

## The NOVA SCOTIA MEDICAL BULLETIN

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### GUEST EDITORIAL

#### A CURE FOR AMBIVALENCE

As physicians we tend to forget the mixed emotions our very profession provokes in the mind of the average man. We are present at his birth, we are present at his death. We share his most intimate secrets and this right knows no barriers. It is human to resent being beholden to others, hence when doctors, either corporately or individually, are found to have feet of clay we must expect the underlying public bitterness to appear. Criticism of doctors will always be present, at times openly, at times just under the surface. We must never become dismayed with criticism, it derives from human traits in our patients and must be expected by all who are physicians.

However, we can do much more to keep this criticism at the level of unconscious resentment, or channel it into constructive paths if we make the effort to assess the individual patient's humor. It takes sense and sensitivity on the physician's part to judge when the patient's grumbling needs therapeutic venting. Most doctors begrudge the time required to let the hostile or discontented one "blow off steam". If we bundle them out of the office without giving them a chance to express themselves, what can we expect?

The general public is convinced that we are out of touch with them. Recently a correspondent in a local newspaper commended "A Local Doctor" for writing to the paper giving an opinion concerning housing conditions. This correspondent went on to say that doctors can take a greater part in forming public opinion on matters of public importance. Are we too busy to be citizens? Are we afraid of what our colleagues will say about us if we give our opinions on matters of the common good?

For several years the Ontario Medical Association has sponsored a Speakers Bureau which supplied physicians to speak to lay bodies when requested. One hundred and eighty Ontario Medical Association physicians spoke to lay societies in 1960. This is one of the best forms of positive medical public relations. There will be muttering from colleagues in the hospital corridors when such a scheme is recommended in Nova Scotia but until we are willing to stand up for our beliefs and be counted we will not in fact be physicians. As the Executive Secretary of the O.M.A. said recently "People want to hear a doctor speak. They want him to be a part of the community—they want to know that he is interested in the whole community's health."

F.A.D.



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"WHITE WATER AHEAD - I  
HOPE SLEEPING SKULL  
DOESN'T WANT TO STEER  
AT THE LAST MINUTE!"



**PRELIMINARY PROGRAMME**  
**108th ANNUAL MEETING**  
**THE MEDICAL SOCIETY OF NOVA SCOTIA**  
**Nova Scotia Division, C.M.A.**

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**Keltic Lodge - Ingonish - June 12th, 13th & 14th, 1961.**

**June 11th, Sunday.**

9.00 p.m. Pictou County Medical Society Ceilidh.  
Welcome to all.

**June 12th, Monday.**

- 9.00 a.m. Registration—Recreation Hall.  
9.30-11.00 a.m. 1st Business Session.  
Chairman: The President, Dr. F. J. Granville.  
11.00-11.30 a.m. Coffee in Exhibitors' Area.  
11.30-12.30 p.m. Clinical Session.  
Chairman: Dr. C. G. Harries.  
Guest Speaker: Dr. W. C. MacKenzie, Dean of Medicine,  
University of Alberta.  
Subject: Acute Intestinal Obstruction.  
1.00 p.m. Luncheon.  
Chairman: Dr. V. H. T. Parker.  
Speaker: Dr. F. A. Dunsworth.  
Subject: Medical Public Relations.  
2.30 p.m. Panel Discussion—Complications of Biliary Calculi.  
Chairman: Dr. J. B. MacDonald.  
Moderator: Dr. W. C. MacKenzie.  
Participants: Doctors E. F. Ross, Halifax; G. W. Sodero,  
Sydney; J. Balmanno, Yarmouth; M. T.  
Casey, Halifax. Dr. R. G. Munroe, New  
Glasgow.  
4.00- 5.00 p.m. 2nd Business Session.  
Chairman: Dr. F. J. Granville.  
7.00- 9.00 p.m. Lobster Party (details to be announced).

**June 13th, Tuesday.**

- 9.00 a.m. Registration—Recreation Hall.  
9.30-11.00 a.m. 3rd Business Session.  
Chairman: Dr. F. J. Granville.  
11.00-11.30 a.m. Coffee in Exhibitors' area.  
11.30-12.45 p.m. Group Clinical Discussions.  
Leaders: Dr. R. C. Dickson, Medicine.  
Dr. R. M. Ritchie, Paediatrics.  
Dr. M. G. Tompkins, Jr., Obstetrics.



**Tues. June 13, (cont'd.)**

- 1.00 p.m. Luncheon.  
Chairman: Dr. W. A. MacQuarrie.  
Speaker: Mr. John H. Delaney, Board Member, U.M.W.  
Subject: To be announced.
- 2.30- 3.30 p.m. Panel Discussion: Medical Services Insurance.  
Chairman: Dr. H. B. Whitman.  
Moderator: Dr. A. A. Giffin.  
Participants: Drs. J. W. Reid, T. W. Gorman, J. S. Robertson, A. A. Macdonald, C. B. Stewart, Mr. S. P. Brannen, Dr. J. A. MacDonald.
- 3.30- 4.30 p.m. 4th Business Session.  
Chairman: Dr. F. J. Granville.
- 6.30 p.m. President's Reception—Lounge, Keltic Lodge.
- 7.30 p.m. Annual Banquet.  
Chairman: Dr. C. B. Smith, President, Pictou County Medical Society.  
Guest Speaker: Hon. R. A. Donahoe, Minister of Public Health.  
Subject: To be announced.

**June 14th, Wednesday.**

- 9.00 a.m. Registration—Recreation Hall.
- 9.30-11.00 a.m. 5th Business Session.
- 11.00-11.30 a.m. Coffee in Exhibitors' Area.
- 11.30-12.30 p.m. 6th Business Session (if necessary).
- 1.00 p.m. Luncheon.  
Afternoon free.  
Golf Tournament: Chairman—Dr. C. B. Smith.
- 2.00 p.m. Meeting Nova Scotia Cardio-vascular Society.
- 9.00 p.m. Annual Ball.  
Presentation of golf prizes.

**LADIES' PROGRAMME**

- Monday, June 12th 11.00 a.m. Sherry Party—Keltic Lodge Lounge.
- Tuesday, June 13th 10.00 a.m. Coffee Party.
- Wednesday, June 14th 10.00 a.m. Coffee Party.

Ladies are invited to attend the luncheons and, of course, all social functions. The panel discussion on "Medical Services Insurance" is also open.

All business and clinical sessions will be held in the Recreation Hall. Social Registration Fee \$10.00.

**Executive Committee Meetings**

- June 10th 9.30 a.m. 5th Regular Meeting
- June 11th 9.30 a.m. Annual Meeting.
- June 15th 9.30 a.m. First meeting of Executive 1961-62.

"All doctors attending the Annual Meeting of The Medical Society of Nova Scotia are invited to attend the clinical program of The Nova Scotia Cardio-vascular Society".

CANCER HAZARDS IN OUR ENVIRONMENT:  
THE USE OF ANIMAL EXPERIMENTS IN THEIR DETECTION  
AND EVALUATION

F. J. C. ROE, D.M. (Oxon)\*

INTRODUCTION

Cancer, like other diseases, could be eradicated either by prevention or by cure. We have just passed through a decade during which most of the available resources have been devoted to the search for cancer cures. Valuable advances in palliation have been made, but fundamental cure, other than by radical surgery, has not yet been achieved. During the same decade relatively scant attention has been given to cancer prevention, but there are signs that this is to become the most important approach in the future.

Because of this change of emphasis it is necessary to consider to what extent the results of tests in animals can and should be applied to the human cancer problem. The inevitability of the fate of the patient with inoperable cancer makes it justifiable to try out any drug which offers the faintest hope of benefit, so that it has not been necessary to examine too closely the validity of applying the results of animal tests to man. But when we turn to the growing field of cancer prevention, the question of the validity of this application becomes far more important.

Theoretically, cancer may be prevented either by removing from man's external environment (the term is used in the widest sense and includes foods, food additives, food contaminants, air pollutants, ionising and other forms of radiation, heat, cold, humidity, infective agents, stress of any kind etc. etc.) factors which induce cancer, or by making good deficiencies in the environment which favour cancer induction. There are not many examples of factors of the latter category (e.g. cancer of the esophagus in the Plummer-Vinson Syndrome due to iron deficiency) and we are concerned only with the former. Already, research in certain of the fields of cancer prevention has advanced to the point where it is desirable to *change the environment of people who as yet have not so far developed cancer*. In attempting this, we can expect opposition both from the general public who are averse to change of any kind (e.g. opposition of public to pasteurization of milk or flouridation of drinking water), and also, not infrequently, from commercial interests who tend to fight changes by which they will lose financially (e.g. the lack of co-operation from the dye-stuff industries in some countries when it first became known that bladder cancer was associated with the handling of benzidine and  $\beta$ -naphthylamine). In order to meet both kinds of opposition it is essential that the case for bringing about a particular change in the human environment is supported by adequate, relevant and sound data and, in particular, by a knowledge of the extent to which the results from animal experiments can be applied to problems of cancer-aetiology in man. In the present article an attempt is made to establish a basis from which the validity of animal tests in this respect can be judged.

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\*Pathologist to Cancer Research Department, The London Hospital Medical College, Turner Street, London, E. 1.



## II. THE NEED AND ADVANTAGES OF USING ANIMALS IN THE DETECTION OF HUMAN CANCER HAZARDS.

Direct studies of human cancer causation by environmental influences are in practice more or less limited to the search by statisticians for associations between particular forms of cancer and specific environmental factors. Sometimes investigations of this kind have brought to light correlations of such high probability that no-one could reasonably doubt a cause-and-effect relationship. For instance, no-one can reasonably doubt that the incredibly high incidence of cancer of the nose and cancer of the bronchus in workers in the nickel industry (Doll, 1958) is caused by exposure to chemical substances used in the processing of nickel. The argument that a cause-and-effect relationship had not been proved and that it is *just as likely* that men who are peculiar, in wanting to work in the nickel industry, are also peculiar in having a high expectation of developing nose and lung cancer, then the statistician concerned must be regarded as ridiculous if common sense is to play any part in this general field. (Compare R. A. Fisher's arguments re smokers and lung cancer—Fisher, 1959). More frequently, however, there are alternative explanations of apparent correlations and conclusions from retrospective studies need to be supported by data from prospective statistical studies, such as those of Hammond and Horn (1958) and Doll and Bradford Hill (1956) on smoking and lung cancer.

Prospective statistical studies are expensive and not always practicable. Because of the tendency for a long latent interval between exposure and tumor-induction it could take over twenty years to obtain adequate data from this type of study. Sometimes the overall incidence of the particular type of human cancer is very low, perhaps 1 or 2 per thousand of the population, and in order to show a statistically significant difference, between those exposed and those not exposed to a suspected carcinogenic agent, enormous population samples would have to be studied. It is rarely possible to control adequately other possibly relevant environmental differences between the two groups. The pattern of human living is infinitely variable, so that no questionnaire can cover all the relevant issues; human memories are inaccurate, and there are often reasons for not wishing to disclose all the facets of one's personal life on an apparently anonymous (though perhaps secretly identifiable!) questionnaire form.

If neither retrospective nor prospective statistical surveys can provide a clear-cut answer, then the possibilities of direct approach are exhausted; for we cannot deliberately test substances for carcinogenic action on man, nor can we study the mechanism of cancer induction in him. As in almost every other branch of medical research, therefore, we must turn to tests on *other* animal species. Indeed, experiments on laboratory animals provide the very basis of modern concepts of human physiology and of general medical therapeutics.

In general, man and laboratory animals suffer from a similar range of diseases, and apart from man's ability to describe subjective symptoms, it is hard to find human diseases which are not simulated in at least one other species. In most cases, the kinds of cancer seen in man, organ for organ, and cell-type for cell-type, have every one of them, parallels in other species of animal; in many instances it is impossible to distinguish a human tumor from an animal tumor simply from its microscopic appearance. On the other hand, these sometimes striking similarities can never be taken to indicate similar



causation. It is known from animal experiments that a variety of different stimuli (i.e. chemical, physical, viral, etc.) may give rise to histologically identical tumors, and that *the microscopic appearance of a tumor depends more on the nature of the tissue from which it arose than on the specific nature of the stimulus which caused it to do so.* For instance, fibrosarcomata of identical appearance may be induced in mice either by the polyoma virus or by one of a variety of different chemical substances.

Even where satisfactory statistical tests on man are practicable, carefully selected animal tests can usually provide an answer very much more quickly. Both human and animal data indicate that malignant tumors arising towards the end of the life span of a species can be the result of exposure to carcinogenic stimuli much earlier in life. For instance, in the dye-stuff industry where workers were exposed to benzidine, or to naphthylamine, between 15 and 25 years usually elapsed from the beginning of exposure to the time when the first cases of bladder cancer were seen, and in many cases exposure to the chemical agent ceased long before the cancer arose. A negligible number of cases occurred during the first 5 years from the beginning of exposure (Case *et al.*, 1954). The average induction time in relation to a particular form and rate of exposure was approximately one-quarter to one-third of the average life span of man. By treating mice with the same substance it is possible to produce a high incidence of bladder tumors in approximately the same proportion of the life span (i.e. 25 to 40 weeks) with these substances (Bonser *et al.*, 1956).

### III. THE DESIGN OF ANIMAL TESTS.

The three most commonly used routes by which substances are tested in animals for carcinogenicity are (1) by application of the substance to the skin after removal of the hair, (2) by subcutaneous or intramuscular injection and (3) by mouth, either in the food or drinking water, or by stomach tube. A fourth method, particularly applicable to the study of the induction of bladder cancer, has been the injection or implantation of substances into the bladder. Less commonly used have been inhalation and intravenous injection. Many other routes have been developed and used from time to time, sometimes in relation to the study of cancer of a particular organ, e.g. injection of benzo-pyrene into the prostate gland to induce prostatic cancer (Moore and Melchionna, 1937) or the implantation of pellets into the brain to induce a variety of gliomas and other tumors (Zimmerman and Arnold, 1941).

Faced with this wealth of method it is necessary to formulate certain general principles upon which to base the selection of tests:—

1. Each substance should be considered separately: all that is known about its chemical structure and pharmacologic action should be taken into account before the tests for carcinogenesis are designed.

2. Sufficient animals should be studied for a sufficient part of their natural life span before a negative response can be accepted. In all species cancer is essentially a disease of the latter half of life and this is the interesting period in all animal tests for carcinogenesis.

3. It is often impossible to design a fully adequate battery of tests on a new substance without more information than is available from preliminary tests: a second line of tests may have to follow the first.

4. Flexibility in design is essential. Cumulative toxicity may make it necessary to reduce dosage of a substance part-way through a long-



term experiment. Alternatively, the development of tolerance may enable the dosage to be increased.

5. Most important of all, interpretation of results is not a matter of simply recording positive and negative responses. Cancer-induction by a substance is not necessarily confined to the site of application. Expert knowledge and experience may be necessary to distinguish cancer from other pathological lesions. A significant incidence of certain non-cancerous lesions in particular test groups may be of considerable interest and importance in its own right. Thus, tests for carcinogenicity should not be divorced from tests for other forms of chronic toxicity and every animal experiment should be designed and conducted to yield a maximum of information.

6. For the above reasons it is clear that there can be no inflexible standardized test regime for testing substances for carcinogenic action and that tests should never be conducted without the advice and, preferably, supervision of a highly-trained biologist or pathologist. The choice and design of tests should be essentially his responsibility. In general, he will be bound to use one or more of the well-tried test systems by which carcinogenic action can be revealed. In addition, if not included in the above, he may try to test substances by the same routes as those by which man is likely to be exposed. This is not always practical and is not necessarily more helpful than standard test systems about which so much more is known.

7. Most authorities agree that substances should be tested near the maximum tolerated dosage (e.g. Hackmann, 1959). In most experiments carcinogenic effect increases with dosage, though not always proportionately. In no case has a positive result been missed because of super-optimal dosage, except where the dosage used also affected survival. On the other hand there are many examples of positive results having been missed by the use of too small dosage.

Subdivision of total dosage into a number of smaller doses either has no effect on carcinogenesis (Druckrey, 1954) or enhances it (Saffiotti and Shubik, 1956). As a general rule it is advisable to use more than one dose-schedule.

8. Obviously all tests must be properly controlled. Adequate numbers of untreated animals, and animals treated with solvents only, must be observed for tumors. Cancer is a naturally occurring condition in animals, just as it is in man. Therefore tumors should not be regarded as having been caused by a test substance unless the probability of their not having arisen spontaneously is known, and known to be significantly lower. Incidentally, tumors that occur apparently spontaneously do not necessarily have a different cause from those induced experimentally. Shubik *et al.* (1957) recorded a high incidence of skin tumors in mice obtained from a particular breeder. It transpired that the mice had been reared in wooden boxes the wood of which had been preserved with creosote. Mice of the same strain bred in metal cages did not develop such tumors (Boutwell and Bosch, 1958). Later it was shown that this casual exposure of infant mice to creosote led also to a high incidence of lung tumors (Roe, Bosch and Boutwell, 1958). In point of fact creosote may be one of the most potent carcinogens in our environment.

A negative result in a test for carcinogenic action cannot carry the same weight as a positive one: it can always be argued that had the



test conditions been different so might the result. The value of negative results is reduced further by the absence of comparable positive controls. Occasionally substances are tested by methods which have never been known to give a positive result using a known carcinogen. Such results are almost valueless as tests for the carcinogenicity of the substance, though they may be of value in the search for new methods.

#### IV. PRECAUTIONS IN INTERPRETATION OF EXPERIMENTAL RESULTS.

##### 1. *Purity of the substance under test.*

It is necessary to be sure that the material under test is the same as that to which man is exposed. Accidental contamination of the test material with even a trace of a potent carcinogen has in the past given a false positive result.

##### 2. *Statistical significance.*

It must be known, at an acceptable level of probability, that the apparent difference in incidence between the test and control groups did not occur by chance alone. A 1 in 20 possibility that the difference arose by chance is barely adequate for a firm conclusion: but if there is only a 1 in 100 possibility that it did so, the result is usually acceptable. In this connection it would be wise to suspect over-ingenious use of statistical tests. Dr. Armitage of the London School of Hygiene once pointed out that if the results in two identically treated groups of animals are analysed by 20 different statistical tests, it is possible that, by chance alone, one would find a significant difference, with a probability of 1 in 20, by one of the tests!

A paper by Boyland (1957) provides useful information on the size of experimental groups necessary to give significant results.

##### 3. *Peculiarities of species and test tissue.*

Although the use of genetically pure animals has been of great benefit in cancer research, it is important to remember that certain peculiarities have been bred into them. These peculiarities may include unusual susceptibility of one or more tissues to carcinogenic stimuli. A clue to the existence of unusual susceptibility of this kind is often given by a high incidence of, so-called, spontaneous tumors of the same kind. It is, for instance, much easier to induce lung tumors in strains of mice which have a high spontaneous incidence of these tumors than in those which have a low spontaneous incidence (Lynch, 1926).

A special precaution is necessary in the induction of sarcomata in the subcutaneous tissue of rats and mice. This tissue is extraordinarily sensitive to the induction of such tumors. Sarcomata have been reported following the subcutaneous injection of normal body constituents such as glucose in this species (Nishiyama, 1938), and all the solvents in which substances have been administered to rats by the subcutaneous route have given rise to malignant tumors on their own. It is now generally felt that evidence of carcinogenesis should never rest *solely* on the demonstration of sarcoma-induction in this site (see Report of Panel on Carcinogenic Risks in Food Additives and Pesticides, Ministry of Health, London, 1960).



Sometimes in animal experiments positive results seem to depend upon quite exceptional circumstances. For instance, if male mice of certain strains are exposed to minute traces of chloroform by any route, they develop a severe inflammatory reaction in the kidneys. For reasons unknown, the kidneys of females of these strains, and of both sexes of many other strains are completely unaffected by exposure even to much higher doses (Deringer *et al.*, 1953). Similar peculiar species and sex differences exist in susceptibility to cancer induction. For instance, the kidney of the male Syrian Golden Hamster is peculiarly susceptible to the induction of renal tumors by oestrogens (Kirkman and Bacon, 1949; Horning and Whittick, 1954). In the early stages cessation of oestrogen treatment is followed by regression of the tumors. The kidneys of no other species so far studied react in this way to administration of oestrogens.

#### 4. *Criteria of malignancy.*

Perhaps the most important, certainly the most difficult and controversial, precaution concerns the criteria for the diagnosis of malignant cancer. There is a tradition in medical education according to which the post-mortem room is the High Court of Justice, and the Pathologist, the Lord-Chief thereof. If he says "It's malignant", then it *is* malignant. No doubt in most cases he is right, but it is always wrong to confuse opinion with truth. In this case the truth is that there is no clear-cut distinction between benign and malignant: a whole series of grades exist between these two extremes. Where human material is concerned, marginal lesions are often called malignant on the basis of "If it were mine, I'd have it out". In animal research one can afford to be more objective. The growth of a tumor can be observed, its growth-rate recorded, and it is not necessary to remove it before it has invaded muscle or metastasised to local lymph glands and other organs. Every tumor can be examined microscopically in a fresh state, since no permission from a mouse's relatives is necessary before post-mortem examination is carried out! Unfortunately, advantage is not always taken of these facts, and lesions are called benign or malignant without any statement of the criteria of diagnosis. It should be a general rule that substances are only described as "carcinogenic" if they have given rise to tumors of unquestionable malignancy, and malignancy should always be questioned if the criteria of diagnosis are not stated.

A commonly used aid in the diagnosis of malignancy is transplantation of part of the suspect tumor to other animals of the same species. It is generally agreed that if a tumor transplant will grow progressively then the tumor is malignant. However this test is of limited value since many undoubtedly malignant tumors fail to thrive in new hosts. In any case caution must be exercised in that a progressively growing swelling in the region of the graft may be entirely inflammatory, so that even at this stage microscopic examination by a competent pathologist is essential. Another source of error occurs when inbred strains of mice are used: normal tissues and benign tumors can survive indefinitely after transplantation to a genetically identical host. In this case it is necessary to be sure that the graft has grown progressively, and has infiltrated surrounding tissues.



*Significance of induction of benign tumors.*

Experience indicates that substances capable of inducing benign tumors are often capable of inducing malignant ones also, though the induction time is longer and the incidence much lower. Therefore the induction of benign tumors, although inadequate evidence of carcinogenicity of itself, should lead to a strong suspicion of such activity. Further work, perhaps on a larger scale and with a longer period of observation, may well reveal the ability of the substance to induce malignant tumors.

These considerations apply equally to metaplasia, and to carcinoma in situ. *Metaplasia* is generally considered to be a precancerous change, but as such its induction should not be regarded as equivalent to cancer-production in a test for carcinogenesis. If it really is precancerous, then it should progress to cancer during a further period of observation, at least in a proportion of cases. *Carcinoma in situ* covers a range of the many stages between undoubted benignity and undoubted malignancy. In human morbid anatomy the term is applied to a variety of lesions, the malignancy of which is uncertain. It has a more or less definite meaning in surgery and prognosis, but has no place in experimental pathology.

5. *Confirmation by repetition of the experiment.*

Finally, it is almost a general rule that, before the result of a carcinogenic test is acceptable, it must have been repeated, preferably in a different laboratory. Past experience indicates that this is a wise precaution, so many are the pitfalls in this type of research.

V. *EXTRAPOLATION OF RESULTS OF ANIMAL EXPERIMENTS TO MAN.*

It has often been pointed out that there are considerable species differences in susceptibility to carcinogens. Therefore, it is argued, the results of tests in animals should not be applied to man. In fact, data for species other than rats and mice are usually entirely inadequate in order that apparently negative responses can be regarded as conclusive. In the past some cancer investigators, while apparently fully aware of the statistical requirements of experiments when using rats and mice, seem to have lost this awareness progressively as the size of the species under test increases: a worker who would not dream of reporting a result obtained on less than 20 mice has, seemingly, been quite content to report experiments on 6 rabbits or 4 dogs or 2 monkeys!

In the case of the most potent carcinogens, e.g. 3,4-benzopyrene, 9,10-dimethyl-1,2-benzanthracene, 1, 2, 5, 6-dibenzanthracene, 20-methylcholanthrene, positive results have been obtained in almost all species tested (Hartwell, 1951; Shubik and Hartwell, 1957 (2)). Admittedly man has not been deliberately tested but, on the other hand, it was because of the demonstration of cancer-induction in man by chimney soots (Pott, 1775) and other coal tar products that research in the field of chemical carcinogenesis was begun; and it is from coal tar, creosote, and chimney soots etc. that substances such as 3,4-benzopyrene and 1, 2, 5, 6-dibenzanthracene were originally isolated. Therefore, it is unlikely that man is insusceptible to carcinogens of this type. In the case of other types of substances where there is less or no direct information of man's susceptibility, the likelihood that he is susceptible increases progressively if:—



1. Cancer can be induced in more than one tissue and species.
2. Cancer can be induced by a realistic method of exposure.
3. Cancer can be induced in the same tissue, and of the same histological type as that which the agent is suspected of inducing in man (such suspicion being based on retrospective and prospective statistical surveys of the human disease).
4. Cancer can be induced by realistic doses of the material in question. The meaning of realistic in this connotation is discussed in the next section.

#### *Realistic Dose.*

The ratio of the weight of a man to that of a mouse is approximately 2000:1. For drugs which act *systemically* the  $LD_{50}$ , expressed as weight of drug per unit of body weight, is similar in the two species. In other words, if a certain weight of drug kills 50 per cent of a group of mice, then 2000 times as much would be required to kill 50 per cent of men.

In the case of substances which act *locally at the site of administration* the body weight is not necessarily particularly relevant. It is generally accepted that every cancer finds its origin in a single altered body cell. Now the body cells of man are not 2000 times the size of those in mice, on the contrary they are of a very similar size. Hence at the site of injection, a particular volume of material would come into contact with approximately the same number of cells in the two species. Given equal susceptibility at the cellular level, therefore, the resulting tumor incidence would be related directly to the volume of the material injected, irrespective of body weight.

Part of the current controversy over the possible hazards of the clinical use of iron-dextran ("Imferon") (Richmond, 1959, 1960; Haddow and Horning, 1960; Golberg, 1960a; Golberg, 1960b), is basically concerned with this point:—Injection of certain doses of iron-dextran subcutaneously or intramuscularly into rats and mice induces sarcomata and histiocytomata. Some workers argue that on the basis of body weight the doses required to induce these tumors are enormous compared with those used clinically. On the other hand, the actual size of the doses used clinically are much the greater. Here is a dilemma which only time can resolve, for although no cases of sarcomata attributable to therapy with iron-dextran have been reported, in view of the much longer life span of man, it is too early to expect them.

#### *Threshold dose.*

Is there a threshold dose for each carcinogenic substance below which it is ineffective? There is no doubt that, in any set of experimental conditions, there is an apparent threshold: using groups of practical size (say 50 animals per group) it is always possible to select a dose of a carcinogen too small to produce any tumors. But if the size of the groups could be unlimited, would any dose, however small, be entirely ineffectual?

As far as man is concerned, a substance could not be regarded as harmless because it failed to induce any tumors in a group of 50 men. A cancer incidence of 1 in 1000 or 1 in 10,000 or even 1 in 100,000 would concern us if we knew that it could be prevented: an incidence of 1 in 50 or 1 in 100 in a civilized community would cause not only concern but alarm! The truth of this is evident from the response of the public to the campaign against poliomyelitis. At the time of the publication of the 1954 Francis Report (Francis *et al.*, 1955), vaccination was shown to reduce the total incidence of the disease



from 46 to 28 per 100,000 and the incidence of paralytic cases from 36 to 16 per 100,000. Despite the fact that only 20 out of every 100,000 vaccinated children appeared to have benefited from the injections, the differences in incidence were considered sufficient to warrant the extension of an enormously costly trial vaccination programme into a nationwide campaign.

Since it is impractical to test substances for carcinogenicity on groups of 1,000 or 10,000 animals, the usual practice is to expose smaller groups of animals to doses much higher than normally present in the environment. However, opinion is divided as to whether it is justifiable to conclude that a *positive result obtained with a large dose in a small group of animals indicates that a similar result would be obtained using a smaller dose on a proportionately larger group of animals*. Workers such as Druckney (1954) hold firmly to the view that such a conclusion is justified. Others argue that this view is based almost entirely on the experimental induction of liver tumors, and may not be true of cancer-induction in general.

Looking back through the literature of the last 25 years it is apparent that, as techniques have been refined, the dosage of a variety of different chemical carcinogens considered necessary to produce tumors has steadily declined. Take for example 9, 10-dimethyl-1, 2-benzanthracene: in the earliest experiments approximately 5-10 mg. were applied to the dorsal skin of mice before tumors arose (Bachmann, Kennaway and Kennaway, (1938); in 1941 tumors were induced by approximately 0.5 mg. (Law, 1941); and today carcinogenesis has been demonstrated with only 1.2  $\mu$ g. (Klein, 1956).

In the final analysis the question whether there exists an absolute threshold is unanswerable; but most people would concede that there are practical thresholds, by which is meant dose-levels at which no effect can be seen in as large a group as it is possible to observe.

But the arguments concerning threshold dose do not end here. Exposure to a carcinogen is in no way similar to exposure to aspirin or to a barbiturate. Recovery from an overdose of either of the latter is as far as we know complete, and has no effect on subsequent tolerance. In the case of exposure to carcinogens however there is considerable evidence that *the effect of one exposure is irreversible* (Berenblum and Shubik, 1949) and that *the effect of several exposures is cumulative* (Roe and Salaman, 1954). Indeed some experimental results suggest that where the total dosage is constant several small doses are more effective than one large dose, (Saffiotti and Shubik, 1956; Salaman and Roe, 1956). If this evidence is accepted, then the size of any one dose of a carcinogen is irrelevant, and the sum of all the doses of a lifetime is the factor which has to be considered.

Even this is not all, for it is possible that the carcinogenic effect of two substances is additive, or perhaps, even synergistic, or that *co-carcinogenic* factors may enhance the effect of carcinogens. Experimental evidence strongly suggests that these are not merely theoretical possibilities. In the case of coal tar, for instance, the carcinogenicity cannot be explained quantitatively by the concentration of any one of the carcinogens in the tar, and it must be the result of the effect of more than one constituent. The role of co-carcinogenic factors has now been clearly demonstrated in rabbit skin (MacKenzie and Rous, 1941; Friedewald and Rous, 1944), mouse skin (Berenblum, 1941; Berenblum and Shubik, 1947a, 1947b), and mouse forestomach (Peirce, 1961); and recent work suggests that they may play an important part in the causation of human bronchial cancer by cigarette smoke (Roe *et al.*, 1959). Moreover, it is becoming apparent that a wide variety of co-carcinogenic substances



are present in the environment (e.g. phenolic substances, including phenol itself (Boutwell and Bosch, 1959); many surface active agents (Setala, 1960); certain citrus oils (Roe and Peirce, 1960); and latices from the stems of plants of the Euphorbia (Spurge) family (Roe and Peirce, 1961).

It may be concluded, therefore, that the existence of threshold dose-levels is of theoretical interest only, since even if a particular dose of a carcinogen is regarded as subthreshold, its effect may nevertheless be augmented to above the threshold by further exposure to the same carcinogen, or to other carcinogens, or to co-carcinogens.

## VI. ACTION.

Interest in possible carcinogenic hazards has increased very much in recent years, but the problem as a whole is not new. *Already thousands of cases of human cancer have been prevented by the introduction of suitable measures, particularly in connection with industrial processes (e.g. in the dye-stuff, nickel, and chromate industries).* The task which lies ahead is the logical continuation of this approach, and its extension to less obvious and less potent carcinogenic hazards in the environment. As in the past, experiments on laboratory animals will play an indispensable role in the detection of these hazards. It is true that it cannot be proved absolutely by animal experiments that there is a cause and effect relationship between a particular environmental factor and a particular form of cancer in man. But this impossibility of obtaining absolute proof is not peculiar to this problem. It occurs in every situation in life. Important decisions are constantly made on the basis, not of proof, not even on probability which can be expressed mathematically, but on a balance of probabilities based on a common sense interpretation of all the relevant data. This is the very basis of judgment in courts of law\*: there is no other.

Agreement that an environmental factor constitutes, or probably constitutes, a cancer hazard indicates the need for legislation. At this stage the scientist should not attempt to become the legislator but should be content to advise. Cancer is not the only hazard in life and from arbitrary high-handed action more harm than good may result. The public, and any industries involved, ought to be represented on the governmental committees which eventually decide the action to be taken.

Where it is possible for the substance which is considered hazardous to be eliminated from the environment, without serious economic loss or interference with established practice, there are no grounds for disagreement. But in other cases, because of lack of alternatives or because possible alternatives carry their own hazards or for serious economic reasons, etc., it is necessary to compromise by agreeing to *permissible levels* of exposure. However, a decision to tolerate a potential carcinogenic hazard up to a certain level should always be regarded as an interim solution only and complete elimination of the hazard should be the goal.

Much of the recent increase in prosperity and well-being in a great part of the world has been due to the development of modern agricultural methods and, in particular, to the use of chemical insecticides, herbicides, and fungicides. Such substances frequently contaminate human food. The manufacturers argue that unless new substances are continually introduced it is

\*"In civil actions . . . a contested case may be established by a balance of probabilities". Halsbury's "Laws of England" 3rd Edition, Vol. 15 p. 272 para 496. Butterworth, London, 1959.



probable that the development of resistance by weeds, insects and micro-organisms will nullify the advances already made. On the other hand the full-scale testing of large numbers of potentially useful chemicals for carcinogenic action poses an enormous problem for the industries concerned. This situation could be eased by:—

1. A very much greater measure of international agreement which would reduce the pressure of foreign competition.
2. The establishment, preferably under the aegis of Governments, or internationally, of centers for the purpose of testing on a large scale environmental substances for carcinogenic action. This would be of great benefit to those industries wishing to introduce new materials.

Progress towards international agreement is slowly being made through the World Health Organization; and some Governments have begun to organize testing facilities. But the rate of progress in these directions is not commensurate with the rate of the accumulation of problems, nor has account been taken of the enormous backlog of work in the form of *the innumerable untested, but potentially hazardous, substances already present in man's environment. It is among these that factors responsible for the existing cancer incidence must be sought.*

Of course every attempt should be made to prevent the further addition of hazardous factors to the environment, but at least equal attention should be paid to the evaluation and elimination of existing hazards. Consider, for example, 3, 4-benzopyrene: this is a ubiquitous carcinogenic substance of considerable potency. It is found in "polluted" air (Waller, 1952), in cigarette smoke (Cooper and Lindsey, 1955), in automobile exhausts (Lyons, 1959), in smoked foods (Gorelova and Deekoon, 1959, 1958), in coffee grounds (Kuratsune and Hueper, 1960), in fact it is produced by the pyrolysis or burning of almost any organic material (Gilbert and Lindsey, 1957). The existence of substances of this kind in almost every department of man's environment presents a very complicated problem of assessment and their elimination an enormous challenge to research workers in many fields, especially that of engineering.

The present tendency to puff up doubtful hazards into nation-wide cancer scares is to be deplored, not only because of the largely unnecessary anxiety which it causes, but also because it blinds the public to what are probably more serious cancer hazards. By all means let us be concerned about how the farmer sprays his cranberries, but let us also try to find out as soon as possible whether the creosote with which he sprays his fences is as great a carcinogenic hazard to him as it is to laboratory animals.

#### SUMMARY AND CONCLUSIONS

1. There is currently a shift of emphasis in cancer research away from cure to prevention. One method of prevention is to remove carcinogenic hazards from the human environment. This involves the testing of suspect substances for carcinogenic activity.
2. The necessity, advantages and disadvantages of using laboratory animals in research of this kind are discussed.
3. It is argued that, in the testing of environmental substances for carcinogenic activity, each substance should be considered separately in the light of all that is known of its pharmacological actions. These tests should be designed, supervised, and assessed by highly trained



- workers and cannot be reduced to a standardized routine capable of application by the semi-skilled.
4. Before a positive result is accepted in a test for carcinogenic activity the following points must be considered:—
    - (a) Chemical purity of the substance.
    - (b) Peculiarities of the strain of animals used and of the test site.
    - (c) The inclusion of both positive and negative controls.
    - (d) The production of malignant, as well as benign, tumors confirmed histologically according to an acceptable standard.
    - (e) Statistical analysis of differences in tumor incidence between test and controls.
    - (f) Confirmation of the results by repetition of the experiment.
  5. A positive result obtained in animals gains increasing significance for man if:
    - (a) Cancer is induced in more than one tissue and species and by a realistic dose and method of exposure.
    - (b) Cancer is induced in the same tissue and of the same histological type as that which the agent is suspected of inducing in man.
    - (c) If a retrospective statistical study in man shows a significant association between exposure to the substance and development of the disease.
    - (d) If a prospective study shows the same association.
  6. None of these types of evidence constitutes absolute proof of a cause and effect relationship. Action can only be taken in the light of evidence based on the balance of probabilities.
  7. There is an urgent need both for international agreement in this general field and for the establishment of centers for the large-scale testing of substances for carcinogenic action. Present progress in these directions is too slow.
  8. At present attention is focussed on the testing of substances which it is proposed to add to the environment. Important though this work is, it cannot lead directly to a fall in the existing high incidence of cancer. Search for factors responsible for this should be made amongst *substances already present in the environment*.

## ACKNOWLEDGEMENTS

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## MARITIME MEDICAL CARE INC.

The annual Meeting of the Board of Directors, Maritime Medical Care Inc., took place on April 26th., 1961. Immediately following this the first meeting of the new Board of Directors was held.

### BOARD OF DIRECTORS M.M.C. INC., 1961-62.

Director	Physician Members, Branch Medical Society Represented	Appointment Expiring
DR. C. H. YOUNG	Halifax Medical	1962
DR. H. B. WHITMAN	Pictou Medical	1963
DR. R. F. ROSS	Colchester-East Hants Medical	1963
DR. A. A. GIFFIN	Valley Medical	1963
DR. J. MCD. CORSTON	Halifax Medical	1962
DR. T. B. MURPHY	Antigonish-Guysboro Medical	1962
DR. G. C. MACDONALD	Cape Breton Medical	1962
DR. L. D. MACCORMICK	Cape Breton Medical	1963
DR. D. F. MACDONALD	Western Counties Medical	1962
DR. A. ELMIK	Cumberland Medical	1963
DR. H. A. FRASER	Lunenburg-Queens Medical	1962

### LAY MEMBERS

MR. J. A. WALKER, Q.C.	—	Halifax
MR. J. NOBLE FOSTER	—	Halifax
MR. VICTOR N. THORPE	—	Kentville

### The Board of Directors elected:

DR. A. A. GIFFIN	—	Kentville	—	President
DR. H. B. WHITMAN	—	Westville	—	Vice-President

### The Executive elected are the Officers and —

DR. R. F. ROSS	—	Truro
DR. J. MCD. CORSTON	—	Halifax
MR. J. A. WALKER	—	Halifax
MR. J. NOBLE FOSTER	—	Halifax

Changes are that Dr. C. H. Young replaces Dr. F. Murray Fraser, Dr. L. D. MacCormick replaces Dr. J. A. MacDonald and Dr. A. Elmik replaces Dr. D. R. Davies.

C.J.W.B.



## PRESIDENT'S REPORT

ANNUAL MEETING

MARITIME MEDICAL CARE INCORPORATED

APRIL 26, 1961

I welcome you, gentlemen, to this 12th Annual Meeting of Maritime Medical Care Incorporated. A special welcome to Mr. Victor Thorpe, of Kentville, who has recently joined our Board. Mr. Thorpe has already attended a "special" meeting held early in March, but as this is his first "regular" meeting, I know you will join me in making him twice welcome.

Our greetings too, to the new members representing their County Societies on our Board for the first time:

Dr. C. H. Young, representing Halifax Medical Society

Dr. A. Elmik, representing Cumberland Medical Society

Dr. L. D. MacCormick, representing Cape Breton Medical Society

It is a wonderful way, gentlemen, to gain an insight into the problems, not only of Maritime Medical Care Incorporated, but of prepaid medicine in general, a subject which, in the light of possible future developments in the practice of medicine, is of paramount importance to all members of our profession as well as to the public at large. In this connection, I would remind you that an important responsibility is yours, as a member of this Board, to see that the deliberations in which you participate, the decisions at which you arrive, and the reasons for such decisions, are made known to as many of your colleagues as possible. This is *their* Corporation as well as ours; nothing we do here should be secret; and only by a wide dissemination of our discussions, our hopes and plans for the future, will the whole-hearted support of the profession be obtained and maintained. This, as I say, to a large extent, is *your* responsibility.

You will be discussing the financial and Auditor's reports in due course. at this stage, all I need say is that considering some very heavy items of expenditure during the year, it is gratifying to close the books with a moderate balance for the second year in a row.

Your Finance Committee consisting of the President, Mr. Walker, Mr. Foster and Dr. Corston has been particularly active during the year, and you will find their activity reflected in the increased investment income of the Corporation during that period. The chief function of this Committee is to scrutinize closely the investments, change them when advantageous, and allow no money which can be earning income to lie dormant. The Treasurer is our chief watch-dog and has been doing an excellent job. It is essential to have a good proportion of laymen on this Committee, since with all due respect to the medical members, our lay directors' intimacy with the world of finance is a great advantage to the Corporation.

The Reserve Stabilization Fund is growing steadily. Its purpose is to maintain proration at an existent level should heavy demands, e.g., epidemics, threaten. Fortunately, no such demand has yet materialized. This Fund cannot be touched without Executive decision.

The number of our subscribers has increased by 7,710 during the past year to a total enrolment of 136,700. This is not a large increase, but considering the defections to the Federal Civil Service Medical Plan, represents excellent work on the part of our Sales Department. Much of their time during 1960 was spent in a tremendous "retention" campaign, which resulted in Maritime



Medical Care Inc. losing to the new Federal Plan only 25% of possible subscribers, the lowest of any prepaid care plan in Canada.

However, the Federal Plan introduced difficulties for M.M.C. The Plan denied to new subscribers payroll deduction facilities for all other carriers, including M.M.C., although deductions for contracts in force at July 1st were continued. We immediately arranged for "pay direct" facilities for all service personnel and are continuing to enrol them, but obviously this is, and can become more so, a nuisance to them, and increases our administrative costs for this group.

Working intimately with the Public Relations Committee of The Medical Society, your Executive informed by letter all the Federal Members of Parliament for Nova Scotia of this situation as it affected M.M.C., and made representations to the Minister of Finance against this iniquitous and discriminatory ruling, trying, so far in vain, to have it altered.

In view of what Mr. Walker has just told you of the attitude of the Minister of Finance when discussing this subject with him, I feel that any further action should come from The Medical Society of Nova Scotia, representing our professional views, rather than from the Corporation representing our financial ones. I feel strongly, too, that the view expressed by the Minister of Finance should *not* be accepted as final.

Our Senior Citizens' Plan has met with moderate success since its initiation. This, in my opinion, is the first step in a series which can lead to comprehensive medical coverage for our older citizens, and should be pursued vigorously. Your Executive decided not to apply the 2% Reserve Stabilization factor to this Fund at the present time, but, in my opinion, this should be done as soon as possible, again to safeguard against heavy demands upon this Fund, and possibly to provide for an extension of coverage for this group in the future.

An informal discussion between the Premier of Nova Scotia and your President took place during the past year at which the suggestion was made for the Premier's consideration that the Government should consider instituting a contributory health plan, using M.M.C.I. as its vehicle, for the old-aged, chronically ill, and indigent. This suggestion met with qualified approval, the difficulty being, of course, money. This subject might easily, at any time, become a political issue, and it would be wise to maintain contact with Government from time to time, intimating our willingness to cooperate in such a plan, even advancing the thought that for certain groups, such as outlined above, the proration might be less than our present, or proposed future level.

A special committee of The Medical Society of Nova Scotia, under the Chairmanship of Dr. A. A. Giffin, met with similar committees representing the Medical Societies of New Brunswick and Prince Edward Island during the year with a view to investigating the possibilities of a united prepaid medical care plan for the Atlantic Provinces. A resolution was passed recommending that the Board of Directors of Maritime Hospital Service Association and Maritime Medical Care Incorporated appoint Committees to review these possibilities and produce concrete suggestions for implementation. It is my understanding that recently the Board of M.H.S.A. has approved this in principle, and that we shall shortly be receiving an invitation to form a committee to consult with them on this matter. This, I think is something which should be given very serious thought by this Board, and every reasonable effort be made to reach agreement on what could be a tremendous boon to the people and profession of these provinces.



I would advise this Board to consider immediately the establishment of an agency to provide for Extended Health Benefits (E.H.B.) as an adjunct to our comprehensive contracts. There are many arguments in favor of this, and few against, and industry, particularly those of a national nature, is demanding more and more the provision of E.H.B. along with the comprehensive coverage or a co-insurance or indemnity program for its employees.

Maritime Medical Care Incorporated must be able to provide what the public wants if it is to survive in the future, and be in a position to compete successfully with commercial carriers. The time has passed when the medical profession can dictate to industry or the public what it should have. If it is not harmful, it should be available—at cost price.

I would strongly recommend that serious consideration be given to increasing the number of non-medical directors eligible for the Board. With the obvious increase in interest of things medical by government, industry, labour and laymen, an increase to five lay members from our present three would strengthen our Board tremendously, be a great asset in many obvious ways, and avoid criticism from various quarters in the future.

In July 1960, we were indeed fortunate to secure the services of Mr. Sam Brannan, previously Assistant General Manager of Medical Services Incorporated, Saskatoon, as our General Manager. Mr. Brannan arrived at the time our Office Management Specialists from Peat, Marwick & Mitchell were in the process of revising our internal administration. As a result of Mr. Brannan's practical experience of prepaid medical plans over a great number of years, many of the recommendations of our Consultants were not adopted, some were altered and a few accepted. Though this naturally meant that we had spent some money fruitlessly, in my opinion, the changes brought about by Mr. Brannan during his short time here, have already proven their value and are bearing fruit. The changed attitude of our employees, due to his friendly, diplomatic but firm approach is most noticeable to those of us who have been in almost daily contact with them. Certain problems will take time to solve, but it is encouraging to see the progress already being made.

It is the opinion of your Executive that larger quarters must be found immediately if we are to carry on efficiently the work of the Corporation. Accordingly, a contract has been entered into with the new owners of the Lord Nelson Hotel Limited for approximately 10,000 sq. ft. of space available approximately October 1st, 1961. The terms have already been made clear to you. It is hoped to rent some of this space to The Medical Society of Nova Scotia and since that Society has never been in the position of having to pay for its space, perhaps we should apply the pincer gently at first.

Your Executive feels too, that looking to the future, The Medical Society might be encouraged to erect its own building, with provision therein for M.M.C. and other para medical agencies, e.g., Dental Society; Nurses Association; Canadian R.C. Society, etc., and with financial help from M.M.C. in the form of interest-bearing bonds. Discussion on this subject has already been undertaken.

In the presentation of a brief by The Medical Society of Nova Scotia to the Hall Commission, it was agreed that we should hold ourselves ready to provide any statistical data which the Society might require.

In spite of the inroads made by commercial carriers in many national groups, we were able to negotiate our contract with the Railways for another two years. Included in the contract this time subject to approval by this Board, is provision for treatment of injuries by dental surgeons. This is a



definite trend and must be considered in any subsequent contract Maritime Medical Care Inc. may produce, or in any question of premium adjustment.

I feel that for a long time in the future, we have reached maximum premiums for our various contracts. Whereas prior to the last increase in rates, the commercial carriers were at a definite disadvantage compared to M.M.C.I., now they are happy at the competitive level our premiums have reached, and are looking forward gleefully to our next increase we may propose and which, in their opinion and mine, will price us out of the market. This we must obviously avoid, concentrating rather on the control of the utilization of doctor's services by the patient, and the over-service of patients by the doctor. In an attempt to introduce such control, Management is studying carefully selected groups and individuals who have consistently been demanding, and getting, service above average. Your Executive has empowered Management to bring this to the attention of the groups and individuals concerned with warning letters, and if no improvement is noticeable in due course, individuals may be transferred by Management to the Health Security Plan, and groups will be referred for Executive decision regarding similar action.

In addition, your Medical Director has been instructed to use his Taxing Committee not only as judges for individual accounts, but to review past accounts of doctors who persist in apparently over-servicing their patients, with a view to bringing them into line with the average services of doctors in similar locations and practices. It is my feeling that The Medical Society of Nova Scotia must be responsible for the discipline of its members, and where the Corporation fails to achieve cooperation from any participating physician, the Disciplinary Committee of The Medical Society will be asked to take action, on the facts presented to them.

At the end of 1960, 845 physicians had signed Participating Agreements with the Corporation: 636 or approximately 75% of the total were from Nova Scotia; 158 or about 19% were from New Brunswick, and the remaining 51 or 6% were enrolled in Prince Edward Island, Newfoundland, and other provinces.

In view of the increased interest among the profession in our sister provinces, we must give thought on the best method of increasing our subscriber membership in these areas. However, I feel, personally, that small groups in Nova Scotia will still be our mainstay, and that our Sales Department must be encouraged to attack vigorously these new fields.

Your Executive has already pointed out to the Executive of the Medical Society of Nova Scotia that to place the responsibility for designating who is, and who is not, a Specialist, upon this Corporation is grossly unfair. Eventually, a difference of opinion will arise as a result of our decisions. Representations should continue to be made to The Medical Society on this subject until such time as they accept this responsibility which is rightfully theirs.

Since this will be the last meeting at which I shall preside, I want to express my deep and sincere appreciation to the members of the Executive, who have so faithfully carried out their numerous duties during the year. Absence from the city was the only excuse acceptable for failure to attend our many meetings—and the attendance record set by them has been an outstanding one.

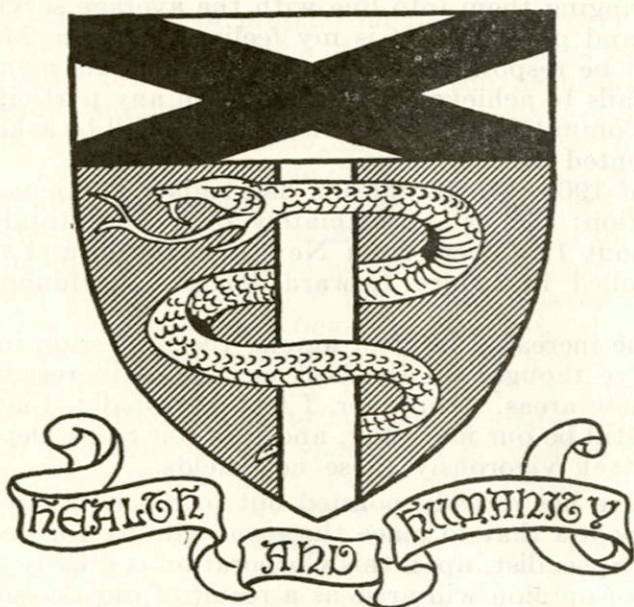
To you members of the Board, for your support, cooperation and encouragement, my heartfelt thanks. You are serving a worthy cause, better, perhaps, than you think and its success will depend on your belief in this cause, and your enthusiasm for its furtherance.



To Mr. Brannan and his Management Committee, and all our staff, who have so ably carried out their duties during the year, often during times of uncertainty and always under extremely difficult conditions, go my sincere thanks for work well done!

Good luck to you all.

F. MURRAY FRASER, M.D.  
President.





# MARITIME MEDICAL CARE INCORPORATED

## AUDITORS' REPORT

We have examined the balance sheet of Maritime Medical Care Incorporated as of December 31, 1960 and the statement of income and expenditure and general reserve for the year ended on that date and have obtained all the information and explanations we have required. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion, and according to the best of our information and the explanations given to us and as shown by the books of the corporation, the accompanying balance sheet and statement of income and expenditure and general reserve, together with the notes thereto, are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the corporation at December 31, 1960, and the results of its operations for the year ended on that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

PEAT, MARWICK, MITCHELL & Co.,  
Chartered Accountants.

Halifax, N. S.,  
March 20, 1961.

## NOTES TO FINANCIAL STATEMENTS

December 31, 1960

1. On December 31, 1960 the Corporation concluded a two year contract, written in conjunction with similar medical service plans in Canada, to provide medical coverage for the employees of Canada's railways. The contract provides that at its termination the experience of the participating plans will be reviewed in order to determine the net gain or loss from the contract. The experience of each plan is then related to the group as a whole, and the appropriate financial adjustments made among the plans. Based on the experience of the Corporation on this contract it is estimated that a refund of approximately \$7,500 to the participating plans will be required.
2. Under the terms of the agreement between the Corporation and the participating physicians the Corporation may, after the expiration of a twelve month period, cancel any unpaid balances outstanding on approved claims. The Board of Directors has passed the necessary resolution to cancel all such unpaid amounts to December 31, 1959. The unpaid balances of approved claims for 1960, amounting to approximately \$498,000 have not been reflected in the financial statements.



## MARITIME MEDICAL CARE INCORPORATED

## Balance Sheet

December 31, 1960

(with comparative figures for 1959)

ASSETS		
	1960	1959
Cash on hand and in banks.....	\$ 136,110	\$ 468,192
Accounts receivable.....	20,214	38,796
Accrued interest on investments.....	12,808	4,630
Investments at cost (Approximate market value)		
December 31, 1960 \$867,757		
December 31, 1959 395,560).....	883,982	423,975
Inventory of supplies at cost.....	10,382	10,799
Furniture and office equipment at cost.....	47,677	36,752
Automobile at cost.....	—	2,418
	<hr/>	<hr/>
	47,677	39,170
Less accumulated depreciation.....	18,931	16,960
	<hr/>	<hr/>
	28,746	22,210
	<hr/>	<hr/>
	\$1,092,242	\$ 968,602
	<hr/> <hr/>	<hr/> <hr/>
LIABILITIES		
	1960	1959
Medical claims payable.....	\$ 504,240	\$ 557,064
Unpresented medical claims, estimated.....	150,000	75,000
Accounts payable.....	6,168	7,269
Trust funds—Province of Nova Scotia		
Welfare Plan.....	16,718	9,809
Revenue from railway contract in excess of allowed deductions, estimated (note 1).....	7,500	26,000
Subscriptions received in advance.....	102,191	90,400
	<hr/>	<hr/>
Total liabilities.....	786,817	765,542
	<hr/>	<hr/>
Retained by the corporation:		
Reserve for stabilization of claims.....	94,732	30,402
General reserve, per statement attached.....	210,693	172,658
	<hr/>	<hr/>
Total retained.....	305,425	203,060
	<hr/>	<hr/>
	\$1,092,242	\$ 968,602
	<hr/> <hr/>	<hr/> <hr/>



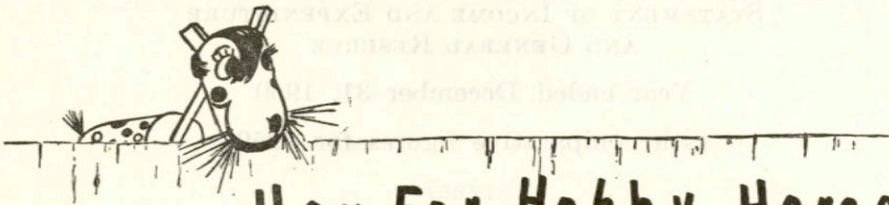
STATEMENT OF INCOME AND EXPENDITURE  
AND GENERAL RESERVE

Year ended December 31, 1960

(with comparative figures for 1959)

	1960	1959
Income:		
Subscriptions.....	\$3,283,085	\$2,866,957
Administration fee, Province of Nova Scotia Welfare Plan.....	10,142	8,781
Total income.....	<u>3,293,227</u>	<u>2,875,738</u>
Expenditure:		
Medical care for subscribers.....	2,899,333	2,476,802
Administration costs—.....	336,144	265,345
Total expenditure.....	<u>3,235,477</u>	<u>2,742,147</u>
Operating income.....	<u>57,750</u>	<u>133,591</u>
Income from investments.....	44,615	20,496
Net income for the year.....	102,365	154,087
Adjustment of 1957-1958 railway contract.....	—	57,607
	<u>102,365</u>	<u>211,694</u>
Appropriated to reserve for stabilization of claims... .	64,330	30,402
Appropriated to general reserve.....	38,035	181,292
Amount at beginning of year.....	172,658	(8,634)
General reserve December 31.....	<u>\$ 210,693</u>	<u>\$ 172,658</u>





## Hay For Hobby Horses

BY GUESS AND BY GOD

(The time is approaching when physicians, private and corporate, will be required to make categorical statements about many aspects of medical affairs. The principal term of reference of the Hall Commission is the study of the health needs and health resources of Canada. The following dialogue deals with some aspects of the problem of estimating the current and future needs for medical consultant services. Ed.)

'Woody Sayve-Life and the Devil's Advocate continue:

W.S.-L.—This province will need a steadily increasing number of internists if the quantity of medical services obtainable in this field is to be increased without sacrificing quality. At present, ignoring the larger problem of encouraging young men to begin the study of medicine, how are medical graduates being distributed among the myriad of sub-professions within our profession, specifically what use is being made of those who turn toward internal medicine?

D. A.—In short you are asking whom, how many, and what kind of internists we will produce for the future?

W. S.-L.—Rugger Doye put his finger on the problem when he said "There are not two of us carrying out the same type of practice. You cannot describe a uniform pattern of practice and call it 'internal medicine' ". How are we to define this specialty, so that we can nurture and protect it in the future?

D. A.—There are at least three approaches to a definition of internal medicine. From the academic point of view, an internist is a medical graduate who has completed a prescribed pattern of post-graduate education and passed at one of two levels of examination set by the Royal College. Presumably, he would be an internist if he never practiced in his life. However, if you desire a practical definition (i.e. pertaining to practice) an internist is a physician who confines his practice to a branch of medicine in which he has a special interest and, pray God, skill.

Historically, this is the source of specialization and in a province like Nova Scotia there are many specialists (in this older sense) whose work is of a high quality and whose labors ante-date the activities of the Royal College. This definition now assumes paper qualification to the level of certification or better.

A variant of that definition of specialism, based on mode of practice, is the economic-geographic one. Here the sine qua non of the internist is that he see only patients referred to him by another physician, preferably a general practitioner and the word internist is taken as synonymous with the older word consultant. This usage implies a formal relationship with other physicians in a hierarchy of medical practice. The existence of this structure presumes a sophistication, both public and professional, that does not yet exist in Nova Scotia.



W. S.-L.—When the members of N.S.S.I.M. were gingerly skirting the edges of this problem of definition, Johnny Balloon straddled two concepts which seemed to carry him in opposite directions; (a) that the internist must purge himself of all taint of generalism and become a pure consultant, the scholar-scientist who brings 'the mostest to the leastest' and (b) that every Nova Scotian hamlet, big enough to support a hospital, should have an internist. These two views of internal medicine are incompatible and stem from two different philosophies of post-graduate training in internal medicine.

D. A.—What two philosophies? If you stay on the unclouded plain of economics the variants of practice in internal medicine are the result of adaptations forced by local economic pressures. For all that cheap-jack medical sociology I favored you with a moment ago, the practice of internal medicine is a means of making a living. For me, the principal distinction between two internists here in Hogtown is in the various stratagems used to solve their economic problems. For example, the "pure" consultant, who is so pious about sending self-referred patients out into the cold without the blessing of his opinion, is merely a specialist who is sufficiently well established to be able to afford the luxury of grand airs. In the sub-culture it is a sign of 'having-arrived', like the prosperous trollop who can pick and choose whom she will bed.

W. S.-L.—Your medical sociology might make sense if you spared me the rhetoric. You set out to define the term 'internist' and suddenly conclude that it all boiled down to a matter of whether or not a man could survive on a referred practice alone.

D. A.—It is a matter of economics. The young internist must sing for his supper and wait until the general practitioners of the area condescend to let him eat regularly. The family doctor decides if the young specialist will survive in the "pure state".

W. S.-L.—If you can stop treating this as a matter for your sardonic wit, we badly need a consolidating definition. There are many good reasons for preferring a purely consulting practice; the most important (which I owe to Rugger) is the firm impression that we do much better work for referred patients than for the casuals in our practices. It may even be that the casual portion of an internist's practice causes a subtle deterioration of his consulting portion.

D. A.—Dammit! I'm not trying to make a joke out of it. I would provide you with a consolidating definition (whatever that is) if I had one, but many of our troubles are, at base, economic.

W.S.-L.—When Johnny Balloon was in full spate the other night I wondered "What will happen if what we want to become (as internists) is not what the public welfare (in terms of available *quality* medical care) requires in the next few decades? Suppose Nova Scotia needs us more as "De-Luxe G.P.'s" (to borrow a faintly derisory term used during the evening's discussion) than as pure consultants?

D. A.—Even if the specialist decided to adapt the development of his specialty to accommodate current local needs the change would have to make economic sense. If, in the future, practicing as a 'pure' consultant pays very well, you will not need to do anything to discourage 'generalists', impure specialists or De Luxe G.P.'s, if the latter pays less.

W. S.-L.—The difficulty is that we need both. Doug Tooth and Johnny Balloon are both good physicians and the types they represent are wanted in much greater numbers than are now forthcoming. It is dangerously shortsighted to insist that all qualified internists should fit into a stereotyped pattern.



(Save us from the pharisaical sin of praying "Thank God that I am not as other men"). I have no doubt that their respective provinces would miss Doug Tooth, Hector MacKimmion and other 'solo' internists far more than they would miss me.

D. A.—You are dodging the issue. The type of luxuriant academic-specialism that the Royal College seems to regard as ideal, should not be a prototype for the internist in Canada for many years to come, if ever. This (to me) grandiose view of internal medicine is the cause of the auto-immune reaction that produced the anomaly of Specialist (first-class) and specialist (second-class) in Canada. The existence of two levels of specialist qualification result as in boxing, in the anomaly of an individual being 'recognized' in one area and denied in another. This anomaly is more obvious in the specialty of general surgery where a certificated person is qualified according to the Law and the Prophets but is unacceptable to his fellow surgeons because he does not hold the higher qualification of Fellowship. How much more straightforward is the American way, establish a criterion for the *practice* of the specialty and let someone else bestow the academic laurels!

W. S.-L.—You have touched a very real problem. Young men who wish to continue the study of medicine after graduation are forced into a pattern (an elegant strait-jacket but constricting none the less) that may not be in the immediate interests of society to say nothing of the human wastage along the way. I've never seen a figure but the average casualty rate at Royal College exams must be about 50-60% of those who reach the oral examinations.

D. A.—The medical profession have assumed that God and the Royal College know how best to utilize that portion of medical graduates (now about 60-70%) who do not elect to go into General Practice. I must ask God. He, at least, speaks to his children.

W. S.-L.—This point only came to the surface briefly at the N.S.S.I.M. meeting. When the cry of "too many specialists" was raised, the rejoinder was "we worship the free enterprise system. If John Doe wishes to starve while trying to break in (in 1970) as the fifth neurosurgeon in Halifax, let him." My secretary asked me to raise the question of the early feeding of embryo specialists. She has invested a spouse in internal medicine and is concerned. When the Powers that Be let it out that there is room in Hogtown for eight new internists in the next decade what responsibility is implied on the part of the authorities?

D. A.—Are you as innocent as you sound? No responsibility at all is implied. The public and some political types believe that the young internist will get filthy rich on the public wards. The Powers seem to believe that consultations begin to flood in as soon as you open your office. The young internist doesn't want to do anything that smacks of general practice (altho' some G.P.'s seem convinced that he sits up nights devising ways and means to steal their patients) and, in my experience, is more than willing to do a straight consultant practice if given half a chance. The plums that once made it possible for the internist to devote such a large part of his time to ward service (unpaid) and the teaching of medical students (largely unpaid) have disappeared or are grimly retained by those who no longer need the fees. The young internist has three choices for the first five years (a) live on air like the chameleon or (b) live off the land like Wellington. If he chooses the second course he will do as many young surgeons do most successfully, become a "de luxe G.P." and (c) sell a large block of his time to some third party (such as industry or a university) to pay his rent. This compromise distracts him



because the duties laid on by his part-time employer rarely fit his professional needs. There is nothing more regrettable than the blunting of interest and the dissipation of energy that takes place in a young physician as peripheral duties multiply.

W. S.-L.—This discussion has mirrored one aspect of the problem faithfully, its confusion. Let me ask a number of questions that the Hall Commission is inevitably going to ask your society:

(1) What is an internist? What contribution does he make in the provision of medical care in this province?

(2) How many and what kinds of internists will be needed in Nova Scotia (a) to provide good medical care at present (b) to meet future demands especially as medical care becomes more complex?

(3) What relationship should exist between the family physician and the internist-consultant especially in the hospital? Should medical schools train an internist with training in ob-gyn and paediatrics who will provide comprehensive family service in the future.

D. A.—That's enough. . . . That's enough. The bar is closing. . . (his voice fades). Hey Jack, did you hear the one about the biology teacher who was demonstrating taste perception to a high school class. . . . .

Yours, in togetherness

BROTHER TIMOTHY

**Would You Like  
To Own  
A Home Of Your Own?**

Funds are now available  
for first mortgage loans  
at

**THE NOVA SCOTIA TRUST  
COMPANY**

55 SPRING GARDEN ROAD  
HALIFAX



## PERSONAL INTEREST NOTES

PHYSICIANS ART SALON: Canadian Physicians and medical undergraduates with art or photographic hobbies are cordially invited to enter and compete for awards in the Physicians Art Salon to be held at Montreal's Queen Elizabeth Hotel, from June 20-23, 1961. Again sponsored by the Canadian Pharmaceutical Firm, Frank W. Horner, Ltd., the Physicians Art Salon will mark its 17th year as a popular feature at the C.M.A. Annual Meeting.

Any Physician or medical undergraduate may obtain an entry form and complete details from the sponsor at P.O. Box 959, Montreal 3, Quebec. A short note or post card will bring the form along with complete instructions on how to prepare and ship your entries.

### ANTIGONISH-GUYSBOROUGH MEDICAL SOCIETY

Dr. Rolf Sers, Goldborough, Guys. Co. has received the Schering Corp. Ltd. award for study in Canada. This award of \$500 is toward post-graduate study of two weeks to a month duration. Dr. Sers, a native Latvian, has been practicing medicine at Goldboro for the past 8 years, having taken out his Canadian citizenship in 1956.

### CAPE BRETON MEDICAL SOCIETY

Dr. Wallace Graham, rheumatologist, of Toronto, addressed the Cape Breton Medical Society on April 6, 1961. Dr. Graham was accompanied by Dr. Lea Steeves, Halifax, Chairman of the Dalhousie Post Graduate Committee. The meeting was held in St. Rita's Hospital.

### CUMBERLAND MEDICAL SOCIETY

Dr. Norman H. Glen, Amherst, has been awarded the Upjohn Scholarship of \$500 towards two weeks to a month post graduate study in any hospital. Dr. Glen, a graduate of Bristol University, has been practicing in Amherst for the past several years.

### HALIFAX MEDICAL SOCIETY

April 7, 1961—The 10th anniversary meeting of the Nova Scotia Division Canadian Arthritis and Rheumatism Society, chaired by the Honorary President, Premier R. L. Stanfield, was held in the Binney Room of All Saints Cathedral Hall, Halifax. The meeting was addressed by Dr. J. Wallace Graham, Toronto, one of the founders of CARS.

April 12, 1961—The monthly meeting of The Halifax Medical Society was held at the N. S. Hospital. Business from the executive meeting of The Nova Scotia Medical Society was discussed. The Annual Dinner and Dance of the Society is scheduled for Saturday, May 6, 1961.

### WESTERN NOVA SCOTIA MEDICAL SOCIETY

Dr. and Mrs. A. F. C. Scott, recently had a vacation in Montreal, Quebec.



## NOVA SCOTIA DIVISION OF THE CANADIAN ANAESTHETISTS SOCIETY

Professor J. Ll. J. Edwards of the Dalhousie Faculty of Law was guest speaker at a meeting of the Society, and clearly defined the position of the Medical Practitioner in Law. During an interesting discussion many areas of uncertainty were explored, including questions of abortion, blood transfusion, and deciding when life was extinct.

A new slate of officers was elected on March 21, 1961, Dr. Ian E. Purkis, being elected chairman, and Dr. Ross Irwin being elected Secretary-Treasurer.

## NOVA SCOTIA ASSOCIATION OF PATHOLOGISTS

Dr. Kurt Aterman, Pathologist at the Halifax Children's Hospital, presented a paper at the Federated Societies Meeting in Atlantic City, during April.

Dr. N. Sairi of the resident staff of the Pathology Institute, Halifax, also read a paper at this meeting.

## SERVICE MEDICAL GROUP

Among the changes of appointment affecting the staff of the Canadian Forces Hospital Halifax this summer are the following:

1. W/C, J. R. W. Wynne goes to the Victoria General Hospital to complete his training in Internal Medicine.
2. Surg. L/Cdr. John Simpson goes to the Canadian Army Brigade in Europe as Chief of Surgery.
3. Surg. L/Cdr. Gordon Holmes goes to Camp Hill Hospital for further training in Internal Medicine.
4. Squadron Leader, P. E. A. Blake-Knox goes to R.C.A.F. Station Cold Lake, Alberta as S.M.O. and Anaesthetist.
5. Major J. F. Harrison goes to R.C.A.F. Station Cold Lake, Alberta.

## UNIVERSITY

April 4, 1961—An agreement between Dalhousie University and Canadian Armed Forces Hospitals, which will allow Medical Students to use the Hospital in their training was signed by Defence Minister, Douglas Harkness, President A. E. Kerr, and Mr. Donald MacInnis, Chairman of the Board of Governors of Dalhousie University.

April 17-21, 1961—A week in Obstetrics and Paediatrics, was given at the Grace Maternity and Halifax Children's Hospitals, under auspices of the post graduate division of the Faculty of Medicine of Dalhousie University and the Departments of Obstetrics and Gynaecology and Paediatrics.

April 19, 1961—Dr. Daniel Stowens, Pathologist and Director of Laboratories, Children's Hospital, Louisville, Kentucky, spoke on "Liver Disease in Infants and Children" (an intensive study by means of biopsies), at the Victoria General Hospital Auditorium. Though this was an open meeting, it was given as part of the week in Obstetrics and Paediatrics noted above.

Dr. J. A. McCarter, Head of the Department of Biochemistry, received another grant this year from the National Cancer Institute of Canada to continue his research in skin cancer.



## BIRTHS

To Dr. and Mrs. Ian Bruce, a son, John Fraser, at Yarmouth Hospital on March 15, 1961.

To Dr. and Mrs. A. K. Lawson (née Susan Mitchell), a son, Bruce Mitchell, Grace Maternity Hospital, Halifax, April 12, 1961.

To Dr. and Mrs. Alan McMillan (Dr. Margaret MacMurdo), a daughter Janet Lynn on March 18, 1961 at the Grace Maternity Hospital, Halifax.

To Dr. and Mrs. F. W. Prince, a son, David Frederick, on March 25, 1961 at Bridgewater.

## CONGRATULATIONS

To Dr. A. L. Murphy on the recent birth of his first grandchild to his daughter in California.

## COMING EVENTS

May 8-12, 1961—The 42nd Annual Session of the American College of Physicians at Bell Harbour, Miami Beach, Florida, U.S.A.

June 4-10, 1961—Third World Congress of Psychiatry at Allan Memorial Institute, 1025 Pine Ave., West, Montreal, Quebec.

June 12-14, 1961—108th Annual Meeting, The Medical Society of Nova Scotia at Keltic Lodge, Ingonish, Cape Breton. Host: Pictou County Medical Society.

June 19-23, 1961—94th Annual Meeting Canadian Medical Association at Montreal, Quebec.

June 19-23, 1961—The American College of Physicians, Post Graduate Course Number 13, on "Current Aspects of Internal Medicine" at State University of Iowa, College of Medicine, Iowa City, Iowa. William B. Bean, M.D., F.A.C.P., Director.

October 2-6, 1961—47th Annual Clinical Congress of the American College of Surgeons at Chicago, Illinois. Address inquiries to Dr. W. E. Adams, Secretary, American College of Surgeons, 40 East Erie St., Chicago 11, Illinois.

November 13-18, 1961—Canadian Heart Association and National Heart Foundation of Canada, joint annual and scientific meetings in Vancouver, B.C. Address enquiries to Dr. J. B. Armstrong, National Heart Foundation of Canada, 501 Yonge St., Toronto 5, Canada.

October 7-13, 1962—The 4th World Congress of Cardiology will be held at the Medical Centre, Mexico City, Mexico. Address enquiries to the General Secretary: Dr. Isaac Costero, 4th World Congress of Cardiology, Institute N. De Cardiologia, Avenida Cuauhtemoc 300, Mexico 7, D.F.

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# Housing Application Form

108th Annual Meeting

The Medical Society of Nova Scotia

Keltic Lodge, Ingonish, N. S.

Monday, Tuesday, Wednesday, June 12, 13, 14, 1961

Dr. C. J. W. Beckwith,  
Medical Society of Nova Scotia,  
77 University Avenue,  
Halifax, N. S.

Please reserve for me the following:—

**A. Main Lodge**

( ) Double room with bath—twin beds—including meals \$14.50 per person per day.

**B. In Cottage**

( ) Cottage with sitting room and two twin bedded bedrooms—including meals \$14.50 per person per day.

I WILL EXPECT TO ARRIVE JUNE ..... A.M. .... P.M. ....

I WILL EXPECT TO DEPART .....

Names of persons who will occupy above accommodations:

Name .....

Address .....

In view of the attendance expected, no single rooms will be available at the Keltic Lodge, unless cancellations permit. If coming alone please check here.....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 cottage with) please insert name(s) below:

I would prefer to share accommodation with

Name .....

Address .....

Name .....

Address .....

Signed.....

Date.....



## INFECTIOUS DISEASES—NOVA SCOTIA

Reported Summary for the Month of February, 1961

Diseases	NOVA SCOTIA				CANADA	
	1961		1960		1961	1960
	C	D	C	D	C	C
Brucellosis (Undulant fever) (044)	0	0	0	0	9	2
Diarrhoea of newborn, epidemic (764)	0	0	0	0	4	2
Diphtheria (055)	0	0	0	0	21	5
Dysentery:						
(a) Amoebic (046)	0	0	0	0	4	0
(b) Bacillary (045)	0	0	0	0	86	172
(c) Unspecified (048)	10	0	0	0	85	54
Encephalitis, infectious (082.0)	0	0	0	0	2	3
Food Poisoning:						
(a) Staphylococcus intoxication (049.0)	0	0	0	0	0	0
(b) Salmonella infections (042.1)	1	0	0	0	77	0
(c) Unspecified (049.2)	0	0	0	0	0	53
Hepatitis, infectious (including serum hepatitis) (092, N998.5)	84	0	88	0	836	604
Meningitis, viral or aseptic (080.2, 082.1)						
(a) due to polio virus	0	0	0	0	1	0
(b) due to Coxsackie virus	0	0	0	0	1	0
(c) due to ECHO virus	0	0	0	0	0	0
(d) other and unspecified	0	0	0	0	10	23
Meningococcal infections (057)	0	0	3	0	13	17
Pemphigus neonatorum (impetigo of the newborn) (766)	0	0	0	0	0	4
Pertussis (Whooping Cough) (056)	0	0	18	0	306	497
Poliomyelitis, paralytic (080.0, 080.1)	0	0	1	0	8	31
Scarlet Fever & Streptococcal Sore Throat (050, 051)	47	0	244	0	1835	4057
Tuberculosis						
(a) Pulmonary (001, 002)	8	4	19	4	0	359
(b) Other and unspecified (003-019)	0	0	4	0	0	94
Typhoid and Paratyphoid Fever (040, 041)	0	0	0	0	18	28
Venereal diseases						
(a) Gonorrhoea —						
Ophthalmia neonatorum (033)	0	0	0	0	0	0
All other forms (030-032, 034)	10	0	42	0	1209	1126
(b) Syphilis —						
Acquired—primary (021.0, 021.1)	0	0	1	0	0	0
— secondary (021.2, 021.3)	0	0	0	0	0	0
— latent (028)	0	0	4	0	0	0
— tertiary — cardiovascular (023)	0	0	0	0	0	0
— „ — neurosyphilis (024, 026)	0	0	0	0	159	0
— „ — other (027)	2	0	0	0	0	0
Prenatal—congenital (020)	0	0	0	0	0	0
Other and unspecified (029)	0	0	1	0	1	155*
(c) Chancroid (036)	0	0	0	0	0	0
(d) Granuloma inguinale (038)	0	0	0	0	0	0
(e) Lymphogranuloma venereum (037)	0	0	0	0	0	0
Rare Diseases:						
Anthrax (062)	0	0	0	0	0	0
Botulism (049.1)	0	0	0	0	0	0
Cholera (043)	0	0	0	0	0	0
Leprosy (060)	0	0	0	0	0	0
Malaria (110-117)	0	0	0	0	0	0
Plague (058)	0	0	0	0	0	0
Psittacosis & ornithosis (096.2)	0	0	0	0	0	0
Rabies in Man (094)	0	0	0	0	0	0
Relapsing fever, louse-borne (071.0)	0	0	0	0	0	0
Rickettsial infections:						
(a) Typhus, louse-borne (100)	0	0	0	0	0	0
(b) Rocky Mountain spotted fever (104 part)	0	0	0	0	0	0
(c) Q-Fever (108 part)	0	0	0	0	1	0
(d) Other & unspecified (101-108)	0	0	0	0	0	0
Smallpox (084)	0	0	0	0	0	0
Tetanus (061)	0	0	0	0	0	0
Trichinosis (128)	0	0	0	0	4	0
Tularaemia (059)	0	0	0	0	0	0
Yellow Fever (091)	0	0	0	0	0	0

C — Cases D — Deaths

\*Not broken down \*\*Not available