

## Considerations of "Whip-Lash" Injuries

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**T**HE incidence of injuries to the cervical portion of the body or neck has greatly increased in our age of mounting automobile accidents and the profession has become very conscious of the fact that so-called "whip-lash" injuries can be responsible for a host of symptoms and many a medico-legal headache.

Insight into some of the perplexing problems relating to this region can be more readily secured if the following facts are kept in mind and the anatomy of the area is reviewed briefly.

Trauma which is of sufficient severity to fracture bones or alter articular relationships must by its nature damage the adjacent soft tissues such as muscles, ligaments, nerves and blood vessels. However, there may be a radiographic latent period during which no demonstrable X-ray findings can be determined although clinical signs and symptoms may be present. Much damage may be done during this period by injudicious exercise and the use of the part. Follow-up X-ray studies are always indicated as pressure absorption and erosion of the injured intervertebral structures may take place at the points of contact. Time must elapse before the roentgen demonstration of the reparative process becomes manifest. The nerve roots are usually contused between the two involved vertebrae.

The radiologic diagnosis of displacements of the cervical spine requires a full study\* and the assessment of pathology should include not only statements as to the presence or absence of fracture, dislocations, degeneration, necrosis, inflammation anomaly or tumor formation but the status of:

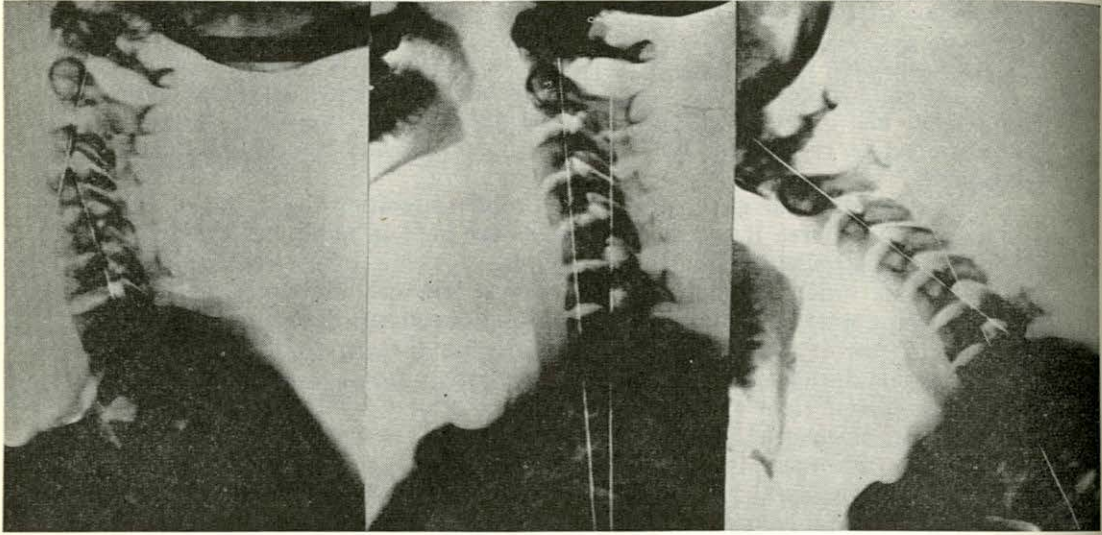
1. The Cervical Lordotic Curve:
2. Deviation, if any, of the Cervical Spine from the midline:
3. Atlas-Axis Articulations:
4. Both Right and Left Intervertebral Foramina:
5. Both Right and Left Uncovertebral Joints:
6. Both Right and Left Apophyseal Joints:
7. The Disc Spaces and the Intercartilaginous Joints:
8. The Bone Texture.

Over the years, several lining methods to facilitate radiologic "screening" have been devised. I have used the one described below since 1941.

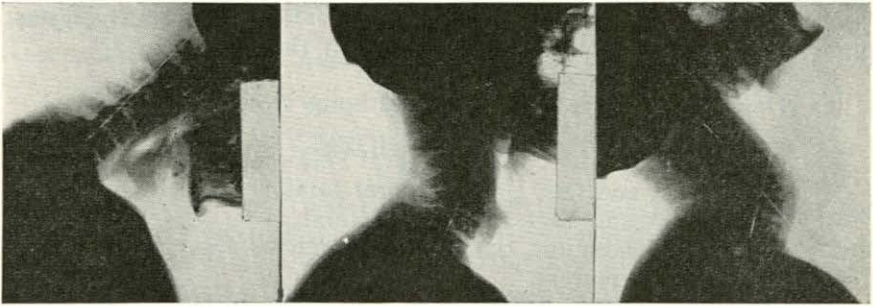
Three lateral roentgenograms are taken of the neck with the patient erect and at the greatest target-film distance that can be secured with the equipment available. These studies are designated "neutral" "forward flexion" and "backward flexion" (extension). The patient executes the last two movements to the limit of his ability. (He is not to be aided.) The axes of flexion are arranged as follows: A line is drawn parallel to the posterior border of the 7th cervical vertebra, and another is drawn in the same manner to the posterior border of the 2nd cervical. In the "neutral" position the point of

\*In my own office the basic procedure for study of the cervical portion of the spine includes the following views: (a) lateral-neutral, (b) lateral-extension and (c) lateral flexion, in each instance right side and left side down; (d) anterior oblique, right and left sides; (e) anteroposterior, with the patient's mouth open, and (f) anteroposterior, lower portion of the cervical segment of the spine, angled 5 degrees toward the head. This is not less than 10 studies, and even more may be needed at times.

intersection is at the 5th cervical level or the 4th to the 5th: in "forward flexion" it is the 4th to the 5th cervical level and in "backward flexion" (extension) it is the 5th cervical.



Lateral Studies of the Cervical Spine at rest, (neutral) and in Flexion and Extension.



Certain essential facts should be kept in mind:

(a) Sprains of the spine are most common in the cervical and lumbar regions because of their greater mobility. The loci at which fixed and movable portions of the spine join each other are the areas of predilection for fractures.

(b) The 5th cervical vertebra is the most commonly subluxated (incompletely dislocated) vertebra and this may well be expected since flexion and extension in the neck are freest between the 3rd and 6th cervical pieces. The subluxation is usually anterior: the articular process of one vertebra slips forward and falls down on the pedicle of the vertebra below, resting in the intervertebral foramina. Sub-

luxations of this type occur readily because the articular processes (Apophyseal Joints) in the cervical region are practically horizontal (Sagittal).

(c) The cord is enlarged where most nerves leave or enter and the cervical enlargement extends from the upper end of the cord to the second thoracic segment.

(d) A typical cervical vertebra consists of two essential parts, the anterior segment or body and a posterior part; the vertebral or neural arch (these enclose a foramen, the Vertebral Foramen), the arch consists of a pair of pedicles and a pair of laminae and supports 7 processes: articular (2 superior and 2 inferior): 2 transverse and 1 spinous. The cervical vertebra include two atypical pieces, the atlas and the axis which are **Peculiar** (Piersol).

The cerebrospinal nerves emerge through the intervertebral foramina which are formed by the vertebral Notches of contiguous vertebra. Alterations of the dimensions of the intervertebral foramina may result in impingement, irritation and damage to the regions of these nerves producing alteration of both "motor" and "sensory" functions in the region of the head, neck and arms.

There are eight cervical nerves and these divide into two rami, anterior and posterior. Essentially the first four cervical nerves are distributed to and supply the neck, head and posterior portions of the shoulders while the lower four through the Brachial Plexus, supply the entire hands, arms, lateral chest wall and to a less extent the upper anterior chest wall and shoulders.

The pioneer work of Bell and Magendie separated the sensory and the "motor" nerves. It remained for Sherrington to demonstrate that in regard to the fibres of touch, temperature and pain, their pathways crossed to the contralateral side in close relationship to the central canal of the cord either in the anterior or posterior commissure. In the cervical region, this crossing is increasing oblique involving four or five segments and Sherrington's formula explains why a unilateral pathology, for example, at the levels, C. 6 - C. 7, manifests itself to the patient by pain not only at that level, but on the opposite side at the levels, C. 1, C. 2 and C. 3. Towne quoted in Lewin's **Fractures and Dislocations**, states that "Neurologic examination indicates accurately the extent of interruption of the motor and sensory impulse." Nevertheless, such interpretations are very difficult and radiographic findings are of the greatest value.

The cervical portion of the sympathetic trunk consists of three ganglions connected by intervening cords. This cervical portion receives no white rami communications from the cervical spinal nerves. Its spinal fibres are derived from the white rami of the upper thoracic nerves and enter the corresponding thoracic ganglia of the sympathetic trunk through which they ascend into the neck. The spinal component consists of pre-ganglionic and visceral fibers. The cervical trunk may contain, a few post-ganglionic fibers. These nerves, in addition to the regional viscera, supply the blood vessels.

Post-traumatic headache is a common complaint with these injuries, and this manifestation of a disease process is due to the intimate connections of the upper cervical nerves (especially C. 2) with the trigeminal and/or Kovacs (Acta. Radiol. 43: Jan. 55) points out due to inflammation degeneration or trauma producing dislocations of the cervical apophyseal joints causing com-

pression of the vertebral arteries and the accompanying sympathetic nerves.

Such headache may be uni-lateral or bi-lateral.

In all cases where the proper physical examinations and X-ray studies are made, assessment of pathologic alteration can be determined. Objective radiographic evidence is worth not less than 10,000 words of explanation.

### Summary:

For determination of "Whip-Lash" injuries of the neck, full clinical and radiographic studies are needed. A "Screening" method used by the author is described. The radiographic analysis should cover the items mentioned in the text of the article. The likely pathogenesis of post-traumatic headache is considered and the Sherrington formula is given to explain pain patterns in the neck.

### ACKNOWLEDGEMENTS

To Donald Mainland, M.B., Ch.B., D.Sc., etc. Professor of Anatomy at Dalhousie who by precept and example showed me how to use available texts and materials; such as his notes, Gray and Cunningham and to Drs. Bean's Structural Neurology and Dr. Cruickshank's Physiology for the use and understanding of Sherrington's Formula.

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## SLOW DOWN AND LIVE

High speed and tired drivers are blamed for most summer highway accidents by the Canadian Highway Safety Conference in a reminder to Canadian motorists.

Learning to slow down and take it easy is the beginning of wisdom at the wheel, says the Conference which suggests the following code for safe driving:

- 1.—Slow down at the first glimpse of children playing in the street.
- 2.—Slow down at intersections, traffic circles, and railway and cattle crossings.
- 3.—Slow down before entering city and town limits and any other crowded area.
- 4.—Slow down for coffee breaks every 100 miles.
- 5.—Slow down after dark and under bad weather or road conditions.
- 6.—Slow down to give the other fellow a chance, even if he is only a pedestrian.
- 7.—Slow down for greater comfort and less strain. You'll enjoy your trip more, and will survive it!

# The Interpretation of the Volmer Patch Tuberculin Test

H. B. COLFORD, M.D., M.P.H.

FOR many years now the Volmer Patch Test has been widely used in the case-finding and diagnosis of tuberculosis. On account of the simplicity of carrying out the procedure, the patch test has been preferred to other forms of the tuberculin test e.g., the intradermal and scarification tests. Ordinarily, in tuberculosis control programs, the patch is applied and read by the public health nurse.

In talking with people who work in this field, or in reading literature on the subject, one gets the impression that the patch test of Volmer is a pretty reliable test, the results being clear-cut — either positive or negative. For example, one reads (1) "The Volmer Patch Test, which consists of two pieces of filter paper impregnated with old tuberculin, is at least as effecient in eliciting positive reactions as the first testing strength of PPD\* or old tuberculin and will detect perhaps 90% or more of the positive reactors to tuberculin." Again, the leaflet published by the Lederle Laboratories the application and reading of the patch test states that — "Positive reactions appear in various forms which may be interpreted by the physician." A little further on the same leaflet reads — "Even if two red spots appear after the tape is removed, it does not mean that active tuberculosis is present. It simply indicates that further examination by means of X-Ray and physical examination should be done."

This seems to imply that two red spots appearing after the patch has been removed is a definite indication that the patient is a positive reactor to the test material, i.e., that he has definitely been infected by the tuberculosis bacillus, and that it only remains to be proven by other tests whether or not he has active disease.

Referring to a standard text book of internal medicine, one reads as follows: (2) "A positive reaction is one that shows edema and redness of varying degree after 48 hours. If there is no edema the reaction should be considered negative." According to this authority then, edema, as well as redness, is necessary before the test can be considered positive. Apparently, there is some conflict of opinions between these two authorities on the interpretation of the Patch Test of Volmer.

Again, this second authority in discussing the patch tuberculin test states: (3) "The Volmer Patch Test is painless, quick **accurate**, and saves the use of the instruments as well as trauma to the skin. It does not cause focal or constitutional reactions, **shows a sharply limited area of reaction**, and prevents uncontrollable spread of tuberculin in the skin."

The above quotations were chosen at random from the literature and they are typical of such statements made routinely by authors and teachers, not only on the subject of tuberculosis but on subjects in general.

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\*Purified Protein Derivative of Tuberculin.

The purpose of this paper is to describe some of the difficulties encountered recently in the interpretation of the Volmer Patch Test reactions in a small group of children in one of the Halifax City Schools. The opportunity arose for obtaining these data when the whole school was being patch tuberculin tested as a means of case-finding in our tuberculosis control program. The project was carried out with a view to determining the accuracy of interpretation of the Volmer Patch Test as it is done routinely by nurses and doctors. The intradermal test employing intermediate PPD was used as a check against the VPT readings. A reaction of six mm. of induration to intermediate strength PPD was considered positive. Any lesser reactions were considered negative. Two doctors read the PPD reactions independently. The area of induration was actually measured according to a pre-arranged plan and there was no disagreement between the two doctors as to whether the pupil was a positive or negative reactor to second strength PPD.

In all, 758 children, male and female, grades primary to nine, were patch tuberculin tested and the results were read independently by four persons, two of which were nurses and two doctors. Children who had BCG previously were excluded from the study. Each reader gave the result as being positive, doubtful, or negative. The results of the readings were later compared and of the 758 children tested, there was some disagreement among the readers in 140 cases as to whether they were positive, doubtful, or negative, i.e., there was disagreement among the readers in 18% of the total number tested.

Of the 140 cases in which there was disagreement in the interpretation of the patch test, 71 were selected for PPD. These 71 were cases in which the disagreement was most pronounced. Of these 71 cases only 54 parents signed permission slips for them to have the intradermal test, and of these 54 cases, only 40 actually received PPD. The others, either because they were absent on the day of the test, or showed undue apprehension where the testing was being done, or for some other reason, were left out of the group. As stated in the foregoing, there was no disagreement between the two doctors in the interpretation of the PPD intradermal tests.

When the patch test readings were compared with the PPD readings, the following results were obtained:

#### V.P.T. READ.

| Intermediate | PPD Read | Pos. | Dbt. | Neg. | Total | % Agree | % Dis-agree | % Doubtful |
|--------------|----------|------|------|------|-------|---------|-------------|------------|
| Nurse 1      | Pos.     | 1    | 0    | 3    | 4     | 25.0    | 75.0        | 0          |
|              | Dbt.     | 0    | 0    | 0    | 0     |         |             |            |
|              | Neg.     | 6    | 15   | 15   | 36    | 41.7    | 16.6        | 41.7       |
|              | Total    | 7    | 15   | 18   | 40    |         |             |            |
| Nurse 2      | Pos.     | 2    | 1    | 1    | 4     | 50.0    | 25.0        | 25.0       |
|              | Dbt.     | 0    | 0    | 0    | 0     |         |             |            |
|              | Neg.     | 9    | 18   | 9    | 36    | 25.0    | 25.0        | 50.0       |
|              | Total    | 11   | 19   | 10   | 40    |         |             |            |
| Doctor 1     | Pos.     | 1    | 1    | 2    | 4     | 25.0    | 50.0        | 25.0       |
|              | Dbt.     | 0    | 0    | 0    | 0     |         |             |            |
|              | Neg.     | 0    | 16   | 20   | 36    | 55.6    | 0           | 44.4       |
|              | Total    | 1    | 17   | 22   | 40    |         |             |            |
| Doctor 2     | Pos.     | 1    | 0    | 2    | 3     | 33.3    | 66.6        | 0          |
|              | Dbt.     | 0    | 0    | 0    | 0     |         |             |            |
|              | Neg.     | 7    | 13   | 12   | 32    | 37.5    | 21.9        | 40.6       |
|              | Total    | 8    | 13   | 14   | 35    |         |             |            |

It will be seen from Table 1 that, of the four children who were positive by the PPD Test, Nurse 1 read only one positive by the VPT, i.e., she was in agreement with 25% of the cases and disagreed with 75% of the cases. Nurse 2 was in agreement with 50% of the cases, was doubtful about 25% and disagreed with the remaining 25%. Doctor 1 was in agreement with 25% of the cases, was doubtful in 25%, and disagreed in the remaining 50%. Doctor 2 (followed only three of the four positive PPD's) was in agreement in 33 1/3% of the cases, and disagreed in the remaining 66 2/3%. Of the total 36 cases who were negative by the PPD Test, there was similar disagreement among the readers, as can be seen from the table.

Table II presents the same data in another way:

|          | No. VPT'S<br>read | No. read<br>correctly | No. read<br>Incorrectly | Reading<br>"Doubtful" | %<br>Correct | %<br>Wrong | %<br>Doubtful |
|----------|-------------------|-----------------------|-------------------------|-----------------------|--------------|------------|---------------|
| Nurse 1  | 40                | 15                    | 10                      | 15                    | 37.5         | 25.0       | 37.5          |
| Nurse 2  | 40                | 11                    | 10                      | 19                    | 27.5         | 25.0       | 47.5          |
| Doctor 1 | 40                | 21                    | 2                       | 17                    | 52.5         | 5.0        | 42.5          |
| Doctor 2 | 35                | 13                    | 9                       | 13                    | 39.1         | 25.7       | 37.1          |

Referring to this table, if we assume that the PPD Test gave the correct tuberculin status of the individual tested, then the VPT as a means of assessing the tuberculin status of these individuals, was correct only 37.5% of the time when read by Nurse 1; 27.5% when read by Nurse 2; 52.5% when read by Doctor 1; and 39.1% when read by Doctor 2.

Admittedly, the above data are based on a small number of individuals tested; therefore, they do not warrant making definite conclusions regarding the accuracy of the Volmer Patch Test. They do, however, suggest — (1) that the Volmer Patch Test is not so accurate as is generally believed and (2) the Volmer Patch Test is not so easily interpreted as it is usually stated to be in the literature.

### Acknowledgements)

The author wishes to extend sincere thanks to the school authorities of the Halifax City Schools for their courteous co-operation at all times during this study. The interest and help of the principal and teachers has been reflected in the high degree of co-operation from the pupils who took part in the study.

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Thanks are also extended to Dr. C. B. Stewart, M.D., Dr. P. H., Dalhousie University, for help in arranging the study and assisting in carrying out the program of administering the test material.

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# The Hazards to Man of Nuclear and Allied Radiations\*

(Excerpts from a Medical Research Council Publication June, 1956)

**T**HE immediate occasion for the Government's request to the Medical Research Council to set up this Committee was the widespread public concern about the long-term effects of nuclear weapon testing. This is only one aspect, however, of the much larger problem arising from the increasing use of ionizing radiations. It is already apparent that the future development of our civilization is closely bound up with the exploitation of nuclear energy. At present, the potential hazards from its possible military uses overshadow in many people's minds the vast potentialities for good of this new source of power. The hazards to health are qualitatively the same, however, whether they arise from nuclear weapons or from the use of ionizing radiation for peaceful purposes. The difference is one of degree and intensity only. As with other sources of energy that man has harnessed to his service, the use of ionizing radiation necessarily entails risk; but the risk is controllable within limits that he can accept. It is the purpose of this report to indicate the nature of the risks and the extent to which they can be controlled . . . .

It will be evident to any reader of this report that, at the present time, there are many large and serious gaps in our knowledge of the medical and biological effects of ionizing radiation. If the potentialities for good are to be exploited with confidence and safety, it is necessary that these gaps should be filled. Much research on many broad fronts will be required. Given the necessary facilities, there is no reason to doubt that the information can be obtained; and we attach the greatest importance to the recommendations for future work that we have been invited to submit for the consideration of the Medical Research Council. . . .

The Effects of Radiation on the Health of the Individual.

## Introduction

Experience of the effects of ionizing radiations has been accumulating with increasing rapidity since the benefits which they may produce in the treatment of malignant disease first began to be appreciated. This experience has been limited, in the main, to the effects produced by the relatively large doses which it is often necessary to give to the area of the body under treatment. More recently, knowledge of the effects of very large doses to the whole body has been obtained as a result of the atomic bomb explosions in Japan. In this chapter it will be necessary to draw heavily on the information from these two sources in considering both the acute and the long-term effects of exposure to radiation, but the reader must bear in mind that such information is only indirectly relevant to the circumstances of ordinary civilian life, since doses of this magnitude would only be conceivable in the immediate vicinity of an accident in a nuclear reactor.

\*Under the chairmanship of Sir Harold Himsworth, London, England.



There is much less information about the possible effects of chronic exposure to very low doses of radiation, such as those to which special groups of workers may be exposed in the course of their occupations. At a time like the present, when nuclear energy is being intensively developed for civil use, the importance of obtaining such information cannot be exaggerated. The investigation which we have sponsored on leukaemia was undertaken in an attempt to obtain information on the relationship between the size of the dose of radiation and the incidence of the disease among patients with ankylosing spondylitis, so that conclusions might be drawn about the effects of lower doses. The investigation must be regarded, however, as only the first step towards this goal.

### Sources of Information

Information about the effects of radiation on man has been derived from four main sources: radiotherapeutic experience; occupational experience, including that from accidents; experience from atomic bomb explosions; and animal studies.

**Radiotherapeutic experience.** Both X-rays and the gamma rays of radium have been used for many years in the treatment of disease, mainly in the treatment of cancer. Observation of patients receiving radiotherapy has yielded information on the general effects of radiation and on the effects produced in different tissues; and the therapeutic use of radioactive isotopes has provided data on the effects of radioactivity within the body.

**Occupational experience.** Information on the occupational hazards of radiation has been obtained from studies of three groups of workers: medical radiological workers, painters of luminous dials for watches and clocks, and miners working radioactive ores in the Schneeberg mines in Saxony and in Joachimsthal. The experience of these three groups serves to illustrate three different forms of radiation hazard. The radiological workers were exposed mainly to external irradiation by X- and gamma rays, and some developed skin cancer, or bone-marrow damage leading to severe diseases of the blood. The luminous-dial painters ingested paint containing the naturally-occurring radioactive elements radium, mesothorium and radiothorium, which are retained within the skeleton, and some developed bone tumours. The miners of Joachimsthal and Schneeberg worked in an atmosphere containing high concentrations of the radio-active gas, radon, and many developed lung cancer. The study of these three different hazards has contributed greatly to our knowledge of the harmful effects of radiation, and has provided data for the formulation of safety standards.

**Atomic bomb experience.** The atomic bomb explosions over Hiroshima and Nagasaki brought widespread destruction to these cities. Blast and fire caused most of the casualties, but about 15 to 20 per cent were caused by the gamma and neutron radiations emitted during the explosions. In 1946 the United States established in Japan the Atomic Bomb Casualty Commission, which has studied the immediate and the long-term effects of radiation from the bombs on the populations of both cities; the findings have been of great value in expanding knowledge on this subject.

**Analogous effects produced in animals.** The discovery that X-rays could produce changes in human tissues led investigators to study the effects of radiation on animals. As a result, it was established that radiation produces effects in animals similar to those observed in man and it thus became possible

to make an experimental approach to the problem of radiation hazards. The knowledge thus gained has been drawn on freely in this report.

### **Factors Affecting the Severity of Radiation Injury**

The harmful effects of radiation can be divided into those developing within a few weeks of exposure and those developing some considerable time, perhaps many years, afterwards. Illnesses which develop within a few weeks are sudden in onset and run an acute course, whereas those occurring some years after exposure develop insidiously.

The severity of radiation injury in any particular instance is determined by the interplay of several factors: the type and dose of radiation received, the duration of the period of exposure, the extent and part of the body which has been irradiated, and also the age of the person exposed.

**The dose of radiation received.** If the dose of radiation is a large one and is received by the whole body in the space of a few minutes, a severe and possibly fatal illness is likely to develop within a few hours, and certainly within a few weeks, of exposure. Some of those who survive this early illness may die several years later from one of the delayed effects of radiation, such as anaemia or leukaemia. Exposure of the whole body to smaller doses of radiation, over a period of months or years, will not cause the early illness, but there may still be a slightly increased risk of death from the delayed effects in later years.

**The extent of the body irradiated.** On the other hand, if only a fraction of the whole body is irradiated, as in radiotherapy, immediate general effects are rare, although some patients may develop a mild form of the early illness, known as radiation sickness. It is often necessary to give a large dose locally and there may be local reaction in the irradiated area with temporary reddening of the skin or blistering similar to that which occurs in sunburn. Delayed local effects that may occur in these patients are scarring, less commonly necrosis and rarely the later development of cancer in the irradiated tissues. It is now apparent that there may be delayed general effects, a small proportion of patients in later years developing anaemia or leukaemia.

**The part of the body irradiated.** Experience has shown that there is a difference in the general effects of radiation according to the part of the body which is irradiated. Even quite a large dose of radiation given to a portion of a limb will usually produce no general ill effects whereas a similar dose directed to an equally large volume of tissue in the upper abdomen, for example, may produce severe immediate illness.

**The type of radiation.** The severity of effect produced by radiation may also depend to some extent upon the type of radiation concerned, since radiations differ in their powers of penetration and in their destructive effects. For example, fast neutrons are about ten times more potent than X- or gamma rays in causing cataract in the lens of the eye, although these three forms of radiation differ very little in their capacity to cause the early acute form of illness.

**The age of the individual exposed.** It has long been known to radiotherapists that young children are more likely than adults to develop reactions after irradiation. Further evidence on this point comes from a recent report on the inhabitants of the Marshall Islands, who were exposed to radioactive fall-out after the thermonuclear test explosion in that area of the Pacific Ocean

in the spring of 1954. A consistently greater fall in the number of white corpuscles in the blood occurred among children than among adults, and a similar age-difference in response was noted also in regard to loss of hair.

**The frequency of radiation effects.** Reasonably good estimates have been made of the numbers likely to develop the acute illness under varying conditions of whole-body irradiation. Thus, every member of a population receiving a single whole-body dose of 500 r of gamma-rays would become ill shortly afterwards; if the dose were 150 r, only about half would do so; and, if it were of the order of 50 r, sickness would be extremely rare. It is much more difficult to assess the proportion likely to suffer from the delayed effects; all that can be said with certainty is that it would be small.

### The Early Effects of Exposure to Radiation

The following description of the effects of a single heavy dose of gamma rays to the whole body is based on observation of the bomb-victims in Nagasaki and Hiroshima. It must be repeated that, in peacetime, exposure at this level could result only from an accident which would rarely, if ever, occur and that, even then, only those in the immediate vicinity of the disaster would be affected.

**Effects of heavy dosage.** The first effect of exposure of the whole body to a heavy dose of gamma rays of the order of 500 r is a sensation of nausea developing suddenly and soon followed by vomiting and sometimes by diarrhoea. In some people, these symptoms develop within half an hour of exposure; in others, they may not appear for several hours. Usually, they disappear after two to three days. In a small proportion of cases, however, the symptoms persist; vomiting and diarrhoea increase in intensity; exhaustion, fever, and perhaps delirium follow; and death may occur a week or so after exposure.

Those who recover from the phase of sickness and diarrhoea may feel fairly well, although examination of the blood will reveal a fall in the number of white cells. Between the second and fourth weeks, however, a new series of ailments, preceded by gradually increasing malaise, will appear in some of those exposed. The first sign of these developments is likely to be partial or complete loss of hair. Then, from about the third week onwards, small haemorrhages will be noticed in the skin and in the mucous membranes of the mouth, which will be associated with a tendency to bruise easily and to bleed from the gums. At the same time, ulcerations will develop in the mouth and throat, and similar ulceration occurring in the bowels will cause a renewal of the diarrhoea. Soon, the patient will be gravely ill, with complete loss of appetite, loss of weight, and sustained high fever. Feeding by mouth will become impossible, and healing wounds will break down and become infected.

At this stage, the number of red cells in the blood is below normal, and this anaemia will increase progressively until the fourth or fifth week after exposure. The fall in the number of white blood cells, noted during the first two days after exposure, will have progressed during the intervening symptomless period, and will by now be reaching its full extent. The changes in the blood-count seriously impair the ability to combat infection, and evidence from Nagasaki and Hiroshima shows that infections of all kinds were rife among the victims of the bomb. Many of those affected die at this stage and, in those who survive, recovery may be slow and convalescence prolonged; even when recovery

appears to be established, death may occur suddenly from an infection which in a healthy person would have only trivial results.

**Effects of lighter dosage.** The radiation effects described above are the most severe which can follow a single wholebody dose of 500 r of gamma rays and still allow some hope of survival; but at least half of a population so exposed would die. With smaller doses, fewer people would develop symptoms and the illness would become correspondingly less severe; thus, with a dose of 100 r, not more than 15 per cent of the exposed population would be affected, the illness would be comparatively mild, and very few, if any, would die.

**Effects of exposure to "fall-out" in the vicinity of an explosion.** The radiations considered above have been those occurring within one minute of the detonation of a nuclear weapon. These radiations have been called the "prompt" radiation to distinguish them from those emitted by the radioactive dust, or fall-out, which settles over a wide area in the vicinity of an explosion. The fall-out may itself be active enough to cause radiation illness of a type similar to that described above and, in addition, it may contaminate and damage the skin with which it comes in contact.

Following the firing of a thermonuclear weapon in the region of the Marshall Islands, the fall-out on one island was so heavy that it was compared to snow, and the inhabitants received an estimated average whole-body dose of 175 r. This fall-out did not cause any deaths, but it did produce a mild illness with early sickness and diarrhoea, a fall in the number of cells in the blood, loss of hair, and some ulceration of the skin contaminated by radioactive material. The skin lesions, caused largely by the higher local dose of beta-radiation emitted by the fall-out, appeared about two weeks after exposure on those parts of the body which had not been protected by clothing, and took the form of spotted areas of increased pigmentation, from most of which the skin peeled off as if it had been sunburnt. In about 20 per cent of cases, deeper ulceration of the skin occurred but all wounds healed satisfactorily.

**Relationship between dose and incidence of effects.** For the purposes of assessing risk and defining standards of safety, it is necessary to know the nature of the relationship between the dose of radiation and the effect induced. This relationship may be a simple linear one in which the incidence of the particular disease increases strictly in proportion to the dose received, or it may be a curvilinear one in which, with each successive and equal increment in dose, the incidence increases not by an equal but by a progressively greater amount. All the evidence suggests that the relation between dosage and radiation effects occurring within a few weeks of exposure is of the latter type, and that the curve shows a "threshold" level, implying that a certain quantity of radiation must be exceeded before these particular effects are produced.

### **The Delayed Effects of Exposure to Radiation**

Delayed effects of radiation which have been observed locally in tissues heavily irradiated are atrophy and fibrosis of the skin and underlying soft tissues, and sudden breakdown or necrosis of tissues such as bone and cartilage. In rare instances cancer has subsequently developed in the damaged tissues. Cataract has occurred if the lens of the eye has been irradiated. The delayed effects of radiation which are known, are the development of severe anaemias and leukaemia; in addition, evidence is beginning to accumulate from observations made on animals that irradiation may cause some shortening of the

normal life span. In our report we have dealt in considerable detail with leukaemia, because experience in Japan following the atomic bomb explosion in 1945, and the results of our own investigation on the incidence of leukaemia among irradiated patients, have provided more precise information on the effects of different levels of exposure than is available for any other of the delayed effects.

The knowledge that long-term effects may be produced by radiation is in itself an insufficient basis for assessing the risk that any of them will develop as a result of a particular dose. For this purpose, it is necessary to estimate, from national mortality statistics, the incidence of the condition in the absence of exposure to radiation additional to that from natural sources, and then to compare this figure with the incidence of the same condition in a population that has been exposed to radiation. If an increase is demonstrated, the frequency with which the condition develops at different levels of radiation dose must be determined, and the relationship between the dose and the incidence of the disease must be evaluated. Only then is it possible to assess the hazards, if any, associated with the different uses of radiation.

### Induction of Leukaemia

Leukaemia is a disease in which uncontrolled over-production of the white blood-cells occurs. It is at present invariably fatal, although some forms may run a protracted course over many years. Several kinds of leukaemia are described according to the type of cell mainly affected. Usually, there is an increase in the number of the affected cells in the blood, associated with the appearance of immature forms of the cell in question. In some cases, however, the numbers in the blood may fall below normal through failure to liberate the cells from their site of formation in the bone marrow; the disease is then known as aleukaemic leukaemia.

In many countries the death rates from leukaemia have shown a steady rise in recent years. In 1920 the crude annual death rate from this condition for both sexes in England and Wales, for example, was 11 per million persons; in 1954 it was 49 per million. Some of this rise has undoubtedly been due to an improvement in diagnosis but it seems probable that this is not the whole explanation and that, for a reason as yet unknown, there has been a real increase in the national death rate from leukaemia.

It is known that leukaemia may be induced in animals as a result of exposure to radiation. Case reports have appeared from time to time of patients who have developed leukaemia after exposure to radiation for the treatment of various disease, and there have also been a number of reports of radiologists dying from leukaemia. Such isolated reports do not of themselves prove that the relationship is one of cause and effect, but the matter has now been put beyond doubt by a series of recent observations on the incidence of leukaemia under conditions in which an estimate could be made of the degree of exposure to radiation.

#### **Leukaemia following a single exposure; atomic bomb explosions.**

The most recent information, for which we have to thank the United States National Research Council, covers all cases of leukaemia recorded by the Atomic Bomb Casualty Commission in Nagasaki and Hiroshima between January, 1947, and August, 1955. Vital statistics allow an estimate to be made of the number of cases of leukaemia that would have been expected to

occur over a similar period in a Japanese population not exposed to radiation from the bombs but otherwise comparable to the surviving populations of Nagasaki and Hiroshima. Calculations have been made for the combined totals of the survivors of the explosions in both cities.

During the eight years from 1947 to 1954, about 25 deaths from leukaemia would have been expected in an unexposed Japanese population of the same size and having the same age and sex distribution as the combined populations of survivors from both cities. Over the same period, however, 91 proven and 14 suspected cases have been recorded among those present at the time of the explosion and still resident in one or other city at the time of diagnosis. The difference between the expected and the observed number of cases is so great that it is most unlikely to be due to chance.

The difference between the numbers expected and those observed becomes even greater if the most heavily irradiated survivors are considered separately. Only for Hiroshima are adequate details available of the distances from the centre of the explosion at which the individual survivors had been exposed. In the absence of radiation, it is unlikely that even one case would have occurred among the number of survivors less than 1,000 metres distant, yet 15 cases have been found. Further, there is a much higher incidence among those who developed the early acute illness than among those who had, at the most, only mild symptoms.

An examination of the incidence of leukaemia in relation to the distance from the explosion has been made for the survivors in Hiroshima, where the concentric distribution of the radiation was not affected to the same degree as in Nagasaki by the irregular distribution of the radio-active fall-out. The dose from the prompt radiation decreases as the distance from the explosion increases. In survivors who were 2,000 metres distant or more, the incidence during the period January, 1947, to August, 1955, was about two cases in every 10,000 persons. Among those between 1,500 and 2,000 metres distant, the incidence was about three to four cases per 10,000 persons, and for those at the shorter distances of between 1,000 and 1,500 metres and under 1,000 metres it was respectively about 28 and 128.

To make an accurate estimate of the relationship between the dose of radiation and the incidence of the disease, one would have to substitute doses expressed in roentgen units for the distances from the centre of the explosion. It has not been possible to obtain reliable estimates of these doses, which should include not only the contribution from the gamma rays but also that from the neutrons emitted by the explosion and that from the radioactive fall-out. Tentative estimates of the gamma ray dose received by people standing in the open can be made from the information published in 1950 by the United States authorities in "The Effects of Atomic Weapons." These estimates suggest that the dose at under 1,000 metres would not be less than 1,400 r and at 1,250 metres about 350 r. At 1,750 metres it would be about 50 r, and at 2,000 metres about 8 r. As a dose of 1,400 r or more would kill everyone exposed to it, survivors who were within 1,000 metres of the explosion must have been heavily protected. An unknown proportion of the survivors at all the other distances must also have been protected to some extent because they were either indoors or, if outside, shielded by buildings. For this reason, it is not possible to indicate with any great confidence the average levels of dose received by survivors at different distances from the bomb and, in view of the uncertainty about the actual doses received by the exposed population, one

cannot infer with certainty whether the relationship between dose and the incidence of leukaemia is a curvilinear or a linear one.

For the Japanese cases which occurred up to the end of 1954, the average length of the period between exposure to the bomb and the first appearance of symptoms was about six years. It is clearly important to determine whether there has been any tendency for cases to occur less frequently in subsequent years. The morbidity rate has therefore been examined year by year in both Hiroshima and Nagasaki, and it has been found that the recorded incidence has remained approximately constant in Hiroshima in the period 1948 to 1954, and in Nagasaki in the period 1950 to 1954. This finding suggests that there is no sharply-defined peak year of occurrence, but that with this type of exposure the incidence of leukaemia rises, after a variable latent period, and then remains approximately constant up to at least the ninth year.

**Leukaemia following repeated exposures: radiotherapy.** Before 1955, there had been a report of leukaemia developing in two patients given X-ray treatment for ankylosing spondylitis. In 1955, two further publications directed attention to this possibility, and another reported the occurrence of leukaemia in young children who had been given X-ray treatment to the chest in infancy for suspected enlargement of the thymus gland. In an attempt to obtain further evidence on the occurrence of leukaemia as a delayed effect of irradiation, and in particular on the relationship between the dose received and the incidence of the disease, we have sponsored a survey of patients treated for ankylosing spondylitis with radiation.

Ankylosing spondylitis is a disease which affects chiefly the joints of the spine, and to a less extent other joints, particularly those of the pelvis and the shoulders. It usually starts in early adult life and is about six times more frequent in men than in women. It causes severe pain and reduced mobility and, unless treatment is given, the affected joints may gradually lose their freedom of movement and the back become progressively stiffer. In severe cases all spinal movement is lost, chest expansion is greatly diminished, and the movements of other major joints restricted. The popular description, "poker back," is a very apt one.

Some patients with this condition are benefited by X-ray treatment, which is given to relieve pain and increase mobility and which may permanently halt the progress of the disease. As treatment usually takes the form of irradiation of the whole spine in one course of radiotherapy, it involves exposing a large section of the body directly to the X-rays. In some patients one course of treatment does not suffice, and further courses have to be given, either to the spine or to the major joints, or to both. Indeed, this group of patients were chosen for our investigation because the treatment is so extensive that it more nearly approaches whole-body irradiation than that given for any other non-malignant condition.

An analysis has been made of the hospital records of between 13,000 and 14,000 patients, all of whom had been treated with X-rays at some time during the twenty-year period 1935 to 1954. Thirty-eight of these patients developed leukaemia, an incidence of only about one-third of one per cent; yet calculations based on the national death rates over the same period show that even this low incidence is about ten times greater than would have been expected in the absence of irradiation. The possibility of such a difference being due to chance is so remote that we shall ignore it.

Caution is necessary, however, in interpreting this finding. It is not possible to conclude immediately that the increased number of deaths from leukaemia is related to the X-ray treatment, in the way that the increased death rates among previously healthy people in Hiroshima and Nagasaki can be attributed to exposure to the radiations from the bombs. The possibility has to be considered that death from leukaemia would, even in the absence of treatment by irradiation, be a more frequent occurrence among sufferers from ankylosing spondylitis than among the normal population, or alternatively that ankylosing spondylitis in some way increases a patient's susceptibility to irradiation.

By courtesy of the Ministry of Pensions and National Insurance, it has been possible to examine the records of a group of about 400 male patients with ankylosing spondylitis who had never at any time been treated with X-rays. The fact that no increased incidence of leukaemia was found in this group suggests that ankylosing spondylitis does not of itself predispose a patient to the development of leukaemia. To confirm this point, it would be necessary to examine the records of a much larger group of unirradiated patients; X-ray treatment is, however, so widely used for ankylosing spondylitis that it may be difficult to do this.

Clear evidence was, however, found in our main investigation for the existence of a relationship between the dose of radiation and the incidence of leukaemia. The dose was estimated in two different ways, firstly by calculating the total amount of energy absorbed in the whole body, and secondly by calculating the dose of radiation received in certain parts of the bone marrow. The first method demonstrated in a curvilinear relationship between the incidence of leukaemia and the radiation dose, whereas the second method resulted in a linear relationship. Fortunately, over the range of doses likely to be met with in ordinary civil conditions, the difference between the two results is negligible. The theoretical implications of the two possible relationships are, however, very different and important and point the way to considerable future research.

The average length of time between the first exposure to X-rays and a diagnosis of leukaemia was about six years. This period cannot be directly compared with that observed in the Japanese cases, as many of the patients had had several courses of radiation before leukaemia was diagnosed, and it is not known which particular course was the effective one or whether all the courses may not, to some degree, have affected the development of the disease. Nevertheless, it may be concluded from both series of cases that the latent period for radiation-induced leukaemia is shorter than for radiation-induced cancers.

**Leukaemia following chronic exposure.** We have no precise knowledge of the incidence of leukaemia under conditions of chronic exposure. It has been reported that, relative to the numbers at risk, there are about nine times as many deaths from leukaemia among American radiologists as among other American physicians. This figure is based on a study of the obituary notices published in the *Journal of the American Medical Association* from 1929 to 1948, in which both the professional occupation and the cause of death are usually reported. In about a quarter of the notices, however, the cause of death was not reported and thus a bias may have been introduced into the results of the study. A review of all the published papers on this subject shows that there may well be an increased death rate from leukaemia among American



physicians as a whole, compared with the general population, and in particular among American radiologists, but it is not possible to estimate the extent of the increase with any certainty.

**General conclusions on the induction of leukaemia.** The results of the investigations carried out by the Atomic Bomb Casualty Commission in Japan, and of our own study of the occurrence of leukaemia in patients with ankylosing spondylitis, leave no doubt that ionizing radiations can induce leukaemia in man, and that the average latent period between exposure and the development of the disease is only a few years. In neither of these situations were the conditions of exposure similar to those of persons engaged in work associated with a possible radiation hazard. Those exposed occupationally tend to receive radiation in small doses over long periods, and it is not yet known whether the dose-response relationship based on short periods of heavy exposure is directly applicable to such conditions.

### Induction of Cancers

The evidence for the induction of cancers by radiation consists chiefly of reports of the occurrence of cases under circumstances which make it reasonable to suppose that some at least were radiation-induced, and of the apparently increased frequency of a particular type of cancer, itself rare in the normal population, in persons exposed to heavy doses of radiation. Most of the information comes from the case-records of patients treated with radiotherapy and from those of workers in certain special occupations who in past received very heavy doses of radiation in the course of their work. It is noteworthy that tumours following radiotherapy tend to develop in tissue already severely damaged by radiation, and that, compared with leukaemia, a much longer period—up to 20 years or more—usually elapses between the first exposure to radiation and the clinical appearance of the disease.

**Cancer of the lung.** The mines of Schneeberg and Joachimsthal are rich in a variety of ores and, since the latter part of the last century, pitchblende, an ore containing radium and other radioactive elements, has been extensively worked there. It had long been known that the miners were liable to die in middle-life from a respiratory disease locally named "mountain sickness." It is now recognized that this condition is one of cancer of the lung and it is generally accepted that there is a strong connection between the excessive mortality from this disease and the high radioactive content of the air of the mines. Investigations have suggested that, up to 1939, nearly one-half of the miners who had died had contracted lung cancer.

The first decay-product of radium is a gas, radon, which in its turn disintegrates, giving rise to a series of products, all of which are solids. Radon, being a gas, diffuses through the rocks containing the radium ore, and escapes into the atmosphere of the mines. The inhalation of radon is known to constitute a serious hazard, and the International Commission on Radiological Protection has advised that the concentration of this gas in the inspired air should not exceed 0.0001 microcuries per litre. A series of measurements of the radon content of the air of the mines, made between 1924 and 1939, showed that the concentration of radon must then have been on the average about thirty times greater than the maximum permissible level since laid down. The serious hazard incurred in breathing such an atmosphere comes, not only from the radon itself but also from its solid daughter-products which, being attached to

dust particles in the atmosphere, may be retained in the chest and may irradiate the tissues of the lungs for long periods.

The average latent period for the induction of lung cancer in these miners was about 17 years, and calculations have shown that the dose to the lungs during this period would have been equivalent to about 1,000 r. This calculation assumes that the radiation dose is spread evenly over the lungs, but it may well be that some areas of the lung, depending on the sizes of the radioactively-charged dust particles which are inhaled, may be subjected to doses of more than 10,000 r over a whole working life. It is consistent with other knowledge that tumours could be induced under these conditions, particularly when it is remembered that radium itself and many of its daughter-products emit alpha particles with high biological efficiency.

The only condition in which an increased incidence of lung tumours has been observed in association with radiation are those in which there is an increased risk of inhaling radon and the other daughter-products of radium. In theory, however, the inhalation of radioactive material in particulate form, either as a result of fall-out from nuclear weapon explosions or in the vicinity of nuclear reactors, could lead to the accumulation of a high radiation dose within the lungs. Such particles would not be uniformly distributed within the lungs but would tend to aggregate on discrete small areas of the bronchi, which would thus be subjected to a high radiation dose, with the result that in the long run lung cancers might be produced in some people. In this country appropriate measures are always taken to eliminate the hazard in the vicinity of nuclear reactors, and it would be extremely unlikely to occur as a result of fall-out except in conditions of actual warfare. There is no evidence that external irradiation by X- or gamma rays can cause lung tumours in man.

**Cancer of the bones and joints.** Radium and the daughter-products of thorium, when assimilated into the body, tend to be held for long periods of time in the bones where, if in sufficient concentration, they may give rise to local destruction and disease. A number of artificially produced radioactive isotopes, of which the most important are strontium and plutonium, also show this predilection for bone. Radioactive strontium exists in several forms, one, strontium 89, having a half-life of 53 days and another, strontium 90, of 28 years, while the half-life of plutonium 239 is about 24,000 years. A warning of the potential danger from these artificial elements is given by past experience of the effects of the natural elements radium, mesothorium and radiothorium after they have gained entrance to the body and become fixed in bone.

Our knowledge of these effects comes mainly from the case-records of former workers in the luminising industry and of a group of patients given radium compounds internally in the course of treatment. Stringent controls are now enforced in the luminising industry to protect the workers, and the prescription of radioactive substances for treatment has been controlled by legislation.

Since 1925 there have been many reports of illness and death occurring among a group of workers engaged in the painting of watch and clock dials with luminous paint, most of whom had been in the industry during the period 1916 to 1924. Luminous paint is compounded of zinc sulphide and radium, and, formerly, varying mixtures of radium, mesothorium and radiothorium were also used. It was customary for dial painters to apply their paint with fine brushes, the points of which they "tipped" between their lips before painting. In this way they swallowed radioactive material, some of which became

lodged in the skeleton. If large amounts were swallowed, death sometimes occurred, within about three years, from severe anaemia, haemorrhages, and infections, particularly of the bones of the jaw. Those who had ingested smaller quantities of paint often developed cystic and necrotic changes in the bones which might cause "rheumatic" pains or fractures. Occasionally, these changes progressed and cancer of the bones appeared. Such tumours usually developed more than fifteen years after the first exposure to the hazard.

Similar effects have occurred in patients given radium compounds internally for the treatment of mental disease or for various rheumatic and other affections, and in people who, for quasi-medicinal reasons, have consumed large amounts of "radioactive water." In animals strontium 90 has been shown to produce similar biological effects.

It is possible to estimate the amount of radium in the body of a living person, if there is good evidence that no other radioactive element is present in addition to the normal components of the body. Measurements carried out on those who have been exposed to unknown mixtures, such as luminous compounds, are difficult to interpret. So far, no person is known to have developed radiation-induced bone cancer who had less than 3.6 microcuries of radium in his body, unless either mesothorium or radiothorium was also present; the lowest radium content, in the presence of one or other of these elements, has been 0.52 microcurie at the time of appearance of the tumour. On the other hand, it seems certain that early non-cancerous cystic changes in bones have developed with a body-content of as little as 0.4 microcurie of radium alone. These amounts of radium are to be contrasted with the maximum permissible level for body radium, which, as laid down by the International Commission on Radiological Protection, is 0.1 microcurie.

Bone cancer has also been reported after the use of X-rays in the treatment of non-malignant bone tumours and some infections. Such cancers have occurred only after very heavy doses of radiation and have originated in the area of the body treated. The risk of the development of bone cancer at the levels of X- or gamma radiation experienced under modern occupational conditions is insignificant.

**Cancer of the skin.** Cancer of the skin was the earliest form of radiation-induced tumour to be described in man. Radiation dermatitis of the hands, forearms and face was common among the early radiologists and radiological technicians, and cancer often occurred in the damaged skin. By 1911 no fewer than 54 cases had been described; the occurrence of these tumours diminished as radiologists learned to take the necessary precautions.

Since the early part of the century, records have accumulated of the occurrence of skin tumours following X-ray or radium treatment. In some instances, these tumours have followed the injudicious use of X-rays for mild skin affections, or even for the removal of facial hair. The latent periods have usually been long, ranging in a recently reported series of 13 cases from 12 to 56 years, with an average of 33 years. Although it is usually impossible to make any accurate retrospective assessment of the doses of radiation received, the severity of damage to the skin suggests that, in these cases, they must have been of the order of several thousands of roentgens.

#### **Cancer of the thyroid gland, the pharynx and the larynx.**

A number of cases of cancer of the thyroid gland have been reported among children, some years after they had been given X-ray treatment for conditions

including suspected enlargement of the thymus gland, bronchitis, infected tonsils and adenoids, and enlarged glands in the neck. In many instances, the children were less than one year old when irradiated. In a series of cases irradiated for suspected enlargement of the thymus gland, the average latent period between irradiation and the establishment of the diagnosis of cancer of the thyroid gland was only about 7 years. Perhaps the most important feature of these cases is the comparatively small dose of radiation responsible for induction of the tumour, in contrast to the large doses associated with the induction of cancer in adults; cancer of the thyroid gland has developed in a child after a recorded dose as low as 250 r. It is possible that hormonal factors may be involved to the direct effect of irradiation.

A few reports have drawn attention to the development, many years later, of cancers of the pharynx and larynx in patients who have had X-ray treatment for such conditions as tuberculous glands of the neck. The latent period is long, averaging about 20 years, and periods of more than 30 years have been recorded. In most cases, the irradiation was given in the early days of radiotherapy, and there is practically no information available about the size of the radiation doses that were employed.

### Effects on the Blood other than Leukaemia.

Observations have shown that a fall in the numbers of red cells, white cells and platelets in the blood may occur in persons exposed to radiation in the course of their work. There is little direct information on the dose-response relationships, but it seems possible that, even with whole-body doses of gamma rays as low as 1 r per week, slight changes can occur in the white-cell count of especially susceptible people. Certainly, with doses much in excess of 1 r per week, a general depression occurs in the white blood cell count. A reduction in the number of red cells and platelets may occur at a later stage, and in some persons continued exposure may lead to severe degrees of anaemia.

**Aplastic anaemia.** If not detected in time, radiation-induced anaemias may endanger life, particularly when the red bone-marrow is itself so severely damaged that the red-cell deficiency cannot be made good by the production of new cells; this condition is known as "aplastic anaemia." The diagnosis is not easy to make, and the condition can easily be confused with aleukaemic leukaemia unless a full examination of the bone marrow is carried out. This diagnostic difficulty was encountered during the investigation of leukaemia among patients treated with X-rays for ankylosing spondylitis. Particular attention was paid to deaths reported as being due to aplastic anaemia but, when these cases were fully investigated, evidence was found that a number were, in fact, aleukaemic leukaemia; eventually, only four deaths could with any certainty be ascribed to aplastic anaemia out of a total of some 50 deaths from leukaemia, aplastic anaemia and allied diseases combined. Similarly, only six cases of aplastic anaemia were reported from Nagasaki, compared with over 40 cases of leukaemia in the same city. It seems clear, therefore, that aplastic anaemia is a rarer delayed effect of radiation than leukaemia.

### Induction of Cataract

The term "cataract" implies an opacity in the normally transparent lens of the eye, varying from a tiny granule which does not cause any definite impairment of visions, and which may disappear, to a large plaque resulting in

blindness. It has been known for some time that exposure of the eye to X-rays can lead to cataract formation, but the large doses which appear to be necessary for its induction are only likely to occur under very unusual conditions. For all practical purposes, therefore, the production of cataract by X-rays is not an occupational hazard, although it was discovered in 1948 that the condition had developed among a group of physicists exposed to neutron irradiation during the operation of a cyclotron.

In the following year there were reports from Japan of an increased incidence of cataract in the populations of Hiroshima and Nagasaki. The extent of the increase cannot be determined with precision, but it is significant that, of 98 cases of cataract among survivors of the Hiroshima explosion, 85 occurred in persons who were within 1,000 metres of the centre of the explosion and would thus have been subjected to neutron- as well as gamma-irradiation. Confirmatory evidence of the high dosage which they had received is provided by the fact that most of them had suffered epilation of the scalp and that two subsequently developed leukaemia.

### **Effects on the Skin other than Cancer**

In the paragraphs dealing with the induction of skin cancers by irradiation it was noted that cancers develop mainly in skin which has been subjected to such heavy doses of radiation as to be obviously damaged. Most of our knowledge of the less serious delayed effects on the skin has been obtained from observation of the results of therapeutic irradiation with X-rays, during which the skin may be exposed to large doses of radiation directed to underlying tissues. With doses of 1,500 r or more, a certain amount of permanent skin-damage is likely to occur, but it will not be particularly severe unless a large area has been irradiated. Larger doses, however, say of 4,000 or more, are often followed by obvious skin-damage, the texture becoming thinner, and the surface being usually covered with dilated blood vessels. In such cases, the skin may be very sensitive and prone to infection, and it is in this type of damaged skin that radiation-induced tumours are most likely to develop.

The hair follicles and glands of the skin may also be affected by radiation. A dose of the order of 300 to 400 r will cause temporary loss of hair, and with higher doses, perhaps 700 r or more, hair-loss may be permanent. It is a common finding that, owing to the destruction of the sweat glands, heavily irradiated skin permanently loses its ability to sweat. After doses of the order of 1,500 r, the sebaceous glands are destroyed and the skin loses its normal greasy texture.

### **Effects on the Kidney and Lung**

It has been reported that therapeutic doses of X-rays to the region of the kidneys may affect their function and lead to the development of high blood pressure which may prove fatal. The damage described has followed the treatment of certain rare tumours with large doses of radiation and it is unlikely that such effects will occur under other conditions of exposure. It has also been reported that pneumonitis, sometimes fatal, has followed radiotherapy directed towards the chest.

### **Shortening of the Life-span**

A number of reports based on observations made on animals suggest that exposure to ionizing radiations may lead to a reduction in the expectation of life. No evidence has yet been published that this occurs in man.

### The Effects of Exposure to Radiation During Pregnancy

**Abortion and stillbirth.** After heavy doses of radiation, a pregnant woman may miscarry or give birth to a stillborn child. Information from the Atomic Bomb Casualty Commission shows that in Hiroshima and Nagasaki there were higher abortion and stillbirth rates among pregnant women near the explosion than among those at greater distances. Of 98 pregnant women in Nagasaki who were within 2,000 metres of the centre of the explosion, about 23 per cent of those who had severe radiation illness miscarried, in comparison with only about 4 per cent of those who did not develop any severe illness, and with about 3 per cent of women who were between 4,000 and 5,000 metres distant. It is apparent that abortion and stillbirth as a result of irradiation during pregnancy do not constitute a problem unless the dose of radiation is large.

**Effects on the children of women irradiated during pregnancy.** There is considerable evidence, both from the case records of patients treated with radiotherapy and from reports published by the Atomic Bomb Casualty Commission, that heavy irradiation of pregnant women can lead to the birth of children who are either abnormal at birth or who later develop in an abnormal way. The case records of women therapeutically irradiated during pregnancy describe a number of different developmental abnormalities in their children, the most striking of which is the condition known as "microcephaly;" one such case was found during the course of our investigation of patients treated by X-rays for ankylosing spondylitis. The underlying cause of this condition is a partial failure of the development of the brain, as a result of which the head is smaller than that of a normal baby. All grades of the condition exist, ranging from the most severe, in which the child usually has to be maintained in a mental institution, to others in which there is only slight impairment of development and mental powers.

There are published records of eleven mentally-retarded children in Nagasaki and Hiroshima who were exposed before birth at a distance of between 700 and 1,200 metres from the centre of the explosion. Ten of the mothers of these children suffered acutely from the effects of radiation, and the eleventh probably did so. The head circumferences of all eleven children were appreciably less than those of unirradiated Japanese children of the same age-group and, in the cases among Nagasaki children, smaller than those of children exposed before birth at distances of between 4,000 and 5,000 metres from the explosion, where the dose of prompt radiation would have been less than 1 r. The evidence from Hiroshima suggests that children irradiated between the twelfth and eighteenth weeks of intra-uterine life are more likely to develop microcephaly than children irradiated either before or after this period.

### The Effect on Fertility of Exposure to Radiation

**Permanent sterility.** It is well established that irradiation may reduce the fertility of men and women, and even render them permanently sterile. In men, a single dose of 500 r to the testes would probably produce permanent sterility. The dose to the ovaries likely to produce the same result in women would depend to some extent upon the age of the woman concerned; a woman nearing the end of her reproductive life would require a smaller dose, about 300 r, than a woman in her early reproductive years. These levels of dose are so high that, if they were received in the course of whole-body irradiation, the

individual would develop the early acute illness already described. It is extremely unlikely, therefore, that permanent sterility would be induced in any one accidentally exposed to a large whole body dose of radiation, unless the acute illness had been manifest.

Under modern conditions of occupational exposure, for example among radiologists and radiographers, there is no evidence of any impairment of fertility. Furthermore, there is no suggestion that female radiographers suffer from radiation-induced menstrual disturbances which might be accompanied by diminished fertility.

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## Appointment of Director of Graduate Medical Education

During the past few years a very active programme of Post-Graduate Medical Education has been developed at Dalhousie University with assistance first from the W. K. Kellogg Foundation and during the last three years also from the Provincial Medical Societies of the four Atlantic Provinces, the Provincial Medical Board of Nova Scotia and the College of General Practice.

The increased extent of this programme has made heavy calls upon the time and energies of the teachers in the clinical departments of the Medical School and upon the members of the Post-Graduate Committee who organize and supervise the programme. At the same time there have been increasing responsibilities in the field of graduate education for specialists. This work has fallen on the same people, although the responsibility is not a University one but rests with the affiliate hospitals. The Interne Training programme for fifth year students also requires considerable supervision.

The W. K. Kellogg Foundation has now made a grant to Dalhousie University to establish a Division of Graduate Medical Education enabling the Medical School to appoint a director to supervise the general practitioner education programme, the fifth year interne training programme, and to cooperate with the affiliate hospitals in graduate medical education, particularly in the basic sciences.

Dr. Lea C. Steeves has been appointed as the first Director of this Division. Dr. Steeves was Chairman of the Post-Graduate Committee for several years and has had valuable experience in the development of this programme at Dalhousie.

Dr. Steeves is Associate Professor of Medicine at Dalhousie University and holds the degrees B.A., Mount Allison, M.D., C.M., McGill and F.R.C.P. (C). He will continue his clinical work and teaching in the Department of Medicine and in the wards of the Victoria General Hospital and Camp Hill Hospital, and will carry on a limited consultation practice in Internal Medicine, but will devote the major part of his time to the three aspects of Graduate Medical Education which will be the responsibility of the new Division.

## REFLECTIONS ON MEDICAL HISTORY

## Vesalius

1514 - 1564

J. Emile LeBlanc, M.D., West Pubnico, N. S.

*"Vesalius, who's Vesalius, This Fallopius,  
It is who dragged the Galen-idol down."*

**B**EFORE writing upon the medicine of the 16th century, we cannot overlook the great figure of Galen, 131-201 A.D., the Founder of Experimental Medicine. He reigned supreme for centuries: laboured incessantly in a time when pre-historic man was roaming the wilds, seeking sustenance and finding means of alleviating pain in the native herbs. He left us the four symptoms of inflammation, differentiated pneumonia from pleurisy, was the first to mention aneurysm, separated the traumatic from the dilated form; described the different forms of phthisis mentioning its infectious nature and proposing a full diet and dry and elevated places for treatment. But his observations were based upon the study of animals only, his dissection being simian, canine, bovine, porcine rather than human, leaving here a gap which demanded research. A genius arose who completed Galen's contribution to Medicine; his name was Vesalius, the most commanding figure before Harvey.

Andreas Vesalius was born in Brussels on the 31st day of December, 1514. He was a descendant from a German family of physicians called Whiting (Wytinck) which came from Wessel in the Rhine and was the son of Andreas Vesalius, court apothecary of the Emperor Charles V. As a boy, he showed great interest in the dissection of animals. After pursuing his early studies at Lourain, he went in 1533 to the University of Paris where Jacob Sylvius taught Medicine. Vesalius gave his attention largely to Anatomy, especially that of the bones which he found in cemeteries and at the places of execution. He dissected entire animals and gained in this way so much knowledge that at the request of his teachers and fellow students he publicly dissected a corpse and explained its parts. In 1536, he returned to Lourain and made a public dissection there, the **second in his eighteen years of study**. In 1537, he went to Venice, thence to Padua where he took the degree of Doctor of Medicine and on the 6th of December of the same year was appointed Professor of Surgery and Anatomy at Padua.

Tradition tells us that reverence for the dead had confined most of the so-called anatomists of his day to the dissection of animals and that Vesalius had to flee to Italy to escape France's disapproval of the dissecting of human bodies.

As we said before, Vesalius was the most commanding figure in Europe after Galen and before Harvey. There were many dissectors and dissections before him, but he alone made Anatomy what it is to-day, a **living, working Science**. It was the effect of his strong and engaging personality that made dissection not only viable but respectable. His career is one of the most romantic in the history of Medicine. His services to Anatomy were that he was the first to lead the way to independent investigation in the examination of the structure of the human body and in the teaching concerning it, and that he dis-



covered the numerous errors of Galen. In so doing he destroyed the foundation of the whole teaching of Galenism and of the belief in its authority and pointed out the way for a free investigation of Nature.

His most noted works were "Fabrica" and his 'Observatons Anatomicae.'" After their publication he spent a short time in Bologna and Pisa and in 1544 was appointed Court Physician to the Emperor Charles V, a position he held up to the time of the Emperor's abdication in 1556. Vesalius accompanied Charles on all his journeys and campaigns. After his abdication he entered the services of Philip II of Spain. For unknown reasons, in the spring of 1564, he undertook a pilgrimage to the Holy Land and died in a Greek city on his journey home.

More could be added to the memory of Vesalius. He was a great man, and a great benefactor to humanity.

## SUMMARY OF MINUTES—EXECUTIVE COMMITTEE MEETING MARCH 18, 1957

A meeting of the Executive of The Medical Society of Nova Scotia was held in the Dalhousie Public Health Clinic, Halifax, N. S., on Monday, March 18, 1957.

Dr. A. G. MacLeod, Chairman of the Executive Committee, called the meeting to order at 9:15 a.m.

Present: Doctor A. G. MacLeod, Chairman; Doctor J. R. McCleave, President; Doctor A. L. Murphy, Vice-President; Doctor C. H. Young, Treasurer; Doctor C. J. W. Beckwith, Executive Secretary; Doctor David Drury, Cumberland Medical Society; Doctor A. W. Ormiston and Doctor H. J. Martin, Cape Breton Medical Society, Doctor R. G. A. Wood, Lunenburg-Queens Medical Society; Doctor J. A. MacCormick, Antigonish-Guysborough Medical Society; Doctor P. R. Little, Colchester-East Hants Medical Society, Doctor J. P. McGrath, Valley Medical Society; Doctor A. F. Weir, Western Nova Scotia Medical Society; Doctors W. A. Murray, D. I. Rice and N. B. Coward, Halifax Medical Society; Doctor H. C. Still, Editor-in-chief, Nova Scotia Medical Bulletin. There was no representative present from the Pictou County Medical Society. Doctor Marcus of Lunenburg-Queens Medical Society had resigned and his place was taken by Doctor R. G. A. Wood.

The Executive Committee observed two minutes silence in remembrance of Doctors Mack and Mathers of Halifax, Doctor Pearl Hopgood of Dartmouth and Doctor Watters of Inverness, also Miss Florence Fraser, Superintendent of Public Health Clinic.

### BUSINESS ARISING FROM THE MINUTES

#### **Delegates to General Council of the Canadian Medical Association**

Doctor G. R. Douglas had sent notification of his inability to attend and suggested Doctor J. C. Ballem as alternate—This was agreed. Doctor Ormiston indicated he would be unable to attend and would inform the Society re his replacement.

#### **Group Disability and Group Life Insurance**

Doctor Beckwith stated that from January 22nd, 1957, there is a 90-day period for new members of the Society to make application for Group Disability Insurance without examination. As of February 28th, 265 had applied and 253 had been accepted. The remaining applications are being processed. Of these, 18 are members not in good standing in The Medical Society. Of 189 members in Group Life Insurance, 10 are members not in good standing. It was decided to discuss action to be taken with reference to members not in good standing later in the agenda.

#### **Annual Meeting—Digby Pines, August 28 - 31, 1957**

The report of the Chairman of the Programme Committee, Dr. D. E. Lewis, Digby was read. This included a provisional outline of the programme and certain inquiries which were dealt with. The report was approved and the Executive informed that the members would be kept informed through the Bulletin.

### Medical Exhibitors in Relation to Annual Meeting

Doctor D. I. Rice had been asked to inquire into this matter together with the Secretary. He reported four meetings had been held, including two with Mr. T. W. Hare, field representative of the Medical Exhibitors Association and one meeting with our Committee on Public Relations. A comprehensive report was submitted concluding with the statement "It is recommended that this matter continue to be explored and your committee advise that the Hospital Display for the Annual Meeting at Digby be employed." This was agreed.

As a result of further discussion of this subject together with a review of expenses associated with the Annual Meeting, and the locale for Annual Meetings, it was moved by Dr. H. J. Martin, seconded by Dr. D. I. Rice and carried, "That a committee be set up to study the problem of expenses for the Annual Meeting. Also some study of the locale of such meetings. It is suggested that this committee work in conjunction with the committee studying the problem of pharmaceutical exhibits."

### Report on Membership

Tables relative to study of membership records were submitted. The Chairman pointed out that 90 per cent of members were in good standing as of December 31, 1956. Those in arrears numbered 55, of which 33 are in arrears for 1956, 13 for 1955 and 9 prior to 1955. The secretary stated that the number in arrears for 1956 had been reduced from 62 to 33 as a result of two letters sent to those in arrears for 1956. Discussion of this matter led to the following motion. Moved by Dr. D. I. Rice seconded by Dr. W. A. Murray and carried that "Having established the category of practice of delinquent members (i.e. ordinary, retired, etc.) and their having been duly advised of the by-law governing membership, delinquent members should be so advised by letter that their membership has been suspended." The Executive Secretary was directed to carry this matter through to a conclusion.

It has been noted that there are 13 possible classifications of membership. Discussion of this and other matters pertaining to membership led to the following motion made by Dr. R. O. Jones, seconded by Dr. Still and carried, "The question of membership in the broadest possible terms and appropriate dues be referred to a committee for a definitive report."

The Secretary reported that he had a meeting with Mr. A. W. Janes, President of the graduating class in Medicine 1957 on February 15, 1957, during which areas in which the Society could be of service to the final year student were discussed. Mr. Janes agreed to put his thoughts in writing which had been done. The Secretary was instructed to follow-up on these matters. A letter and questionnaire to all members of the class had been sent on February 15, 1957. Discussion led to the following motion, proposed by Dr. W. A. Murray seconded by Dr. H. C. Still and carried, "That the Secretary meet with Graduating Classes to point up advantages of early membership in the Division and to effect membership in same."

The Secretary pointed out that physicians taking post-graduate work and those in first-year practice were not required to pay dues for membership in The Medical Society of Nova Scotia, that the amount of \$10 represents \$5 for membership in the C.M.A. and \$5 as a levy for the post-graduate committee. He considered this should be reviewed since such members have the services of the office available to them and receive the Bulletin. It was moved

by Dr. D. I. Rice and seconded by Dr. Still and carried that "Membership fee of \$5.00 be levied against members in first-year of practice and those doing post-graduate study—this fee to be inclusive of any amount that may be charged by post-graduate committee."

The question of a fee to be paid by those non-resident physicians who wish to remain members of The Medical Society of Nova Scotia was taken up. Some members felt that it was not necessary to have absentee members. The majority felt that an official tie with the "Home Society" would be useful and appreciated. It was finally resolved in a motion by Dr. H. C. Still, seconded by Dr. McGrath that: "Non-Resident membership be offered for \$5.00 for year 1957."

Dr. P. S. Campbell of Halifax was nominated for Senior Membership in The Canadian Medical Association.

### Honorarium to Members of Executive

The Executive Secretary had prepared a report on this matter. The cost of each Executive Meeting including travelling expenses and honorarium for each attending member at \$10, \$15 and \$20 per day would be respectively \$535.00; \$625.00 and \$715.00. The cost for each Executive Committee Meeting (1956-1957) is approximately \$355, based on mileage and whether the members stay overnight. Extensive discussion resulted in the following motion, moved by Dr. A. F. Weir, seconded by Dr. J. P. McGrath that "The payment of \$20.00 per day to members of the Executive Committee while attending meetings is agreed in principle, but that the matter be left for consideration until next year." Carried.

## REPORTS OF COMMITTEES

### Committee on Medical Economics

Herewith is a progress report of the Chairman, Committee on Economics' Dr. A. L. Sutherland. "As you know, I attended the meeting of the C.M.A. Committee in Toronto on December 7th and 8th, 1956. On the agenda of the meeting were the following items:

(1) D.V.A. Negotiations re Provincial Fee Schedules.

All the other provinces were in favor of using their own provincial scales. Doctor Kelly suggested that he thought it would be a good idea for us to go along in the same way, so as not to throw a spragg in the negotiations.

(2) Research Bureau on Medical Economics.

It was recommended that Dr. Kelly or Dr. Peart visit A.M.A. headquarters and study the Bureau of Medical Economics Research of that Association and report on its activities. I have had a letter from Dr. Peart since, showing the proposed set-up or such a one for the C.M.A. which would cost in the vicinity of \$38,500 yearly.

Would you please advise me as to what the Executive think of this so I could pass it along at the next meeting of the Committee on Economics, which will be held in Montreal in April.

(3) The Present Status in Provinces re Universal Hospital Care Insurance, including Diagnostic Services.

(4) Study of the Principles of "Job Evaluation" as applied to Economics of the Medical Profession.

- (5) Preparation of a Plan or Plans for Comprehensive Services plus Diagnostic and Physicians services—in other words—T.C.M.P.

Along this line there was a full morning spent with Executive officers of T.C.M.P. who explained in detail the contract that had been signed with the non-operating employees of the Railways.

In January 11th and 12th I attended the Trans-Canada Medical Plans Conference meeting in Toronto as a representative of our division. This was called due to some disagreement between the Medical Service Plans in Ontario and the T.C.M.P. Neither one of the main Plans in Ontario, namely, the P.S.I. and the Windsor Medical are carrying the Railway contract. They are carried by Associated Medical Services, which is not a member of T.C.M.P.

This meeting was called to try to iron out this difficulty between the Ontario Plans and T.C.M.P. and to also try to devise some method of T.C.M.P. and all its member Plans to service future national contracts. As a matter of fact, the Civil Servants Association Emp., the dependents of the Armed Forces and C.B.C. employees have all approached T.C.M.P. for coverage in line with the Railways.

The nucleus of your Committee on Economics in Sydney met and drafted a letter to the Hon. Minister of Welfare regarding Welfare Group Contract which is up for renewal in March and the necessity of increasing government payments from eighty-three cents to one dollar per month. (Breakdown of Welfare Fund enclosed).

We also advised him in this letter that Blind Pensioners on reaching the age of seventy automatically transferring from Blind Pension to Old Age Pension, lose their medical attention and suggested to him (the Minister) that it would be a good idea to keep them covered.

We have asked the Minister for a meeting with him in Halifax sometime before March 18th. If we are successful, will advise you as to the outcome.

(Signed) A. L. Sutherland, Chairman,  
Committee on Economics.

ALS/gm

### "Welfare Funds for The Medical Society of Nova Scotia"

|  |              |
|--|--------------|
| Credit Balance due The Medical Society of Nova Scotia                                |              |
| January 1st, 1956.....   | \$ 37,894.10 |
| Less Doctors' accounts for Nov. and Dec. 1955 paid in January and February 1956..... | 17,145.00    |
|  | <hr/>        |
|  | \$ 20,749.10 |
| Add net revenue Jan. Dec. 1956.....  | \$ 83,220.86 |
|  | <hr/>        |
|  | \$103,969.96 |
|  | <hr/>        |
| Deduct Doctors' accounts paid 1956.....  | \$ 82,560.85 |
| Add Doctors' accounts Nov. and Dec. 1956 and paid in 1957.                           | \$ 18,383.85 |
| Balance carried forward December 31st, 1956.....                                     | <hr/>        |
|  | \$100,944.70 |
| Balance carried forward December 31st, 1956.....                                     | \$ 3,025.26  |

Note: No provision for other outstanding 1956 Doctors' accounts.

You will note that this scheme spent in the vicinity of \$18,000 in excess of the net income during the past year or roughly \$1500 a month was spent over and above the net receipts. As a result, \$3,025.26 remains in the fund at the present time.

At the present rate of expenditure, it is questionable whether we can continue to pay 100 per cent of accounts for the duration of the contract, which expires March 31st, 1957. In order to meet future accounts, it will be necessary to increase the monthly payment by the Department of Welfare from eighty-three cents to one dollar."

(Signed) A. L. Sutherland, M.D.

Chairman Committee on Medical Economics

**Committee on Fees**, Chairman Dr. F. Murray Fraser—adopted.

**Committee on Public Health**, Chairman Dr. R. A. Moreash—adopted.

**Committee on Civil Disaster**, Chairman Dr. A. R. Morton—adopted.

**Committee on By-Laws**, Chairman Dr. H. A. Hewat—adopted.

**Committee on Rehabilitation**, Chairman Dr. W. M. Stevenson—adopted.

### Treasurer's Report

As provided in the Constitution and By-Laws, Chapter IX, Section 3. I herewith submit Budget for year ending December 31st, 1957.

### Revenue

|   |              |
|---|--------------|
| Membership Fees, etc. (Less Payment to C.M.A.)..... | \$ 21,000.00 |
| Profit from Nova Scotia Medical Bulletin.....       | 1,600.00     |
| Profit from Annual Meeting.....                     | 1,500.00     |
|   | <hr/>        |
|   | \$ 24,100.00 |

### Expenditures

|  |              |
|--|--------------|
| Salaries and Wages.....  | \$ 13,750.00 |
| Travelling Expenses.....   | 3,500.00     |
| Telephone & Telegraph, Office Expenses, Auditing, Sundry<br>etc..... | 2,400.00     |
| Post-Graduate Programme Dalhousie University.....                    | 2,100.00     |
| Bank Charges and Exchange.....                                       | 100.00       |
| Capital Expenditures for Office Equipment.....                       | 1,000.00     |
| Contribution to Pension Fund (Secretary).....                        | 1,544.16     |
|  | <hr/>        |

Net Loss for Period..... \$ 294.16

\$ 24,394.16

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\$ 24,100.00

All of which is respectfully submitted.

(signed) C. H. Young, M.D.,  
Treasurer

Examination by members and explanations by the Treasurer led to the following motion, moved by Dr. C. H. Young, seconded by Dr. Ormiston and carried "That the Treasurer be authorized to incur an expenditure not exceed-

ing fifty dollars to be utilized in reviewing with the auditor the bookkeeping system presently in use by The Society and implementing any changes that appear advisable." It was moved and seconded that the Treasurer's report be adopted. Carried.

#### **Committee on Finance**, Chairman, Dr. M. R. Macdonald.

This report provided considerable detail and was studied in conjunction with the Treasurer's report.

The Committee on Finance indicated that its functions were as follows:

- (1) Vetting of all accounts.
- (2) Examination of the authority for incurring accounts before they are accepted by the treasurer for payment.
- (3) Report to the Executive Committee any tendency to exceed the amounts provided for in the budget as authorized by the Executive Committee.

To fulfil these functions, it was necessary to have Executive Committee directive re the following items:

- (a) Attendance of Executive Secretary at various meetings—moved by Dr. Ormiston seconded by Dr. Rice and carried that "The Chairman of the Executive and the Secretary decide on the meetings which the Secretary shall attend where the expenses shall be paid by the N. S. Society Division."
- (b) Travelling expenses for Executive Secretary. It was moved by Dr. R. O. Jones, seconded by Dr. Still and carried "That the Executive Secretary be paid 10c per mile and hotel expenses for out-of-town trips."
- (c) The principle of payment of the levy to the Post-Graduate Committee required clarification. It was moved by Dr. C. H. Young, seconded by Dr. W. A. Murray and carried that "The Levy to the Post-Graduate Committee be paid on the basis of ordinary membership as has been carried out during the year 1955-1956."

Other items associated with Finance Committee's report:

- (1) **Additional Stenographic Assistance:** This request had been referred to Finance Committee as a result of a letter from the Executive Secretary to the Chairman of the Executive Committee in January 1957 at which time it became apparent that the office demands were in excess of the capabilities of one stenographer. Discussion resulted in the following motion, moved by Dr. Martin, seconded by Dr. Wood and carried "That a sum up to \$350.00 be granted for additional stenographic assistance to Mrs. Currie, as requested." Carried.

- (2) **Fiscal Year:** The recommendation of the Finance Committee that the fiscal year be changed from the calendar year to coincide with the Annual Meeting was discussed. No action was taken pending further study.

#### **Report of Editor-in-Chief**—Nova Scotia Medical Bulletin—Dr. H. C. Still.

This report led to approval by the Executive Committee of a change in format, authority to explore the possibility of increase in advertising and a subscription rate of \$5 per year for non-members of the Society. The report was adopted.

#### **Report of Representative on Hospital Planning Committee**

"Although a report of representatives of The Society on various committees is not required, I think that a report from your representative on the Hospital Planning Committee may be of interest and in order.

The Planning Committee to the Government on this matter was made up of Sister Catherine Gerard, Registered Nurses Association; Doctor Hugh MacKay, Nova Scotia Section Maritime Hospital Association; Mr. Henry Muggah, Attorney General's Department; Warden A. F. Leverman, Union of Municipalities; O. C. MacIntosh, M.D., Laboratory and Radiological Services; L. E. Peverill, Provincial Auditor, Mr. Innis MacLeod, Executive Assistant to the Premier; Doctor C. B. Stewart, consultant to the Provincial Department of Health; and Doctor Beckwith, The Medical Society of Nova Scotia. The Committee functioned under the Chairmanship of Doctor J. S. Robertson, Deputy Minister of Health.

Three meetings were held. The first on October 29, half day and on February 5 and 21, 1957, both full day meetings. Members of the Committee were given reports and briefs to study as they arrived.

The Briefs were as follows:

- (1) The Medical Society of Nova Scotia.
- (2) The Nova Scotia Section of the Maritime Hospital Association.
- (3) The Union of Nova Scotia Municipalities.
- (4) The Registered Nurses Association of Nova Scotia.
- (5) The Industrial Union of Marine and Shipbuilding Workers of Canada.
- (6) Letter from the Nova Scotia Federation of Labor.

Reports were as follows:

- (1) "The Impact of the proposed National Health Plan upon public and private finances, by provinces, with particular reference to Nova Scotia." N. Morse and W. Kontak.
- (2) The latest computations on cost of Hospital Insurance in Nova Scotia from the Federal Department of Health and Welfare, dated October, 1956.
- (3) "Financial Statistics of all Hospitals in Nova Scotia for 1955." L. E. Peverill.
- (4) "Estimate of bed requirements in Nova Scotia Hospitals under a Comprehensive Hospital Insurance Plan." C. B. Stewart, M.D., and D. R. Mantin.
- (5) "Survey of Nursing Facilities in Nova Scotia Hospitals." Jean Church, R.N. and Rhoda F. MacDonald, R.N.

The meetings of the committee were centered on further study as a group and discussion of these, the result of which was an interim report, which was also studied as a group, and finalized. This was submitted to the Hon. Minister of Health on February 27 and tabled in the House on March 4, 1957.

The work involved in producing these reports was very great and the interim report represents a good summary of the thinking of the Committee as a whole. Doctor J. S. Robertson and members of his sub-committee are to be congratulated on the completion and quality of the interim report.

The Brief on The Medical Society of Nova Scotia received close attention and discussion lasted one and a half hours. The Major portion of discussion took place concerning "diagnostic services are medical services"; "the provision of a budget related directly to the volume of diagnostic service and separate from the budget for hospital services"; "payment for services be on a fee for service basis for radiology and in so far as this is possible for clinical pathology"; and particularly "but it (The Medical Society) feels since co-insurance will be necessary, taking care to see that no hardship would be imposed on the medically indigent." The word "co-insurance" was debated in detail and it was decided that while it could be used in the sense of deterrent fee (which was intended)



that the latter term was more accurate. Committee discussion led to divided opinion. The chief arguments against the use of such a fee were (1) that it is "non-shareable"; (2) that it is the hospital's responsibility to collect it and if not collected a portion of hospital cost would be lost. I recommended that the matter be again referred for study to the Advisory Committee on Health Insurance.

The undersigned has kept informed Dr. D. M. MacRae, the Chairman of the Advisory Committee on Health Insurance, on progress.

One of the recommendations of the Interim Report is that "the detailed planning will require full-time personnel. The experience gained by the present (part time) Committee would be of value to full-time personnel dealing with detailed planning and might be useful as members of a part-time Advisory Committee." Your representative feels that it is very advisable that an official liaison of some type be maintained between The Medical Society and the "full-time Hospital Planning Committee" recommended, and that appropriate steps be taken to so advise the Hon. Minister of Health."

(signed) C. J. W. Beckwith, M.D., D.P.H.  
Executive Secretary.

**Report of Chairman of Advisory Committee on Health Insurance—**  
Chairman Dr. D. M. MacRae.

Dr. A. G. MacLeod,  
Chairman, Executive Committee,  
Medical Society of Nova Scotia,  
Halifax, N. S.

Dear Sir:

The Chairman of the Advisory Committee on Health Insurance was kept informed on the proceedings of the "Planning Committee" by your representative, Dr. C. J. W. Beckwith. A meeting of the Halifax area members of the Advisory Committee was held on March 7th. The recommendations of the "Interim Report" were reviewed and discussed. Dr. Beckwith told of the varying views presented during the planning committee's discussion of the Medical Society's "brief."

Your committee now recommends that the Executive Committee write the Hon. R. A. Donahoe, Minister of Health, to offer him the services of the Advisory Committee and re-affirm several points made in our brief. To lighten your deliberations, the enclosed letter has been drawn up for your consideration.

Yours truly,  
(signed) D. M. MacRae, M.D.

Discussion led to the following motion being made by Dr. R. O. Jones, seconded by Dr. H. C. Still and carried. "The Advisory Committee on Health Insurance inform the Minister of Health that we will wish an active part in planning health care in the Province and request that our Executive Secretary be in a position to take an active part in discussion leading up to policy decisions."

**Report of Committee on Legislation, Chairman Dr. J. McD. Corston.**

A meeting of the local members of the Committee on Legislation was held at 11:30 a.m., March 12, 1957, to consider a communication addressed to our Executive Secretary from the Solicitor for the Nova Scotia Chiropractors Association, with attached legislation entitled "Chiropractic Act," proposed for presentation to the Legislative Assembly during the present session. Doctors N. H. Gosse, D. F. Smith, J. W. Reid (by invitation), C. J. W. Beckwith and the undersigned were present.

Your Committee recommends:

- (1) That the proposed legislation should be opposed by The Medical Society of Nova Scotia.
- (2) That this opposition should be based on inadequate training for the responsibility of diagnosis and consequently appropriate therapeutic measures thereby endangering the public health.
- (3) That since this proposed legislation is in effect to set up a Nova Scotia Chiropractic Association with power to grant registration through examination, your Committee recommends that The Medical Society should work in close association with the Provincial Medical Board, rather than initiate action on its own.

This communication has been sent to other members of the Committee on Legislation, viz. Doctors D. F. Macdonald, Yarmouth, G. R. Douglas, New Glasgow, J. A. Vaughan, Windsor and A. H. Sutherland, Sydney, with the hope that they may express their opinion prior to the Executive Meeting March 18th, 1957.

(signed) J. McD. Corston, M.D.,  
Chairman.

A full discussion of this matter took place with the following motion being made by Dr. H. J. Martin, seconded by Dr. Ormiston and carried "We approve the report of the Legislative Committee, and that the Secretary notify each Branch Society so that they can alert their elected representatives in the legislature to oppose the passage of the Act."

**Motions and Resolutions from Branch Societies**

The Valley Medical Society had submitted two resolutions:

- (1) "This Branch Society recommends to the Executive of The Medical Society of Nova Scotia that a change in the voting procedure in The Medical Society of Nova Scotia be made to allow the vote of the delegate of each Branch Society to be equal and counted as 10 (ten) votes, and that the vote of each individual member present be counted as one (1) vote."

This resolution was forwarded to the Committee on By-Laws for further study.

- (2) "It be suggested to the Executive of The Medical Society of Nova Scotia that when any alteration in the Annual Membership dues to The Medical Society of Nova Scotia is contemplated, notification of such be forwarded to all paid-up members in the form of a mailed ballot, to enable the Executive to secure by means of a simple majority vote the approval or disapproval of such action being considered." It was moved by Dr. McGrath and seconded by Dr. Still that this be referred to the Committee on By-Laws.

**The Pictou County Medical Society** had forwarded the following resolution:

"WHEREAS The Public Health Act of Nova Scotia provides that a 'sufficient quantity of one per cent Silver Nitrate or other approved Silver or Other Approved Preparation' be instilled in the newborn's eyes immediately after birth. "AND WHEREAS no preparation other than one per cent Silver Nitrate is now approved for such purpose.

"BE IT RESOLVED that the Nova Scotia Division of The Canadian Medical Association recommend to the Minister of Public Health of this Province that preparations in addition to Silver Nitrate be approved for such purposes." The Secretary had obtained information to clarify this matter and which was forwarded to the Pictou Medical Society.

**The Cumberland Medical Society** had forwarded the following resolutions:

"BE IT RESOLVED

"(1) That the medical examination of disabled persons applying for Government disability pension be preceded by a means test done by the Department of Public Health and Welfare of the Province of Nova Scotia.

"(2) That no medical examination for disabled persons applying for disability pension be performed unless requested by the Department of Public Health and Welfare of the Province of Nova Scotia.

"(3) That physicians performing the medical examination for disabled persons applying for disability pension be adequately compensated for their services by the Department of Public Health and Welfare of the Province of Nova Scotia." Dr. Drury moved, seconded by Dr. Still that this resolution be adopted and forwarded to the Department of Public Health and Welfare. Carried.

"That the Cumberland Medical Society go on record as being opposed to doctors being billed for laboratory fees not covered by free service and that a copy of this resolution be sent to The Medical Society of Nova Scotia." This was discussed and the Secretary was instructed to review the whole matter.

A letter from D. C. Macneill, General Manager of Maritime Medical Care was read, dealing with a letter from the Lunenburg-Queens Branch. Debate led to the following motion by Dr. A. W. Ormiston which was seconded and carried. "The Executive approve the proposal of Maritime Medical Care whereby 70 per cent of the regular operating fee be paid to the surgeon and the remaining 30 per cent be paid to the physician doing the post-operative care in the conditions outlined as pertaining to the Liverpool area." The Secretary was instructed to refer the communication and motion to the Committee on Fees.

## OTHER BUSINESS

### Workmen's Compensation Act

A press notice March 7, 1957, stated that Judge A. H. McKinnon had been appointed Chairman of a Royal Commission to "Examine into all matters relating to the Workmen's Compensation Act." It was moved by Dr. McGrath and seconded by Dr. Weir that: "Dr. J. V. Graham be appointed convener and chairman of a committee, with power to add, for the purpose of preparing a brief to be submitted to the Royal Commission appointed to investigate the Workmen's Compensation Act. That he receive submissions from the various

branches of The Nova Scotia Medical Society in order to prepare such a brief." (It is doubtful that Dr. Graham will act as Chairman). In the meantime, all Branch Society Secretaries have received a request to inform the Executive Secretary of any recommendations etc., which each Branch may have. A copy of the Workmen's Compensation Act has been forwarded to each Branch Society.

### **Canadian Medical Association Meeting 1958**

The Executive was informed that this meeting will be held in Halifax, June 15-19, 1958. The meeting is under the joint sponsorship of the Atlantic Divisions of the C.M.A. with the New Brunswick Division acting as host. The first meeting relative to it will be held April 15, 1958. It is expected that representatives of each of the Atlantic Divisions will be present, as well as Dr. A. D. Kelly, General Secretary of the C.M.A.

### **Amendments to By-Laws of Maritime Medical Care Incorporated**

These had resulted from recommendations made at the Annual Meeting of The Medical Society in 1956 by a Committee under the Chairmanship of Dr. J. F. Woodbury set up to study M.M.C. Inc. Dr. Jones moved, seconded by Dr. Ormiston and carried that: "The proposed by-laws of M. M. C. and further information concerning the implementation of Nova Scotia Medical Society requests be distributed to the Branch Societies and discussed at the Executive Meeting." Motion Carried.

The date of the next Executive Committee Meeting was left for decision of the Chairman.

Compiled by  
C. J. W. B.

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### **UROLOGY AWARD**

**"Urology Award**—The American Urological Association offers an annual award of \$1000 (first prize of \$500, second prize \$300 and third prize \$200) for essays on the result of some clinical or laboratory research in Urology. Competition shall be limited to urologists who have been graduated not more than ten years, and to hospital internes and residents doing research work in Urology.

The first prize essay will appear on the program of the forthcoming meeting of the American Urological Association, to be held at the Roosevelt Hotel, New Orleans, Louisiana, April 28 - May 1, 1958.

For full particulars write the Executive Secretary, William F. Didusch, 1120 North Charles Street, Baltimore, Maryland. Essays must be in his hand before December 1, 1957.

## Secretary's Page

### General Council C.M.A.

The 90th Annual Meeting of the C.M.A. takes place in Edmonton June 17-21, 1957. The General Council of the C.M.A. meets June 17 and 18th. The Nova Scotia Division is represented by nine delegates who are as follows:

Dr. J. R. McCleave of Digby, President.

Dr. A. L. Murphy, Vice-President.

Dr. A. G. MacLeod, Chairman, Executive Committee of the Nova Scotia Division and representative of this Division on the C.M.A. Executive.

Dr. R. O. Jones, Past-President.

Dr. C. J. W. Beckwith, Executive Secretary.

Dr. G. R. Douglas (Pictou Med. Society) has been replaced by Dr. J. C. Ballem.

Dr. A. W. Ormiston, Cape Breton Med. Society has been replaced by Dr. J. R. Macneil.

Dr. J. P. McGrath, Valley Medical Society has been replaced by Dr. R. C. Dickson.

Dr. D. M. Cochrane, Cumberland Med. Society has been replaced by Dr. C. B. Stewart.

Dr. A. L. Murphy has also found it impossible to make the trip and is replaced by Dr. Frank Dunsworth.

The "Reports for the General Council" were received by the delegates on or about May 21, 1957, and have been studied. A briefing session for at least six of the nine delegates will be held Saturday a.m. June 8th. It is planned to have another such session in Edmonton on Sunday evening June 16th. These sessions are planned to prepare for debate at General Council.

### re: Workmen's Compensation Act

The Executive Committee at the March Meeting directed that the Branch Societies be notified re the Royal Commission under Chairmanship of Judge A. H. McKinnon. This has been done and each Branch Society Secretary has been forwarded a copy of the Workmen's Compensation Act. While there has been no public announcement of the dates of hearing, dependable information indicates that the hearings in Halifax will be held toward the end of July. The Branch Societies have been so notified. Any communications relative to this matter should be in the Secretary's Office not later than July 8th for consideration of the Committee which will draw up the brief.

### Annual Meeting - 1957

Preparation continues for the Annual Meeting which will be held at the Digby Pines Hotel August 29th to 31, 1957. The programme will be published in the July issue. Please note that although the General Sessions start Thursday at 9 a.m. there will be a clinical presentation on Wednesday evening at 9 p.m. followed by a "get-together" of members and their wives at 10 p.m. in the Lounge of the Hotel. The Programme Committee has planned this as an extra inducement for the members to arrive on Wednesday evening August

28th, so that the sessions starting Thursday will be well attended. Members are urged to send in the Housing Application which have been in each issue of the Bulletin since April.

Notices of the date of the next Executive Committee Meeting have been sent to the Secretaries of Branch Societies, Secretaries of Affiliated Organizations and representatives of the Society on various committees.

It is necessary that these reports and any business to be placed before the Executive be in the Secretary's office by July 8th in order to give time for preparation of the business to be considered by that Committee.

### Committee Meetings

During the past month the Committee on Fees has met regularly. There have also been meetings of the full Committees on Legislation and Medical Economics. The Committee on Legislation gave further consideration to the Chiropractic problem in preparation for the Annual Meeting. The Committee on Medical Economics studied the "Welfare Group" in relation to the Medical Services provided to them - very satisfactory progress is being made in this matter.

C.J.W.B.

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### CLINICAL RESEARCH MEETING ABSTRACT

#### Some Effects of Glucose and Succinate Loading in Obesity

J. W. MacIntosh, Jr., W. I. Morse and R. C. Dickson  
Department of Medicine, Dalhousie

In an attempt to discover an abnormality in carbohydrate breakdown in overweight individuals, blood sugar and pyruvic acid levels have been determined at intervals before and after intravenous administration of glucose and of succinate. The latter is a naturally occurring product of glucose oxidation. At the time of this preliminary report the procedure has been completed on thirty-two persons with varying degrees of adipose tissue excess or deficiency. A significantly higher fasting blood sugar level has been observed in obese individuals, and a tendency to greater pyruvic acid elevation in obese cases following dextrose infusion. Sodium succinate infusion has resulted in a marked rise of both blood sugar and pyruvic acid levels in one patient, receiving corticoid therapy for Addison's disease. A similar result was obtained in a thin patient receiving ACTH.

## DALHOUSIE MEDICAL RESEARCH COMMITTEE

Abstract Clinical Research Meeting April 24, 1957

## THE INFLUENCE OF PRESSURE ON GROWING BONE\*

Dr. A. R. Trias, Assistant Professor.  
Anatomy Department,  
Dalhousie University

The influence of pressure on growing bone has been a subject of controversy for many years and has not yet been settled. Many papers have been written on the role that pressure plays in diseases like osteoarthritis, scoliosis, Perthes', C.D.H., deformities in poliomyelitis, etc., and in procedures such as stapling, compression arthrodesis, etc.

These experiments, started in Oxford under the direction of Prof. J. Trueta, aim at the observation of both macro- and microscopic changes that occur at the ends of growing bones when submitted to pressure. In order to apply pressure a clamp was fitted at the knee joint of living rabbits. The clamp was maintained by two pins passed through the lower end of the femur and upper end of the tibia. Pressure was obtained by a pair of springs mounted on the clamp and it was maintained for different lengths of time. Some animals were sacrificed when pressure was released; the rest were allowed to survive for different periods after the removal of the clamp. In all cases an intra-arterial injection of Berlin Blue or Indian Ink was perfused when the animals were sacrificed. This permitted the observation of changes of local blood supply.

The compression forces that were developed under the clamp in these experiments were surprisingly high. A decrease in growth directly proportional to the pressure time resulted in most cases. The first change in the epiphyseal cartilage under the pressure consisted of an increase in number of the hypertrophic cells, resulting in a widening of the epiphyseal plate. The widened cartilage underwent degeneration when kept under pressure. Where degenerative lesions were severe and extensive, a bony bridge fused the epiphysis with the metaphysis and deformity occurred as growth went on. These changes were produced by ischemic changes of the epiphyseal plate.

I am grateful to Prof. R. L. de C. H. Saunders for facilities to continue the work started in Oxford Eng., and for his and Dr. F. Fyfe's help and advice. The histological work was performed by Mr. Carl Saiphoo.

\*Read at the Orthopaedic Research Society, Chicago, Jan. 25th, 1957.  
This work was supported by a Grant of the National Research Council.

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**WANTED**

Locum tenens wanted for July and August in Truro. Apply to the Executive Secretary, The Medical Society of Nova Scotia, Dalhousie Public Health Clinic, Halifax, N. S.

Available for locum tenens for about one month, either July or August, preferably August, in or near Halifax. Apply to Doctor A. Trias, 123 Cunard Street, Halifax, N. S.

## Post-Graduate Committee Activities

The Spring Courses in Halifax have now been completed. The active participation of those attending, by their discussion and by their constructive criticism, adds much to the success of these courses and is gratefully acknowledged. It is the hope of the Director to discuss the Post-Graduate Courses with a large proportion of the profession individually in coming months, in search of suggestions for future programmes.

The Week in Medicine, March 25th to 29th, for which we owe thanks to the Department of Medicine and the Victoria General Hospital and Dalhousie Public Health Clinic, was largely attended, Nova Scotians including Dr. C. L. MacMillan, Baddeck, Dr. P. A. Cole, Hubbards, Dr. H. D. Lavers, Truro, Dr. J. A. MacCormick, Antigonish, Dr. U. A. Weste, Halifax, Dr. J. A. McDonald, Glace Bay, Dr. A. J. Brady, Halifax, Dr. J. H. Fraser, Westville, Dr. M. E. DeLory, Annapolis Royal, Dr. L. Cogswell, Berwick, Dr. H. O. Royal, Truro and Dr. W. A. McJannett, Camp Debert.

The Short Course in Psychiatry, April 8th to 10th, was conducted by the Department of Psychiatry at the Victoria General Hospital, the Nova Scotia Hospital and Dalhousie Public Health Clinic and deserved, through its excellence, a much better attendance. Dr. A. Elmik, Canso, Dr. D. H. Spark, Dr. W. Watters, Greenwood and Dr. H. A. Myers, Amherst, were present.

The Week in General Surgery, 29th April to 3rd May, held in the Victoria General Hospital, the Children's Hospital and Camp Hill Hospital, saw the Department of Surgery provide a varied and interesting programme. Registrants from Nova Scotia included Dr. R. G. A. Wood, Lunenburg, Dr. J. R. McCleave, Digby, Dr. R. W. Campbell, Shelburne, Dr. J. Carson Murray, Springhill, Dr. D. S. MacKeigan, Dartmouth, Dr. H. O. Royal, Truro and Dr. W. E. Coates, Amherst.

A new combination course offered between May 27th and 31st by the Departments of Obstetrics, Gynaecology and Urology, in the Victoria General Hospital, the Grace Maternity Hospital and the Dalhousie Public Health Clinic, resulted in much discussion by the visitors, of value to both them and the teachers. Dr. P. M. Sers and Dr. R. Sers, Goldboro, Dr. H. O. Royal, Truro, Dr. D. R. MacInnis, Shubenacadie, Dr. D. G. Black, Digby and Dr. D. L. Davison, Wolfville, attended from Nova Scotia.

L. C. S.



## Housing Application Form

The Medical Society of Nova Scotia  
 Digby Pines Hotel, Digby, N. S.  
 August 29, 30 & 31, 1957.

MR. HOWARD WALKER,  
 Manager,  
 Digby Pines Hotel,  
 Digby, N. S.

Please reserve for me the following:—

### In Hotel

- ( ) Double room with bath—twin beds—including meals \$12.00 per person per day—  
 minimum rate \$24.00. (2 Persons)

### In Cottage

- ( ) Cottage with sitting room and two twin bedded bedrooms—including meals \$13.25  
 per person per day—minimum rate \$53.00 per day. (4 Persons)
- ( ) Cottage with sitting room and three twin-bedded rooms—including meals \$13.25  
 per person per day—minimum rate \$79.50 per day. (6 Persons)

I WILL ARRIVE AUGUST..... A.M..... P.M.....

I EXPECT TO DEPART.....

Name of persons who will occupy above accommodations:

Name (Dr. & Mrs.).....

Address.....

In view of the large attendance expected, no single rooms will be available at the Digby Pines Hotel, unless cancellations permit. If coming alone, please check here..... (v) if you are willing to share a room. If you have a preference for some party to share a double room with (or couple(s) to share a two or three bedroom cottage with) please insert name (s) below:—

I would prefer to share accommodation with

Name.....

Address.....

Name.....

Address.....

## PHYSICAL ACTIVITY AND THE DIET IN POPULATIONS DIFFERING IN SERUM CHOLESTEROL\*

Data on total serum cholesterol are presented for samples of men, classified by age and physical activity, in Minnesota, Malmo, Sweden, Bologna, Naples, the Island of Sardinia and three ethnic groups in Cape Province, South Africa. Data on the cholesterol in the beta lipoprotein fraction in the serum are presented for some of these groups.

Differences in physical activity do not explain the large differences in serum cholesterol found when groups with different dietary habits are compared.

Within some populations there is a tendency for men doing heavy manual labour to have somewhat lower serum cholesterol values than other men in the population. Among the Bantu, who show this tendency most prominently, it was found that men performing heavy work consume diets lower in fats than the other Bantu and there is other evidence pointing to a general tendency for the composition of the diet to be related similarly to the habitual level of physical activity.

It is concluded that the habitual diet, and especially its fat content, has much more influence than the physical activity, *per se*, on the concentration of total cholesterol and beta lipoprotein cholesterol in the blood stream.

Keys, A., Anderston, J. T., Aresu, M., Bjorck, H., Brock, J. F., Bronte-Stewart, B., Fidanza, F., Keys, M. H., Malmros, H., Poppi, A., Posteli, T., Swahn, B., and del Vecchio, A., *Journal of Clinical Investigation*. 35: 1173-1181, October, 1956.

\*From Medical Abstracts, December, 1956.

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## CANCER OF THE THYROID GLAND\*

Cancer of the thyroid gland, no matter what the pathologic classification, must be considered a potentially fatal disease. As such, it should be treated vigorously with all possible means.

Nothing short of total thyroidectomy together with block dissection on the same side constitutes adequate surgery.

Radioactive iodine is used to ablate any remaining thyroid tissue in the neck. Should metastases occur subsequently, they then would be more likely to take up radioactive iodine.

Ross, D. E., *Surgery, Gynaecology and Obstetrics*. 103:171-179, August, 1956.

\*From Medical Abstracts, December, 1956.

# Physician's Colour Slide Exhibition

## ANNUAL MEETING

### THE MEDICAL SOCIETY OF NOVA SCOTIA

Digby Pines, Digby, N. S.

August 29 - 31, 1957.

Dear Doctor:

1. This is your invitation to take part in the Colour Slide Show to be held during The Medical Society of Nova Scotia meeting at Digby in August this year.
2. Here is what you do to enter; read carefully the conditions of entry listed here.
  - (1) List the titles, process and value of your entries on the Entry Form. Add your name and address.
  - (2) Detach the entry form and mail or deliver it to C. J. W. Beckwith, M.D., Executive Secretary, The Medical Society of Nova Scotia, Dalhousie Public Health Clinic, University Avenue, Halifax, N. S.
  - (3) Mail your slides with the entry form to arrive in Halifax by August 1, 1957.
3. Exhibitors may submit up to three slides and may be 35 mm. mounted in standard 2" x 2" size; or 2 $\frac{1}{4}$ " x 2 $\frac{1}{4}$ " mounted in 2 $\frac{3}{4}$ " x 2 $\frac{3}{4}$ ".
4. Each slide must be clearly marked with title, name and address of the owner. You are urged to use glass mounts as we cannot be responsible for damage to slides not protected by glass.

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### ENTRY FORM

NO..... Title..... Process..... Value.....

1. ....

2. ....

3. ....

Name.....

Street.....

City.....

## Personal Interest Notes

Doctor Denis Howell, Head of the Department of Dermatology, Dalhousie University and Victoria General Hospital, was elected President of the Canadian Dermatological Association recently in London, Ontario. This honour was extended to Doctor Howell on the termination of the year in office, as President, of Doctor J. B. Sexton of London. Next year's meeting of the Association is to be held in Halifax, N. S.

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Doctor George Hubert Flight of Halifax has been granted a John S. McEachern Memorial Fellowship by the Canadian Cancer Association. The sum involved is that of \$4,050 for one year's training in gynaecology at the University of Minnesota. Doctor Flight is a native of Newfoundland, and belonged to the graduating class of Dalhousie University of 1950. A good deal of Doctor Flight's post-graduate training was carried out in the Victoria General Hospital in the Departments of Pathology, Gynaecology and Obstetrics. Following completion of his studies, Doctor Flight plans to return to St. John's, Newfoundland, where he will be engaged in the diagnosis and treatment of cancer.

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Doctor Ian MacKenzie, Dalhousie's full-time Professor of Surgery, recently arrived from Great Britain to assume his new appointment here. A meeting of the Department of Surgery was held on the evening of May 21, with the retired Chief of Staff, Doctor Alan Curry, in the chair. The purpose of this meeting was for the Surgeons of the Staff to officially welcome Doctor MacKenzie, and for the handing over ceremony involved. Doctor MacKenzie spoke briefly to us of his hopes and aspirations for the Department of Surgery laying special emphasis on research. At the close of the ceremony, Doctor N. H. Gosse paid glowing tribute to the past services of Doctor Curry, the outgoing Professor of Surgery. Doctor MacKenzie assumes not only the Chair of Professor of Surgery, but also that of Head of the Department of Surgery of the Victoria General Hospital. We are glad to welcome him and wish him every success in his new homeland.

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The monthly business meeting of the staff of the Victoria General Hospital was held on the evening of May 22. The President, Doctor E. F. Ross, paid tribute to Doctor Alan Curry, the retired Head of the Department of Surgery. Doctor Ross drew attention to the fact that Doctor Curry has served over thirty years in the Department, the last ten of which he had held the Chair as Head of the Department of Surgery.

Doctor Curry's faithful attention to his responsibilities and duties have been exemplary. During his many years of service, Doctor Curry carried out surgical procedures and teaching of the highest order. The many residents, interns and students who had the benefit of his wide experience and advice will be forever grateful. His constant attention to the public ward patients who came under his care has not been surpassed, and indeed few have equalled it. Doctor Curry brought to his surgical service, surgical treatment of a very high order indeed. The kindly word, and an occasional flash of humour will long be remembered by those patients who had the pleasures and benefits of his services.

Doctor Curry has been promoted to Honourary Consultant Surgeon to the Victoria General Hospital. In his new role we will continue to have the benefits of his wide experience in diagnosis and treatment.

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The excavation for a new addition to the Victoria General Hospital is now in full swing. This addition will be in the form of a rectangular building of three storeys. It is designed to house the cobalt bomb and facilities for isotope therapy. In addition to this, it will house a new record department, and have one large conference room.

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A course in post-graduate surgery under the sponsorship of the Post-Graduate Committee was carried out during the first week in May. The guest speaker was Doctor H. F. Moseley, Hunterian Professor, R.C.S. of England, Assistant Professor of Surgery, McGill University, and Association Surgeon, R.V.H., Montreal.

During the course, Doctor Mosley presented many interesting cases of trauma of the extremities. These cases were well illustrated with coloured slides. The mid-week evening meeting was given over to Doctor Moseley, at which time he gave an interesting lecture on traumatic conditions around the shoulder joint.

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*"Ours the Wind Against the Eyes."*

Rupert Brooke

The pilot and flying surgeon, W. I. Coates of Amherst, let his home during the first week of March in the company of Mr. Norman Carruthers of Moncton and flew to Miami, Florida. From there, Doctor Coates took off by himself and flew his plane from Key West, Florida to Havana. Whilst in Havana he attended the medical meeting of the Flying Physicians' Association, of which he is a member. On his return to the mainland, he continued his flight to Toronto where he attended the Sectional meeting of the American College of Surgeons. Altogether, he flew a distance of over six thousand miles within a three-week period.

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The Professor of Urology, Dalhousie University and Victoria General Hospital, Doctor Clarence L. Gosse, was elected President of the Canadian Urological Association at a combined meeting of the Canadian and British Urological Associations held in Montreal in May 15.

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Doctor B. J. D'Eon, who has been practising medicine in Yarmouth for the past eight years, has announced his appointment to the Department of National Health and Welfare, Overseas Service, and left Yarmouth for London, England, with his family on May 28. They are scheduled to sail from Montreal May 31, on the S. S. Corinthia. Their first destination will be London where the doctor will be stationed for the present. Incidentally, it will be home coming for Mrs. D'Eon, the former Coral Golding, daughter of Mr. and Mrs. Charles Golding, London. Doctor and Mrs. D'Eon were guests of honour at a dinner attended by the Medical Staff of the Yarmouth Hospital and their wives, at the Seafood Restaurant on Friday, May 10th. Doctor and Mrs. D'Eon were presented with a painting of a Yarmouth scene done by a Yarmouth artist. Doctor D'Eon's present office and general practice will be taken over on May 15 by Doctor Gerald Belliveau, Meteghan native, who has recently been practising in Mahone Bay.

Three residents will be completing their training at the Department of Psychiatry of Dalhousie on June 30th of this year and will be returning to service in the provincial areas. Doctor Aubrey Shane and Doctor Carl C. Giffin will join the staff of the Nova Scotia Hospital and Doctor Harry MacQue who in the late fall will join the staff of the Hospital for Nervous and Mental Diseases in St. John's, Newfoundland. The Department of Psychiatry held a dinner in their honour at the Lord Nelson Hotel on June 4th, at which they were presented with certificates of satisfactory service and training during their period with the Department of Psychiatry.

Doctors R. O. Jones and R. J. Weil will be attending The Canadian Medical Association and Canadian Psychiatry Association meetings in Edmonton from June 17th to 22nd. Doctor F. A. Dunsworth will also be in attendance and is participating in a programme having to do with Psychiatric Treatment of Children. Doctor Weil will present a paper, "The Psychiatric Aspects of Disaster" based on his experience during the Springhill Mine explosion and Doctor Jones will be participating in a panel on Psychiatric Teaching.

Doctor H. C. Still, Halifax, who is spending a short vacation in England with his family, will be attending the British Medical Association Annual Meeting being held at Newcastle-on-Tyne, July 15th to 19th, as the official delegate and representative of The Canadian Medical Association.

## Maritime Medical Care Incorporated

For many years doctors' accounts which have been submitted to Maritime Medical Care and subsequently reduced on a basis of "over-service" have been a sorely vexing problem to many physicians. Most doctors feel that excessive demand, as such, originates on the part of the subscriber, and that the physician should be paid for all legitimate calls which he makes in good faith. At the same time, excessive demand from whatever cause, has resulted in Maritime Medical Care having the highest rate for home and office calls of any comparable plan in Canada. It seems to be the feeling of the profession that where this excessive demand originates on the part of the patient, it should properly be chargeable to him. Previous to this time only the certificated specialist had this privilege, under his agreement with Maritime Medical Care, of rendering any extra bill to the patient. It was decided at the Board of Directors meeting (June 5, 1957) to extend this privilege in a limited form to the General Practitioner in the following motion:

"That all participating physicians be allowed to extra bill in cases where an account has been reduced by the Medical Taxing Committee because the subscriber has demanded services in excess of what the attending physician would normally provide."

This applies **only** to accounts in which, in the opinion of the attending physician there has been over-demand on the part of the patient. At present, the extra billing privilege cannot be extended to embrace accounts which have been reduced for other reasons, or accounts in which no reduction has been made.

G. B. SHAW,  
Med. Director M. M. Care.

## Obituary

Funeral services were held 1.30 p.m. Wednesday, May 29, at All Saints Cathedral in Halifax for Doctor Walter Lawson Muir, Halifax, one of Canada's leading anaesthetists, who died Sunday night, May 26, at Victoria General Hospital following a lengthy illness. He was in his seventy-sixth year.

Interment was in Terrace Hill Anglican cemetery, Truro.

Head of the Department of Anaesthesia at the Victoria General Hospital for more than a quarter of a century before his retirement two years ago, Doctor Muir's death marks the end of an era for a pioneering medical family in Nova Scotia.

Doctor Muir was well known and highly regarded by the hundreds of fellow physicians and surgeons throughout the province with whom he had worked in his capacity as an anaesthetist. In 1955 he was installed as an honorary member of The Canadian Medical Association, the highest honour the organization can bestow.

Born at Truro on August 8, 1880, he was a son of the late Doctor William Muir, one of the town's best loved citizens, and Mrs. Muir. His grandfather, also a physician, was one of Nova Scotia's pioneer medical practitioners.

He attended Kings Collegiate School and King's College at Windsor and graduated from there in 1903 with a Bachelor of Arts degree. He received his medical degree from McGill University in 1907 and took further training at the Montreal General Hospital and the Montreal Maternity Hospital.

Doctor Muir returned to Truro and established a practice there in 1910 but shortly after the outbreak of World War I he joined the Canadian Army Expeditionary Force and served overseas as a battalion medical officer.

On his return from overseas he was appointed to the staff of the Department of Anaesthesia at Camp Hill Military Hospital and, in addition, practised at the Victoria General Hospital and the Halifax Infirmary. In 1927 he succeeded Doctor J. F. Lessel as head of the Department of Anaesthesia at the Victoria General Hospital, a post he held until his retirement a few years ago.

He also served as a part-time faculty member of the Dalhousie Medical School from the time he returned from overseas until his retirement as an assistant professor in October, 1946.

A Fellow of the International College of Anaesthetists, he was also certified with the Royal College of Anaesthetists of Canada. In 1932 he served as President of the Canadian Society of Anaesthetists.

He was a member of the Halifax, Nova Scotia and Canadian Medical Societies as well as the International Anaesthetists and Research Society. Doctor Muir held numerous offices in these organizations through the years and took a keen interest in all matters pertaining to his particular field of endeavour.

Doctor Muir was a devoted member of the Cathedral of All Saints and sang in the choir at the Cathedral for more than thirty years. He was also a member of the Board of Governors of the University of King's College for many years.

He is survived by his wife, the former May Bigelow, Truro.

## Walter

Did anyone ever have fewer enemies or more friends than Walter Muir? Not that he was all things to all men—far from that—but he certainly was loved by all men. I think we loved him because he was that rarest of humans—a gentle man. He was a gentleman, too, respecting and living up to the aristocratic tradition, believing in and giving homage to the old school tie, an Episcopalian of the Episcopalians. But perhaps what really bound us to him was his liking for us and his profound respect for the sanctity of our rights. He was a big man physically and had the heart to go with it.

But who can really analyze personality? Whatever made him the Walter he was, caused us to hold him in the highest regard and affection. The sense of *noblesse oblige* with which he was so strongly endowed revealed itself in all his activities. He not only belonged to our profession, he worked to make it a better one. He was not only an Episcopalian, but a most faithful member of Synod, cathedral and choir. None of us was more loyal attending hospital or society meetings, or so willing to play a part (no matter how humble) in getting the work done. Perhaps the most thankless and troublesome of all tasks is being a treasurer: Walter was treasurer of our provincial society for years and years—and needed no auditor!

He loved the fellowship of the meeting. This was partly due to his innate liking for his fellowmen, but also in a very real sense to something boyish in his personality that remained to the end. For although he was reserved in manner, he was genuinely young at heart. As a result he found himself as equally at home at a King's Collegiate reunion, or Haliburton Club dinner, as at Synod, C.M.A. annual meetings, or senior golf tournament. It certainly revealed itself in his penchant for song.

He loved to sing. For years and years he was a member of All Saints Cathedral choir, and gave up only when surgery—as he put it—“took half my wind away.” Those of us at the V.G. knew affectionately another aspect of this talent. Whenever there was a special celebration—some farewell dinner—an unusual society meeting—Walter belonged to a group that was called upon to prepare and present a topical song. In fact, he was the mainspring of this special quartet, providing not only the bass voice, but the practise piano and the enthusiasm. He got a great kick out of these occasions, and, since he was called upon time after time to head them up, others must have, too. I am sure that we Haligonians will miss this melodious part of his contribution to our joy of living.

For years he was the anesthetist *sans egal* at the Victoria General. He belonged to a simpler age of anesthesia than the present. His tools were a mask, a tube of ethyl chloride, and a can of ether, yet the variations he could play with these gave a beautiful relaxation in days when the surgeon struggled not only with the disease but the bowels. While he adjusted his technique to the new age, I'm sure most of us will remember him with the simpler tools and the gentle induction. One thing can be said without fear of contradiction: he was in his day as fine an anesthetist as he was a person.

It was a great privilege to have worked and played with such a man. In a profession where the very competition—to say nothing of our rugged individualism—tends to bring out a certain asperity, his gentleness fell like a balm (perhaps even a reproach) on us all. In a real real sense we have lost—because he himself was so friendly—a friend; but more than that something irretrievable of “sweetness and light” has gone out of our lives.

H. B. A.