide and occasionally by such alkalies as sodium bicarbonate, magnesium oxide and bismuth subcarbonate. On reducing gastric acidity, gastric hypermotility, the result of acid acting on ulcer, is reduced. The response to such a regimen is frequently dramatic when a crisislike type of penetrating ulcer is present, but unfortunately the results are temporary in most cases, even though an ambulatory medical regimen is continued. From a surgical standpoint these criteria for treatment are obtained by removal of a half to two thirds of the stomach and that part of the duodenum containing the ulcer whenever it is possible and safe to do so, or by gastroenterostomy either with or without associated vagotomy.

Partial Gastrectomy or Gastroenterostomy.—Partial gastrectomy for chronic recurring duodenal ulcer and especially for chronic gastric ulcer in my experience has been the most effective operation and given the best results of any surgical procedure. On the other hand, there is ample evidence to support the thesis that gastroenterostomy will decrease gastric motility, relieve the pain of ulcer and will effect reduction of gastric acidity by the reflux of pancreatic, biliary and duodenal secretions into the stomach. In every case in which the gastrojejunal anastomosis functions properly, the duodenal ulcer will heal and it will remain healed unless a new ulcer or other chronic obstruction develops at the gastroenteric stoma and prevents the gastroenteric stoma from doing what it is supposed to do. When vagotomy is added to gastroenter-

ostomy, gastric motility is diminished to a marked degree, the stomach dilates and gastric acidity is reduced more than if the gastroenterostomy alone were done. With vagotomy added achlorhydria is obtained* in approximately 30 per cent of the cases.

Gastric resections for duodenal ulcer produce achlorhydria in a variable percentage of cases. [8], [9] It is obtained in an average of 75 per cent of the cases in which the remnant of stomach is joined to the jejunum (Billroth II-Polya type of anastomosis) but in only 40 per cent of cases in which a remnant of stomach of the same size is joined directly to the duodenum (Billroth I operation). This difference in occurrence of achlorhydria is due, I believe, to the amount of pancreatic, biliary and duodenal secretions which enters the remaining stomach. A much greater quantity enters through the indirect gastrojejunal anastomosis than through the direct gastroduodenal anastomosis. In the former peristalsis carries the secretion into the stomach unless an entero-anastomosis has been made between the loops of jejunum while in the latter peristalsis carries the duodenal, pancreatic and biliary secretions away from the stomach. In my opinion, this accounts for the greater frequency of recurring ulceration after the Billroth I anastomosis (remnant of stomach to duodenum) than after the Billroth II-Polya procedure (remnant of stomach to jejunum) when this type of resection is used for duodenal ulcer.

That reflux of pancreatic, biliary and duodenal secretion into the stomach through the gastrojejunal anastomosis after gastric resection performed for duodenal ulcer plays an important role in reducing gastric acidity and hence in the prevention of recurring ulceration is evidenced by the fact that when an entero-anastomosis is made between the two loops of jejunum attached to the stomach, and the reflux of the secretions into the resected stomach is prevented for the most part, achlorhydria occurs in only about 40 per cent of the cases and the incidence of recurring ulceration is much, much greater than when entero-anastomosis is not performed.

When an adequate amount of stomach including the ulcer is removed in the course of partial gastrectomy for gastric ulcer, acidity decreases to achlorhydric levels almost without exception with both the Billroth I and the Billroth II operations and recurring ulceration practically never occurs. I doubt whether I have ever encountered a case in which an ulcer recurred after either of these two types of partial gastrectomy when they were performed for chronic benign gastric ulcers.

The corollary of this is that gastric resection whether of the Billroth I or Billroth II-Polya type is an excellent operation for chronic gastric ulcer with practically no recurrences, but the Billroth II-Polya operation (remnant of stomach joined to jejunum) is superior to the Billroth I operation for duodenal ulcer because of the considerably lower incidence of recurring ulceration. Entero-anastomosis should not be done between the loops of jejunum attached to the stomach—especially in cases in which the partial gastrectomy was done for duodenal ulcer.

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*Determined after an Ewald test meal with acidity measured by tenth normal sodium hydroxide.

Delayed Gastric Hemorrhages Following Gastroenterostomy for Congenital Pyloric Stenosis

Some of the most interesting studies on the theories of ulcer formation which I have carried out included study of a group of only five patients, all of whom had serious gastric hemorrhages from 18 to 28 years after gastroenterostomies performed in their home localities for congenital pyloric stenosis when the patients were a few weeks of age. Fortunately the Ramstedt procedure soon replaced gastroenterostomy for this condition. In one of the patients an acute gastrojejunal ulcer perforated between the episodes of bleeding. In another patient, a 28-year-old woman, the only female in the group, a gastrojejunal ulcer was found when the gastroenteric anastomosis was disconnected. Pylorectomy without removal of the gastroenteric stoma had not relieved the bleeding of two patients. The gastroenteric anastomosis was disconnected in all the five cases and the stomach was resected and the remnant was anastomosed to the duodenum with a Billroth I procedure as modified by von Haberer.* Bleeding episodes ceased in three of the patients. The other two, both vigorous young men, had a few mild episodes of gastric bleeding following overindulgence in alcoholic beverages. After use of alcohol was discontinued there were no other episodes of bleeding.

Some very interesting clinical observations can be made from these cases. First of all, under certain circumstances gastric secretions acting on the jejunum will produce sufficient inflammation, possibly superficial ulceration, or even deeper ulceration, to cause severe gastrointestinal bleeding. The inflammation may lessen and the ulcers may heal but both may recur under circumstances which are difficult to evaluate. The patient already mentioned who had the perforated gastrojejunal ulcer was a young man of 24 years. When he was first examined at the clinic, roentgenograms failed to indicate ulceration of the stomach, gastrojejunal stoma or the jejunum; yet 6 weeks later after he returned home a gastrojejunal ulcer perforated. This perforation was closed as an emergency surgical procedure. The patient returned to the clinic some weeks later. The jejunum was detached from the stomach, the stomach was resected and the end of the stomach was anastomosed to the duodenum. There was no evidence of gastrojejunal ulceration at this time although slight gastrojejunitis was present and was localized about the anastomosis. The patient has had no further evidence of ulceration or bleeding. The sections of stomach and rim of jejunum, removed from all the other patients, with the exception of the woman who had definite gastrojejunal ulceration exhibited only mild degrees of gastrojejunitis, and yet serious bleeding had occurred in all at intervals. Pylorectomy in two cases did not prevent further episodes of bleeding; these ceased, however, after removal of an additional amount of stomach and a Billroth I (gastroduodenal) anastomosis.

Fowler and Hanson[10] and Baker[11] and co-workers reported two cases in which bleeding ceased after removal of the gastroenteric anastomosis even though only

*In the von Haberer modification the entire circumference of the stomach is anastomosed to the duodenum after its larger circumference is decreased with interrupted reefing sutures.

pyloroplasty was performed and none of the stomach was removed. The inflammatory effect of gastric secretion acting on the jejunum, even though the pyloric antrum has been removed, in the two cases in my series in which it was done, is, I believe, an observation of considerable significance.

Vagotomy

I have attempted in the preceding discussion to indicate the importance of the free hydrochloric acid in gastric secretion as well as the role of the pyloric antrum in the pathogenesis and treatment of peptic ulceration.

Pavlov's[12] experiments distinguished three phases of gastric secretion, the cephalic phase mediated by the vagus, the gastric phase when food comes in contact with the gastric mucosa, and the intestinal phase when food passes beyond the pylorus. At this time, therefore, I should like to discuss the cephalic phase mediated by the vagus since in recent years resection of the vagus nerve has been recommended by Dragstedt[13] for the treatment of duodenal and gastrojejunal ulcer and used with satisfying results both from the patients' and surgeons' standpoints by some, especially on duodenal ulcer, and with uncertainty by others. It is worth while, I believe, to refer to some of the early work on resection of the vagus nerve because of its contribution to the decreasing frequency with which vagotomy has been used in recent years except in cases in which gastrojejunal ulcer develops after adequate gastric resections.

In the early 1920's Latarjet,[14] of Lyon, France, studied the effects of resection of the vagus nerve experimentally and reported the results in 12 cases in which he had operated with Wertheimer, Santy . Delore, Molin and Pauchet. Apparently use of the operation was discontinued after a short time—at least, I have not found a report of the late end results and when I visited Pauchet's clinic in Paris in 1927 he made no mention of the procedure, nor did he when I visited him again in 1931. At about this time Greggion found that resection of the vagus nerve of rabbits was followed by a high incidence of gastric ulceration due apparently to the retention of acid secretions within the stomach plus the inability of the gastric wall, made flaccid by the vagotomy, to push the gastric secretions through the pylorus.

Dragstedt found, and so did others, including myself, that when vagotomy was done in the treatment of gastric ulcer, not infrequently the ulcers failed to heal, or if they did heal, they recurred. When vagotomy alone was performed for duodenal ulcer, although it reduced gastric acidity even to an achlorhydric level in 30 per cent of the cases, gastric retention became so troublesome that nausea and vomiting, and frequently diarrhea, became even more distressing than the symptoms of ulcer for which the operation was performed. In addition, retention of gastric secretion within the dilated stomach pouch produced gastritis and not infrequently some gastric ulceration. For these reasons after Dragstedt[15] had reported his results in his first 54 cases he advocated the addition of gastroenterostomy to the vagotomy. This has seriously interfered with a scientific determination of the role that vagotomy plays in such cases for gastroenterostomy alone, when properly made, without vagotomy will result in healing of all duodenal ulcers.

In 1928 Hartzell,[16] working in the Institute of Experimental Medicine in the Mayo Foundation, resected the vagus nerves of eight dogs. The immediate results were similar to those described by Latarjet. They consisted of total abolition of psychic secretion (cephalic phase), pronounced and constant reduction of the quantity of free hydrochloric acid and the total acids, an increase in the pH of the gastric secretion and dilatation with loss of motility of the stomach. Vanzant[17] studied these animals and some others 2½ years later and found that free acid was present in stomachs of all but one of Hartzell's original animals. The initial effect of vagotomy on the motility of the stomach was inconstant. In four of the dogs for which these data were reported, emptying of the stomach was delayed, two had hypermotility of the stomach with diarrhea and emesis, and three had no change in gastric emptying time. Later results revealed the motility of seven of the 10 dogs she studied to be essentially normal. The studies of my colleagues and myself over the last 8 years on vagotomized patients carried out from 1 to 4 years after operation indicate that in human beings, gastric motility returned to the stomach in 73.6 per cent of the cases and gastric acidity in 23.7 per cent of the cases over a period of 1 to 4 years.[18]

This return of gastric acidity in some and gastric motility in many cases probably explains why vagotomy when studied over a period of several years may not produce consistent and lasting results and why, as in my experience, it has failed to prevent recurring ulceration when the operation is used in conjunction with gastroenterostomy in a smaller percentage of cases than when gastroenterostomy is performed alone.

Two of the problems which arise in studying the results of vagotomy are that all of the branches of the vagus nerves may not be identified and sectioned and that no laboratory tests which will give better than a 80 per cent chance of correlation with the results are available.[19] This has been my experience with the Hollander insulin test. My colleagues and I, from dissection of vagus nerves in 110 cases studied during routine postmortem examinations, showed that in 8 per cent the vagi had so many branches around the lower part of the esophagus that it would be exceedingly difficult to excise all the branches. In addition, in approximately 20 per cent of the cases there was multiple branching of the vagi even when the lower 5 cm. of the esophagus was pulled into the abdomen.

In May of this year it was my good fortune to have the opportunity of visiting again the surgical clinics in England, France and Italy before and after the sectional meeting of the American College of Surgeons in London. It was interesting to inquire again concerning the frequency with which vagotomy was being performed. The experience of the surgeons in these countries is practically parallel with that of my colleagues and myself and many other American surgeons, in that use of vagotomy with gastroenterostomy has practically been abandoned as a routine procedure in the treatment of chronic recurring duodenal ulcer, when gastric resection can be performed with almost equal risk. The reason given is that partial gastrectomy has given so much better results. However, vagotomy has produced excellent results in most cases in which it

has been used on the rare occasions when gastrojejunal ulcer has developed after adequate gastric resection.

Vagotomy is most valuable in the treatment of gastrojejunal ulcer after adequate gastric resection. In our experience, to be reported shortly by Chance, Berkson and myself,[20] excellent results have been obtained in 70 per cent of these cases at a minimal risk. In contrast, re-resection of the stomach, which carries a risk several times greater, has given excellent results in only 57 per cent of the cases as reported by my colleagues, Priestley and Gibson.[21] The explanation of the good results of vagotomy probably lies in the fact that the pylorus and two thirds of the acid-secreting surface of the stomach had previously been removed. Thus the quantity of acid secretion is reduced and the loss of motility and dilatation of the remaining gastric pouch are of little consequence with regard to interference with the emptying of the stomach. The most important effect, of course, is the reduction in gastric acidity, and vagotomy after previous adequate resection gives this to a maximal degree.

In contrast, vagotomy in cases in which gastrojejunal ulcer has developed after gastroenterostomy may result in disturbances of gastric motility or obstruction, if the gastrojejunal ulcer is large and in healing partially obstructs the gastroenteric stoma. Vagotomy after previous gastroenterostomy does not reduce gastric acidity to the degree that gastric resection does, for the pylorus and a large section of the stomach have not been removed, the hormonal phase of gastric secretion continues and the quantity of gastric secretion remains about the same as previously. The quantity and acidity of gastric secretion, therefore, are disturbing factors especially if the contents are retained in the stomach for a time. I think all of these play a role in the less favorable results of vagotomy for gastrojejunal ulcer developing after gastroenterostomy than for gastrojejunal ulcer developing after gastric resection. In addition they suggest why vagotomy alone yields excellent results in only 77.8 per cent of cases of gastrojejunal ulcer after gastroenterostomy in contrast to the excellent results obtained in more than 86.5 per cent of such cases from gastric resection.

There is still much to be learned about the normal and abnormal physiology of the stomach and duodenum in health and in disease—and until the exact etiologic features leading to the formation of peptic ulceration are better known or understood all of us should continue to learn as much as we can from experimental and clinical observations of gastric physiology.

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Carcinoma of The Thyroid, Diagnosis and Treatment *

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THE subject of Cancer of the Thyroid is that of a disease which is not common nor is it a rarity. It is apparently becoming more prevalent, or at least we are seeing and reading a lot more about it than formerly. As you may know, the Nova Scotia Tumour Clinic functions at the Victoria General Hospital and utilizes the services provided by the four surgical groups and other specialists for its treatment program. Each Service handles a specialized area and the one on which I am a junior member takes care of the cancers of the head and neck. Hence we see all the cancers of the thyroid, and during the past year I have been fortunate in having four cases to operate on for this disease. During the past two years, the Clinic has seen 14 cases, not all public. Twelve were papillary adenocarcinoma, two anaplastic with two deaths. All have had some operative procedure. As time goes on a better and more accurate knowledge of what our results of treatment will be can be tabulated and made available to the profession in Nova Scotia.

Interest in this subject is further stimulated by the apparent good results obtained, the odd manner in which the disease commonly presents itself clinically, and the variety of forms of treatment. Uniformity is certainly not the rule. The diagnosis of early cancer of the thyroid cannot be made by ordinary clinical means as there are no special signs of malignancy. Even in later stages the diagnosis may have to be made by biopsy. Sex, age and consistency of nodule are of little or no value.

It is generally agreed that a large proportion, perhaps 90% or more, of carcinomas of the thyroid have their origin as a malignant change in a previously existent benign adenoma. Crile believes it is impossible to prove this and that adenomas which become malignant are actually that from the beginning. The embryonal and fetal types of adenoma are particularly prone to malignant change followed by Papillary Cystadenomas which may give rise to a low-grade malignancy.

Classification and Pathology

There is no uniform, generally accepted classification. Confusion results from variability of terminology and lack of uniformity of criteria used. The most commonly accepted one is that based on morphology which allows correlation of clinical features, behaviour and prognosis.

1. Papillary Adenocarcinoma: low-grade malignancy, good prognosis.
2. Follicular, Areolar or Malignant Adenoma: moderate grade malignancy, fair prognosis.
3. Carcinoma Simplex (a) Small Cell, (b) Large Giant Cell
4. Epidermoid Carcinoma

} high-grade malignancy, poor prognosis.

*Delivered at the Annual Meeting, The Medical Society of Nova Scotia, Sydney, N. S., September 8, 1954.

5. Miscellaneous Malignant Tumours, Sarcoma, Hurthle Cell, Metastases from breast, kidney and lung.

1. *Papillary Adenocarcinoma*, the more frequent and the least malignant. occurs at any age, children, adolescents, young adults. The primary lesion varies in size but is often small. Hidden within the gland it may be overlooked. The metastases are often larger than the original lesion. It is prone to metastasize to regional lymph nodes, 58% show it on original examination. It is low-growing and of low-grade. It slowly invades the capsule and may metastasize by blood stream, to mediastinum, lung and bones. This is the type found in the so-called lateral aberrant thyroid which now is really considered as a metastasis from a carcinoma, which will usually be found if looked for as small nodule in the gland. It is more radio sensitive than other types. Metastases may be present in lymph glands for years. Histologically they show typical papilliferous outgrowths and small cystic spaces. They invade the capsule and infiltrate the normal gland.

2. *Follicular, Alveolar (Malignant Adenoma)*, occurs as a large, solid, well encapsulated nodular or lobular growth. It has a tendency to form follicles. It may show simple colloid goitre, diffuse carcinoma or adenocarcinoma. There is early invasion of blood vessels and remote metastases may occur while the tumour is still encapsulated. These metastases may occur in bone, lungs, mediastinum but also *frequently to regional lymph nodes* as adenocarcinoma. Incidence of metastases 17% to 54%. Bones are skull, vertebra, pelvis, clavicle, sternum, femur, ribs, scapula. These metastases frequently tend to reproduce normal thyroid stricture, hence may be helped by radio-active iodine.

3. *Carcinoma Simplex*, usually presents itself in the older age group as a large, solid, invading tumour, hard non-encapsulating, and appears obviously malignant. It grows rapidly and metastasizes to glands, lungs and viscera. It consists of solid masses of cells without glandular formation. Giant Cell Carcinoma, a disease in older people, grows rapidly,quite large when first seen with wide invasion and obstructive symptoms appear early. It is the most malignant. Cells are large, undifferentiated. Death is due to compression of trachea or other cervical structures, in four to six months.

4. *Squamous Cell Carcinima*, is rare. It arises from structures of the Thyroglossal duct.

5. *Metastases* from Hypernephroma, breast, lung cancers are also rare.

From the above it will be seen that the commonest sign or symptom is a lump in the neck which may be found either in the thyroid or in the side of the neck and unless its nature is established clinically a biopsy should be done on all lumps outside the thyroid, and single nodules in the thyroid must be challenged by operation

Incidence of Carcinoma in Thyroid Disease

Statistics on the incidence of cancer in nodular goitre are totally unreliable because such statistics are based on a selected group of patients whose goitres *are removed.* Definite knowledge as to the overall incidence of thyroid

cancer is lacking. 0.5% of all cancer deaths are due to cancer of thyroid and 60% of all cancer of thyroid are papillary type. This is low-grade but shows glandular metastases in 58% of cases and contralateral lymph node involvement in 13% of cases.

There is close relationship of thyroid cancer to the solitary adenoma regardless of age, sex or geography. 90% of carcinomas of the thyroid have their origin in pre-existing adenoma.

The incidence of cancer of the solitary adenoma varies from 10 to 24 per cent (Lahey Clinic 10 per cent; Wood, California, 15 per cent; Illinois College of Medicine, 20 per cent; Cole, Chicago, 24 per cent). The incidence of nontoxic multiple adenoma is 8.7 per cent, of toxic goitre 0.1 to 1.0 per cent, and of all types of goitre 5 per cent.

Because there is a high percentage of cancer in adenomas they should be removed. A discrete nodule may be a malignant tumour. It should be removed intact and unruptured.

"The finding of a discrete area of malignant degeneration in the gland for which subtotal thyroidectomy has been done for diffuse nodular goitre or even primary hyperthyroidism or exophtalmic goitre should not be treated as thyroid cancer. Recurrence in these cases is rare." R. B. Cattell, S.C. of N.A., June, 1953.

In Chronic Thyroiditis, the gland is enlarged, hard, tender. It tends to assume normal shape of both lobes and isthmus (its normal anatomical outline) and both lobes are involved at once. Discrete adenomas are ball-like in character. Voice changes may or may not indicate Ca.

A Short Resume of Cases.

Case 1. Mrs. M., age 32, weight 183 lbs. Lumps in neck for 3 months getting larger. Typhoid Fever at age 17 years. Pulmonary Tbc age 19 years, was in Sanatorium for 8 months. One child, age 7 years. Menses—normal. No loss of weight. Neck showed a large collar-shaped nodular mass situated mostly on the right side of neck in the midline and also on left side. This did not move up and down on swallowing and the thyroid gland was not palpable. Some of the mass seemed to overlie it. The thyroid cartilege could be seen and felt moving up and down on swallowing. The lumps felt firm and discrete and extended on the right side from the angle of the mandible down along the sternomastoid to the sterno-clavicular joint, not quite so extensive on the left. One could not help but think of Hodgkin's Disease. B. P. 117/80. Pulse 80. Hb. 90%. White Cells 10,900. X-ray of chest showed fibrotic healed lesion at right apex, no signs of metastases in chest, lumbar spine, pelvis, skull.

Biopsy of lymph gland showed a well differentiated low-grade adenocarcinoma forming regular acini with colloid.

Diagnosis: Carcinoma of Thyroid with lymph gland metastases bilateral. Operation: August 7th. Left side hemithyroidectomy with subradical dissection of neck. The left lobe and isthmus were small, soft, reddened and to all intents looked normal, no nodules seen or felt but glands extended all along the internal jugular vein, the trachea, esophagus and front of thyroid and above isthmus. (Delphian Node). Pathological Report showed left lobe com-

and its high extension up to the base of the skull, also across the midline to the opposite side behind the pharynx. (Note: The pathologist reports the cyst wall as simple).

Treatment

It is probably the safest procedure to challenge all solitary adenomas of the thyroid by operation. Removal in toto is the procedure of choice and in all likelihood the safest thing is a hemithyroidectomy. However one must be mindful of the recurrent laryngeal nerve and not to injure it, also to try and preserve any parathyroid glands on that side. It may be all there is in that patient. A local excision of the adenoma, provided it has not broken through its capsule may be done. If subsequently it is found to have invaded the capsule then re-operation with hemithyroidectomy should be done and possibly a radical neck dissection.

When there has been invasion of the gland or metastases to the regional nodes then a radical neck dissection is indicated on the same side. If in addition the contralateral lymph nodes are invaded, then a bilateral neck dissection will have to be undertaken and it is probably better to preserve one sternomastoid with its accompanying internal jugular vein. Ligating of both veins may be dangerous especially in older people, even in the young it will cause oedema of the face.

Many of the cases of Carcinoma Simplex are not operable but some palliation may be obtained by use of deep therapy and many times this will require a preliminary tracheotomy, or a hemithyroidectomy if possible and tracheotomy combined.

Crile believes a rather different type of radical neck dissection is needed for Carcinoma of the Thyroid in that it must include the lymphatics in front of thyroid up to hyoid bone, all those about the trachea down to the superior mediastinum and usually not the submaxilliary area. The usual radical includes the sterno-mastoid, the sterno-hyoid, sterno-thyroid and omo-hyoid muscles with the anterior, middle and internal jugular veins and the lymphatics in the carotid sheath, paratracheal, anterior and posterior triangles of the neck and many times the spinal accessory nerve will be lost. One tries to save the recurrent laryngeal nerve. If it has to be sacrificed a tracheotomy should be done. In so far as it is possible the dissection should be done in block from below up. However, this cannot always be done in safety.

The approach may have to be changed to gain advantage because of the peculiar findings. Healing is usually rapid and very little deformity exists.

Post-operative Radiation is usually given in the radical cases.

Radio-active Iodine 131 has very little place in the treatment. Its value depends on the ability of the tumour to take up iodine for the formation of Colloid as this so many times is limited, not enough can be extracted to be of real value. However, in the case of thyroid metastases to bone which show some hyperfunction it can be of great value but most metastases do not take up the Iodine. Metastases may be forced to take up more Iodine by doing a complete thyroidectomy, by using Methyl Thuouracill for three months, then use 131 I. However, Radio-active Iodine is of most value to the research worker.

Results

Results of treatment are dependent on the type of the disease and its stage of progress at the time. Varying statistics are reported.

In operable cases 5 year survival rates of 36% to 95%. In inoperable cases without distant metastases 35% survive 5 years.

Crile in a series of 24 cases, one death, the rest survived 5-15 years without recurrence.

R. T. Smith, Missouri, reports 20—80% recovery for 5 years or more in the papillary adeno-carcinoma, 20—45% in the follicular, and in the carcinoma simplex none.

Lahey reports 80% survival rate at 5 years in those treated by hemithyroidectomy and radical neck dissection.

The survival rate increases when diagnosed by laboratory methods and decreases when diagnosed clinically. However, the incidence of deaths over 5 years increases rapidly so that this is no criteria of cure. Pemberton and King report 3 deaths and 15 recurrences in 38 cases of papillary carcinoma and Frazell and Foote report 21% deaths so carcinoma of the thyroid is a metastasizing malignant tumour and must be treated as such.

SUMMARY

1. Interest increasing because of apparent increase in the disease, more operations done.
2. Diagnosis is clinically impossible in early stages. Many require biopsy of lymph node enlargement to make diagnosis.
3. Classification, a working one is given.
4. Incidence of disease not firmly established in relation to simple thyroid disease.
5. Resume of cases.
6. Outline of treatment, hemithyroidectomy, hemithyroidectomy with radical neck dissection, x-ray radiation, Radio-active Iodine.
7. Results.

Poliomyelitis In A Prairie Village,

Elgin, Manitoba, 1953

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I COMMENCED practice in Elgin in 1952 and it so happened that during that year and the year following Manitoba was stricken by the worst poliomyelitis epidemic in its recorded history, and indeed probably the worst in the records of the world.

Elgin is a village of some three hundred and fifty people of whom three hundred are adults and only some fifty or so school children or younger. The village is situated in the south west corner of Manitoba and, being thus enclosed in a vast land mass, its climate is characterized by intense sub-zero cold in winter and prolonged periods of considerable day and night heat in the summer months. Precipitation the year round is only an average of eleven inches, so that the air is dry and the water level in the soil correspondingly low. A result of this is an unavoidable resort to historic methods of sanitation and the sinking of wells as the sole means of obtaining drinking and washing water. Ablution is therefore something of a luxury and the effort of attaining ordinary cleanliness a considerable one. Thus through no fault of their own high standards of hygiene, such as obtain in the best of urban communities, do not exist, and all the wells contain strong coliform concentrations the year round. Infective diarrhoeas, even frank dysenteries, are as a consequence extremely common and accepted more or less as a natural state of affairs by the settled inhabitants and designated by them as "stomach flu." Considering, however, that it was only eighty years ago that the virgin soil was first broken up under conditions which certainly no white man would endure to-day, the standard of civilized living attained by this remarkably tough Anglo-Saxon stock is extraordinarly good though not many, I think, would care to share it, other than the Prairie born.

Two things therefore strike the stranger with considerable force. First the lack of water and sanitary facilities and the civilizing influences which they introduce, and secondly the vastness of the prairie lands. Village life as a result is self-contained and revolves around the activities of the three churches of different denominations and the Elgin district school which takes children from the farms within a ten mile radius. These farms are spaced geometrically, a method made easy by the flatness of the land and made necessary by the lack of naturaly boundaries such as brooks and rivers, etc. Thus, a main track runs through Elgin east and west and at each mile an intersection runs north and south. The address of a patient is thus given as four miles east and nine miles south, and if one starts from zero intersection and checks it on the speedometer, one usually gets pretty close. It is under these conditions of sparse population and great space that an epidemiologist may perhaps trace far more accurately those disorders which spread by contagion. As news travels quickly by that remarkably efficient instrument of broadcast, the bush telephone, the details of everybody's life and illnesses

are known to everyone else. Thus the village doctor is extremely well supplied with every particle of information for ten miles and more around.

Now, by long and fearful association all the prairie people are very polio-conscious and they are perfectly aware of the frequent association of a sore throat and poliomyelitis. Hence, it is that the prairie doctor sees more than his usual share of throat conditions, and moreover is more than usually careful in his examination and prognosis. I was fortunate therefore in being able during the year 1953 to see a type of case which suddenly became invested with a much more sinister import, when poliomyelitis struck the village at the end of the year. I propose to describe these cases in the order in which they appeared, and if the reader will remember that during these months one of the world's worst epidemics of poliomyelitis was mounting in Winnipeg one hundred and eighty-seven miles north east, he will understand how parents and doctors alike regarded the least suggestion of throat infection with great fear. There is therefore, little drama and not much to say about these very ordinary cases. But they were the shadow of the disease and the people knew it.

At this point I will give my own working classification of throat conditions:

1. Tonsillar swelling of quite young children often so marked that they meet in the mid-line. This is always accompanied by very high fever. The onset is sharp and recovery often in twenty-four hours. I have recorded three cases in 1953.

2. A condition similar to the above but with flakey white exudate in addition and of a more severe order. This is the streptococcal throat and may be related to 1. I had two cases in the year, one of which was a typical but mild scarlet fever. They responded well to penicillin.

3. Vincent's infection, common here owing to the scarcity of water in the countryside and villages and consequently poor facilities for washing up in the cafes, etc. Three cases were seen in the year.

4. The mild state of injection accompanying the common cold.

5. Diphtheria—not seen here because Public Health work in this vast province is very good in spite of its size, and the inoculation programme well promoted.

6. The red throat with perhaps watery eyes and Koplik's spots, presaging measles. Four cases were seen in the year.

7. A condition of diffuse red throat with an illness curve rising slowly remaining at its peak for two or three days and then tailing off slowly. It is accompanied by moderate fever up to 102°, a mild constitutional disturbance and a diffusely swollen plum red throat affecting tonsils fauces and the pharyngeal wall. It varies from quite mild to quite severe. It does not respond to penicillin but clears up on its own in the course of a week. I record here those eleven cases which occurred during the year 1953.

Case 1.

The first case I have recorded occurred on May 8th, 1953. He was a young farmer, aged 22, who walked into my office in the village in great fear and said he thought he had polio. He complained of sore throat and headache which had come on during the past two days. On examination, his temperature was 99°, pulse 80 and his fauces, tonsils and pharynx were all diffusely red and slightly swollen with plenty of sticky mucus but no exudate otherwise. There were no signs of nervous involvement, so I gave him 600,000 units of intramuscular penicillin and sent him home to bed.

Case 2.

On May 13th he brought his eighteen year old brother up with the same complaint. The condition subsided within a week after which both continued quite well. They told me later that their sister aged twenty-four had also had a mild attack of the same thing.

Case 3.

On July 11th a case occurred in a schoolboy aged seven years. His temperature was 101° and his throat was diffusely swollen and red though he was not severely ill. He cleared in five days without incident.

Case 4.

On August 3rd the fourth case occurred in Elgin village. He was a schoolboy aged seven, one of twins, and it is interesting to note that a year previously I had seen the other twin with the same condition.

Case 5.

It was at this time I recorded my first case of poliomyelitis in the district. He had been to a summer camp some twenty miles away and on returning home to a farm two miles out of Elgin went straight to bed with a sore throat. I saw him on the 29th of July and found his throat to be similar to the type I am here describing and of a fairly mild degree. In August 1st he had some weakness in his left arm and I admitted him to Brandon Hospital, forty miles away. His final state was that of a paralysis of his opponens pollicis. Since he contracted his disease at camp where two other poliomyelitis cases were reported, I have not considered him to be a village case.

Cases, 6, 7, 8, 9.

On August 13th the condition of diffuse red throat struck the Turner family, living in the middle of the village. I was called to see the youngest of a large family aged two and a half with a temperature of 101° and a quite severe attack of the condition. I gave her penicillin, which I know now to be valueless, but I did not know it then. Her constitutional symptoms were not too severe, her mother saying she was cranky and off her food. Her mother, aged thirty, next acquired the infection and a few days later I saw two of her elder boys, aged seven and ten, with the same condition. She later told me that they all got the "cold," but having seen the first three recover and herself without ill effect very reasonably assumed that the rest would as well—which they did. At this time it must be remembered that the Winnipeg epidemic

was mounting with great violence and that the numbers of sporadic cases all over the province were rising too. Privately in my own mind I thought the Turner family was developing poliomyelitis but not a suggestion of any involvement of the nervous system was evident.

Cases 10, 11.

On September 10th I received a call at midnight to a neighbour's house. One of three brothers aged four had contracted a sore throat and the mother was deeply anxious lest it be polio. His temperature was 101° and his throat and pharynx were darkly injected. The following day his brother contracted the infection. I gave them penicillin more as a placebo than anything else, for I was now sufficiently familiar with the condition to know that it was of no use, and I reassured the mother though I was no wiser than she was as to the eventual outcome. However, no signs of involvement of the nervous system were apparent and they cleared up as the others had done with incident. Once more the village breathed freely.

Case 12.

On September 20th I notified my second case of poliomyelitis. A boy of seventeen, while working in a small town thirty miles away, came home to his father's farm ten miles south of Elgin feeling unwell. He came home on the Saturday and was brought up to my office on Sunday morning with no special symptoms other than feeling off colour. He was afebrile and his throat and pharynx were perfectly clean. He gave a vague history of a feverish complaint during the previous work while working in the fields as a farm hand. He had about him, however, that look and sense of apprehension with which all who see much of this disease are familiar. I took him into hospital nearby where he subsequently developed complete paralysis of both legs and ultimately he became a polio cripple. His brother and sisters remained quite well throughout, and no case occurred in his home. The disease had been reported in the town near his work. Clearly his infection was contracted elsewhere, but his case represents so well the so-called spinal type of infection, to whch I refer later, that I have included it here though strictly not of the village.

Case 13.

On October 23rd another case of diffuse red throat occurred on the outskirts of the village. He was a boy of three and his case was mild and he cleared up without effect. I doubt if I should have been called had not his cousin died from polio in a different part of the province.

Case 14.

On Wednesday the 4th November, I received a call to a two-roomed cabin on the outskirts of the village where there lived four children with their mother of pure Eskimo breed and a father of Anglo-Saxon stock. The boy Danny had a temperature of 101° and a diffusely swollen red throat of the type described. I gave him intramuscular penicillin on seeing him and on the day following, and his illness curve seemed to tail off just as the others had done. His illness had dated from about two days before I first saw him.

Case 15.

On November 9th I was called to see a schoolgirl aged eleven. She had been away for awhile and had contracted a sore throat two days before, which had now become worse. She went straight to bed on arriving home and I saw her in the evening. She was a quite severe case of diffuse red throat with a temperature of 102°, a swollen plum red throat, including tonsils, fauces and pharyngeal wall. Though not acutely ill she was apprehensive and restless and insomnic. I gave her barbiturate but the next morning when the telephone rang at 7.30 I knew at once that this child had developed paralysis during the night. Sure enough this only child was now unable to use her left hand and on seeing her I knew that the poliomyelitis virus was now among us.

Case 16.

On that same day, November 10th, I walked over to the little cabin to take another look at Case 14 and the family there. I found that the eldest boy, Melvin, aged seven had come home from school the previous day complaining of his throat. His temperature was 102° and his throat was like that of his brother Danny, diffusely swollen and red. That night the mother phoned to say that Danny, who had been making a good recovery from his throat infection, had not been too well for the past two days and was becoming ill again. When I examined them both I found that Melvin (the eldest) was developing paralysis in his left arn, while Danny had a temperature of 99° and his throat was still mildly injected. The next day Danny also showed signs of paresis. But now I knew that wrapped up in the histories of these two little boys illnesses, lay partly exposed the secret mechanism of this infection.

Cases 17, 18.

On November 13 the three-year old sister of the boys contracted the throat infection and a paralysis of the seventh nerve followed. On November 16 the infant, aged sixteen months, was also taken ill and was unable to stand in his cot.

The outcome of these cases was as follows: The schoolgirl (case 15) suffered severe and grevious paralysis and is now a polio cripple. Of the four Constable children, Melvin the eldest (Case 16) has a permanent weakness of his erector spinae with scoliosis and a slight weakness in both his legs. The remaining three children made a full recovery.

Case 19.

Also on November 13th a woman living in the village, aged thirty, who was four months pregnant, was admitted to hospital with the diagnosis of non-paralytic poliomyelitis. With the consent of her doctor I examined her and found her to have a temperature of 99°, a pronounced tachycardia and a painful slightly rigid neck. There was no sign of a throat infection. She told me her children had "colds" at the time she was taken ill. In five days the condition had subsided. I have noted that she later developed early toxaemia, preeclampsia and eventually foetal death.

Case 20.

On the 19th of November a boy of thirteen, a playmate of the Constable family, developed a weakness of his left leg with a painful lumbar spine. There was no pyrexia or throat condition and he cleared up without any trouble at home where I kept him, since he was the only child.

Cases 21, 22.

On the 20th of November I was called to a farm on the outskirts of Elgin. A farmer, aged thirty, was taken acutely ill the day before with a headache, vomiting and sore throat. The family history goes back to October 16th when his wife, aged twenty-six, returned from Winnipeg with a story of fleeting pains in her neck and back and a general feeling of unwellness. I took her into hospital for observation and lumbar puncture, but there were no abnormal signs at all and her cell count was normal. I treated her for rheumatism and sent her home on the 24th October. I saw her again on the 27th, when she was still very apprehensive, but she later improved. On about November 8th her eldest son, aged seven years, came home from school and vomited, and her twin boys and the patient in question did the same the following day. I was not called on this occasion and they all cleared up and continued to work and play as usual. And so on November 20th I saw this farmer already aphonic with pharyngeal paralysis and with a fulminating diffuse red throat. He was clearly desperately ill. I sent him to Winnipeg where he was put in the respirator but died four days later.

Case 23.

On November 26th the father of the Constable family got severely chilled after an exhausting hunting expedition for deer and developed a pain in the lumbar region and severe neuritic pains in his limbs. He was never febrile but the condition persisted for a month before it gradually cleared.

Case 26.

On November 27th the three-year old niece of the dead farmer and a contact of the family living seven miles away, suffered a mild attack without paralysis or throat infection.

Case 27.

On November 28th I was called to a farm twelve miles east where a schoolboy aged fifteen suffered a spinal attack without throat infection.

Another case was notified in a woman of thirty not seen by me, but taken to Winnipeg with severe throat paralysis.

Near Christmas in a farm ten miles south a farmer and infant son contracted the paralytic disease.

Analysis

From a perusal of these quite ordinary cases we see running quietly through the village from May onwards this throat infection, which I have named diffuse red throat. Of the eleven cases recorded it will be seen that eight of them are divided between three houses and remainder single. Cases 1 and 2 are

young adults and the remainder young children excepting one mother. Cases 6, 7, 8. 9 of the Turner family were all affected within the confines of their home during the school holidays. No other case appeared at that time in the village, so that the close nature of the infection is evident. In no case after careful examinations was there the slightest indication of involvement of the nervous system. When I saw Case 14 therefore, I had no reason to suspect that in the first instance he differed from the remainder. He too began to recover as the rest had done and I have no doubt in my mind that he was in the first place a case of uncomplicated diffuse red throat. Meantime, however, another factor was operating. Case 22 had come back from Winnipeg in mid-October and, from the tragic family sequence which was to follow, I have no doubt that she brought the polio virus with her from Winnipeg. This led to a distribution of polio infection through the classmates of her seven year old son, of which the eldest Constable was one. Though Danny, the younger, commenced his illness on November 2nd, he showed no signs of nervous involvement until November 12th, whilst Melvin, the elder, commenced his throat condition on November 9th and yet showed signs of nervous involvement as early as the 11th. I knew that somewhere in this discrepancy lay the key to the true nature of epidemic poliomyelitis, and it was this single apparent anomaly which has led me, after much thought, to present in chronological sequence as they occurred these cases of diffuse red throat and the dramatic climax in the cases of these two boys. For it was under that roof that I saw perhaps as never before the exchange of hosts between these two infections, with the precipitation in Danny of paralytic poliomyelitis as he acquired the polio virus which his brother brought from school, and the paralytic process appearing in Melvin as he acquired the diffuse red throat infection picked up by Danny as he played in the village, having already indwelling the virus of poliomyelitis from his school contacts. May not the reader see already that the pattern of infection so commonly seen in epidemic poliomyelitis is that, in fact, of its pilot infection, diffuse red throat. If he compares the Turner family (Cases 6, 7, 8, 9) with the Constable family, he will appreciate that the only difference lay in the presence of the second infection as well beneath the same roof.

Thus it will be seen that the diffuse red throat so commonly seen in poliomyelitis is in fact a distinct clinical entity quite unrelated to the virus of poliomyelitis, having a distinct clinical appearance and running a characteristically mild course of its own. From my own observations it leaves the patient insusceptible to further attacks. When, however, with all the drama of paralysis and death the virus of poliomyelitis is superadded, the symbiotic relationship between the two at once becomes manifest. We then see not the seeded faecal virus but virus in the fullest quintessence of its growth and power expelled from the throat, where the dual infection is indwelling, in a radiating parturient viral shower of both infections.

Thus we see in an epidemic of poliomyelitis some cases of the throat infection without the poliomyelitis, as in Cases 1, 2, 3, 4, some cases of poliomyelitis infection without the throat manifestations, Cases 12, 22, 23, 27, and some cases where both co-exist in the same individual as in Cases 14, 15, 16, 17,

18, 21. Such virus seems capable of inducing disease in quite minor states of susceptibility—the ordinary limits for instance of natural fatigue as in Cases 20 and 23, when the virus is indwelling. Attacks of epidemic vomiting are common in the viral radius, seen in my own household (son and wife) and several of our neighbours. It was seen also in the dead farmer, Case 21, who had the misfortune later while the virus was still indwelling to contract the throat condition thereby transforming him overnight as it were to an altogether different plane of susceptibility.

The occurrence of the twin infections in an individual results in active poliomyelitis. Where the poliomyelitis virus is indwelling or acquired in a household where diffuse red throat infection exists, a household outbreak of polio is the result. Where the twin infection runs through a district, epidemic poliomyelitis results. Note how travel or a boy's camp in the summer is such a common history in poliomyelitis for the reason of course that it so multiplies the possibilities of acquiring either or both of the infections. Note too how if by chance or by the economics of living a neighbourhood or a village were to miss the infection of diffuse red throat say for ten years, there would grow up a group of susceptibilities who would, should the dual infection appear, tend to show a high incidence in that particular age group. Moreover the close nature of the infection of diffuse red throat makes it more likely to appear early in large families whose chance of foraging the infection is much greater and who are more likely to sleep together. For the opposite reasons it appears later in smaller families. With the smaller families, of recent years, improved ventilation and increased living space have reduced the chances of infection in infancy so that the tendency is for the age incidence to rise. And so we see that the pilot infection portrays in every way what we see to be actually occurring in epidemic poliomyelitis.

In the two years of my stay in Elgin, I was not to see the infection recur in any individual or any of the eleven cases who suffered from poliomyelitis. I have noticed how twin boys contracted the infection, one in 1952 and the other in 1953 (Case 4). There is therefore, a considerable likelihood that insusceptibility occurs after an attack. The task remains therefore to isolate the organism and apply to it Koch's postulates, for the possibilities of rendering the symbiosis inert by vaccine or controlled infection in infancy are obvious. But the laboratory must come to the people. Bottled stool and postal blood are not the real stuff of the acute infective process. The live "florescing" virus must be seen, as it were, to be understood and to evoke in its viewer the conviction necessary to cast aside the trammels of conventional theory and open independently new windows on to the horizon of thought. For the crux of poliomyelitis lies not so much in virus-antibody reaction as in the reaction between florescent virus and a variety of susceptible states in epidemic poliomyelitis on the one hand, and the growth of the seeded virus in the occasional susceptibility in sporadic poliomyelitis on the other hand.

The Susceptible State In Poliomyelitis

Because we have seen poliomyelitis infections without any throat symptoms at all and because we have seen during poliomyelitis epidemics throat infections without any symptoms of poliomyelitis, the so-called subclinical or

abortive types, and because the virus of poliomyelitis appears to be intensely neurotropic, I have expressed the belief that the condition of diffuse red throat so commonly seen in poliomyelitis cases is a distinct clinical entity, and that the epidemic picture of poliomyelitis is that of this pilot infection together with poliomyelitis infection when both co-exist in an individual, a house, or a district. Moreover, because the effects of diffuse red throat on an individual is identical with that of tonsillectomy, when in both instances the poliomyelitis virus is indwelling, and that both conditions are intimately related to the pharyngeal muscular bed and its respondent anterior neurones; and because in a similar way the well known relationship of the injection of irritant inocula into the deltoid or gluteal mass, or in anti-rabic treatment into the muscles of the anterior abdominal wall, and *its* relationship to regional paralysis, we have strong reasons for believing that to throw a set of muscle fibres into sustained spasm and its respondent anterior neurons into chronic fatigue when the poliomyelitis virus is indwelling has the same enhancing effect on the virus as physical exercise. Be it due to infection, trauma, chronic irritation, or voluntary movement, the basic effect is the same.

Poliomyelitis and measles, affecting as they do the same age groups, have often come in for comparison. Howe[1] compares the notifications for the two diseases for the counties of Maryland, U.S.A. during the period 1921 to 1945 when there were reported 97,909 cases of measles and only 1,185 cases of paralytic poliomyelitis. Since about 60 per cent of measles cases are reported, the ratio on this computation is 200 to 1. "Consequently, it is difficult to escape the conclusion that during the period there were 200 nonparalytic and abortive cases of poliomyelitis to every paralytic one" states the author. This is to assume. however, that susceptibility is a passive state of the cells, and is therefore a constant for each disease and is the ultimate expression of the subclinical attack with antibody formation. Every clinical observation goes to show, however, that susceptibility in measles and in poliomyelitis is of a very different order. Measles, where a susceptible person and the measles virus are in contact, is irresistible and its mode of onset is practically uniform for all sufferers. Other illnesses and physical states seldom enter the picture. Poliomyelitis on the other hand has such a diversity of conditions associated with its onset in different individuals as to render any such comparison invidious. Pregnancy, tonsillectomy, dysentery, as quoted by McAlpine[2] on British troops in India during the war, diffuse red throat in my own cases, exhaustive states during hot weather, the injection of antigens[3]—all these are episodes in the life of the individual which may reasonably not have happened and had they *not* happened active poliomyelitis may reasonably be assumed not to have occurred. With the return then to the non-pregnant state, with the healing of the tonsillectomy scars in the pharyngeal bed, with the subsidence of diffuse red throat, when the voluntary and involuntary spasms associated with acute dysentery subside, and when antigen is eventually absorbed from the site of inoculation we may reasonably infer that the chronic fatigue in the respondent neurones also returns to normal and to insusceptibility and indifference to virus presence. We thus have a conception of stable and labile states of susceptibility the one inherent in the cell of elective disease at birth (measles) and the other in the

response of the anterior neurone to various transitory states in the life of the individual (poliomyelitis). We cannot therefore avoid the conclusion that susceptibility is a positive cell state and that during chronic fatigue states, coupled perhaps with a temporary defection of the renal-osmotic mechanism so often seen during pregnancy, dysentery and heat exhaustion conditions, there accumulates in the anterior neurone a component necessary to initiate virus division and to maintain it until such component is either exhausted or removed from the neurone during recovery from the primary conditionl. Cell death, cell damage or cell recovery is the end result in the nerve cells concerned. We know too well how physical exhaustion incurred in long trips to the hospital tips the scales progressively against the patient and in favour of the virus. We know also how physical exercise during the early phases of the disease affects the prognosis in a similar fashion. How also, parturition, especially associated with toxaemia, is a hazard of great severity when the disease is mounting. We thus have every support for the conclusion that poliomyelitis is a reaction between the virus and an affinity substance—possibly a normal metabolite—in the anterior neurone which, for the reasons stated, have by cumulation rendered the neurones susceptible.

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The Canadian Diabetic Association: Its Aims and Objects

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AFTER years of planning and many meetings and discussions, "The Canadian Diabetic Association" on April 9th, 1953 received its Federal Charter, and began its existence as an organization dedicated to the interests and welfare of diabetics. The scope of the Association covers the whole of Canada, and it is to be organized on the basis of Provincial Districts with branches in the larger and more important centres of each Province.

September 14th, 1953 was a notable day in the history of the Association: when nearly one thousand people came to the Auditorium of the Northern Vocational School, Toronto, to see five of the world's most eminent physicians and scientists receive Honorary Life Membership in the Association in recognition of their contributions in the fields of research and treatment of diabetes. These included Professor Joseph P. Hoet of Louvain University, Belgium; Doctor Robin D. Lawrence of Kings College Hospital, London; Doctor Elliott P. Joslin, Founder of the Joslin Clinic, Boston, Massachusetts; Sir Henry Dale, Chairman of the Board of Trustees of the "Wellcome Trust" Past President of The Royal Society; and Doctor B. A. Houssay of Buenos Aires, winner of the Nobel Prize in 1947 for Medical Research.

The candidates for Life-Membership were presented by Doctor Charles H. Best, and received their Certificates from Doctor A. L. Chute, President of the Association.

Doctor Hoet paid glowing tribute to the achievement of two young Canadians for their discovery of insulin thirty-one years previously, and stated that the progress of science and medicine must go forward hand-in-hand as it had done in the case of Sir Frederick Banting and Doctor Charles H. Best.

The aims of the Association include the following:

(1) To co-ordinate and correlate all efforts by individuals and organizations to reduce morbidity and mortality among diabetics.

(2) To provide an authoritative and advisory organization for the benefit and service of diabetics and to assist in safeguarding their social and economic interests and to secure fair opportunity of employment.

(3) To promote lectures, discussions and correspondence on the subject of diabetes for the purpose of disseminating reliable information concerning it.

(4) To work with, and in conjunction with and under the guidance of the medical profession.

(5) To promote facilities for the early detection and treatment of diabetics.

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* Director at Large: The Canadian Diabetic Association.

(6) To provide essential information to those operating boarding-houses, restaurants, refreshment rooms and summer camps in order that they may be qualified to cater to the interests or needs of the diabetics.

Surveys in Canada and the United States indicate that the incidence of diabetes affects approximately 1½ per cent of the population, but that only 60 per cent of these are aware of their condition. Assuming that there are two hundred and fifty thousand diabetics in Canada, approximately one hundred thousand are not yet receiving treatment. These run the risk of development of serious complications which often result in permanent injury or death. Detection, therefore, becomes one of the major objectives of the Association, and this is an objective that can only be reached through the complete co-operation of and under the guidance of the medical profession.

Self-management is a most important feature of the treatment of diabetics. They must submit themselves to the injection of the insulin and they must observe the dietary rules prescribed by their physician. It is important, therefore, that the Association should assist the medical profession in the matter of education—not only among the diabetics themselves, but among their parents and families and friends in order that the patients themselves may realize the necessity for adhering strictly to the injections and to the diet prescribed by the medical profession.

Also because of the nature of the disorder, it is important that patients should receive the moral encouragement that comes from friendly counsel, understanding companionship and the opportunity to exchange personal experiences with those who have similar problems. This is one field in which the Association can be of the greatest assistance to the practising physician.

At the present time, the Association is largely engaged in building up the local branches and Provincial District Organizations, but in addition to this it is supplying the following services under the advice and with the full approval of the Medical Societies of the Provinces in which branches have been established.

(1) The Canadian Edition of the American Diabetes Association Journal, "Forecast," a bi-monthly magazine, is furnished to all members of The Canadian Diabetic Association. This contains interesting and helpful articles on a variety of subjects relating to diabetes and is written in non-technical language.

(2) The CDA Newsletter, also published bi-monthly, reports news of members and branches and carries summaries of addresses and lectures and articles in the publications of other Diabetic Associations.

(3) In addition to the material in the "Forecast" and "Newsletter" carefully planned recipes and instructions for canning fruits and vegetables are circulated through the branches.

(d) Branch meetings where members hear qualified speakers and learn new techniques and treatments; lectures from authorities on diet are features of these meetings as they generally provide the members with substitute foods designed to give them variety without increasing or deviating from the diet prescribed by the physician.

Uppermost in the minds of those directing the affairs of the Association are two prime objectives.

(1) *A Detection Campaign* which is now under consideration by the National Medical Advisory Board; and

(2) The providing of diabetic diets at restaurants, hotels, summer camps, etc., through the education of those already engaged in this type of work.

In Nova Scotia three branches of The Canadian Diabetic Association have been organized, namely, Halifax, Springhill and Sydney. The two latter are still in the provisional organization stage. In Halifax activity commenced in December, 1952, and a number of very successful meetings have been held which have been addressed by personnel of the medical profession and by dietitians and pharmacists.

The Halifax Branch has received the most perfect co-operation from The Medical Society. All that was necessary was to ask the President for assistance, and he placed the hand of responsibility on one of its members. Following the address he would invite the members to ask questions relating to the subject, which he would gladly answer.

If the percentage figures above quoted are correct, there must be nearly ten thousand diabetics in Nova Scotia of whom four thousand are unaware of their condition. This presents to the medical profession and to The Canadian Diabetic Association, a major challenge which can only be accepted and brought to a successful issue by hard work and cheerful co-operation. The need for this co-operation is sharpened by the fact that with all the service already provided, diabetes stands EIGHTH in the list of killers in this country.

Dalhousie Notes

In these days of rapid advance in so many fields of knowledge and practice, the medical profession is fully aware of the difficulty of keeping up to date, as well as the hazards involved in failing to do so. A program of continuing education is an absolute necessity for a member of the University staff. No group is more critical than a class of medical students, and none more quickly aware that the professor is becoming a bit out-dated.

Each year a number of Dalhousie staff members attend clinical and scientific meetings throughout Canada and the United States, in an effort to keep abreast of the latest developments in medical practice, education and research. They also make definite contributions to the programs of such meetings.

A development in medical education that promises to be of considerable practical importance is a series of teaching institutes under the auspices of the Association of American Medical Colleges. The first institute organized by that body was held in Atlantic City last year on the teaching of Physiology, Biochemistry and Pharmacology. Dalhousie's representative was Dr. J. A. McCarter, Professor of Biochemistry, who brought back many valuable suggestions. There had, in fact, been one previous teaching institute under different auspices held in 1952 at Colorado Springs by the teachers of preventive medicine. Its success prompted the Association of American Medical Colleges to undertake annual institutes on teaching in various fields of medicine.

This year the meeting was held in French Lick, Indiana, on the teaching of Pathology and Bacteriology, with some attention given also to Genetics. Dr. Roger Reed, professor of Bacteriology, was the Dalhousie representative. One staff member was invited from each Canadian and American University. Group discussions were held on all aspects of teaching, research, organization, relation with other departments, etc. Discussions were continued over a period of five days, with some shifting from group to group. Following this, the Association of American Medical Colleges met early in the following week. This body is made up chiefly of the Deans of American and Canadian Medical Schools with some representatives of the larger educational foundations. On the first day of their meeting they were given a "run-down" of the main features of the teaching institute by some of the participants, who had stayed over for this purpose.

Discussions ranged widely over all fields of teaching and research in Pathology, Bacteriology and Genetics. The horizontal method of teaching (by correlation with the other basic sciences in the same years) was compared with the vertical approach (correlation with the clinical courses in later years). One professor, after hearing numerous references for several days to the horizontal versus the vertical approach, eventually suggested as an alternative the spiral approach to teaching. As he described it, this was one that was all "screwed-up."

The main trends in teaching Pathology and Bacteriology seem to be a reduction in emphasis on cellular morphology, increased emphasis on the dynamic processes involved in disease, and a closer correlation between the teaching of these two basic sciences and the clinical disciplines by means of clinical-pathological conferences and other types of inter-departmental teach-

ing. More emphasis is also placed on Genetics, and several larger hospital centres now have a medical geneticist to advise parents or prospective parents, who have a family history of hereditary disease.

At these institutes the exchange of ideas, the differences of opinion, and even the heated arguments serve a very useful function. They permit the teacher to see how his program compares with others, and it would indeed be a very self-assured individual who did not learn something from such sessions. It is not intended that these institutes should bring about a rigid standardization of medical education, nor is this generally believed to be desirable. No field of medicine is so stereotyped that variety should be completely discouraged. Nevertheless, some of the inequities are probably ironed out, and at the same time new experiments in medical education are stimulated.

In addition to this series of institutes for teachers, the American Physiological Society has initiated a series of courses designed to review the recent advances in specific fields of Physiology. These courses are given in association with the annual society meeting. Dr. C. B. Weld, professor of Physiology, attended this year's meeting at Madison, Wisconsin, where the subject was 'Pulmonary Physiology.' In these courses the emphasis is on the newer knowledge which contributes to the content of the teaching, rather than on methods.

The Canadian Physiological Society, which met in Toronto in the latter part of October, was attended by Dr. J. A. McCarter, professor of Biochemistry, Dr. J. G. Aldous, professor of Pharmacology, Dr. J. G. Kaplan, associate professor of Physiology and Dr. F. J. Moya, biochemist to the Victoria General Hospital, all of whom participated in the program. Dr. McCarter spoke on the 'Metabolism of Mustard Gas'; Dr. Aldous on the 'Effect of pH on the Toxicity of Fluoro-Acetic Acid'; Dr. Kaplan on 'Enzyme Alteration and the Inter-Facial Hypothesis'; and Dr. Moya on the 'Mode of Action of the Hyperglycemic-Glycogenolytic Factor from Urine.'

Dr. Aldous also attended the autumn meeting of the Advisory Committee on Dental Research of the National Research Council in Ottawa. At this meeting several aspects of the research work that is being supported by this committee came up for review. Dr. R. L. Saunders, Professor of Anatomy, gave a paper on 'Micro-Arteriographic Studies of Human Dental Pulp Vessels.' Dr. Saunders has been experimenting for some time with the use of radio-opaque substances in studying the patterns of blood vessels, muscles, teeth, and other tissues. His work received high commendation at this meeting of the Dental Research Committee. He was asked to allow the use of some of his illustrations, and to participate in the preparation of certain sections of a new edition of one of the standard textbooks on Histology.

Members of the clinical departments have also participated in a number of meetings during this autumn, including Dr. D. J. Tonning and Dr. R. M. MacDonald of the Department of Medicine, Dr. Alan Curry, Dr. V. O. Mader and Dr. A. L. Murphy of the Department of Surgery, and Dr. R. C. Tupper and Dr. J. M. Corston of the Department of Obstetrics and Gynecology. Dr. Tonning attended the Regional Meeting of the American College of Physicians in Hartford, Connecticut, where he gave a paper on 'Clinical and Laboratory Studies on Acute Methyl Alcohol Poisoning.' This paper reported an exten-

sive series of laboratory studies which Dr. Tonning and Dr. Aldous have conducted recently, following previous experience by Dr. Tonning in clinical studies on this subject. Dr. MacDonald gave a paper at the Royal College of Physicians and Surgeons of Canada in Winnipeg on 'Cough Syndrome Syncope.' Dr. Corston also spoke at the Royal College of Physicians and Surgeons on 'Ectopic Pregnancy', and Dr. Tupper at the International College of Surgeons in Chicago in September on 'Conditioning for Childbirth'. Dr. Curry and Dr. Mader attended the meeting of the Canadian Association of Clinical Surgeons at Quebec, and Dr. Mader attended the Council Meeting of the Royal College of Physicians and Surgeons in Winnipeg. Dr. Arthur L. Murphy attended the American College of Surgeons meeting in Atlantic City in November, and represented Dalhousie University at a dinner tendered by the Advisory Council on Graduate Medical Education.

Dr. Gordon Kaplan, Associate Professor of Physiology, has recently received an unusual honour in being invited to take part in a symposium on 'The Effect of Light on Biological and Biochemical Systems', sponsored by the American Association for the Advancement of Science at its annual meeting to be held in Berkeley, California, during the Christmas holidays.

It is not intended that these Dalhousie notes should degenerate into a back-patting exercise. However, considerable valuable research work is being done by members of the staff, and is receiving attention in other parts of Canada and the United States. In addition, the Medical School is making its contribution to the work of a number of scientific and medical organizations, from which the staff members also derive considerable benefit, and this in turn is reflected in the teaching and research conducted at Dalhousie.

C.B.S.

Post-Graduate Programmes

A very successful day of post-graduate education was held on December 8th when a Symposium on Geriatrics was presented at the Nova Scotian Hotel. The attendance totalled 185 with a very good registration of doctors from around the Province and a representation from New Brunswick, Prince Edward Island and Newfoundland.

The first presentation was "Neurologic Problems of the Aged" by Dr. Allan Walters, Assistant Professor of Medicine, University of Toronto. Dr. Walters gave an excellent summary of this subject. The next speaker was to have been Dr. Richard H. Freyberg, Associate Professor of Clinical Medicine, Cornell University Medical College, but unfortunately he suffered a broken ankle and so was unable to participate. Dr. Louis G. Johnson, Assistant Professor of Medicine, McGill University spoke on "Nutritional Aspects of Aging", and Dr. J. F. L. Woodbury of the Dalhousie Faculty of Medicine joined these two speakers for the panel discussion which followed.

The speaker for the afternoon session was Dr. E. Lee Strohl, Associate Professor of Surgery, Northwestern University, Chicago and his paper was "Acute Surgical Conditions of the Abdomen in the Aged." He pointed out that we need no longer fear the use of major abdominal surgery in the aged

providing proper use is made of the newer methods of restoring the patient's chemical equilibrium to normal values.

The final item on the programme was a film on "Carcinoma of the Bronchus."

This Symposium was sponsored jointly by the Lederle Laboratories Division, American Cyanamid Company and the Post-Graduate Programme, Faculty of Medicine, Dalhousie University.

The next programme will be a Two-Day Session in Psychiatry from January 31st to February 1st, 1955. In seeking to give the general practitioners of the four Atlantic Provinces a well rounded programme of post-graduate education the Committee has arranged with the Department of Psychiatry for the inclusion of a short session which will assist in the diagnosis and management of psychiatric conditions encountered in everyday practice. This programme includes a number of case presentations in order to make it as practical as possible. Your comments and suggestions would be appreciated and these, with your enquiries or applications may be addressed to the Executive Officer, Post-Graduate Committee, Victoria General Hospital, Halifax, N. S. The registration fee for the course is ten dollars.

PROGRAMME

January 31st, 1955—Monday.

9.00-10.45 Early Recognition of Mental Disorders.—Dr. R. O. Jones.

11.00-12.30 Case Presentation.—Dr. R. O. Jones.

2.00- 5.00 Child Psychiatry-Etiology, Treatment and Prevention of Behaviour Problems, illustrated by actual treatment cases followed by discussion period. —Dr. F. A. Dunsworth.

February 1st, 1955—Tuesday.

9.00-10.00 Regular Psychiatric Case Presentation.

10.30-11.15 Organic Cerebral Reaction including delerium—Diagnosis and Treatment including the use of new drugs.—Dr. J. F. Nicholson.

11.15-12.30 Case Presentations.—Dr. J. F. Nicholson.

2.00- 5.00 Psychosomatic Medicine:

(1) Historical background.

(2) Theoretical concepts.

(3) Practical implications.

(a) Frequency of Psychosomatic problems.

(b) Management-Therapy.

(c) Importance of interpersonal relationship.

(d) Difficulties arising in management of Psychosomatic problems.

(e) Prognosis.

(4) Case reports.

Dr. R. J. Weil

NOVA SCOTIA CHAPTER, COLLEGE OF GENERAL PRACTICE

The General Practitioners' Society and the newly formed College of General Practice of Canada, Nova Scotia Chapter, held a very successful dinner meeting in Halifax on December 7th, with an attendance of 110, of whom a great number were from various provincial centres outside of Halifax. Attendance at the general symposium the following day reached a total of 185 registered, including general practitioners, specialists, internes, etc. Following is a resume of the addresses given at the dinner.

We have looked forward for some time to the pleasure of a visit from Dr. W. Victor Johnston, the Executive Director of the College of General Practice of Canada, so it was a very happy occasion when we were able to welcome him as guest speaker at a dinner held at the Nova Scotian Hotel on the evening of December 7th. The dinner was under the joint auspices of the Nova Scotia Society of General Practitioners and the College of General Practice of Canada, Nova Scotia Chapter.

Dr. Johnston gave an outline of the history of the formation of the College of General Practice of Canada and its aims. To eighty per cent of the people the general practitioner provides all their medical service and it is he who must guide them through the maze of modern medicine.

It was with great pleasure that Dr. Johnston informed the group that three weeks ago the general practitioners of the Province of Quebec had decided to associate themselves with the College, and already Quebec City has formed a branch within the Provincial Chapter. Branches of the College of General Practice have now been established in every province and membership is more than 700.

He spoke of Health Insurance, saying that some form of National Health Insurance is a definite need in Canada but that it should not be State controlled.

In outlining the aims of the College Dr. Johnston spoke of the various means by which the general practitioners might be assisted with post-graduate education, e.g. travelling teams, prescribed reading courses, and established University courses and instruction. He felt that the administration of the College should be decentralized.

The Honourable Harold Connolly spoke of the high place which the general practitioner holds in the hearts and minds of the laity and of his hope that the Victoria General Hospital might some day be the great medical centre of the Maritimes.

Dr. C. B. Stewart spoke of the wide range of responsibilities of the Medical School including undergraduate, graduate or specialist and post-graduate teaching, research and surveys, etc. He also spoke of the work of the Medical School during the past three years in providing a diversified post-graduate programme for the general practitioners of the Atlantic Provinces.

Dr. F. Murray Fraser, President of the College of General Practice of Canada, Nova Scotia Chapter thanked Dr. Johnston. Acknowledgement was made to Lederle Laboratories Division, American Cyanamid Company who arranged Dr. Johnston's visit here in connection with the Post-Graduate Symposium in Geriatrics presented on December 8th. Special thanks were tendered to Miss Joan Hudson for her generous co-operation in arranging the meeting and taking the minutes.

Dr. A. G. MacLeod of Dartmouth, President of the Nova Scotia Society of General Practitioners presided.

C. HENRY REARDON.

Personal Interest Notes

Doctors D. K. Murray and S. Green of Halifax were inducted at Atlantic City in November as Fellows of the American College of Surgeons. Doctor Murray also received his Certification in Ophthalmology and Doctor G. J. H. Colwell of Halifax his Certification in Physical Medicine, from the Royal College of Physicians and Surgeons of Canada.

Doctor R. R. Prosser, director of mental health services of the mental health division of the New Brunswick Department of Health and Social Services has been honoured by the Canadian Mental Health Association. At a meeting of the Fredericton Mental Health Association he was awarded a citation and a gold watch by the CMHA for "the most outstanding contribution to mental health work in the province." The awards are made annually by the CMHA to each province.

The rank of serving brother of the Order of St. John was conferred on Doctor S. H. Keshen of Halifax on November 8th, and on Doctor T. E. Kirk of Halifax on November 30th, by Hon. Alistair Fraser, Lieutenant-Governor of Nova Scotia, at investitures at Government House. Doctor C. B. Weld, also of Halifax, was presented with a twelve-year service medal.

Doctor Norman H. Gosse of Halifax was honoured by the University of King's College in November at a special convocation when he received the honorary degree of Doctor of Civil Law.

Doctor Stanislaw B. Donigiewicz, who was born in Stanislawow, Poland, and who graduated from the University of Leeds Medical School in 1950, has been appointed anaesthetist at St. Martha's Hospital in Antigonish.

The Bulletin extends sympathy to Doctor D. S. McCurdy of Truro on the death of his brother, Arthur D. McCurdy, at the age of 74, on November 25th and to Doctor L. R. Hirtle of Halifax and Doctor W. E. Hirtle of Sackville, N. B., on the death of their grandfather, William E. Parker of Sackville, N. B., at the age of 92, on December 1st.

NOVA SCOTIA MEDICAL BULLETIN

GENERAL INDEX

VOL. 33 — 1954

Abbreviations used:—Ab. for abstract; anon. for anonymous; biog. for biographical note; C. for correspondence; C.R. for case reports; diagr. for diagrams; Ed. for editorial; illus. for illustration; Pers. for personal item; port. for portrait; rev. for review.
