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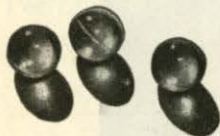
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*The Sanatorium: Its Place in the Work of Tuberculosis Control

A. F. MILLER, F.R.C.P.(C)

ON this occasion there seems every reason that my talk to you should centre around the work and usefulness of the sanatorium in the struggle that is being waged against the old enemy of mankind, tuberculosis. While there is a notable decline in the mortality rate from this disease in many countries where measures have been taken to curb its spread, nevertheless, it must be remembered that tuberculosis is still a major cause of death between the ages of 18 and 40. Certainly, the fight is still on, and our best weapons still needed. These weapons are not quite the same as those in use when I began my medical work; they have been improved and added to.

For almost thirty years I have had the privilege of being in charge of the Nova Scotia Sanatorium. During that time some 4,336 civilian patients and 1,600 ex-service men have been admitted to this institution. As you can well believe I have had an unusual opportunity to observe tuberculosis in many of its phases, its insidious onset, its manifestations once the disease has taken hold in the body, its response or otherwise to various forms of treatment, and in the end whether or not the disease is to terminate in resolution or destruction of tissues. These are points of vital interest to the practitioner. But we must also not forget there are individual, family and community conditions which precede and follow in the wake of tuberculosis. These causes and effects are matters of deep concern, not only to those of us who come in close contact with tuberculous patients, but also to every individual who has the welfare of these sufferers at heart, and to everyone who cares at all for the life of his community and of his family.

For many years we followed the teachings of the renowned physician, Dr. Trudeau, Saranac Lake, pioneer and leader in the first successful forward movement in the treatment of tuberculosis, under whom I had served on the staff of his sanatorium. The essentials of treatment laid down by him, rest, fresh air, nourishing food, regulated exercise in the open, were systematically prescribed and followed with a degree of success by patients under my care. These principles even to-day, properly modified, continue to be the backbone of sanatorium treatment, especially in the earlier and stricter use of bed rest, even, in some cases, where there is little or no fever.

Tuberculin was also administered at this time in suitable cases of tuberculosis with the hope that it might bring about not only a degree of immunity to the disease but possibly help to cure it as well. In this belief we were sadly mistaken, and by 1912 we had practically given up its use at the sanatorium. Two years later, 1914, we undertook to treat a small number of our patients with a comparatively new measure, artificial pneumothorax, which was on trial in a few of the larger institutions in America. There was no fluoroscope nor X-ray at the sanatorium for my guidance to give refills of air, and I had to depend upon the patient's symptoms as well as my own ability to percuss and auscultate the chest before and after the introduction of air into the pleural space.

*Read at the Refresher Course in Tuberculosis, Nova Scotia Sanatorium, Kentville, N. S. —August 2-4, 1939.

Owing to the lack of equipment necessary for work of this kind, few cases came on for treatment, and it was not until some years later, following the gift of a complete X-ray outfit from the Nova Scotia Red Cross Society, that we were able to go ahead with much more confidence than formerly, to carry out a compression aid which had always appeared to me to have curative possibilities in the treatment of tuberculosis. In 1921 a more drastic procedure, extrapleural thoracoplasty, was performed on one of our patients at the Victoria General Hospital, Halifax, by Dr. Edward Archibald, Montreal, who is here as our honored guest to-day. From 1921 to 1933 some thirty of our patients consented to undergo thoracoplasty. They, of course, had to be taken to Halifax to the Victoria General Hospital for the operation. In a number of cases the results were encouraging. In 1930 we decided to attempt a new measure, phrenicotomy, which was then on trial, on a few of our patients who, on account of an obliterative pleuritis, could not be given pneumothorax. This operative means is still employed with considerable success at the sanatorium. However, it was not until 1934, following the appointment of Dr. V. D. Schaffner, as surgeon to the sanatorium, that we proceeded, after careful consideration, to carry out on a more progressive scale the various operative procedures that are now so commonly and so successfully employed in many of the leading sanatoria. The institutions that are not making full use of these operative aids are generally not sufficiently equipped to have them carried out.

This table will show to what extent compression therapy is employed in Canada.

TABLE I.

Surgical Procedures in Use in Canadian Sanatoria
Table Showing the Number and Percentage of Patients in Whom Different Types of Operative Procedure Were Employed During the Year 1937

Institution	No. of patients treated	Pneumothorax		Pneumolysis		Phrenic paralysis		Thoracoplasty	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1	139	24	17.0	0	...	0	...	0	...
2	356	73	20.5	3	0.8	0	0	4	1.1
3	143	84	58.7	0	...	22	15.3	7	4.9
4	216	109	50.5	0	0	37	17.1	6	2.8
5	223	104	46.7	0	...	18	8.0	5	2.2
6	302	59	19.5	1	0.3	13	4.3	14	4.6
7	1,234	232	18.8	10	0.8	22	1.7	28	2.2
8	424	59	13.9	0	...	3	0.7	3	0.7
9	182	32	17.5	0	...	0	...	0	...
10	190	53	27.8	0	...	0	...	0	...
11	418	177	42.3	9	2.1	5	1.2	8	1.9
12	1,160	168	15.0	12	1.0	16	1.5	9	0.8
13	419	193	46.1	20	4.7	89	21.3
14	179	76	42.5	0	0	8	4.5	11	6.1
15	715	231	32.3	7	1.0	16	2.2	0	0
16	544	170	31.2	39	7.1	51	9.4	33	6.1
17	107	29	27.1	0	...	3	2.7	2	1.8
18	40.0	...	3.4	...	21.0	...	6.0
19	306	97	31.7	11	3.6	1	0.3	6	1.9
20	185	54	29.2	0	0	2	1.1	0	0
21	847	407	48.0	40	4.7	22	2.3	46	5.4
22	376	196	53.0	29	7.7	20	5.3	25	6.6
23	531	82	15.4	3	0.6	4	0.8	30	5.7
24	215	46	21.4	0	...	0	...	4	1.9
25	884	97	10.9	8	0.9	80	9.0	34	3.8
26	567	201	35.5	42	7.4	7	1.2	33	5.8
Total	10,862	3,053	38.1	214	2.0	370	3.4	397	3.6

"No." at the head of each of the last four columns refers to "Number of operative measures carried out".

Before we deal with the results of treatment from collapse therapy, let me, for the purpose of contrast and comparison, give you an idea of the results of ordinary sanatorium treatment without compression of the lung. Here is a table showing the ultimate or end results of treatment on a group of 3,907 patients, ten years following their discharge from the Trudeau Sanatorium, Saranac Lake, New York. Approximately only five per cent of these persons had received artificial pneumothorax treatment; otherwise the results obtained are from the usual rest treatment alone.

TABLE II
Condition of Patients After Discharge 1918-1931 inclusive

Stage of Tuberculosis	Condition	End of 5 years	End of 10 years
Minimal.....	Alive	93 per cent	90 per cent
	Dead	4 " "	7 " "
	(Tb. or other causes)	3 " "	3 " "
Moderately Advanced.....	Alive	85 per cent	80 per cent
	Dead	12 " "	18 " "
	(Tb. or other causes)	3 " "	2 " "
Far Advanced.....	Alive	53 per cent	44 per cent
	Dead	46 " "	54 " "
	(Tb. or other causes)	1 " "	2 " "
	Unknown		

The figures show that when either rest treatment alone or relatively little collapse therapy is employed the end results of treatment among patients in the moderately advanced and far advanced stages of tuberculosis are far from satisfactory, the greatest number of deaths taking place in the far advanced within two or three years following their discharge from the sanatorium.

In the tables which are to follow, you will have some idea as to the results of treatment when collapse therapy is freely employed in sanatoria. In 1931 the National Tuberculosis Association in the United States published a report of 42,107 patients at the time of their discharge from 278 civilian sanatoria in which the average use of collapse therapy did not exceed 5 to 10 per cent. The result of treatment is as follows: Arrested or apparently arrested (no sputum nor tubercle bacilli), 17 per cent; quiescent or improved, 41 per cent; unimproved or worse, 19 per cent; dead, 23 per cent.

Compare these figures with the recently collected results (1935) at the time of discharge from the Michigan State Sanatorium of 823 patients in 72 per cent of whom a wide variety of collapse therapy had been employed. The results are: arrested or apparently arrested, 47 per cent; quiescent or improved, 20 per cent; unimproved, 15 per cent; dead, 18 per cent. The percentage in the vitally important group of arrested or apparently arrested is almost three times as great in patients for whom collapse therapy was extensively used as among those who received little or no collapse treatment.

At the Nova Scotia Sanatorium, 1938, as a result of pneumothorax therapy in 100 patients, all of whom had a positive sputum, 61 per cent are now completely free from tubercle bacilli. Among the twenty-nine re-expansion cases, treatment ended, 75 per cent are now negative for tubercle bacilli.

In a study of 450 cases treated with pneumothorax, as well as other operative aids, during the twenty years previous to 1934 at the Nova Scotia Sanatorium, we find that of those in the moderately advanced stage, with pneumothorax, 58.6 per cent are well; without pneumothorax, 22.7 per cent are well; of those in the far advanced stage, with pneumothorax 25 per cent are well; without pneumothorax only 5.7 per cent are well. That is to say in the moderately advanced group with pneumothorax two and a half times as many patients are well and at work as in a similar group without pneumothorax. In the far advanced group almost five times as many patients are well and at work as those of a similar group without pneumothorax.

In 1938 Phrenicotomy was carried out in 71 patients. This measure, as you know, is a means to secure relaxation and partial compression of a diseased lung. The results of treatment show: greatly improved 35; improved 27; stationary 5, worse 3; dead 1. Patients with positive sputum before operation 25, patients with negative sputum following operation 12 or 48 per cent.

Extra-pleural thoracoplasty in 1938 was carried out in 60 patients. The results of treatment as follows: Greatly improved (cavity closed t.b. negative) 27, improved 23, worse 1, dead 3, cases not yet completed 6. Patients with positive sputum before thoracoplasty 32, patients with negative sputum after thoracoplasty 16 or 50 per cent.

From this you will see that these various collapse procedures play an exceedingly important part in the present day treatment of tuberculosis. I wonder how many of you know this:—it is a surprising and disconcerting fact,—about the type of cases we get here at the sanatorium: Of the total of over 4300 patients admitted from 1904 to 1938 only 18 per cent are classified as "incipient" or "minimal", while 32 per cent are in a moderately advanced stage and 46 per cent in a far advanced stage and for the year 1938 there is little difference in the figures, 16 per cent incipient, 32 per cent moderately advanced, 52 per cent far advanced. That is, fully 80 per cent of all admitted to this institution are already in an advanced stage of the disease, many with wide spread lesions throughout both lungs, making them most unsatisfactory subjects for compression help, and rendering our task of selecting cases for such treatment a difficult and often discouraging one, to all concerned. Consider, now, as is well known to you that tuberculosis at some time or other is invariably found to be unilateral. Pleural adhesions between the visceral and parietal pleura have not been firmly established and the lung is easily compressed. This is the time when such aids as pneumothorax, phrenic nerve paralysis, may be carried out, and, it is superfluous to add, but must not be forgotten, this, too is the time when healing more readily takes place under sanatorium rest without compression in many cases. Even when the disease has passed beyond the early stage, and cavities, small or moderate in size, have made their appearance in the affected lung, much may yet be done to bring about restoration to health at an institution equipped for the scientific carrying out of modern compression therapy. I would estimate that approximately 80 per cent, or possibly more, of the unilateral cases may be saved through the means that we have at hand to-day. However, once tuberculosis has spread to the contralateral side, new difficulties arise, and the application of these surgical aids, singly or in combination, demands careful consideration before they can be attempted, and very careful supervision throughout the course of the treatment.

We still have the tragedy of late diagnosis brought before us at the sanatorium. I have told you that fully 50 per cent of the patients admitted to this institution are found to be in the far advanced stage of tuberculosis, many of them hopelessly ill. Apart from isolation and keeping them at rest in bed, little can be done for those who are beyond medical or surgical help. Regrettable as the situation is I plainly see that it is not the fault of the practitioner, when, as in most of such cases, patients come to him only when they feel sick enough to require medical attention, which, in a disease like tuberculosis, is usually very late; too late. It is to overcome this state of affairs that I appeal to fellow practitioners throughout the province to be constantly on the outlook for tuberculosis in their practice, to seek the disease early when there is every possibility of recovery under proper management and treatment. If this is ever to be accomplished,—and, mind you, without this as a starting point, little or nothing can be accomplished—it must be done by the help of the physicians, with their knowledge and insight into conditions of health in the homes of the people. You are the persons best able to carry on the front-line attack upon this enemy. We must all work together; you watching for contacts and for infection and disease even before they are manifest; we by lending every possible aid in clinics, examinations and consultations, and by providing treatment-aids with the best of our skill and equipment for those sent to us at the sanatorium. It takes an early discovery for an almost sure recovery.

Many of you already know that during the past five years there have been important advances in our method of seeking new tuberculosis. Public health officials tell us it will no longer do for us to sit passively by waiting for the patient to come to us—we must go to him. Otherwise tuberculosis will continue to take its toll among individuals who might have been saved long years of costly illness, and even then with no assurance of recovery in the end, had we utilized to the fullest extent the scientific means we have on hand to discover a far greater percentage of cases in the earlier and curable stage of the disease. This knowledge has been gained in recent years as a result of surveys, i.e., group examinations of many apparently healthy persons among industrial employees, insurance policy holders, university students and by school surveys.

I believe that in the next five to ten years, through the activities of the Department of the Public Health and its trained personnel of divisional health officers and county health nurses, we in Nova Scotia are likely to come across tuberculosis at a much earlier period in its evolution than ever before. This will be attained through the practice of tuberculin testing and the common use of X-ray films. There can be no question of the great worth of X-ray examinations if the films are well taken and wisely interpreted. We have in the roentgenogram a means to discover tuberculosis long before physical signs are apparent in the lungs. Valuable as the physical examination may be, we frequently find at the sanatorium that it fails to bring to light early infiltrations in the lung which may be readily discovered by expert interpretation of well-taken films of the chest.

The sanatorium, and we hope, the hospital annexes that are being built and organized to look after tuberculosis in all its stages will play an important part, hereafter, in the work of tuberculosis control in Nova Scotia. The open case with tubercle bacilli in his sputum should at all costs be isolated and treated at one of these places as it offers an effective means to stop the further

spread of the disease. Home treatment in the majority of these cases is a poor substitute for the care and oversight that may now be had in these well-equipped and staffed units. It is quite true that a fair proportion of patients with early tuberculous lesions in the lung may be successfully cared for at home provided rest treatment in bed is strictly prescribed and supervised. However, it is necessary that X-ray examinations should be carried out at frequent intervals for such patients to determine the progress, for good or otherwise, of the case. If resolution with fibrosis is not to be noted at the end of approximately three months, time should not be lost in having the patient admitted to the sanatorium so that some form of collapse therapy, to supplement the ordinary rest treatment in bed, may be tried out. This is the period when the minor compression aids such as pneumothorax, or phrenic nerve paralysis may prove so successful. The necessity of major thoracic surgery arises only when the other procedures prove impossible. At present, thoracoplasty is used in approximately one-fifth of all patients admitted to the sanatorium. I daresay this state of affairs will continue for some time to come as fifty-two per cent of the admissions to the sanatorium are already in a far advanced stage of tuberculosis. I trust that in the course of the next few years practitioners will send their cases of tuberculosis to us at an earlier period than ever before when recovery is practically assured for fully three-quarters of them. The necessity for major thoracic surgery will then decrease, provided we carry on an intensive collapse therapy programme for those in the early or curable stage of the disease.

* Anaesthesia In Chest Surgery

E. M. FOUND, M.D.

RECENT articles by Overholt and by Caryllos are significant in that they point out that in different clinics, different techniques for anaesthesia in chest surgery are employed.

The majority of patients requiring thoracoplasty for pulmonary tuberculosis are not good surgical risks—The vital capacity is usually greatly diminished due to the involvement of the pulmonary tissue by tuberculous disease—often a small pneumothorax is given on the contra-lateral lung, if it contains tuberculous disease, with the hope that spread of disease will be checked during the complete thoracoplasty. Then again, when we consider that the patient is postured on his side with the diseased lung above, thus permitting the flow of sputum into the trachea, it is easily understood how difficult it is to keep a patient with so little normal pulmonary tissue properly anaesthetized.

The two most important requirements of the anaesthesia in thoracic surgery are:—

- (a) The prevention of anoxemia and
- (b) the removal of foreign material from the trachea and bronchi.

The drug that is used to produce anaesthesia is of secondary importance—In some centres a nasal catheter attached to a proper glass receptacle, is introduced into the trachea and foreign material is aspirated.

However, the prevention of anoxemia and the removal of foreign material from the trachea, can best be accomplished by means of intratracheal tubes, through which the anaesthetic agent may be introduced or foreign material may be aspirated.

In this paper we will confine ourselves to anaesthesia used in thoracoplasty operations only.

Various combinations of anesthesia in the performance of thoracoplasties for pulmonary tuberculosis have been employed; the more common ones used on this continent are:

- (1) Local novacaine infiltration and evipal or pentothal sodium intravenously.
- (2) Local novacaine infiltration and nerve blocking.
- (3) Cyclopropane.
- (4) Avertin and cyclopropane.
- (5) Avertin and nitrous oxide and oxygen.
- (6) Spinal.
- (1) *Local novacaine infiltration and evipal or pentothal sodium intravenously:*

The patient is usually given a fairly large hypodermic of morphia and hyoscine, three quarters to one hour before operation. The operator infiltrates the skin and underlying muscles with novacaine in the vicinity of his incision; when the ribs are exposed and the scapula retracted laterally the intravenous anaesthetic is administered—Evipal has been in common use, but many anaesthetists prefer pentothal sodium for the reason that the patient

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can be kept under fairly deep anaesthesia for a longer period of time thus eliminating excessive haste on the part of the surgeon. In passing, it might be a point of interest that it is our custom to add one ampule of coramine to the prescribed quantity of solution used in either of the above-mentioned intravenous anaesthetics, as a prophylactic measure against circulatory failure. With such a combination post-operative nausea and vomiting is usually not troublesome, and the patient soon regains consciousness thus enabling him to raise his sputum.

(2) *Local novacaine infiltration and nerve blocking.*

This type of anaesthesia is self explanatory—for the apprehensive patient it is not indicated: at the sanatorium we have used local anaesthetic and nerve block only when other anaesthetics were contra-indicated.

(3) *Cyclopropane.*

In cyclopropane we have an excellent anaesthetic agent for thoracic surgery—It must be remembered, that this is a very dangerous drug and should only be administered by an experienced anaesthetist. Many clinics today use cyclopropane alone or in combination with avertin:—

The pre-medication for cyclopropane alone is usually Nembutal gr. $1\frac{1}{2}$ at night, repeated in the morning; Morphia gr. $\frac{1}{4}$ hyoscine gr. $1/150$ three quarters of an hour before operation.

Induction of anaesthesia is very easy with cyclopropane, the patient's colour is always good, owing to the fact that there is usually about an 80% mixture of oxygen. Under cyclopropane the patient's respirations are very shallow thus making it easier for the surgeon and we are assured against anoxemia.

Following the withdrawal of cyclopropane the patient regains consciousness in a matter of minutes, and the cough reflex returns at once thus enabling him to raise sputum before it gets a chance to invade the contra-lateral lung. We might mention in passing, that in our experience we have noted excessive bleeding when the patient was under cyclopropane anaesthetic.

(4) *Avertin and cyclopropane.*

What has been said regarding cyclopropane need not be repeated—Here a rectal instillation of "Avertin" is given as a basal anaesthetic.

On the night prior to operation the patient is given an enema—Phenobarbital gr. III is given at night. For the first stage thoracoplasty 80-90 mg. of avertin per kilogram body weight are given—and 90-100 mg. per kilo is given for subsequent stages. A very light cyclopropane anaesthetic is usually sufficient where avertin has been administered. From the patient's mental standpoint this is an ideal combination in that they pleasantly go to sleep in their rooms and following the operation awaken in their rooms with no memory whatsoever of what went on during the time they were being operated on. An objection to avertin anaesthesia is the possibility of spread due to decreased cough reflex and inability of the patient to cough up sputum immediately after operation.

(5) *Avertin and nitrous oxide and oxygen.*

Up until about January 1939, this is the anaesthetic that has been employed mostly at the Nova Scotia Sanatorium. Unfortunately we *have not* the cyclopropane attachment for our gas machine.

The same technique for administering avertin is used as we outlined a few moments ago.

In contra-distinction to cyclopropane, instead of an 80% oxygen mixture, with nitrous oxide and oxygen we have but a 10-25% oxygen mixture, consequently the patient often becomes cynaotic and the anaesthetist must be on his guard lest anoxemia occurs—especially with patients who have a lot of sputum which may obstruct the air passages.

Before the patient leaves the operating table a liberal supply of oxygen is administered, often carbon dioxide is given to stimulate respirations. We encourage our patients to cough up any sputum that may have lodged in the trachea or upper bronchi before they return to their room. Immediately on return to their room, oxygen is given by means of an oxygen tent for from one half to one hour or longer if necessary:—rectal saline or glucose saline intravenously is also immediately administered and the foot of the bed is elevated for eight hours following completion of the operation.

(6) *Spinal anaesthesia.*

For the past five months we have almost exclusively employed spinal anaesthesia for thoracoplasty operations at the sanatorium.

The technique described by Etherington-Wilson of Torquay, England, with certain modifications has been used in all cases.

There can be no doubt of the advisability of giving sedatives beforehand; this is desirable to dispel fear, produce drowsiness and establish amnesia. As a preliminary sedative, it is our custom to give nembutal gr. $1\frac{1}{2}$ one hour before operation and morphia gr. $\frac{1}{4}$ with hyoscine gr. $1/150$ three quarters of an hour before operation—often the morphia is repeated just before the patient enters the operating room, if necessary.

The patient is supported sitting upright.

Nupercaine (1:1500) solution is employed for anaesthesia—this solution comes in ampules of 20cc. and is heated to body temperature before administering—the lumbar puncture needle is introduced in the 2nd or 3rd lumbar space and the solution is injected slowly without barbotage. At the completion of injection a stop watch is started and time allowed for the passage upward of the solution—It might be mentioned that the specific gravity of spinal fluid is 1.007 while that of nupercaine (1:1500) is 1.003. Depending upon the amount of solution injected and the time allowed for its passage upward, three main zones of analgesia are obtained.

(1) 10cc. nupercaine (1:15cc) 20-25 sec.—1st lumbar nerve segments suitable for operation upon the lower limbs and the perineum.

(2) 12cc. nupercaine 30-35 sec.—10th thoracic segments, suitable for operations upon the lower abdomen and pelvis.

(3) 15cc. nupercaine 30-35 sec. suitable for operations upon the upper abdomen and lower thorax.

(4) 15-17cc. nupercaine 30-40 sec.—suitable for operations up to and including the first rib—however, here the length of the spine gives us a clue to the dosage. At the end of the allotted number of seconds the upright position is quickly changed to that of recumbent, and about 10° Trendelenburg position is given.

The patient lies on his back for eight to ten minutes and is then turned in position for operation. The sensory roots are thus anaesthetized.

During the operation inhalations of oxygen are given about every five minutes.

The advantages of spinal anaesthesia may be tabulated as follows:

(1) It is possible to induce the patient to cough upon instruction during the operation.

(2) Respirations, particularly if oxygen is administered, are quiet thus making it much easier for the surgeon to manipulate his instruments.

(3) Owing, presumably chiefly, to the drop in blood pressure and the quiet tranquil respiratory effort, there is less bleeding during the course of the operation.

(4) On return to the ward, cooperation on the part of the patient can be obtained at once. (It is our custom to administer oxygen intra-nasally for two to four hours).

(5) Patients have been able to commence the ingestion of nourishment within a few hours of operation.

One disadvantage of spinal anaesthesia is that during the operation the degree of paradoxical breathing is impossible to estimate by the surgeon due to the lack of respiratory movements of the chest.

The usual after effects following spinal anaesthesia are:

(a) Nausea and vomiting, which in our experience has never been alarming.

(b) Some degree of circulatory depression.

(c) Headaches occurred in only one out of twenty patients operated on under spinal anaesthesia; this is usually prevented by our routine order of not allowing the patient's head to be elevated above the level of the pelvis for forty-eight hours following the operation.

At the Nova Scotia Sanatorium some 323 thoracoplasty operations have been performed between November 1935 and June 1939. Of these:

282 stages were given avertin and nitrous oxide and oxygen anaesthesia.

2 stages were given cyclopropane. These were given by a demonstrator for the Foreger gas machine.

3 stages were performed under local anaesthetic.

36 stages were performed under spinal—out of this number nine were first stage thoracoplasties.

One patient who was given avertin and gas died on the operating table but this death was found to be due to a spontaneous pneumothorax of the contralateral lung.

From our limited experience we are very favourably impressed with spinal anaesthesia for chest surgery, and unless some contra-indication arises, hope to continue its use in every suitable case.

To summarize:

The attributes of a good anaesthetic for thoracoplasty should be:

(1) To prevent anoxemia.

(2) To assure the cooperation of the patient in order that sputum might be expectorated during the course of the operation.

(3) To minimize respiratory excursions thus making it easier for the surgeon.

(4) To eliminate post-operative complications such as nausea and vomiting, circulatory collapse, etc.

(5) That the anaesthetic be as safe as possible.

The general consensus of opinion at many of the outstanding chest clinics is, that spinal anaesthesia plays the role of fulfilling the above requirements as well or better than most of the other combinations mentioned in this paper, but should always be given by one competent in its use.

*Problems in The Diagnosis of Tuberculosis

By J. E. HILTZ, M.D. Assistant Medical Superintendent

IN many cases to make a diagnosis of pulmonary tuberculosis with an absolute certainty is not a simple procedure.

Sometime a history of haemoptysis or a definite pleurisy with effusion will necessitate the diagnosis of *suspected* pulmonary tuberculosis until proven otherwise even when accompanied by an X-ray picture showing both lungs to be within normal limits.

More frequently, however, one finds an X-ray picture showing definite disease in the lungs but a careful investigation reveals the condition to be only questionably tuberculous. If tuberculosis can be ruled out this may mean a more rapid return to a normal form of life and also may be of great importance in the consideration and evaluation of the patient as an insurance risk at a later date. "Apparently cured" cases of tuberculosis are accepted by most companies but only at a higher premium rate and there is usually a heavy lien imposed upon the policy.

If a patient's X-ray shows disease of the lungs and the sputum is positive for tubercle bacilli the diagnosis is easy. If ordinary smear examinations of the sputum are negative for tubercle bacilli it is necessary to resort to sputum concentration. If this is still negative, the sputum should be cultured or inoculated into a guinea pig. The two latter procedures are of approximately equal value. Although the guinea pig method will give a slightly greater number of positives, this advantage is offset by the difficulty of maintaining and tending a sufficient number of animals and also by the fact that it is not customary to kill the guinea pigs for microscopic examination for 4-6 months if they have not died in the meantime. On the other hand, cultures may give a growth of tubercle bacilli as early as five days following implantation of sputum. However, the culture should not be discarded for at least sixty days before declaring it negative for the organisms.

The following cases illustrate this point:—

(1). M. G. complained of loss of strength, hoarseness of the voice, cough, a half dram of sputum daily, night sweats and dry pleurisy on the right side. Physical examination did not reveal any rales. He had a mid lung lesion on the left side as seen by X-ray. Typically the adult type of tuberculosis involves the upper and outer thirds of the lung. This case is atypical in that the disease is situated in the mid-lung region and the apices are clear. However, this patient's sputum was positive for tubercle bacilli and the diagnosis became apparent.

(2). F. J. complained of loss of strength, weight and appetite, cough, two ounces of sputum daily and dry pleurisy on the left side of a few days duration. Physical examination revealed fine and moderately coarse rales apex to base on the left side. Here the X-ray showed a lesion rather similar to Case 1, in the mid portion of the left lung and extending downwards to the base. This

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man was very sick running a fever to 103%. His cough was troublesome and the sputum blood tinged. Examination showed it to be free of tubercle bacilli but numerous pneumococci were seen. A course of Dagenan was initiated. In thirty-six hours the temperature was normal. The X-ray appearance of the lung after seven days showed that the lesion had disappeared almost completely. This was a case of lobular pneumonia.

In all doubtful cases the tuberculin test should be utilized. A positive reaction does not necessarily indicate tuberculous disease but merely tuberculous infection whether it be old and inactive or recent and significant. However, a reaction which is negative following this administration of the first and second strengths of either Old Tuberculin or Protein Purified Derivative definitely indicates that there is no active or latent tuberculous infection present. The exceptions to this are few and chiefly concern the dying patient whose ability to react to allergens is absent. The tuberculin test may also be negative in the presence of the acute infectious fevers. The following is a case to illustrate the value of the tuberculin test in adults.

(3). H. S., an adult housewife, complained only of pain, suggesting dry pleurisy within the left chest. There were no physical signs of disease elicited. The X-ray revealed scattered infiltrations throughout both lungs. Although rather linear and not typically tuberculous they might well be so from an X-ray point of view alone. Repeated sputum examinations by direct smear and concentration were negative for tubercle bacilli. However, numerous spirochaetes were seen to be present. The intracutaneous tuberculin test using P.P.D. 1st and second strengths, and repeating the latter, were all negative.

The presence of spirochaetes in the sputum is not sufficient evidence to rule out tuberculosis which also might be present. However, the presence of spirochaetes, the absence of tubercle bacilli and the presence of a negative tuberculin test ruled out tuberculosis entirely. This patient had a spirochaetal pneumonitis.

On occasions, fluoroscopic examinations will reveal conditions not seen in the ordinary X-ray film. The patient may complain of chest pain and you may suspect a pleurisy. The X-ray may show absolutely normal lung fields and yet examination of the patient behind the fluorescent screen will show definite restriction of movement of a diaphragm and so help establish the diagnosis of "dry pleurisy". Patients with repeated attacks of dry pleurisy are tuberculous in almost as great a percentage of cases as when a pleural effusion is present.

On other occasions it is possible to posture a patient behind the fluoroscopic screen and so see areas not visualized in the ordinary X-ray plate. Sometimes a cavity situated behind the heart can be demonstrated in this manner and can be further verified by X-rays of the chest taken in the oblique position.

(4). L. F., an adult female, had very numerous tubercle bacilli in the sputum. Physical examination indicated the presence of a cavity. X-ray examination showed a lesion in the lower half of the left lung field. A cavity was suspected in the perihilar region. Fluoroscopic examination showed this very plainly and its presence was confirmed further by means of a special X-ray film taken in an oblique position. This resisted ordinary rest and artificial pneumothorax treatment but the disease was controlled finally by means of a thoracoplasty operation.

In other cases it becomes necessary to visualize the bronchial tree in order to discover the etiological factor behind an X-ray picture of disease. This is

done by introducing an opaque oil over the back of the tongue and then posturing the patient so that the oil runs into the desired lobe. In this manner we may demonstrate the presence of bronchiectasis, lung abscess or bronchial obstruction.

(5). As an illustration, T. P., a woman of 34 years, complained of severe cough, copious sputum and occasional small haemorrhages from the lungs. Ordinary X-ray examination revealed bilateral disease of the lungs apex to base but becoming more marked towards the base. Repeated sputum examinations were negative for tubercle bacilli. Investigation of the bronchial tree by means of opaque oil revealed a marked bilateral bronchiectasis.

(6). Another interesting case is B. T., who came to us with moderately advanced tuberculosis chiefly situated in the right lung, most marked toward the base. A phrenic paralysis was carried out with satisfactory results in that the lesion cleared up from an X-ray point of view. In spite of this her sputum remained positive for tubercle bacilli, there being numerous organisms present in each specimen examined. Investigation of the bronchial tree by means of an opaque oil showed the presence of a definite cylindrico-saccular bronchiectasis. This was tuberculous in origin and accounted for her positive sputum, i. e., she had a tuberculous bronchiectasis.

(7). One other case, J. K.—age 53, gave a history of cough and four drams of expectoration daily plus a six ounce haemoptysis two weeks prior to examination. The patient had had pneumonia three times years before. There were a few moderately coarse rales at the base. The ordinary X-ray examination did not show any evidence of disease of the lungs. Lipiodol opaque oil investigation revealed a definite bronchiectasis to be present.

Another fine aid in the differential diagnosis of chest disease is bronchoscopic examination by which we have at our disposal direct vision of the bronchial tree and in addition specimens of diseased tissue may be removed for microscopic examination.

(8). The last case, O. K.—age 54, gave a history of a persistent cough and blood streaked sputum which did not clear up following an attack of influenza. The X-ray showed an infiltration involving the upper third of the left lung extending outwards and upwards from the hilus. Examination of the bronchial tree by opaque oil showed partial obstruction of the left main stem bronchus. Bronchoscopic biopsy revealed a squamous cell carcinoma to be present at the previously demonstrated area of obstruction. This patient is still living, fourteen months later, although he is now quite ill.

To summarize briefly:—in many cases the correct diagnosis of diseases of the chest cannot be established by any one method. The X-ray usually indicates when disease is present, but not always, nor does it always indicate the *type* of disease. In all cases, the X-ray must be augmented by careful history, a careful physical examination and repeated sputum tests. In addition many cases will require further investigation by means of the tuberculin test, fluoroscopy, delineation of the bronchial tree by means of opaque oil, or bronchoscopic examination. Ordinary antero-posterior X-ray films may have to be supplemented by oblique, lateral or heavy penetration films. Serial X-rays following the course of the disease every few weeks or even days may be of tremendous value in the more obscure cases.

*Some Observations on Practical Tuberculing Testing

C. J. W. BECKWITH, B.A., M.D., D.P.H.
Divisional Medical Health Officer,
Sydney, N. S.

THE control of pulmonary tuberculosis, in view of our present knowledge of the disease, lies in decisive action along two lines. First, every open case of tuberculosis must be segregated, educated and/or treated until such time as his disease is under control and his sputum negative for tubercle bacilli. Second, and equally as important, a persistent and relentless search must be made for the disease especially among contacts of the known tuberculous. This latter procedure is commonly called "case finding". If and when this campaign for the diagnosis of early tuberculosis is as widely employed in the physician's office as in the chest clinic, the spreaders or "open" cases will continue to become fewer, the patching up which surgery is called on to do will become less frequent, and the dread of tuberculosis will become a thing of the past. Today, case finding procedures are of paramount importance in the campaign for the control of pulmonary tuberculosis.

From the clinical standpoint, it is universally admitted that the classical symptoms of tuberculosis are caused by toxemia from the tuberculous process and that a relatively large area of pulmonary disease is present before the toxemia makes itself felt by the patient. Then is the time the patient may come to the doctor, and frequently is it too late for him to derive benefit from treatment. Frequently also has he been spreading the infecting organism for some time before his diagnosis. These points being accepted, it can easily be understood why, in the campaign for the diagnosis of early tuberculosis, not only must the public be educated as to first symptoms of the disease but the aid of the medical profession is solicited in the endeavor to diagnose the disease before symptoms appear in the patient.

On first thought, the difficulties of case finding might appear insurmountable for, of the general population, only one, or at the most two, out of every one hundred will be found with the disease. The contact group, namely those with tuberculosis in the immediate family, will show fifteen to twenty out of every one hundred developing the disease, but even this probable yield will only occur with repeated examinations and the zeal of the most enthusiastic searcher is likely to become dampened by the prospect.

A periodic stock taking of methods employed in case finding is a good thing. Contributions to case finding procedures have been made by Laennee with the stethoscope, Roentgen with the X-ray and Koch with tuberculin. We are all creatures of habit and once a habit is formed, it is sometimes difficult to change it. In the diagnosis of early tuberculosis, the stethoscope can no longer be regarded as an instrument of primary value. The habit of using the stethoscope to find early tuberculosis must be changed to the habit of using the X-ray plate. Just as the stethoscope made possible earlier diagnosis than

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visual or tactile physical examination, so the X-ray has made possible the very earliest diagnosis of pulmonary tuberculosis. Do not infer from this that the time has come to place the stethoscope in the museum, for the stethoscope today remains of such great value in the field of diagnosis that a complete chest examination should consist of physical examination and an X-ray plate, correlating the findings of each to give the complete diagnosis of the chest condition. But we are speaking of case finding methods for pulmonary tuberculosis and here the X-ray is not only superior, it is paramount.

Are we to use the X-ray indiscriminately? If so, we should start a system whereby certain groups of the population will be periodically X-rayed. The cost of this would be prohibitive and the machinery necessary for its achievement enormous. To take one hundred films to find one case of tuberculosis becomes a serious financial matter when applied to the general population. Among the contact group the procedure is regarded as a necessity by some, but here too the financial barrier has to be surmounted, even with X-ray at \$2.50 per film. Tuberculin testing offers a key to the problem of case finding insofar as positive reactors require further examination and negative reactors do not.

Tuberculin, originated by Koch in 1898 and announced as a cure for tuberculosis, was, as such, one of humanity's great disappointments. Out of this so-called "cure" however, evolved a diagnostic aid, since it was found that the presence of tubercle bacilli in the body produced a sensitivity to tuberculin, which sensitivity was evidenced by a reaction around the site of inoculation. A tuberculin reaction *per se*, does not mean the presence of the disease tuberculosis but it does indicate the presence of tuberculous infection and the reactor must be examined for evidence of disease, the most common site of which is the lung. It will be seen therefore that a tuberculin survey of any group acts as a sieve, separating on the one hand, the positive reactors who require further examination because they harbor the tubercle bacillus, from the negative reactors who, on the other hand, do not require the examination because no living tubercle bacilli are present. By using tuberculin then, we are able to select from any group, people who should have their chest X-rayed.

It is necessary here to emphasize several points. First, I am referring to tuberculin testing as an aid in case finding only and not as an indicator of the level of infection in a community. Manifestly a person with tuberculous disease may be expected to be more sensitive to tuberculin than one harboring a few dead bacilli. The lack of appreciation of this difference in the use of tuberculin is what frequently confuses discussion on its value. A second point is that a person negative to tuberculin today may be positive in a month, or a year, if he picks up the bacilli in the meantime. It is apparent therefore that a negative reactor, especially among contacts, should be re-tested at regular intervals. At the same time, a positive reactor with a negative X-ray film should be re-plated at intervals. A third point is that tuberculin may fail to react under some circumstances, such as moribund conditions, or during recovery from acute communicable disease.

The accepted procedure for tuberculin testing is the intracutaneous (Mantoux) test and the accepted tuberculin is the purified protein derivative (P.P.D.) of Long and Sabin. This method of testing, when considered as a field or office procedure, has its disadvantages, among which may be mentioned: first, the solution, once made, is unstable, being dependable for not longer than three days under conditions of refrigeration; second, the test requires a specially trained individual and cannot be given accurately without some practice, that

is, in general, its use is restricted to physicians; third, sterile technique is required and also special syringes and needles; fourth, the use of the needle and the word "tuberculin" are objectionable to many adults, the needle to many children; finally, frequently two tests are required before the tuberculin status is known. This means if the first injection is given today, the reading is made in 48 to 72 hours, and if the result is negative or doubtful, a stronger second injection must be given which will be read 48 to 72 hours later. This point alone illustrates how much there is to be desired from the standpoint of making tuberculin testing practical as a field procedure, for it may take nearly a week and two visits before the tuberculin status is known. The intracutaneous method then is hardly practical as a procedure in the field. Attempts have been made to overcome these difficulties. Notable among them are the tuberculin ointment of Morro, used as a percutaneous test, and the patch tuberculin test introduced by Vollmer.

The patch tuberculin test presents certain practical advantages, among which may be mentioned: First, only one test is necessary. Second, the application of the test is simple; no sterile technique is required. The area chosen for the test, usually the arm, is cleansed with acetone. The adhesive, with the patches of filter paper previously saturated with prepared tuberculin and dried, is then applied. The patient is instructed to remove the adhesive in 48 hours later or two days after the test is applied. Third, the application is so simple that it requires little experience to apply the test satisfactorily. If it be remembered that the adhesive prevents evaporation of perspiration, which in turn moistens the filter paper containing the tuberculin, thus placing moist tuberculin in direct contact with the skin, then the important point in the application of the test is to be sure that the adhesive is on firmly. Fourth, the reading of the test is usually definitely positive or definitely negative. In the 318 tests reported on, only 3 reactions were doubtful. Fifth, the facility with which the test is made and the absence of any discomfort, gives assurance to children and parents. Parents see that nothing is put into the skin and children have no reason to fear the needle.

The patch tuberculin test, if it is reliable, would appear to answer the administrative and practical difficulties obstructing the wider use of the tuberculin test as an aid in case finding. In this study, attempt has been made to measure its efficiency by using two standards; first, the X-ray and/or fluoroscopic examination. In general, it has been our policy to X-ray all patients over the age of 12 and fluoroscope those under that age. If the appearance of the lung under fluoroscopic examination was suspicious, an X-ray film was taken. The second standard used for measuring the efficiency of the patch tuberculin test was the intracutaneous tuberculin test, using P.P.D. In all, 318 individuals were tested and examined. This total is made up of three groups as follows:

Group "a"—119 clinic patients varying from less than one year to 40 years of age.

Group "b"—91 high school students, the result of a survey for tuberculosis. The ages in this group varied from 14 to 20.

Group "c"—108 nurses in training in two hospitals which have adopted a regular health programme in their training schools. The ages varied from 18 to 27 years.

The 119 clinic patients were tested at the time of examination and read after the diagnosis of the chest condition had been established. The diagnosis

therefore, was not influenced by the tuberculin reading. The 91 high school students all had their parents' permission for the test. The positive reactors were X-rayed; the negative reactors fluoroscoped and if anything suspicious was perceived, an X-ray film was taken. Six plates were taken because of suspicious fluoroscopic findings. The 108 nurses in training had been routinely X-rayed before tuberculin testing. Those found with positive tuberculin reactions were again X-rayed. This group also received simultaneously the patch tuberculin test on one arm and the first strength P.P.D. in the other. Negative reactors to first strength P.P.D. were retested with second strength regardless of the reaction to the patch test. In this group then, the patch test was checked not only against X-ray findings but also against the accepted intracutaneous test.

The following is a summary of the observations made:

Taking the three groups individually, it is interesting to note that of the 119 clinic cases, of which 83% gave a history of exposure to tuberculosis, 61 or 52% showed a positive tuberculin and 58 or 48% were negative. Of the 91 high school students, 26.3% showed positive reactions and 73.7% negative. Of the 108 nurses tested, 3 patch test readings were doubtful; of the remaining 105, 56.2% were positive reactors and 43.8% negative. It is seen therefore, that the nursing group showed 4% higher positive reaction than among the clinic group and 30% higher than among high school students. These findings indicate further that tuberculin, as an aid in case finding, is becoming increasingly valuable. Twenty five years ago, with eighty to ninety per cent of the population reacting, its value might have been questioned. Today with only about fifty per cent positive reactors, as observed in this study, its value is greatly enhanced.

Now, examining the group as a whole in an attempt to evaluate patch tuberculin testing as a practical measure, the following points are to be noted:

Of the 318 tests, 315 or 99.3% gave definitely positive or negative reactions. Of these 315, 144 or 45.9% were positive and among this group of positive reactors, 15 or 10.4% showed significant tuberculosis, 6 or 4.2% showed suspected tuberculosis and 34 or 23.8% showed evidence of calcification. In other words, the positive reactors gave a yield of 55 or 38.3% who require further observation; 61.8% showed no evidence of disease.

Among the negative reactors, of which there were 171 which represents 54.1% of the total, no case of significant tuberculosis was found. Of the 171, 163 or 95.3% showed no evidence of tuberculous disease. Of the remaining 8 cases, 2 were diagnosed suspected tuberculosis. It is to be remembered, however, that these plates were read without knowledge of the tuberculin reaction and these patients will probably be found negative when re-checked. The remaining six cases showed evidence of calcification. Of these, one was tested by the patch tuberculin method only. The remaining five gave a negative reaction to both the patch and two strengths P.P.D. They were apparently anergic. I wish to emphasize from these observations that in no instance was a significant tuberculous lesion found in the presence of a negative patch test.

The next set of observations was made by observing the results of the patch tuberculin test as compared with the standard of the intracutaneous test with Purified Protein Derivative of Tuberculin (P.P.D.). As mentioned previously, the tests were done simultaneously. 108 nurses in training received the two tests. There was complete correlation between the patch and

the intracutaneous test in 102 or 95.4% of this group. It is of more than passing interest to note that the second strength P.P.D. had to be used in 62% to obtain the same information as obtained from the single patch test. The six tests which did not correlate, gave the following results:—

Two cases; patch test negative and second strength P.P.D. positive.

Two cases; patch test positive and both strengths P.P.D. negative.

One case; patch test doubtful and first strength P.P.D. slightly positive.

One case; patch test doubtful and both strengths P.P.D. negative.

It will be seen therefore that measuring by the yardstick of the standard intracutaneous test, the patch tuberculin test has so far proved its efficiency.

Conclusions

First, the "patch" tuberculin test is a simple and inexpensive tuberculin test, requiring little time and no sterile technique in its application.

Second, the reaction is usually definitely positive or negative. The positive reactions vary from a few vesicles to marked edema, conforming in position with the patches of tuberculin, but which remains local.

Third, checking results of the "patch" tests against X-ray and fluoroscopic examinations, no case was seen in which a tuberculous lesion was associated with a negative patch tuberculin test.

Fourth, by checking the results of the patch tuberculin test against the intracutaneous test with P.P.D. in the same individual, the patch test is shown to be efficient within practical limits. It was found necessary to repeat the intracutaneous test in 62% to obtain the information provided by the patch tuberculin reaction.

Fifth, the value of tuberculin testing as an aid in case finding procedure for pulmonary tuberculosis is illustrated in that of the 318 tests given, 171 were found to be negative and further examinations showed no significant tuberculosis in this group; whereas among 144 positive tuberculin reactions, tuberculosis requiring observation or treatment was found in 38% of the cases.

Sixth, the patch tuberculin test, properly applied and interpreted, places in the hands of the practising physician a practical and efficient tuberculin test which may be used with facility as an office or indeed a routine procedure.

Seventh, this series of 318 observations is not large but the results indicate that the patch test is of definite value in practical tuberculin testing. Further observations are planned.

I wish to thank Dr. H. R. Corbett, radiologist, Dr. J. R. McNeil of Glace Bay and Dr. Mary Fetter, radiologist, Antigonish for their assistance in preparing material for this study.

*Collapse Therapy In Brief

A Few Practical Points and Some Case Reports

V. D. SCHAFFNER,
Surgeon to Nova Scotia Sanatorium

GENTLEMEN, we have been greatly honored to-day in having Dr. Archibald speak to us. His name and work, as you know, stand out in the field of thoracic surgery. He is, I am proud to boast, my former chief, and it was one of my greatest pleasures to be associated with him for a few years at the Royal Victoria Hospital, Montreal.

He has described and discussed with you the general indications of surgical collapse in the treatment of pulmonary tuberculosis. He really has left very little for me to add, but I will try to give you a few practical points, as we see them, and present a few case reports indicative of the type of case in which we use each specific procedure.

Collapse therapy, as you know, is taking an ever increasing position in the treatment of pulmonary tuberculosis. At the State Sanatorium in Michigan, which I visited last February, approximately 97 per cent of their patients are receiving some form of collapse, and one could not help but be impressed by the marvellous results they were attaining even in the far advanced bilateral cases. O'Brien has stated that there is only one contra-indication to collapse therapy, and that is a dying patient. He may be right, but we do not go quite that far.

First I will briefly outline to you our own idea of the value of phrenics. Let me here state, that with one exception, we use them more frequently than any other institution in Canada, and, from our experience, we feel, with justification. The indications for this operation, however, we feel are definite and should not be overstepped. Case selection should be carefully made. When case selection has been improperly made, the future handling of the case is decidedly more complicated and difficult, and in some instances robs the patient of a chance of a good and safe recovery. We have seen such instances occur.

To be brief, I will state that it should be used in minimal or moderately advanced cases. If cavitation exists, it should not be larger than 3 cm. in diameter, should be thin-walled and surrounded by a fair amount of resilient lung. It should never be used in cases in which cavitation is larger than 3 cm., or thick-walled or peripherally placed. We have recently analyzed 250 of our cases and have shown this to be true. It is of particular value in basal lesions and in the control of haemorrhage where pneumothorax is impossible, its value is well recognized.

I might point out that we now do temporary phrenic paralysis in practically all cases, repeating the operation as often as necessary to attain the desired result. We firmly believe that a patient should be left with the maximum of functioning lung at the termination of treatment, and a functioning diaphragm is of extreme value in the case of spread, or flair, of disease in the opposite lung. In the temporary operation the main trunk is crushed and all accessories

severed and portions removed. It is a more difficult and dangerous operation than doing an exeresis, as the 5th cervical root has to be elevated and the nerve to the subclavius divided, as this carries fibres to the phrenic. This part of the operation subjects the 5th root to possible damage, with arm complications. It requires a much more meticulous and careful dissection.

A few cases indicating types in which phrenic operations may be used, are given below.

Case No. 5901. L. W. Female 22 years of age.

Entered the Sanatorium July 23, 1937, as a moderately advanced case of pulmonary tuberculosis R₁L₁ and a history suggestive of a pulmonary condition with loss of strength; seven pound loss of weight in a month and diminished appetite. She had cough and expectoration of one dram negative sputum a day.

At this time her right side showed a slight mixed exudative productive parenchymal lesion 2nd I.S., in middle and outer zone.

Left: Scattered mixed exudative productive parenchymal lesion apex to 3R., with a very small thin-walled cavity opposite upper border of 2nd R., middle zone. Infiltration in 2nd Interspace was slight.

This patient was also seen to have tuberculous colitis of the ascending and pelvic colon. Within three months there was noted a slight but definite clearing, with localized exudative productive lesions both sides and no cavities seen.

The patient's physical condition improved and there was a steady gain in weight.

Phrenic nerve section was undertaken as a compression procedure on November 9, 1937, with an immediate rise of the diaphragm of 6 cm.

Within five months, (April, 1938) all that remained on the *right* side were slight linear fibroid changes 1st I.S., and on the *left*, definite clearing with slight linear fibroid infiltration. 1st. Interspace, no cavity seen. Diaphragm 7.7 cm. elevation.

Patient was discharged in May, 1938 as a Quiescent case.

On re-admission in April of 1939, both right and left lungs were considered "essentially within normal limits"—except for slight fibroid changes 1st. Interspace, inner zone—right.

Patient was discharged July 16, 1939, quiescent and free from all symptoms, pulmonary and gastro-intestinal.

2. Case No. 4933. B. D. Female 36 years of age.

Patient was admitted November 19, 1936, as a far advanced case of pulmonary tuberculosis R₂L₂, having a suggestive history and haemoptysis, with one to two drams of sputum positive for tubercle bacilli. She had had a loss of strength and appetite and occasional night sweats.

Her right lung was diagnosed as negative for tuberculosis.

Left: Localized exudative parenchymal lesion apex to 2R. with two thin-walled cavities averaging 2 x 1 cm. behind and below clavicle. Lesion was confluent in extreme apex with slight calcification in 2nd. Interspace.

Inoperable for artificial pneumothorax.

The condition was treated by a phrenic crush, resulting in a definite clearing by April 9, 1937, with only one cavity 1½ x 2 cm. visible. The lesion was mixed exudative productive, apex—2R. elevation of diaphragm 2.5 cm.

The last picture available December 8, 1938, shows a lesion mainly productive, apex to 2R. which appeared to be clearing, and no definite cavity visible.

Patient was resting but in good physical condition, symptomless and with a negative sputum when last heard from.

3. *Case No. 4957.* V. B. Female, age, 27.

Admitted December 22, 1936. Far advanced R₂L₂ with a history suggestive of tuberculosis.

She had loss of strength, weight and appetite, occasional hoarseness with cough and expectoration of positive sputum. Fever 99° F., and a history of dry pleurisy on the right side.

Her X-rays showed on the:

Right: Disseminated mixed exudative parenchymal lesion 1R.-4R. and a small thin-walled cavity above 2R., outer zone.

Left: Exudative parenchymal lesion 3R. to base, chiefly noted in the peri-hilar area. Distinct cavity opposite 4R., middle zone.

By March the right side had begun to clear and no cavity was visible. Left also showed slight clearing, still exudative in type. Rather confluent with cavity formation 31.S. 2 x 2½ cm. and clouding of basal pleura.

Phrenicectomy was performed April 2, 1937, and 9 cm. of nerve removed and by June, 1937, the well marked cavity had practically disappeared.

Patient has been free of symptoms and sputum negative.

4. *Case No. 4898.* A. R. Female, 28 years of age.

Patient was admitted October 4, 1936, having a history suggestive of tuberculosis with haemoptysis extending back to 1929.

There had been considerable loss of strength, weight and appetite, cough and expectoration of sputum positive for tubercle bacilli. Fever, night sweats and pleurisy.

X-ray films of October 5, 1936:

Right: Mixed exudative productive lesion, apex to 2R. with thin-walled cavity 3 x 2 cm. just above clavicle. Fibrotic changes 2nd. Interspace and thickened inter-lobar pleura.

Left: Scattered mixed exudative productive lesion 1-4R. with suggestive cavity between 2 and 4R., middle and inner zone.

Pneumothorax was initiated on the left February 23, 1937, and by the following July there was a 30-40 per cent collapse, chiefly noted in the upper lobe. A large cavity 6 x 5 cm. with fluid level remained open opposite 2-3R. middle zone. Considerable infiltration throughout lung field.

The right side showed some improvement. No cavity visible, and a scattered mixed exudative productive parenchymal lesion apex to 3R. and 7V.S.

Phrenicectomy was performed on the left side September 17, 1937, with a resultant rise of four cm. of the diaphragm.

By December, 1937:

The right side had cleared considerably.

The left side showed an irregular collapse, 30-40 per cent, with cavity 3 x 3½ cm.

In March, 1938, the pneumothorax collapse was increased to eighty per cent and the cavity closed. Cord adhesion opposite 1R. No fluid noted. This condition has shown improvement to the present. Sputum negative and no exacerbation of symptoms.

Results: Cavity cases without regard to thickness of wall, but 3 cm. or less in diameter, were closed in 46.8 per cent of cases operated upon, and decreased in size in an additional 17 per cent. Cavities with thin walls but of varying sizes were closed in 36.8 per cent of the cases. Those that were both thin walled and three cm. or less in diameter should be closed in about seventy or eighty per cent of cases. It is in this type of cavity case, as stated before, that phrenics should be employed. In the non-cavity cases, where phrenic was employed as the only collapse measure, cures and arrests were made in 72.3 per cent of cases, with improvements in an additional 21.2 per cent. These figures, I think, speak for its value when proper selection is made.

The second procedure of which I wish to speak briefly is that of closed pneumolysis. Pneumothorax cannot be carried on effectively in any large numbers without this operative aid. Unfortunately, a relatively large number of pneumothoraces attempted are unsuccessful and useless, and I might add dangerous, on account of adhesions preventing proper collapse of the lung. These adhesions are formed by the presence of superficial disease on the lung, causing the visceral and parietal pleura to adhere by the formation of fibrous tissue. When the lung is compressed, the parietal pleura slides to form the adhesion. These adhesions are of various sizes and shapes and have to be dealt with differently, depending upon many factors which need not be dealt with here.

The indications for pneumolysis in ineffective pneumothorax due to adhesions are definite and obvious. The adhesions most certainly should be cut if it is thought by so doing the pneumothorax can be converted into an effective one. There are cases, however, in which the pneumothorax is effective in so far as control of disease and symptoms is concerned, yet adhesions are to be seen in the X-ray and fluoroscopic examinations. Controversy exists in chest clinics concerning whether these adhesions should be severed or not. In many places, you will be told that if the pneumothorax is effective, whatever adhesions might be present should not be meddled with. At this institution we cannot subscribe to that idea. Personally, I feel that all adhesions should, at least, be inspected by means of the thoracoscope, regardless of whether good collapse is attained or not.

As previously stated, adhesions form due to the presence of superficial disease on the lung and the sliding of the parietal pleura, when pneumothorax is induced. When the adhesion is viewed, disease is usually seen at the lung attachment of the adhesion. This, in many cases, constitutes a weak spot which can easily be torn through with strain of coughing, sneezing, etc., thus exposing the patient to the danger of empyema due to the opening of this diseased area with formation of fistula. When such superficial disease is present, which it usually is, at the base of adhesions, we feel that the adhesion should be cut to decrease the incidence of empyema. Pneumothorax is complicated by effusion of mild of severe nature in about seventy to eighty per cent of cases, and of these fifteen or eighteen per cent become empyemata. The empyemata occur almost exclusively in adhesion cases. Personally, I believe that empyema is a complication of the operation in very few incidences, but does occur due to the lack of it in many.

In all cases operated upon here, we make a note on the operative report, on cases that we suspect will develop empyema. This prediction is made upon the appearance of the surface of the lung. When it is smooth and little or no superficial disease is seen, the possibility of empyema is remote. When

numerous tubercles are seen, some of which are probably soft, the possibility of empyema is great, due to continued superficial caseation and fistula formation. It is surprising how often we are correct in our predictions and how infrequently an unsuspected empyema develops.

Many other points could be touched upon in connection with these procedures, but time does not allow of any degree of completeness. Further points may be discussed at the round table conference.

1. *Case No. 4554.* M. H. Female, 23 years of age.

On admission of October 30, 1934, in a condition of far advanced tuberculosis R_3L_2 , and a history suggestive of pulmonary tuberculosis dating back five months previously, with loss of weight, strength and appetite, cough productive of two ounces of sputum positive for tubercle bacilli and a temperature of 100.8° .

Her first film indicated:

Right: An exudative parenchymal infiltration apex to base, with a confluent area in 2nd. Interspace, outer zone, and in 3rd. and 4th. Interspace. From 2R. to base condition is caseous broncho-pneumonic with cavity formation 2 x 2 cm., inner zone, with a probable larger cavity lateral to this.

Left: Localized exudative parenchymal lesion 3rd. Interspace, inner zone, with possible small cavity present.

Artificial pneumothorax was initiated on the right on December 15, 1934, which by March, 1935 was seen to affect a collapse of 50 per cent, with a thin adhesion present just above 2-4 and 5R., and cavitation still evident in hilus region.

Left showed definite clearing.

Pneumolysis was advised and carried out May 15, 1935 on the right, when thorascopic examination revealed a 60 per cent collapse of the upper lobe and 40 per cent collapse of lower part of lung. From apex to lateral chest wall two broad adhesions were seen, and from base to lateral chest wall, and attached to diaphragm, a broad thick adhesion. All those were cut.

The X-ray following this procedure showed an almost complete collapse of the lung.

General condition improved. The sputum became negative for the first time and the patient began to gain in weight.

By January, 1939, 40 per cent compression was maintained with no evidence of recent disease on the right or left.

2. *Case No. 4793.* H. L. Female, 23 years of age.

Admitted June 8, 1936, with a history of haemoptysis and a diagnosis of far advanced pulmonary tuberculosis R_3L_1 . She had spat up blood the previous January, 1936, and had had a severe haemorrhage of eight ounces in May, 1936. She had lost about fifteen pounds of weight, and considerable strength, with occasional pleurisy pains sometime previously; cough and expectoration of two drams of positive sputum daily.

The radiographic report of June 9, 1936, showed:

Right: A disseminated exudative parenchymal lesion apex to 3R. and 7V.S., with thick-walled cavity $2\frac{1}{2}$ x 2 cm. in 1st. Interspace, outer zone, and probably another cavity within the hilus opposite inner end of 2R.

Left: Slight exudative tuberculosis 1st. and 2nd. Interspace.

Pneumothorax was initiated June 3, 1936, and by August a 40 per cent collapse of the right lung was obtained, but thin adhesions were noted in apex and below clavicle. Two cavities were seen. The upper one measuring $2\frac{1}{2} \times 2\frac{1}{2}$ cm. and the one near the hilus 3×3 cm.

In the middle of August this patient's temperature showed signs of activity and in September she lost four or five pounds in weight. The lung was collapsed to about 65 per cent, but the cavities still remained open. In the left side the mottling now appeared somewhat more accentuated.

Internal pneumolysis was carried out October 27, 1936, and the adhesions of the upper lobe severed. The collapse increased to 70 to 80 per cent, but the cavities still remained open at this time.

By February 3, 1937, a collapse of 70 per cent was maintained and the two cavities could not be seen on the right. Left side showed no change.

Clinically and by the X-ray improvement was slow but continuous for the next year, but in June, 1938, the infiltration in the left was questionably a little more marked, and in the subsequent twelve months this side retrogressed somewhat.

Phrenic crush was performed on the left side, May 31, 1939, and an elevation of 2.8 cm. of the diaphragm obtained. At the present time, November, 1939, there has been no great change on this side, if anything a possible slight improvement.

3. Case No. 4892. S. T. Female, 18 years of age.

Admitted September 4, 1936, as a moderately advanced case of pulmonary tuberculosis L, and a suggestive history with some loss of strength, cough and expectoration of one dram of positive sputum a day. She had had dry pleurisy six months before admission, and "occasional" night sweats for the preceding three months.

Her X-ray films at that time showed:

Right: No parenchymal pathological condition.

Left: A localized exudative parenchymal lesion 1st. and 2nd. Interspace.

A small thin-walled cavity 2×2 cm. immediately above the inner end of 3R.

Artificial pneumothorax was established September 28, 1936 and a 60 per cent collapse attained within a short time; but a fairly large cord adhesion extending obliquely parallel to 2R. was seen to be preventing satisfactory compression. The small cavity at the inner end of 3R. was still evident.

Internal pneumolysis was undertaken November 3, 1936, and the above mentioned cord-adhesion cut, providing an 80-90 per cent collapse. Some bleeding was seen to follow and one c.c. of sanguineous fluid aspirated. This was repeated and finally had cleared by December 4, 1936. The vomica shadow was now not visible.

Parenchymal condition continued to improve throughout the following two years and when last studied November 25, 1938, the disease within the partly compressed lung appeared to be undergoing satisfactory healing.

The patient has been living at home since May, 1938. General physical condition good and sputum constantly negative for tubercle bacilli since March 3, 1937.

4. Case No. 4888. C. LeB. Male, 24 years of age.

This patient entered the Sanatorium September 24, 1936, with a history suggestive, and a diagnosis of far advanced tuberculosis R₃L₂. He was seven-

ten pounds under weight and had lost strength, troubled with persistent cough, productive of two drams of sputum positive for tubercle bacilli, and in which there was streaking on numerous occasions.

The radiologist's report was as follows:

Right: Localized exudative parenchymal lesion apex to 3R. and 7V.S. with two distinct cavities; one 2 x 2 cm. just below clavicle; the other 2 x 1 cm. opposite 2R., inner zone. Thickened apical pleura.

Left: Localized exudative parenchymal lesion at end of 3R.

For the next six months the condition remained practically stationary and artificial pneumothorax was instituted on the right. By May 29, 1937, there was obtained a 40 per cent collapse, chiefly selective, but numerous small adhesions were noted over the upper lobe. Cavitation was not seen at this time. The left lung had now begun to clear.

On June 8, 1937, intra-pleural pneumolysis was performed on the right side. A 60 per cent collapse of the lung was estimated at operation, and two large adhesions noted. One very thick and attached to sub-clavicular vessels. Both were cut.

Between 50 and 75 per cent of the right side was maintained in a good selective collapse and no cavity or recent disease could be seen.

The scattered mixed exudative productive lesion of the left side showed continuous slight improvement.

Patient was discharged November 26, 1938, as a quiescent case.

Extrapleural pneumothorax is the procedure that I wish to briefly discuss next. It was heralded a few years ago as a great addition to our methods of collapse therapy. Since a rather extensive use, however, it has been vigorously condemned in many quarters. I suspect that in many instances it has been used for the wrong indications and that eventually this operation will find its rightful place and be recognized as one of worth. We have not used it extensively, but have found it of value when cases are carefully selected for its use.

The operation consists of an extrapleural separation of the lung over diseased area alone, thus giving a very selective collapse. It is maintained in the same manner as an ordinary pneumothorax, except refills are more frequent and pressures have to be kept higher.

In performing the operation an approach is usually made through a posterior thoracoplasty incision. A three-inch section of a rib is removed (usually the 4th) subperiosteally, and the intercostal muscles separated along the periosteal bed until the pleura is reached. The pleura is then peeled forward and this separation is continued until the whole apex is depressed. The separation is carried downward until sufficient lung is released to control the disease. Care must be taken to separate the pleura well down on the mediastinal side, as it appears that obliteration starts from this side when it occurs. When the operation is completed, we fill the created space with saline and close the wound tightly. This saline is aspirated later and replaced with air. Filling the space with saline, we believe, has several advantages over the method of simply closing the wound and leaving an air space. In the first place, it prevents paradoxical motion of the lung and so, lung trauma. We also believe this splinting of the lung cuts down the possibility of spread. There is always a slight amount of oozing into the space and this blood is easier to remove when mixed with saline than if it is allowed to clot at the bottom of the space.

We believe that the operation should never be used as a substitute for

thoracoplasty or ordinary pneumothorax. Speaking very broadly, it should be used only in those cases where thoracoplasty is considered inadvisable at the time, for various reasons. That is a rather vague statement, but perhaps some of the cases to be presented will make somewhat clearer its meaning. By its use in far advanced bilateral disease, the maximum vital capacity can be maintained and this is frequently a very important factor in the treatment of bilateral cases. Personally, I believe that the operation will come to be used almost entirely in far advanced bilateral cases. Certainly it is here that it should find its greatest field of usefulness. The operation is frequently very useful in converting poor risk thoracoplasties into good ones. It is very easy to superimpose a thoracoplasty over an extrapleural pneumo.

Personally, I believe that the operation should never be attempted over a thin, free pleura and this is especially so if the opposite lung has a decreased functional capacity. We have done it under such conditions on a few occasions, and in one instance the pleura gave way in many places due to a coughing spell (which practically always occurs when separation is carried down the mediastinum). This, of course, resulted in immediate massive intrapleural pneumothorax, and although the wound was immediately closed and attempts made to re-expand the lung, it ended fatally on the third post-operative day. A fatal termination on the table would not be uncommon under such circumstances.

The greatest dangers of the operation are opening into large, thin-walled cavities during separation, tuberculous infection of the space due to the fact that mediastinal lymphatic channels are torn across during separation, and haemorrhage. Haemorrhage, when it does occur, is very difficult to control, and in some of our cases we have found considerable blood in the space, at the time of the first aspiration, when we thought we had left it dry.

One of the main objections to the procedure has been early obliteration of the space. We too have been confronted with this difficulty, but I believe that if proper care is taken with the mediastinal separation, this will cease to become a very important annoyance.

1. *Case No. 3455.* M. G. Male, 19 years of age.

Patient was a steelworker. Was admitted January 8, 1930, as a moderately advanced case of pulmonary tuberculosis R₂L₁, of insidious onset. His admission films showed:

Right: Slight fibrocaseous parenchymal infiltration apex to 3R. and 5V.S.

Left: Similar type of lesion, confined to apex.

Patient was discharged in July, 1931, as an arrested case.

In 1938 this man was again admitted having had an extension of trouble and a leucic infection as a complication. His history showed persistent cough with expectoration of sputum positive for tubercle bacilli. Haemoptysis and pleurisy.

Radiographic report of February 11, 1938, showed:

Right: A mixed exudative productive lesion in apex and 1st. and 2nd.

Interspace. Moderate sized thin-walled cavity 2 x 2 cm. containing fluid level at level of 1R. Generalized peri-lymphatic mottling.

Left: Mixed exudative productive lesion, mainly linear fibroid in apex with increased lung markings and a suggestive fine mottling apex to base.

Artificial pneumothorax was attempted and patient found inoperable.

In September, 1938, extra-pleural pneumothorax was suggested for the right side, and if necessary for the left also.

By January, 1939, this patient had a cavity $1\frac{1}{2} \times 1\frac{1}{4}$ cm. on the right at level of 1R., and one $1\frac{3}{4} \times 1\frac{3}{4}$ cm. on the left, 2nd. Interspace.

Extra-pleural pneumothorax was carried out on the right, February 2, 1939, bringing about collapse of upper lobe to level of 8th Dorsal vertebrae. No cavity seen.

The left lung at this time had become honeycombed at the apex and on March 17, 1939, extra-pleural pneumothorax performed, with good collapse of upper half of the lung and obliteration of the cavity formation.

Suppuration developed in the pneumothorax cavity on the left and routine aspirations carried out with replacement of gomenol. In August the oil was removed and replaced by air, with suggestion to continue compression as long as possible.

The last pictures of this thorax October 7, 1939 showed:

Right: Good collapse 30-40 per cent. No recent disease. No cavity.

Left: Some re-expansion has taken place. Moderate thickening of pleura. No definite cavity seen, although a small area suggestive of vomica formation is present opposite lower border of clavicle, inner zone.

2. Case No. 2695. C. MacC. Female.

Admitted June 30, 1927, moderately advanced R₃L₂, having previously been under treatment in 1924 for three months. History was one of haemoptysis. There was also cough with expectoration of positive sputum, and loss of weight and strength. One year later patient was discharged as a far advanced case. Condition continued as essentially unimproved showing by the autumn of 1928:

Right: A slight extension of the chronic parenchymal lesion in upper and middle lobes.

Left: Extension of tuberculous process, chronic advanced lesion throughout whole lung with cavities at 2nd. and 3rd. R.

In February, 1929, bilateral pneumothorax was considered to control haemoptysis and combat spread of disease. *Right* not compressible. *Left*-pneumothorax induced and some collapse of cavities obtained, but this was abandoned in May of the same year because of contralateral progressive disease.

X-ray of September 20, 1933, showed:

Right: Chronic upper lobe infiltration. Exudative productive in nature with possible small cavity at apex.

Left: Extension of the lesions throughout the lung. Chronic caseous broncho-pneumonic parenchymal infiltration apex to 5R. and 9V.S. Cavity 1st. Interspace, 3 x 3 cm. Definite thickening of apical and lateral pleura.

Left phrenic exeresis October 10, 1933, with immediate decrease in size of cavity above noted.

For the next five years there was no essential change in the type of disease and patient's general condition not improved, nor haemoptysis controlled.

By September 26, 1938: Right side was fibroid in type with honeycomb cavitation above 1R.

Left: A more advanced fibroid infiltration apex to 2R, containing honey-comb cavitation in the apex.

September 24, 1938, extra-pleural pneumothorax on left, which produced an 80 per cent collapse.

November 25, 1938, extra-pleural pneumothorax on right with good compression of upper lobe—fluid level in extra-pleural cavity opposite 2nd. Interspace.

By January, 1939, Right: Slight re-expansion. About 30 per cent collapse remaining. No definite cavity formation.

Left: No great change, possible slight re-expansion—40 to 50 per cent collapse. No definite cavity, although suggestive areas are seen. Some fluid in extra-pleural cavity.

In November, 1939, Right side revealed obliteration of costo-phrenic sinus. Left side: Moderate fluid level within extra-pleural space opposite 5th. Dorsal vertebrae. It became necessary to aspirate. At this time 100 c.c. of thick pus was removed and azochlorimide instilled daily.

Present condition, 50 c.c. pus being obtained and injections of Dakin's solution. Gomanol treatment advised.

3. Case No. 5378. H. Z. Male, 29 years of age.

Admitted August 18, 1938. Moderately advanced pulmonary tuberculosis R₁L₂, with suggestive symptoms and history. He had lost strength and ten pounds in weight in the previous year. Cough, expectoration of one dram of sputum a day and a fever of 99° F. Questionable pleurisy and occasional night sweats.

Films taken on admission showed a uni-lateral left sided involvement, consisting of scattered exudative tuberculosis apex to base, marked at extreme apex and between 2nd. and 4th. ribs. Pneumothorax treatment was advised. Inoperable.

On September 9, 1938, the phrenic nerve was cut and sutured with an elevation of diaphragm 2.6 cm. which was slightly immobile. Condition improved and patient gained weight steadily.

Films of February, 1939, showed a mixed exudative productive infiltration above 1R. and to slight extent opposite 3R. and 4th. Interspace. Questionable small cavity in extreme apex.

Because of haemorrhage left extra-pleural pneumothorax was decided upon, and performed March 17, 1939, and the pleura separated to 5R. anteriorly and 7R. posteriorly with excellent collapse of whole upper part of lung. Lung soft except one area over apex posteriorly indicative of fibrotic disease. X-ray showed good collapse with moderate fluid level. Final picture showed 30 per cent collapse over upper lobe. No fluid. Possible slight mixed exudative productive disease 3rd. Interspace.

Thoracoplasty is the last operative procedure concerning which I wish to speak briefly. Time does not permit the discussions in detail, of the varied indications. Suffice it to say that the operation is indicated in the more advanced, usually cavity cases, in which pneumothorax is impossible on account of adherent lung, or inadvisable on account of extent of disease. There are many cases that can be aided or saved by this procedure alone.

Originally we demanded that the opposite or "good" lung be relatively free of disease. This, of course, is the ideal, but to-day we are operating on cases with a fair amount of disease, and even cavity, in the opposite lung,

provided we can control the contralateral disease with some form of collapse. We have just reviewed a group of one hundred of our thoracoplasty cases. Sixty-five of this group had contralateral disease, and twenty-one of these received some form of contralateral collapse. The handling of bilateral cases is an interesting subject which cannot be entered into here. Possibly some of you will wish to bring it up at the round table discussion. Bilateral disease, in itself, is no contra-indication to major collapse.

In regard to technique, I will have very little to say, beyond that each case is considered unto itself, all factors being taken into consideration, and as conservative an operation done as is consistent with good results. We do not believe in the doing of apicolysis in all cases, in fact this is added as infrequently as possible. Again this point might be discussed at the round table conference, if any of you are interested.

Results in 100 Cases:

1. All Cavities Regardless of Size:

Complete closure.....	77.1%
Decreased.....	18 %
Stationary.....	4 %

Small Cavities:

Complete closure.....	91.9%
Decreased.....	8.1%
Stationary.....	0 %
2. Sputum conversions.....	70.3%
3. Case mortality.....	11 %
4. Operative mortality.....	4.4%

1. Case No. 5411. M. McD.

Admitted October 4, 1938. Far advanced R₁L₂. A history of pleurisy with effusion, loss of weight ten pounds. Cough and expectoration, one dram of sputum in the mornings, positive for tubercle bacilli. Gaffky VI. Patient had pleurisy with effusion. Right, 1934, Left, 1936. Occasional night sweats following this, with exacerbation of temperature to 101° F. Symptoms dated back to February, 1934.

Right side in Radiographic investigation showed mixed exudative productive infiltration apex to 1st. Interspace with peri-lymphatic changes of main trunks 3R. to base.

Left: Thick walled upper lobe cavity 11 x 7 cm., with moderate exudative infiltration below to level of 9V.S.

A needle inserted into cavity gave readings—2-3, and patient was passed for thoracoplasty.

First stage thoracoplasty November 22, 1938. First three ribs removed. Lung tissue over location of cavity was very soft indicating extensive excavation requiring more than ordinary thoracoplasty procedure. An extra fascial apicolysis was done stripping the lung down on all sides to the level of rib resection.

November 30, 1938, X-ray films showed cavity still open but somewhat decreased in size, and extrapleural fluid level opposite 4th. dorsal vertebrae.

Second stage was completed December 6, 1938, and an additional two ribs removed, which was also followed by apicolysis, permitting good release of upper lobe. Cavity again felt but smaller than previously.

X-ray films showed cavity reduced to $4\frac{1}{2} \times 1\frac{1}{2}$ cm. behind 6th. and 7th. R. posteriorly.

Third stage performed December 20, 1938, and three more ribs resected with excellent collapse of upper lobe.

Films showed the cavity reduced farther in size, $3\frac{1}{2} \times \frac{3}{4}$ cm. opposite 5-6 dorsal vertebrae. Moderate extra-pleural fluid level behind clavicle.

By February, 1939, the temperature was consistently normal and the sputum negative for tubercle bacilli. An X-ray of March 20, 1939, showed no evidence of recent tuberculosis on the R. and on the left an excellent collapse, with no cavity or fluid noted.

Patient was discharged June 12, 1939, as a "Quiescent Case".

2. Case No. 4318. C. H. K.

Admitted September 18, 1934—moderately advanced L₂. Catarrhal onset. Loss of weight, strength, appetite, cough with expectoration. Gaffky 111. Fever, three years' duration.

Right: Small area calcification in apex and two smaller nodes 2nd. Interspace.

Left: Confluent, exudative parenchymal infiltration apex to 1st. and 2nd. Interspace. Ill defined cavity with fluid level 1st. Interspace, outer zone. Thickened pleura.

Pneumothorax attempted October, 1934, on left without success. July 8, 1935—Right: Definite extension to 3R. with cavity formation opposite 2nd. R.

Left: Extension with exudation. Cavity 1st. Interspace.

Progressive extension of disease until April, 1936, when clearing took place in right side. Cavity in left 6×3 cm. Retraction of heart and trachea. Thickened pleura; lung field became more opaque and cavity increased to 9×5 cm. in April, 1937.

Pneumothorax induced on right side April 15, 1937.

Thoracoplasty—first stage on left—three ribs removed April 23, 1937.

May 3, 1937: Right: Compression due to pneumothorax 30%.

Left: Result of 1st. stage thoracoplasty. Cavity decreased one-third, dense opacity 6V.S. to base.

Thoracoplasty—second stage—May 7, 1937.

Right: 20-30 per cent collapse, chiefly upper lobe.

Left: Three ribs more removed—70 per cent collapse, small shadows $1\frac{1}{2} \times 2$ cm. suggestive of open cavity with generalized opacity throughout lung field.

Thoracoplasty—third stage June 8, 1937—parasternal incision with section of portion of pectorales muscle—cartilages and remaining portions of first, and second ribs removed, over remaining small cavity.

Right lung was re-expanded with slight partly healed lesion first and second Interspace.

Left: Cavity almost completely obliterated. Small slit remaining. Remainder of lung atelectatic. 80-90 per cent compression. Sputum became negative for tubercle bacilli. Cavity was seen open for some time but by September, 1937, 85-90 per cent collapse with no cavity visible. Further organization of slight upper lobe lesion on right.

Exercise was increased July, 1938. Patient has remained free of symptoms since. For the last six months the patient has been working part time.

3. Case No. 4363. L. S.

Patient was admitted November 16, 1934, as a far advanced case, tuberculous pneumonia R_3L_1 , with a history suggestive of a rapidly advancing tuberculous process. She had considerable cough, sputum positive for tubercle bacilli, and a fever 101.4 F. A month before admission she had had a condition diagnosed as pneumonia, and pleurisy with possible effusion. She had as well an occasional hoarseness and sore throat with night sweats frequently. Her condition on admission was presumably aggravated by an acute respiratory infection about one month previously (October, 1934).

Her radiographic report showed a recent caseous broncho-pneumonic parenchymal infiltration apex to base. Definite consolidation apex to 3R. with cavity formation, inner zone. Localized soft confluent parenchymal infiltration opposite 3 and 4R., middle and inner zones. Thickened pleura and clouding throughout.

Left side: Slight parenchymal infiltration below inner end of 1R. with congestive changes above descending trunks.

A fifty per cent collapse artificial pneumothorax was decided upon for the right side, and initiated November 24, 1934. By October 26, 1934, upper lobe compression amounted to 20 to 30 per cent with pockets at the apex. Lung was adherent to lateral wall 2-4R. with uniform opacity due to either atelectasis or consolidation. No cavity made out.

By January, 1935, the patient began to run a high swinging type of temperature, and fluoroscopy, showed a fluid level to 5R. At this time there were several distinct pockets of air at the apex with irregular compression of the lung. Upper lobe atelectasis with small cavity below 1R. Definite extension throughout the rest of the lung with consolidation and atelectasis, and two distinct cavities of moderate size, 4th. Interspace.

Left side showed no parenchymal infiltration.

Following this aspirations were carried out with the withdrawal of purulent fluid, and some irrigation practised.

On May 7th, 1935, appearances similar to that above were noted, with the upper lobe definitely re-expanding.

A three stage thoracoplasty was begun May 24, 1935. The first two stages being posterior and the last antero-lateral, with a removal of nine ribs.

By July, 1935 the right lung was well collapsed 85-90 per cent and no cavity or effusions present. The pleuritic clouding had definitely cleared by October, 1936, and the narrow area of lung field remaining showed satisfactory healing.

Patient was discharged as "quiescent", November, 1935, and for the last three years has been doing regular work as a typist.

4. Case No. 4933. L. D. Male, 17 years of age.

Admitted February 18, 1937. Far advanced R_2L_2 , with history suggestive of tuberculosis. Loss of strength, occasional hoarseness with cough and expectoration of one dram daily of sputum positive for tubercle bacilli.

X-ray showed—Right: Localized exudative parenchymal lesion apex to 3R. and 7V.S., chiefly immediately above and below clavicle. Fairly thick-walled cavity 3 x 3 cm. opposite 1R. and thickened apical pleura.

Left: Slight linear parenchymal lesion opposite inner end of 3R.

March 1, 1937, pneumothorax was initiated and carried on for two months

without collapse of the apical cavity now 3 x 4 cm. with scattered mixed exudative productive lesion apex to 3R.

The left side was given a thirty per cent collapse of uniform character.

First stage thoracoplasty May 14, 1937, three ribs removed, which decreased the size of the upper lobe cavity by one half; which still contained a small fluid level.

Left side held a forty per cent collapse.

Second stage, May 28, 1937, four additional ribs removed—seventy per cent collapse with no cavity visible.

Left side ten to fifteen per cent compression with slight effusion in costophrenic sinus.

In April, 1938, seventy per cent collapse due to thoracoplasty. No fluid or cavity in right. Left side—no evidence of tuberculous disease.

Patient discharged April, 1938; "quiescent".

5. *Case No. 4553.* L. B. W. Female, 17 years of age.

Patient admitted August 26, 1935. Far advanced R₃ with a suggestive history and haemoptysis. She had some cough and expectoration of one-half ounce of positive sputum; gaffky 111. Haemoptysis on one occasion.

She showed a localized caseous broncho-pneumonic parenchymal infiltration apex to 3R. and 7V.S. with irregular thin-walled vomica 3 x 4 cm. opposite 2R., middle zone and thickened pleura.

Left: No pathology.

Pneumothorax was advised and carried out in September, 1935, which by November, 1935, showed a collapse of 60-70 per cent, an adhesion opposite 2R., irregular cavity formation in upper lobe, and apex which is adherent. Case was investigated for intra-pleural pneumolysis and found inoperable.

In March of the following spring (1936) the left lung had a very irregular collapse apex to 3R. with numerous adhesions, lower portion of lung well collapsed, possible cavity formation 2 x 3 cm. opposite 2R., middle zone. Small amount of fluid present, sputum was now negative; cough considerable.

In May, 1936, patient developed a pleural effusion.

In July, 1936, there was noted a clouding over the whole lung field particularly at the base. Lung adherent to 2R., with exudative lesions present at apex, and cavity formation opposite 1R. Below 2R. pneumothorax with adhesions. Collapse to seventy-five per cent with atelectatic lung.

During this time routine aspirations were carried out, and became positive for acid-fast organisms—and of thick consistency.

First stage thoracoplasty was undertaken July 24, 1936, and the first four ribs removed. Pleural cavity containing air and fluid still remained.

Second stage August 11, 1936—resection of the next four ribs. Excellent compression. Small air pocket 5V.S. to diaphragm. No fluid. No cavity in lung.

By August 21, 1936, pleural space obliterated. No fluid seen.

Patient discharged May 16, 1937, as quiescent.

6. *Case No. 5030.* T. F. Female, 16 years of age.

Patient was admitted May 6, 1937. A far advanced case of active pulmonary tuberculosis R₂L₂, with a suggestive history and haemoptysis. Loss of strength, weight, and appetite, hoarseness with cough and expectoration, eight ounces of sputum positive for tubercle bacilli daily. She had had repeated haemoptysis. Pleurisy both sides previously, and night sweats.

Her admission films May 8, 1937, showed—Right: disseminated exudative parenchymal lesion apex to 3R. Small cavity 1 x 1 cm. opposite lower margin of 2R., outer zone.

Left: Artificial pneumothorax with a collapse of thirty per cent with broad adhesions. Cavity $3\frac{1}{2}$ x $2\frac{1}{2}$ cm. opposite 3R., inner zone containing fluid level.

Patient seemed to be going down hill rapidly and phrenic exeresis was performed May 22, 1937, with a good basal collapse and a decrease in size of cavity to $1\frac{1}{2}$ x $1\frac{3}{4}$ cm. By July, 1937, there was noted a forty per cent collapse on the left and the cavity had disappeared. Patient began to gain weight and the temperature to stay around 99° F.

Shortly after this, this patient began to run a temperature again 100° F. and films taken October 1, 1934, indicated: Right: Definite extension and reactivation—thick-walled cavity $2\frac{1}{2}$ x 3 cm. in second Interspace, and scattered exudative lesion to 4R. Left: 30-40 per cent collapse, chiefly basal.

Artificial pneumothorax was initiated on the right, October 16, 1937, by March, 1938, there was a forty per cent selective collapse of upper lobe with atelectasis present. Cavity enlarged $2\frac{1}{2}$ x $3\frac{1}{2}$ cm. Left side showed slight clearing.

Because of so recent disease in left lung it was decided to re-expand the right and consider extra-pleural pneumothorax. Patient's general condition was bad, with active fever. Re-expansion showed cavity 3 x $2\frac{1}{2}$ cm. on the right which was closed by the extra-pleural pneumothorax. January 14, 1938, showed the cavity reappearing ($1\frac{1}{4}$ x $1\frac{1}{4}$ cm.) due to re-expansion of lung. Left, 30 per cent collapse.

In the interim, however, patient had begun to improve. She gained weight again and temperature had stayed at normal, making thoracoplasty possible.

First stage thoracoplasty September 21, 1938; removal of first three ribs, right.

Left side now carried a collapse of fifty per cent.

Second stage October 7, 1938, with removal of two additional ribs. Good collapse of upper portion of lung. Cavity closed.

Four months later both lungs healing well, and no cavity formation noted. Patient discharged in satisfactory condition. Sputum negative.

We divide our tuberculous empyemata into five classes as follows:

Type I—Turbid positive fluid. No need of lung collapse.

Type II—Turbid positive fluid. Need of lung collapse.

Type III—Purulent positive fluid. No need of lung collapse.

Type IV—Purulent positive fluid. Need of lung collapse.

Type V—Mixed infected.

Without going into detail our attempted management is as follows:

Type I—Re-expansion of the lung if possible with pleural washings, etc.

Type II—Thoracoplasty. This is done on account of the need for further pulmonary collapse.

Type III—Short attempt at pleural washings and re-expansion. If unsuccessful thoracoplasty is done to prevent progression of empyema.

Type IV—Immediate thoracoplasty.

Type V—Depending upon many factors, various procedures have to be used usually terminating in the more extensive Schede type of operation.

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It is to be distinctly understood that the Editors of this Journal do not necessarily subscribe to the views of its contributors, except those which may be expressed in this section.

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THE daily press recently has carried items from various cities and towns where the governing bodies have dropped their claim to public works projects with a view to freeing the allotted monies for the war effort. These were patriotic and commendable acts with which no one can find fault. There is one field of endeavor however in which the very fact of war enhances the importance of the work and calls if anything for more effort and that is in the field of public health and preventive medicine.

It is a well recognized fact that epidemics are likely to follow a great conflict as witnessed by the pandemic of influenza in 1918-1919 and it should be the aim of Health Departments, Health Officers and private physicians to do everything in their power to maintain the public health at the highest possible level.

A recent editorial in the BULLETIN focussed attention on the venereal disease problem as it is accentuated in wartime but this is only one of the public health activities that must be pursued. Vaccination and toxoiding against diphtheria must be continued as usual, the work of prenatal clinics and maternal welfare has to be kept up, likewise the tuberculosis clinics and what is just as important the provision of sanatorium care for the open cases, and a supervision of the national diet.

If economy has to be practised it must not be in the field of public health and preventive medicine.

H. E. K.

CASE REPORTS

CEREBELLAR ABSCESS

THE patient, a school girl, age 12, when admitted to hospital had a temperature of 104°F, pulse 120, and respirations 25. Her past history is unimportant and nothing abnormal was detected on general physical examination.

The present illness began with left sided earache which started three days previous and the ear had been discharging for two days. There was slight swelling over the left mastoid region and some tenderness. A diagnosis of acute mastoiditis was made.

A mastoid operation was performed by Dr. McGrath who was associated with me all through the treating of this case. Definite pus was found at operation, thus confirming the pre-operative diagnosis.

Following the operation, the patient made satisfactory progress for a time and on the 7th and 8th days her temperature and pulse were normal. However, on the 9th day she had a rigor, her temperature being 103° and pulse 125. The day following the chill her temperature was normal, but on the next day she had a rigor again, her temperature on this occasion being 104.5°F. It was decided she had a lateral sinus thrombosis. A history of a severe chill followed in a day or so by a second chill is very suggestive of an infected lateral sinus.

A second operation was performed on this day and the thrombus in the lateral sinus was cleaned out.

Following this, her condition improved for a short time. The improvement did not continue, however, and on the 8th day her temperature went to 105°F. For four days Neoprontosil was given intramuscularly in large doses. This was followed by the use of Streptocide. Neither improved her condition very much. Her pulse all the while was quickened and at no time did she have signs of cerebral compression as far as the pulse indicated.

The patient complained of headache which was more in the nature of a pain in and about the mastoid region, and she had a whining cry. She was curled up in bed with the affected side uppermost. Vertigo was marked. Mentally she was alert although at times she was delirious. Vomiting did not occur until late. When sitting up in bed, there was a tendency to fall toward the unaffected side. Wasting was marked. Optic neuritis was noted. Deep reflexes were increased slightly with no difference being noted between the two sides of the body. Weakness of limbs. No Kernig's sign. Spinal fluid examinations did not reveal a meningitis to be present. Material from a bulging mass presenting in the mastoid wound, sent to pathologist, revealed cerebellar brain tissue and necrotic debris. Cultures proved sterile.

A third operation was performed on the 11th day after the second operation with cerebellar abscess being the diagnosis. The surface lesion proved the best guide to the location of the suspected abscess, there being slight bulging of the brain tissue. The bone posterior to the mastoid region was trephined and the opening enlarged with bone forceps and made continuous with the original mastoid wound. With the aid of a probe pus was located and a considerable amount evacuated. A large rubber tube was inserted into the

abscess cavity and the subsequent drainage was profuse. Her condition was worse the following day, but later there was slight improvement which lasted for only two days when she became worse again.

Emaciation and pallor by this time were becoming marked. A few days after draining the abscess she was given a blood transfusion (about 400 c.c.). This did not help very much. On the eighth day following the operation she died.

In the differential diagnosis, encephalitis, influenza, endocarditis, typhoid, typhus, labyrinthitis and haemorrhage into the posterior fossa did not come in for much consideration in this case. At first it was difficult to determine whether we were dealing with a brain abscess or meningitis. The absence of such signs of cerebral compression as slow pulse and subnormal temperature increased this difficulty.

Meningitis begins with severe headache and usually vomiting, sometimes convulsions. Neck rigidity is usually definite from the start and headache persists.

Brain abscess begins insidiously as a rule; the early stages may be called influenza. But sometimes an abscess may begin with rigor, vomiting or convulsions.

The examination of the spinal fluid practically ruled out meningitis. The pressure was increased; highest cell count was 10 (on one occasion after the abscess of the cerebellum was opened it was approximately 60); glucose—normal; chloride—normal; no organisms. Removal of spinal fluid is not without danger in brain abscess, especially in the presence of a cerebellar abscess because of the alleged possibility of the sudden release of pressure causing herniation of the medulla, or breaking down adhesions walling off the abscess and thus setting up a generalized meningitis. If necessary for diagnosis only 2 c.c. should be withdrawn.¹

In considering the location of the brain abscess—cerebellar abscess is less common than temporal sphenoidal,² the latter occurring twice as often.¹ In temporo sphenoidal, providing the abscess is large enough, it affects the opposite side of the body, causing paralytic symptoms. Twitching of the muscles concerned may precede the paralysis. If the abscess is deep and causing pressure on the internal capsule, the leg is affected first together with sensory changes, while if in the cortex, the face is affected first.³ Facial nerve paralysis may already result from involvement of the facial nerve in its intrapetrous position, on the same side as the disease.³ The third nerve may be involved resulting in external squint, ptosis, and fixed dilated pupil on the same side as the disease.³

When the abscess is on the left side (as in this case) pressure on the inferior frontal convolution may cause motor aphasia, and upon the back part of the superior temporal convolution auditory aphasia.³ But here it must be remembered that deafness may already be present on account of the middle ear suppuration.

In cerebellar abscess ataxia, incoordination weakness and vertigo are present. Cerebellar abscess is nearly always the result of chronic middle ear disease in which case it is often associated with thrombosed lateral sinus or extradural abscess. When small, the signs and symptoms are indefinite, but as size increases, the amount of pressure compensation that can occur beneath the tentorium is small and the general symptoms of cerebral compression are noted.⁴

At post mortem examination, practically the whole of the left lateral lobe of the cerebellum was involved in abscess formation. However, there were two abscess cavities. The drainage tube was in the first cavity. The other, smaller and situated deeper, drained into the first. Apparently this small abscess broke spontaneously into the large, which in turn was drained by the tube.

The pathologists report on the brain was "typical abscess of cerebellum with basal meningitis."

Reasons, among others, offered for no improvement following drainage are:⁵

- (1) Coexistent cerebellar and cerebral abscesses.
- (2) Loculation in either.

These are considered rare possibilities. If the latter is suspected, insert the gloved little finger; it may be possible to break down the barrier to drainage. This latter was present in this case although it was not necessary to break down the wall.

To summarize:—Acute otitis media of short duration in a young girl, leading to acute mastoiditis. Operation on mastoid followed by apparent recovery only to be complicated by sinus thrombosis, which in turn was followed by cerebellar abscess with loculation.

R. A. MOREASH,
Berwick, N. S.

References

- (1) Bailey: Emergency Surgery, 2nd Edition, P. 771.
- (2) Bowlby and Andrewes' Surgical Pathology and Morbid Anatomy, 8th Ed., P. 516.
- (3) Romanis and Mitchener, Regional Surgery, 6th Ed., Vol. II, P. 39.
- (4) Romanis and Mitchener, Regional Surgery, 6th Ed., Vol. II, P. 39-40.
- (5) Bailey, Emergency Surgery 2nd Ed., P. 779.

The Dalhousie Medical Library

THE new building devoted exclusively to the medical and dental libraries was officially opened on August 30, 1939. A description of the building has already been published in the pages of the BULLETIN. Suffice it to add that the expectations of the library committee and of those responsible for the plans have been abundantly satisfied. Ample space and a quiet atmosphere have already caused the attendance of both students and practitioners to be increased markedly. In response to a request from the student body the library is now opened on Sunday afternoons.

The librarian reports the continued use of both books and journals by members of the profession outside of the City of Halifax. For the academic year 1938-39 some eighty-eight items were recorded as mailed to different parts of the Province under the single regulation that the borrower pay postage charges. The library continues to serve the contributors to the abstract service of the BULLETIN. Mrs. Margaret Cornell, the librarian, reports numerous requests for a search of the recent literature for special subjects of interest. This service makes available to practitioners outside of Halifax the full resources of the library.

The total number of journals now being received on current subscription has reached the level of 153. Recent accessions of books added to the collection are listed below.

LIST OF NEW BOOKS

MEDICAL SCIENCES:

- | | |
|------------------------|--|
| Allen, E. | Sex and internal secretions. |
| Barcroft, J. | The Brain and its environment. |
| Francis, Carl C. | Fundamentals of anatomy. |
| Harris, L. J. | Vitamins and vitamin deficiencies. Vol. 1. |
| Harrow, B. | Biochemistry for medical and dental students. |
| Moon, V. H. | Shock and related capillary phenomena. |
| Treves, Sir Frederick. | Surgical applied anatomy, 10th ed. |
| Beecher, H. K. | The physiology of anaesthesia. |
| Horrall, O. H. | Bile: its toxicity and relation to disease. |
| Mathews, A. P. | Physiological chemistry, 6th ed. |
| Hrdlicka, A. | Practical anthropometry. |
| VanDyke, H. B. | Physiology and pharmacology of the pituitary body, 2v. |

MEDICINE:

- | | |
|---------------------|--|
| Beaumont & Dodds. | Recent advances in medicine, 9th. ed. |
| Craig, C. F. | Amebiasis and amebic dysentery. |
| Findlay, G. M. | Recent advances in chemotherapy, 2d. ed. |
| Long & Bliss. | Clinical and experimental use of sulfanilamide. |
| Murphy, W. P. | Anemia in practice. |
| Osler, Sir William. | Principles & practice of medicine, 13th. ed. |
| Roesler, Hugo. | Clinical roentgenology of the cardiovascular system. |
| Henderson, J. | Wheeler & Jaek's handbook of medicine, 10th. ed. |

SURGERY:

- | | |
|-----------------------------------|--|
| Ross & Carless. | Manual of surgery, 14th. ed. 2 vol. |
| Royal Northern operative surgery. | |
| Watson-Jones, R. | Fractures and other bone and joint injuries. |

OBSTETRICS AND GYNECOLOGY;

- | | |
|--------------------|--|
| Beck, A. C. | Obstetrical practice, 2d. ed. |
| Crossen & Crossen. | Operative gynecology. |
| Greenhill, J. P. | Office gynecology. |
| | Diseases of women, by ten teachers. |
| | Queen Charlotte's text book of obstetrics, 5th. ed. |
| Fluhmann, C. F. | Menstrual disorders: pathology, diagnosis and treatment. |
| Lane-Roberts, C. | Sterility and impaired fertility. |
| Thoms, H. | The obstetric pelvis. |

THE SPECIALTIES;

- | | |
|----------------------|--|
| Blum, Sanford. | Pediatric symptomatology and differential diagnosis. |
| Gifford, S. R. | Text book of ophthalmology. |
| Imperatori & Burman. | Diseases of the nose and throat. |
| McNally, Wm. D. | Medical jurisprudence and toxicology. |
| Noyes, A. P. | Modern clinical psychiatry. |
| Smith & Glaister. | Recent advances in forensic medicine. |
| Stone, E. L. | The new-born infant. |

MISCELLANEOUS:

- | | |
|--------------------|---|
| Lake, N. C. | The foot, 2d. ed. |
| McLester, J. S. | Nutrition and diet in health and disease, 3d. ed. |
| Newman and others. | Twins: a study of heredity and environment. |
| Ryle, J. A. | The natural history of disease. |
| Stern, Frances. | Applied dietetics. |
| Still, F. G. | Common happenings in childhood. |
| Young, F. B. | Dr. Bradley remembers. |
| | The purposes of examinations; a symposium. |
| Lewis, T. | Research in medicine. |

DIGBY COUNTY

Belliveau, P. E., Meteghan, (Clare Mepy).
 DuVernet, Edward, Digby.
 Rice, F. E., Sandy Cove, (Mepy).

GUYSBORO COUNTY

Chisholm, D. N., Port Hawkesbury
 (Mulgrave).
 Sodero, T. C. C., Guysboro (Mepy).
 Moore, E. F., Canso.
 Monaghan, T. T., Sherbrooke (St. Mary's
 Mepy).

HALIFAX COUNTY

Morton, A. R., Halifax.
 Forrest, W. D., Halifax (Mepy).
 Payzant, H. A., Dartmouth.

HANTS COUNTY

Bissett, E. E., Windsor.
 MacLellan, R. A., Rawdon Gold Mines
 (East Hants Mepy).
 Reid, A. R., Windsor, (West Hants Mepy).
 Shankel, F. R., Windsor, (Hantsport).

INVERNESS COUNTY

Chisholm, D. N., Port Hawkesbury.
 Grant, T. E., Port Hood.
 Proudfoot, J. A., Inverness.
 McNeil, A. J., Mabou, (Mepy).

KINGS COUNTY

Bishop, B. S., Kentville.
 Bethune, R. O., Berwick, (Mepy).
 de Witt, C. E. A., Wolfville.
 Moreash, R. A., Berwick.

LUNENBURG COUNTY

Marcus, S., Bridgewater (Mepy).
 Donkin, C. A., Bridgewater.
 Donaldson, G. D., Mahone Bay.
 Zinck, R. C., Lunenburg.
 Zwicker, D. W. N., Chester, (Chester
 Mepy).

PICTOU COUNTY

Blackett, A. E., New Glasgow.
 Chisholm, H. D., Springville, (Mepy).
 Bagnall, P. O., Westville.
 Crummey, C. B., Trenton.
 Dunn, G. A., Pictou.
 Parker, V. H. T., Stellarton.

QUEENS COUNTY

Ford, T. R., Liverpool.
 Smith, J. W., Liverpool, (Mepy).

RICHMOND COUNTY

Deveau, G. R., Arichat, (Mepy).

SHELburne COUNTY

Corbett, J. R., Clark's Harbour.
 Fuller, L. O., Shelburne, (Mepy).
 Dinsmore, J. D., Port Clyde, (Barrington
 Mepy).
 Lockwood, T. C., Lockeport.
 Churchill, L. P., Shelburne. (Mepy).

VICTORIA COUNTY

MacMillan, C. L., Baddeck, (Mepy).

YARMOUTH COUNTY

Hawkins, Z., South Ohio, (Yarmouth
 Mepy).
 Caldwell, R. M., Yarmouth.
 Lebbetter, T. A., Yarmouth, (Wedgeport).
 LeBlanc, J. E., West Pubnico, (Argyle
 Mepy).

Those physicians wishing to make use of the free diagnostic services offered by the Public Health Laboratory, will please address material to Dr. D. J. MacKenzie, Public Health Laboratory, Pathological Institute, Morris Street, Halifax. This free service has reference to the examination of such specimens as will assist in the diagnosis and control of communicable diseases: including Kahn test, Widal test, blood culture, cerebro spinal fluid, gonococci and sputa smears, bacteriological examination of pleural fluid, urine and access for tubercle or typhoid, water and milk analysis.

In connection with Cancer Control, tumor tissues are examined free. These should be addressed to Dr. R. P. Smith, Pathological Institute, Morris Street, Halifax.

All orders for Vaccines and sera are to be sent to the Department of the Public Health Metropole Building, Halifax.

BĒPRON

for the Nutritional Anemias

WYETH'S ELIXIR OF BEEF LIVER (Unfractionated)



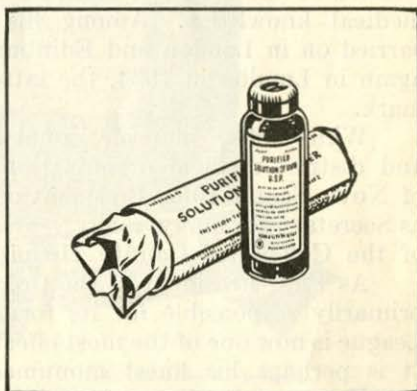
A PALATABLE wine containing the total soluble constituents of 2 ounces of unfractionated Fresh Beef Liver in each fluid-ounce.

Useful in the treatment of nutritional Anemias, Bepron supplies the nutritive fractions which are deficient in these conditions.

DOSE:—One to two tablespoonfuls twice daily.

Supplied in 16 fl. oz. bottles.

WYETH'S PURIFIED SOLUTION OF LIVER



FOR parenteral use 5 or 10 units per cc. Packages of 10 cc. ampoules supplied 50 or 100 units per ampoule.

Dose: 0.1 cc. or 0.2 cc. injected intramuscularly daily, or multiple amounts at longer intervals.

John Wyeth & Brother (Canada) Ltd.
WALKERVILLE, ONT.

OBITUARY

A LONG, useful, and well-lived life came to a close when on Wednesday, January 31, Dr. H. V. Kent laid down his stethoscope for the last time. There was no indisposition other than a cold of some days duration before the final call. This came in the form of a heart-attack which lasted only a brief hour.

Dr. Kent was born in Lower Truro almost eighty-one years ago, a son of Mr. and Mrs. Alexander Kent. He graduated from The Halifax Medical College along with Major General Carleton Jones who during the past world war was D.M.S. at London, England and is now living in Italy. Had Dr. Kent lived only a few more months his full term of professional service would have covered fifty years. All his professional life was spent in Truro. He was especially interested in the medical side of his work and in diseases of the chest. Dr. Kent was one of the pioneers in X-Ray work in Nova Scotia.

He was a man of high ideals and excellent character; professionally and personally he was held in the highest regard. His fellow-practitioners never wearied of admiring Dr. Kent's zeal in keeping abreast of current advances in medical knowledge. Among his major post-graduate studies were those carried on in London and Edinburgh 1894-1895; London winter of 1922; and again in London in 1934, the latter when he was approaching the four-score mark.

While active in professional life he held important offices in provincial and district medical organizations. He was President of the Medical Society of Nova Scotia 1912, President of Colchester-Hants Medical Society, as well as Secretary for many, many years. At the time of his death he was Secretary of the Colchester County Hospital Staff.

As First President of the Colchester County Tuberculosis League he was primarily responsible for its formation, and due to his untiring efforts the League is now one of the most effective organizations of its kind in the province. It is perhaps his finest monument.

He always took a man's full share of the load in whatever good work came to hand—Church, Town and Country. At his funeral his pastor paid a fine tribute to the stalwart work Dr. Kent had done, all his life, for the good of the church. From 1898 until 1909 he was medical officer of the 78th Regiment (militia) with the rank of major, and in 1910 was appointed to the Army Medical Corps holding the same rank. During the First Great War he was Officer Commanding the Military Hospital, Truro, 1916-1917, and later President of the Medical Board, Truro, in connection with the Military Service Act. He was awarded medals for long service in the Colonial Auxiliary Forces.

He served as Town Councillor for several terms, was a member of the School Board, and was especially interested in the Y.M.C.A., of which organization he was president and treasurer for many years.

His outstanding characteristics were his diligence, his faithfulness, and his remarkable ability to inspire confidence. His patients were those who stay with their own doctor year in and year out, some of them for a full lifetime.

Thus a long life was filled to the full with steady and sterling work.

To Mrs. Kent who survives him, and to the four daughters who have ornamented their parents lives we, his fellows in the profession, extend admiration and sympathy.

T. W. MACLEAN, M.D.



SCILEXOL *E.B.S.* **CODOPHEN** *E.B.S.* **BRONEXOL** *E.B.S.*

Each fluid ounce contains:

- Heroin
- Hydrochloride - 1-3 gr.
- Ammonium Chloride - - - 16 grs.
- Chloroform - - - 2 min.
- Acid Hydrocyanic
- Dil. B.P. - - - 4 min.
- Syrup Scillae - - - 90 min.
- Syrup Tolu - - - 120 min.

Dose: One to two fluid drachms repeated every four hours until relieved.

An Efficient Expectorant, Respiratory Sedative and Anodyne

NOTE: Scilexol with Codeine Phosphate 1 grain to the ounce also supplied.

Each tablet contains:

- Ebsal, E.B.S. - - - 3 grs. (Acetylsalicylic Acid)
- Phenacetine - - - 2 grs.
- Caffeine Citrate - - 1/4 gr.
- Codeine Phosphate - - - 1/4 gr.

Dose: One to three tablets as required.

Analgesic Febrifuge Sedative

Each fluid ounce represents:

- Ammonium Carbonate - - - 8 grs.
- Ammonium Chloride - - - 16 grs.
- Prunus Serotina - - 6 grs.
- Senega - - - 8 grs.
- Menthol - - - 1/4 gr.
- Chloroform - - - 2 min.
- Glycyrrhiza - - - q.s.
- Honey - - - q.s.

Dose: One to two fluid drachms every three hours.

Non-Narcotic Stimulating Expectorant

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 TORONTO MANUFACTURING CHEMISTS CANADA
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S P E C I F Y E . B . S . O N Y O U R P R E S C R I P T I O N S

Personal Interest Notes

Dr. L. R. Ryan, Dal. '38, who has been practising for the past year in Dingwall, Victoria County, has moved to Sheet Harbour.

Dr. W. C. O'Brien of Wedgeport was re-elected Mayor of that town on nomination day by acclamation, and will begin his third term of office.

Dr. W. R. McRae of Sydney has been appointed to the Harbour View Hospital Board of Sydney Mines as a representative of the Provincial Department of Health. He replaces Dr. D. W. Archibald who recently tendered his resignation.

Dr. D. R. Sutherland who has practised in the Musquodoboit Valley for the past ten years was recently honoured when he left that section to take up military duty. Friends of his from all sections of the Valley gathered and numerous resolutions expressing appreciation and respect and a gold watch suitably engraved were presented to the Doctor.

Dr. D. W. Archibald of Sydney Mines, who for the past fifteen years has served as a member of the Board of Highland View Hospital, was presented with a smoking set on behalf of the board, the ladies' auxiliary and staff of the hospital at a meeting held at the hospital on the evening of January 30th.

WANTED—MEDICAL SUPERINTENDENT

Medical Superintendent wanted for Children's Hospital in Upper Canada. Salary \$125.00 a month plus maintenance. Further information from the Secretary.

WANTED—RESIDENT PHYSICIAN

Resident physician wanted for the Children's Hospital for the next three months. Salary \$75.00 a month, plus board. Apply to Miss Marjorie Jenkins, Superintendent, Children's Hospital, Halifax, N. S.

PROMPT SATISFACTORY DIURESIS

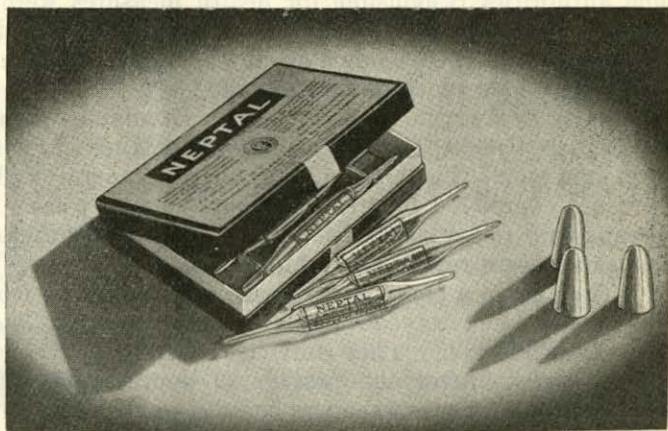
NEPTAL

is a powerful mercurial diuretic which may be administered by intramuscular or intravenous injection for the relief of **Cardiac Failure with Decompensatory Symptoms**. Neptal is also of great value in Chronic Hydræmic Nephritis associated with albuminuria, but without hypertension or nitrogen retention, Hepatic Cirrhosis with Ascites, Bronchorrhœa and Obesity. Neptal is contra indicated in acute and azotaemic nephritis.

HOW SUPPLIED:

Ampoules of 1.5 c.c. of solution, in boxes of five and twenty ampoules.

Suppositories. Boxes of five suppositories.



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Laboratory Poulenc Frères

OF CANADA LIMITED - MONTREAL

Fifty Years Ago

A Calamity and a Lesson

FIFTY years ago in the year 1885 Montreal was scourged from its centre to circumference with the most appalling epidemic of all its years counting from the very day of its birth.

It was a scourge born of ignorance, prejudice and an indifference to public welfare that had earned for the city an ill-repute throughout the world. For ten years a quack doctor named Coderre had worked for fame and won it by a vigorous unending campaign against vaccination. He preached from the rostrum, argued through the press and warned through personal contact until there was established a genuine earnest opposition that led large sections of the population to deliberately prefer the risk of death from a deadly disease to the use of a preventive endorsed by 95 per cent of the world's physicians. The charlatan who by his fanaticism exposed a quarter of a million of people to hideous deadly disease won the support of thousands who yielded to his sophistry. His methods were bold, daring and truculent beyond human belief. He littered the town with repulsive literature blazoned with revolting pictures imaginary of woeful results from vaccination.

The crusade was effective. Sections of the people were frenzied with dread. Vaccination became an abomination to be shunned at all cost of risk. The authorities responsible for health measures were paralyzed by the prejudice that had seized the populace. Vaccination was dropped as the invention of the devil and there came a docile yielding to public clamour a period of calm surrender to the anti-vaccinationists.

Early in August, 1885, the whole Dominion was started by the death of Sir Francis Hincks, Canada's ex-Finance Minister, not from vaccination, but from smallpox. The closing scenes of the funeral of the venerated statesman were not completed before three more smallpox cases were announced in the newspapers, to be succeeded day by day until dozens, scores, hundreds and thousands were registered in the press.

Then came a commercial crisis. Merchandise from Montreal to Ontario was turned back as contaminated contraband. The wholesale merchants were panic stricken. They convened meetings to discuss the crisis, particularly the embargo. After the passage of deprecatory resolutions the convenors decided to ask the newspapers to stop publishing the statistics—the seizures and the deaths. They came to *The Star* Office very earnestly pleading for the stoppage of all publicity relative to the disease now raging throughout the city with hundreds of dwellings labelled with a yellow poster:

Picotte, Smallpox

The deputation to *The Star* Office included:—

Hon. D. A. Smith (Lord Strathcona), Andrew F. Gault, David Morrice, Andrew Robertson, Senator Ferrier, W. C. Macdonald (Sir William), T. C. Shaughnessy (Lord), George Stephen (Lord Mount Stephen), William Wainwright, Henry Hogan, Richard White, John Kerry, D. G. Torrance, Walter

A Protective Factor in Midwinter Diet



Made in Peterborough
Canada By
A. WANDER,
LIMITED

Low temperature and lack of sufficient sunshine combine to give the family physician many problems at this season. Vitality in many cases is at a low ebb.

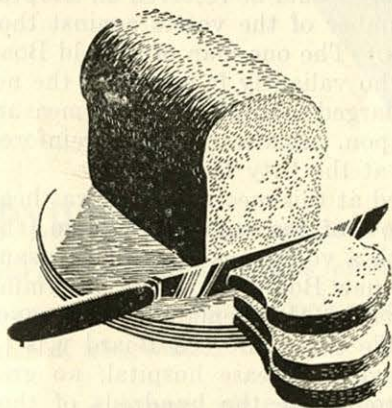
Ovaltine, the well-known tonic food beverage has been found by physicians everywhere an invaluable winter ally. It builds resistance. It supplies those "protective" nutrients the mid-winter diet of this country too often lacks, particularly the vitamins—A, B, D and G and the minerals calcium, phosphorus and iron.

The wholesome flavour of Ovaltine makes it acceptable to all ages. It is quickly and easily absorbed.

Why not advise it in your own practice?

OVALTINE

THE TONIC FOOD BEVERAGE



Before the Loaf of Bread is made

wheat must be grown, shipped to market, milled into flour . . . the flour shipped to the baker who, in turn, has a manufacturing job to do before the loaf is ready for sale. Each step is a complicated process involving labour, machines, money. Money is provided by your bank for just such legitimate needs of industry. The Royal Bank welcomes inquiries for loans for such essential purposes.

The Royal Bank of Canada

Paul, Donald Macmaster, William Clendinning, Henry Lyman, George Craig, Arthur Boyer, James O'Brien, R. R. Grindly and others.

A long discussion ensued. Many suggestions were made by different members of the deputation. When the spokesman, Mr. A. F. Gault, in polite deferential terms, asked for the stoppage of all publicity in *The Star*, the reply was, "Will the suppression of the publicity cure the disease and stop the epidemic?" This rejoinder was discussed with kindly criticism and well modulated entreaty. When the deputation was told by a representative of *The Star* that the suggestion of suppression did not appear to him as a wise measure, he was queried by a member of the deputation—"What would you suggest?"

This was the rather startling reply: "Let us go from here to the City Hall where the Council is now in session and ask for permission to deal with the epidemic. If they manifest disbelief in our good intentions and ability to cope with it, we will offer a deposit of \$25,000 as an earnest of our good will to act discreetly." This proposal was unanimously approved.

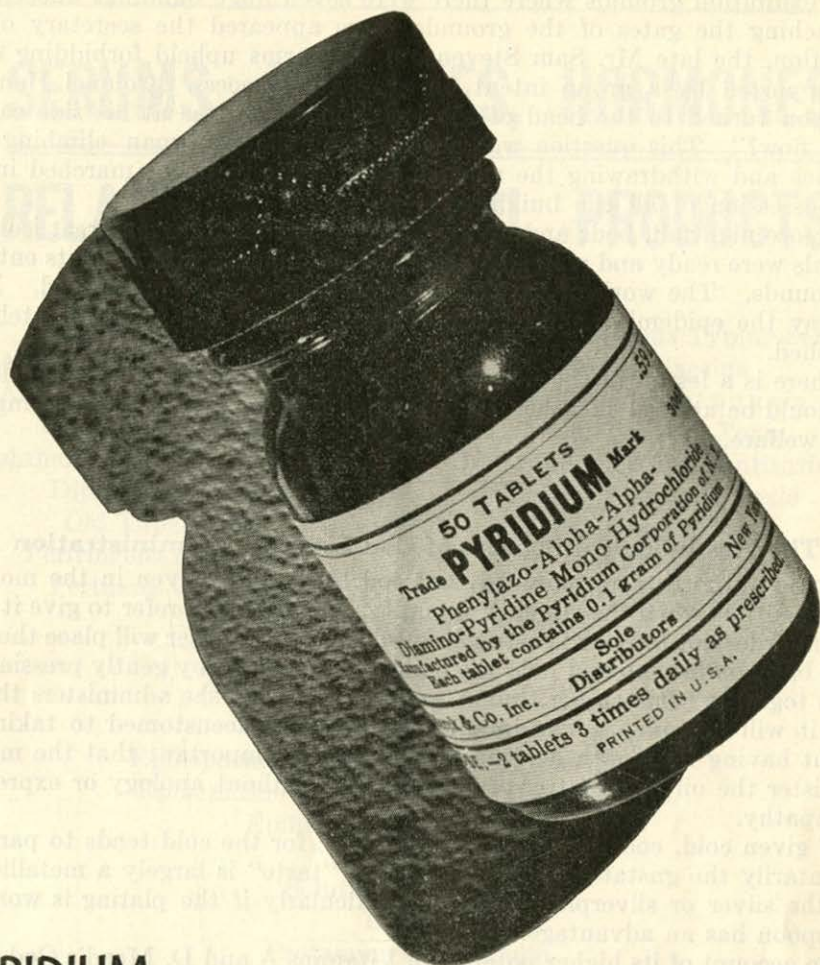
Twenty-five of those present proceeded to the City Hall and sent in to the Mayor, H. Beaugrand, then presiding at a Council meeting, a proposal to depute to the members of the deputation the right to deal with the epidemic. The answer was a polite explanation that the City Charter forbade deputing the aldermen's duties, but it was accompanied by an offer to add six of the visiting deputation to the Board of Health, then consisting of six members. This was accepted. The delegates, acting upon this suggestion, selected the following:—George E. Desbarats, Richard White, Louis Perrault, W. Masterman, A. Levesque, Hugh Graham.

The next day the new Board commenced emergency meetings day and night. Five members of the regular old Board deserted, frightened by the accession of the new members, who presumably would be resolved on adopting drastic measures that might prejudice a number of the voters against those willing to unite with the newly appointed six. The one man of the old Board who refused to desert was Ald. Levesque, who valiantly fought with the new six to the end. At the first meeting of the enlarged committee drastic measures for vaccination and isolation were resolved upon. A meeting of the reinforced Board was announced to be held at 9 p.m. at the City Hall.

Before the discussion of plans were outlined at this meeting there was heard a rumbling uproar from the easterly window of the committee room, then Champ de Mars was seen to be covered with a vociferous mass of thousands in a mad riot against the new Board. The new Board resolutely determined to act and to act drastically, and, daring the results, they remained undismayed.

The great question that seemed to baffle the reinforced Board was the problem of isolation. There was no contagious disease hospital, no great unoccupied buildings that could be used to isolate the hundreds of those afflicted and yet the epidemic could not be checked without isolation. Mr. Richard White was named head of the vaccination committee. He carried out the work quickly and efficiently. A member of the Board, Hugh Graham, of *The Star*, was selected as chairman of the isolation committee with a free hand. In view of the anti-vaccination riots then in threatening aspect, he telegraphed the Ottawa Government saying the epidemic was assuming unmanageable growth and asked for one of the local regiments to support those selected to take measures for checking the disease. The reply came promptly that the Victoria Rifles were selected to support the measures to be adopted.

With Colonel Henshaw and the isolation head, the regiment marched



PYRIDIUM in the treatment of urogenital infections (cystitis, pyelitis [pyelonephritis], prostatitis, and urethritis), affords prompt symptomatic relief, without

- urinary pH adjustment
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 - specialized diet
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for the production of its therapeutic effects

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A decade of service
in urogenital
infections

MERCK & CO. LIMITED Manufacturing Chemists MONTREAL

to the exhibition grounds where there were seven huge buildings unoccupied. On reaching the gates of the grounds there appeared the secretary of the Exhibition, the late Mr. Sam Stevenson, with arms upheld forbidding entry and supported by a group intent on preventing access. Colonel Henshaw thereupon turned to the head of the isolation committee at his side saying, "What now?" This question was answered by the chairman climbing over the fence and withdrawing the wooden bars. The regiment marched in and took possession of all the buildings.

Before nightfall, beds and appliances were installed, seven great isolation hospitals were ready and a steady stream of ambulances with patients entering the grounds. The work of vaccination was then forcibly prosecuted. From that day the epidemic's spread was checked, waned and was ultimately extinguished.

There is a lesson in the history of that great epidemic, and it is a lesson that should be utilized in other situations of gravity and peril affecting the public welfare.

The Psychological Aspects of Cod Liver Oil Administration

Some authorities recommend that cod liver oil be given in the morning and at bedtime when the stomach is empty, while others prefer to give it after meals in order not to retard gastric secretion. If the mother will place the very young baby on her lap and hold the child's mouth open by gently pressing the cheeks together between her thumb and fingers while she administers the oil, all of it will be taken. The infant soon becomes accustomed to taking oil without having its mouth held open. It is most important that the mother administer the oil in a matter-of-fact manner, without apology or expression of sympathy.

If given cold, cod liver oil has little taste, for the cold tends to paralyze momentarily the gustatory nerves. As any "taste" is largely a metallic one from the silver or silverplated spoon (particularly if the plating is worn), a glass spoon has an advantage.

On account of its higher potency in Vitamins A and D, Mead's Cod Liver Oil Fortified With Percomorph Liver Oil may be given in one-third the ordinary cod liver oil dosage, and is particularly desirable in cases of fat intolerance.

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Anti-Anthrax Serum
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 Diphtheria Toxin for Schick Test
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 Vaccine Virus (Smallpox Vaccine)

Pneumococcus Typing-Sera
 Rabies Vaccine
 Scarlet Fever Antitoxin
 Scarlet Fever Toxin
 Staphylococcus Antitoxin
 Staphylococcus Toxid
 Tetanus Antitoxin
 Tetanus Toxoid
 Typhoid Vaccines

Adrenal Cortical Extract
 Epinephrine Hydrochloride Solution (1:1000)
 Epinephrine Hydrochloride Inhalent (1:100)
 Epinephrine in Oil (1:500)
 Heparin
 Solution of Heparin
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 Protamine Zinc Insulin
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 Liver Extract (*Intramuscular*)
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 will be supplied gladly upon request**

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"Busy fingers" can't spill OLEUM PERCOMORPHUM

Even if the bottle of Oleum Percomorphum is accidentally tipped over, there is no loss of precious oil nor damage to clothing and furnishings. The unique Mead's Vacap-Dropper* is a tight seal which remains attached to the bottle, even while the antiricketic is being measured out. Mead's Vacap-Dropper offers these extra advantages also, at no increase in price:

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Mead's Vacap-Dropper will not break even when bottle is tipped over or dropped. No glass dropper to become rough or serrated.

No "messiness"

Mead's Vacap-Dropper protects against dust and rancidity. (Rancidity reduces vitamin potency.) Surface of oil need never be exposed to light and dust. This dropper cannot roll about and collect bacteria.

*Supplied only on the 50 c.c. size;
the 10 c.c. size is still supplied with the ordinary type of dropper.

Accurate

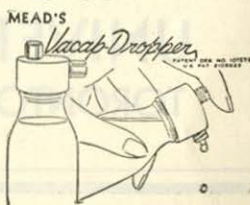
This unique device, after the patient becomes accustomed to using it, delivers drops of uniform size.

No deterioration

Made of bakelite, Mead's Vacap-Dropper is impervious to oil. No chance of oil rising into rubber bulb, as with ordinary droppers, and deteriorating both oil and rubber. No glass or bulb to become separated while in use.

How to Use MEAD'S Vacap-Dropper

Remove both top and side caps. Wipe dropper tip. Place forefinger firmly over top opening and regulate rate of flow by varying the degree of pressure. Oleum Percomorphum is best measured into the child's tomato juice. This is just as convenient and much safer than dropping the oil directly into the baby's mouth, a practice which may provoke a coughing spasm.



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A Canadian National Welcome Awaits You

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HALIFAX, N.S.



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Unexcelled Shadow Forming, Perfect Suspension. No hardening and retention of excreta. Satisfactory for oral and rectal use.

Gives Best Results—Least inconvenience to physician and patient when Mallinckrodt Barium Sulphate is used because it is made by the precipitation process, the only method that gives a uniform fine powder remaining satisfactorily in suspension.

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Neuro-Trasentin

"CIBA"

(Trasentin + phenylethylbarbituric acid)

FOR THE TREATMENT OF NEURO-VEGETATIVE DISTURBANCES

Neuro-Trasentin should undoubtedly be of great value in the following conditions:—

Excitability, states of agitation,
Cardiac neurosis, angina pectoris,
Vascular spasms, hypertonia, nervous dyspepsia,
ulcer pains,
Climacteric disturbances, dysmenorrhoea,
Pruritus, hyperthyreosis, etc.

ISSUED:

Tablets, in bottles of 30 and 100; also in bottles of 500 for hospital use.

DOSAGE:

As a sedative and antispasmodic: 1 tablet 3 to 6 times during the day.

As a hypnotic: 2 to 3 tablets half an hour before retiring.

CIBA COMPANY LIMITED - MONTREAL

DR COLLECTEM

Is it worth just a few minutes
of your time right now, Doctor,



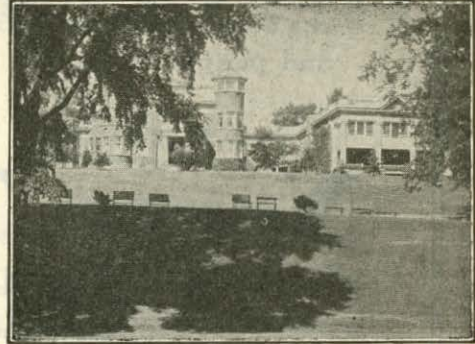
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Mild and incipient mental cases.

Selected habit cases will be taken on advice of
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For rate and information, write

HARVEY CLARE, M.D.

Medical Superintendent

Hitler's Quacks

Because Chancellor Hitler has chased 3,000 Jewish doctors out of Germany and revoked the licenses of the remaining 3,000, the Third Reich faces a serious shortage of physicians. To increase the number of "Aryan" doctors, Hitler last month announced that beginning April first, the period of medical education will be reduced by two full years. Last week he legally recognized *Heilpraktiker* (healing physicians) over 25 years of age. To practice medicine all a *Heilpraktiker* need show is an "intuitive ability" to cure the sick and three years of successful work in healing. Purpose of licensing practitioners who would be labeled quacks in most other countries, was said to be the eradication of quackery.—*Time*.

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