

# The Nova Scotia Medical Bulletin

OFFICIAL ORGAN OF THE MEDICAL SOCIETY OF NOVA SCOTIA  
CANADIAN MEDICAL ASSOCIATION NOVA SCOTIA DIVISION.

DECEMBER 1946

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Published on the 20th of each month and mailed to all physicians and hospitals in Nova Scotia. Advertising forms close on the last day of the preceding month. Manuscripts should be in the hands of the editors on or before the 1st of the month. Subscription Price:—\$3.00 per year.

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# The Interpretation and Value of Sternal Puncture in The Diagnosis of Blood Disorders\*

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IN the diagnosis of blood disorders it is important to consider not only the changes in the peripheral blood, but also those present in the bone marrow, which may or may not be reflected in the routine blood picture. Sternal puncture and the study of the resultant myelogram have therefore assumed an important role in routine haematological investigation. The purpose of this paper is to emphasize this fact and to show briefly by case histories some of the helpful findings that may be encountered.

To obtain marrow in the adult, sternal aspiration is the method of choice, while in young children tibial puncture is preferred since active red marrow is then still present in the tibial shaft.

## Technique

The skin and sub-periosteal tissues overlying the sternum just below the angle of Louis are thoroughly infiltrated with 2% novocaine. For aspiration a "Turkel" or other similar needle is employed. This is carefully inserted into the marrow cavity by exerting firm pressure and twisting the needle while the stylet is still in position. The needle can be felt to enter the marrow cavity in a manner similar to the sensation met with in doing a lumbar puncture. The stylet is then withdrawn and a 5 c.c. syringe is inserted in the needle. Gentle suction results in the marrow fluid flowing into the syringe. Take only about 0.1-0.2 c.c.s. to prevent over dilution of the marrow cells with fluid. At the moment the needle enters the marrow cavity and also during aspiration the patient often complains of a pain rather similar to a mild anginal attack. Smears are now prepared on grease free slides. The smears should be thin, at least on one end. If they are not to be stained immediately, the films, after drying at room temperature, should be fixed by placing them in absolute methyl alcohol for 3-5 minutes. For staining we prefer Leishmann's method which gives us excellent results when properly used.

The interpretation of marrow changes requires considerable experience and a thorough knowledge of the clinical picture as well as the peripheral blood findings. It is by a correlation of these factors that one gains a true impression of the dyscrasia under investigation. Before presenting the case histories it might be well to study the normal myelogram in order better to appreciate the pathological changes that will be discussed (Table I).

Myeloblasts.....	2	
Promyelocytes.....	3	
Myelocytes.....	6	
Juveniles.....	8	62% Granular Series.
Band Forms.....	12	

\*Paper read at Dalhousie Refresher Course, October, 1946.

Polymorphs . . . . .	27	
Eosinophil . . . . .	3	
Basophile . . . . .	1	
Lymphocyte . . . . .	15	
Monocyte . . . . .	4	
Erythroblasts . . . . .	5	19% nucleated reds.
Normoblasts . . . . .	14	

Ratio of granular series: nucleated reds = 3:1.

Table I: These figures are averages of normal marrow smears.

It will be noted that the granular series form the largest percentage of cells while the lymphocytes only constitute about 15%. The ratio between the granular series and nucleated red cells normally averages about 3:1. Total counts of cells are done in some laboratories but we feel that there is too great a discrepancy in dilution of the marrow with blood to make this useful. With experience the degree of quantitative hyperplasia or hypoplasia in the marrow can be judged from the smears.

### Case Reports

*Case I.* Female child, age 4 years, first admitted to the Halifax Children's Hospital on Dr. Carney's service, on September 9, 1945, complaining of cough, pyrexia and weight loss of 3 weeks' duration. Examination revealed a pneumonitis. There was no enlargement of glands, liver or spleen. A differential count revealed Polymorphs 16%, Lymphocytes 74%, Monocytes 9% and Eosinophiles 1%. Seven months later she was readmitted with complaints of chills, fever, and pain in the abdomen. Since her previous discharge she had not done well, being easily fatigued, pale and restless. The axillary lymph nodes were now enlarged and the liver and spleen were palpable. Blood counts on April 18, 1946, revealed Hb: 37%, R.B.C.: 3.2 million, W.B.C.: 2,500, Differential—Polymorphs 10%, Basophil 1%, Lymphocytes 89%, with an occasional questionable lymphoblast. One week later the blood count showed identical findings except the W.B.C. was now 3,700. It was suspected that this was a case of aleukaemic lymphatic leukaemia though the failure to find definite lymphoblasts made the diagnosis indefinite. A sternal puncture was carried out and revealed the following myelogram (Table II).

Myeloblast . . . . .	0
Promyelocyte . . . . .	0
Myelocyte . . . . .	1
Juvenile . . . . .	0
Band Form . . . . .	1
Polymorph . . . . .	0
Eosinophil . . . . .	0
Basophil . . . . .	0
Lymphoblast . . . . .	8
Prolymphocyte . . . . .	15
Lymphocyte . . . . .	70
Monocyte . . . . .	0
Erythroblast . . . . .	1
Normoblast . . . . .	4

Table II: Myelogram from Case I. Aleukaemic lymphatic leukaemia.

The marrow was very hyperplastic due to a massive infiltration of the lymphocyte series forming 93% of the cells present. The granular cells and nucleated red cells were markedly depressed. This is the characteristic finding in lymphatic leukaemia, whether the peripheral blood picture is aleukaemic or not. The diagnosis was thus lymphatic leukaemia in the aleukaemic phase. The patient rapidly went down hill expiring on May 18, 1946. At no time did the white count rise above 3,750/ c.m.m. in spite of the marked marrow hyperplasia.

\* Three further cases similar to the above have been seen in the past eight months and in our series we find that acute lymphatic leukaemia is more often aleukaemic than showing the picture of a high white cell count, that is so frequently regarded as the classical finding.

*Case II.* Male age 62 years entered the Victoria General Hospital, May 8, 1946, with complaints of listlessness, dyspnoea and pain in the chest on exertion. In June, 1945, he had consulted his physician because of an abscess involving his jaw. It was noted that he was pale and a blood picture revealed a macrocytic anaemia which was treated with liver and iron with a good response. In April, 1946, his symptoms recurred, and he was very pale with a haemoglobin of 44%. Blood films revealed numerous normoblasts, a suggestive macrocytic anaemia, and questionable immature white cells and he was hospitalized for investigation. Blood counts revealed Hb: 50%, R.B.C.: 3.8 million, W.B.C.: 18,850/ c.m.m., Differential-Polymorphs 6%, Immature "blast" cells 53%, Lymphocytes 39%, Monocytes 2%, Normoblasts 33% (seen while counting 100 white cells). The condition was thus one of acute leukaemia but its type was not at all clear. A sternal puncture was performed and the following myelogram obtained. (Table III)

Myeloblast.....	39.5
Promyelocyte.....	14.0
Myelocyte.....	13.0
Juvenile.....	3.5
Band Form.....	3.0
Polymorph.....	3.5
Eosinophi.....	0
Basophil.....	0
Lymphoblast.....	0
Prolymphocyte.....	0
Lymphocyte.....	2.0
Monocyte.....	0
Erythroblast.....	4.5
Normoblast.....	17.0

Table III: Myelogram for Case II. Note the marked increase in the immature granular cells. Acute myelogenous leukaemia.

The marrow was extremely hyperplastic being packed with immature cells of the granular series, the largest percentage of cells being myeloblasts. It will be noted on comparison with the normal myelogram (Table I) that the maturation of the myeloid cells from this case stops short at the myelocyte

stage instead of maturing to adult polymorphonuclears. This is termed "maturation arrest" and in conjunction with the massive hyperplasia is characteristic of acute myelogenous leukaemia. In chronic myelogenous leukaemia the marrow shows a similar marked hyperplasia but the biggest percentage of cells are myelocytes, juveniles and band forms, i.e. maturation arrest is not so complete and occurs closer to the fully developed polymorphonuclear cell. In this case there was also a normoblastic activity in the marrow (17%) which was reflected by finding large numbers of nucleated red cells in the peripheral blood.

*Case III.* A female, age 71 years, was admitted to the Victoria General Hospital with complaints of pain in the right shoulder and pain and swelling of the ribs. She had been in good health until the spring of 1946, when a severe pain occurred in the back and radiated upwards when she had attempted to lift a heavy box. This symptom has persisted to the present time. Three weeks before admission she developed a similar pain in the right chest and noticed "lumps" on her ribs. Examination revealed marked tenderness of the ribs and sternum when pressure was exerted. A mass the size of a walnut overlay the seventh right rib in the mid-axillary line. This was fixed to the rib. Another small indefinite hard mass was thought to be present in the upper right abdomen just below the costal border. This was movable and the fingers could be inserted between it and the rib border. X-ray examination revealed narrowing of the upper dorsal and lumbar spines with diffuse decalcification involving the entire spine, ribs and scapulae. Small circumscribed areas of rarefaction were also present in all bones examined and there was a pathological fracture of the third rib in the mid-axillary line. These findings were felt to be consistent with metastases or a myeloma. Urinalysis was positive for Bence-Jones proteose. The corrected sedimentation rate was 54 m.m. fall in one hour. Blood count showed Hb: 54%, R.B.C.: 2.9 million, W.B.C.: 4,500/c.m.m., and the differential count was within normal limits. No plasma cells were seen. The clinical impression was one of generalized carcinomatosis or multiple myeloma. A sternal puncture revealed the following myelogram (Table IV).

Myelocytes.....	0.5
Juveniles.....	3.0
Polymorphs.....	2.0
Tumour Myeloma cells.....	90.0
Normoblasts.....	4.5

Table IV: Myelogram from Case III. Multiple myeloma.

Films of the bone marrow here revealed a heavy infiltration of the marrow with neoplastic cells that were of plasma cell type. They were large oval cells with a deep blue cytoplasm and an eccentrically placed nucleus. The finding of such cells is pathognomonic of multiple myeloma of plasma cell type. Further laboratory studies revealed a high total protein due to increased serum globulin and smears of fresh blood showed very marked rouleaux formation which made blood typing and cross-matching difficult. These two findings are usually met with in multiple myeloma and added further confirmation to the diagnosis.

Shortly after this case was studied a similar one was seen in which sternal puncture again revealed typical myeloma cells confirming the clinical diagnosis of multiple myeloma.

*Case IV.* A female, age 72 years, was admitted to the Victoria General Hospital complaining of a mass in the left upper quadrant. She had suffered from arthritis for years mainly involving the knee joints and hands. The mass she had noticed first a few weeks before admission. Examination revealed an enlarged spleen and the liver edge was just palpable below the costal margin. The blood examination showed Hb: 72%, R.B.C.: 4.4 million, W.B.C.: 2,400, Differential—Polymorphs 2%, Eosinophils 5%, Lymphocytes 81%, Monocytes 12%, Platelets 176,000/c.m.m. Because of the neutropenia and marked lymphocytosis it was felt that an aleukaemic phase of lymphatic leukaemia should be ruled out. A sternal puncture was therefore performed

(Table V).

Myeloblasts.....	3.0
Promyelocytes.....	8.0
Myelocytes.....	16.5
Juveniles.....	16.5
Band forms.....	13.5
Polymorphs.....	1.5
Eosinophil.....	1.5
Basophil.....	.....
Lymphocytes.....	14.0
Monocytes.....	.....
Erythroblast.....	8.0
Normoblast.....	17.5

Table V: Myelogram from Case IV. The marrow shows a mild myeloid hyperplasia.

In spite of the very marked neutropenia in the peripheral blood (Polymorphs 2%) the marrow slides showed an *unexpected mild myeloid hyperplasia* with a maturation arrest at the band form stage of development (Table V). The appearances were not those of a leukaemia. Such a condition is thought to be an example of hypersplenism which Dameshek<sup>1</sup> has recently emphasized. It is suggested that the spleen in certain conditions has an untoward effect on the normal maturation of the marrow elements resulting in a decrease of the effected cells in the peripheral blood. This effect is possibly due to some hormone as yet unidentified, acting directly on the marrow and also to excessive phagocytosis of blood cells by the hyperactive spleen. When the platelets are primarily involved, we see the clinical entity of thrombocytopenic purpura; when the red cells are mainly effected, haemolytic anaemia results, while if the myeloid cells are involved, the picture described by Doan and Wiseman<sup>2</sup> as Primary Splenic Neutropenia results. Frequently all three elements are involved though one cell group tends to be more effected than others, e.g. in primary purpura there is usually some anaemia and neutropenia in addition to the thrombocytopenia.

In Case IV, there was a combination of rheumatoid arthritis, splenomegaly, hepatomegaly and marked neutropenia, in spite of active myelo-

poesis in the marrow. This combination of symptoms was originally described by Felty and still bears the name Felty's Syndrome.<sup>3</sup> If the above theory regarding the hyperactive spleen is correct then splenectomy in such cases should show an immediate response in the blood picture due to the withdrawing of the hypersplenic effect on the marrow. It is well known that splenectomy is the treatment of choice in primary purpura and congenital haemolytic anaemia; while recently it has been shown that splenectomy in cases of primary splenic neutropenia is followed by immediate increase in the circulating polymorphonuclears. A splenectomy was therefore performed on this patient by Drs. C. E. Kinley and A. L. Murphy on September 20. Chart I shows the dramatic response.

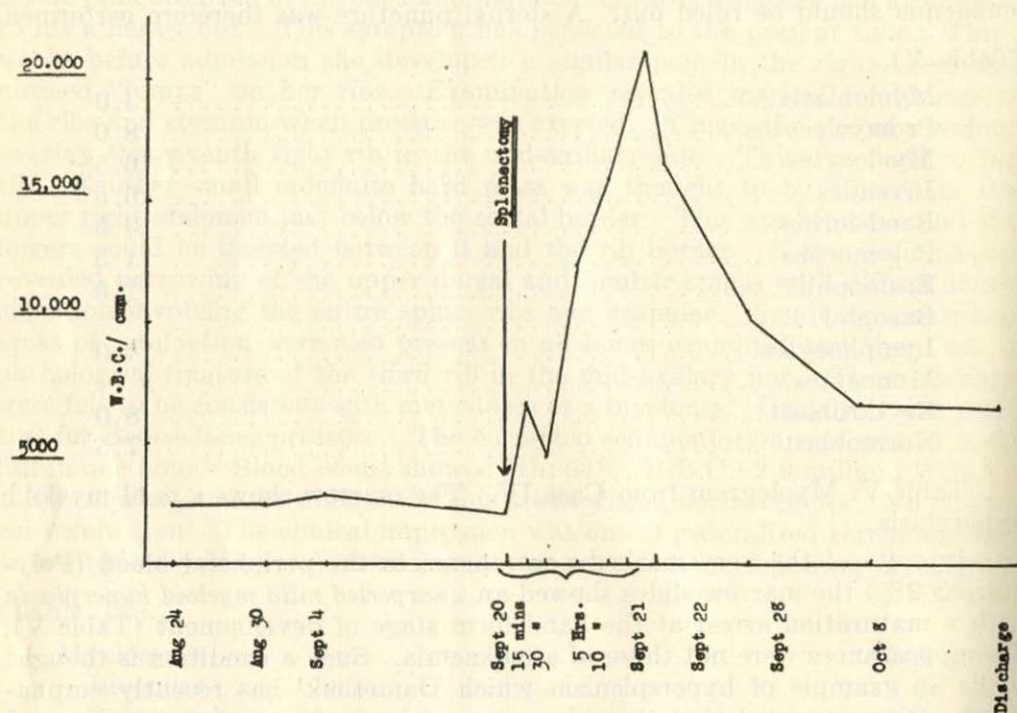


Chart I: Response of W.B.C. following splenectomy in Case IV.

Fifteen minutes after the pedicle was clamped the white count rose from 1,500/ c.m.m. to 7,000/ c.m.m. In 10 hours it had risen to 15,000 and in 24 hours to 20,000 after which it gradually fell to normal figures. The differential count showed a similar response. Twenty-four hours after splenectomy the polymorphs rose from a very low 2% up to 85%—the majority of the cells being of band form type. Thereafter, they quickly assumed normal figures and one week later the count showed 62.5% adult polymorphonuclears and 12% bands.

## Conclusions

It is hoped that the above cases will serve to emphasize the usefulness of sternal aspiration.

So frequently cases are met in which the clinical examination and blood picture may suggest a leukaemia or neoplasm of marrow elements, but nothing definite is found to make the diagnosis absolute. In such cases the result of marrow examination may completely clear up the baffling problem or at the least confirm the original diagnosis, while in others, e.g. Case IV, an unexpected diagnosis may be reached and suitable therapy be instituted, which otherwise might have been missed.

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# Teaching Trends in Pharmacology at Dalhousie

M. G. WHILLANS and J. G. ALDOUS

PHARMACOLOGY\* as a separate basic medical science is a relative newcomer, and only recently has it been given its rightful place in the medical curriculum. Its place can be considered at least equal in importance to any other basic medical subject, as pharmacology is an indispensable introduction to the whole science of treatment, and can form a convenient bridge from the basic medical sciences to clinical medicine.

Pharmacology has too often been presented to medical students in an unattractive fashion. No less serious a criticism is that a great deal of information, no doubt scientifically valuable but useless or unimportant to the practising physician, is given to the medical student who is expected to absorb it. There has been, for instance, too much memory work involving isolated facts and doses of many minor drugs. Too much time has been spent on chemical formulae (which are usually complex in drugs). The clinical application has often been lightly touched or left entirely to the clinicians to discuss. The lessons taught failed to demonstrate points which would be clinically useful. Finally, there has frequently been no consistent attempt to instil in the student a critical attitude concerning the reliability and reproducibility of the actions of a drug. In short, the student and the practitioner find that much or even most of the course in pharmacology has been of no use at the bedside.

## Difficulties in Teaching Pharmacology

Pharmacology is an interesting subject in its own right, and the student readily appreciates its potential practical value to him. It remains with the teacher to preserve that interest and to capitalize on it, so that the difficulties the student may have, can be more easily overcome. The difficulties are important. There are so many drugs of such widely different character that the subject is necessarily rather broken up, and the association of ideas thereby limited. A second difficulty is that the field is in a very changeable state; new drugs so rapidly supersede time-honoured remedies, that the student finds his teaching in pharmacology rather "dated" even by the time he graduates. Terminology is another plague—probably even worse than in anatomy with its old and new systems. Unfortunately, the time has not yet come when clinical teachers will invariably use the official name for a drug, and it behooves the student therefore not only to know the official name but also its various proprietary names. Nearly every drug in common use has a common synonym, often better known than the official name. (e.g. *adrenaline* (B.P.), epinephrine (U.S.P.), suprarenin, suprarenalin, adrenalin; *phenobarbitone* (B.P.) phenobarbital (U.S.P.), luminal; *procaine hydrochloride*, ethocaine, neocaine, novocain). The newer drugs are just as confusing, and already mepacrine hydrochloride (atabrin or atabrine or quinacrine) has been labelled only too generously.

\*As used in this paper, the term pharmacology does not include materia medica and prescription writing.

### The Presentation of Pharmacology at Dalhousie

It appears clear that what the student needs (and what he is interested in) is *practical, clinically-useful pharmacology*. The first and prime objective is to provide such a course. The more direct the application to treatment, in general, the better the lessons. The important scientific principles on which the science of pharmacology has been built can be emphasized just as readily in such an approach, as in a more strictly academic presentation.

At Dalhousie, it has been found that the lessons of drug action are most readily absorbed by the student when he is *personally* interested in the demonstration of that lesson. That is one of the reasons why the second objective is considered important: to *provide the students with personal, direct experience with useful drugs*. It is only fair to his future patients that many of the drugs which he will be prescribing so frequently should have been tested by the future physician on himself. This applies to most drugs and excludes only those which may be addicting, those particularly apt to sensitize the student to subsequent administration of the drug, and those which are toxic in amounts close to the therapeutic dose. It is fitting, for instance, that the student should have had a therapeutic dose of at least one of the common cathartics, a subcutaneous injection of adrenaline and of insulin, some experience as a subject with an inhalation anaesthetic, and an opportunity to compare the efficacy of various local anaesthetics on himself and his partners.

Another objective in the teaching programme is the *proper presentation of the drug to the student at the time he is studying its actions*. The drug is displayed in the various forms in which it is commonly administered. This provides a further aid in memory work.

It goes without saying that the emphasis in teaching pharmacology should be on those drugs which will be most useful in the practice of medicine. It is surprising nevertheless, to find such drugs as aconite, squill, and camphor still occupying important places in pharmacology curricula.

At Dalhousie, the attempt is made to achieve the above objectives by:

(a) Closely linking every discussion on the action of drugs with its therapeutic application. It is not enough simply to indicate for what diseases the drug is used. The discussion reaches a more logical and useful stage when the various ways in which the drug is used, and the difficulties encountered in treatment, are pointed out.

(b) Practical laboratory periods showing clearly how the drug acts. A number of animal experiments do this very well, and when they concern some toxic effect or the action of a narcotic, they are invaluable. Many animal experiments however, appear to confuse the student because of the mechanical difficulties involved with apparatus, and because the interpretation of results from animals often cannot safely be applied to human beings. Such animal experiments are being discarded as far as practicable, and human experiments are taking their place. (An instance of mutual benefit!) The drugs given are only those which are therapeutically important—given in the manner in which they are commonly administered, and in therapeutic doses. Representative of the drugs studied by the students on themselves are the following:—insulin; adrenaline (intracutaneous and subcutaneous); pituitary extract (posterior lobe), (for antidiuretic effect); ether (first stage

of anaesthesia only); various local anaesthetics; various rubefacients and astringents; penicillin; caffeine (as strong coffee).

(c) *Class Surveys.* Human subjects offer difficulties in control, and observations may have to be subject to numerous qualifications. These very disadvantages in scientific experiments with human subjects are one of the valuable by-products for medical students. The student learns to expect wide variations in drug actions in a group of individuals, and he is therefore more likely to be critical and cautious in drawing conclusions from his clinical experiences with drugs. A further aid in encouraging critical judgments on the actions of drugs is provided in the form of a survey of the laboratory results of each period by the students themselves. At each laboratory period, following a brief survey of pertinent literature by one of the students, another student reviews the previous laboratory period's results from the whole class, and presents his statistical analysis and conclusions before the class. At first there was too great a tendency to draw hasty or ill-grounded conclusions. Now there is almost an excess of caution in that regard,—a healthy attitude which we hope will be retained.

(d) "*Homework.*" Certain drugs lend themselves to observation outside of class hours (cathartics, some of the hypnotics). The student turns in a report on a mimeographed sheet the following day on the effects noted.

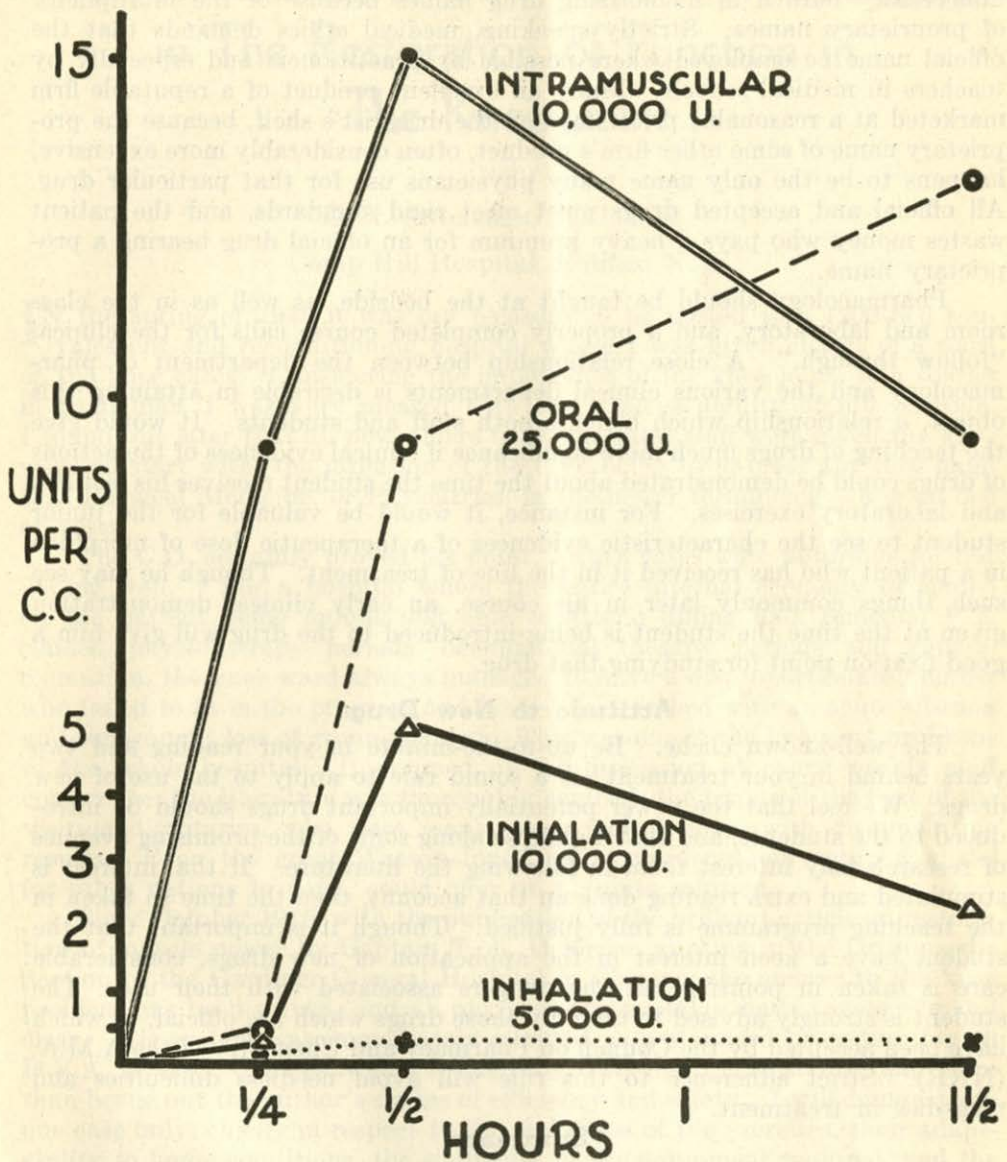
(e) *Drug demonstrations.* A new type of drug museum is in process of formation. The important drugs are displayed in their various commonly used preparations on open shelves, with an accompanying card for each drug summarizing the important pharmacological data. With such an arrangement, it is hoped that the correlation of necessary facts with important drugs will be made easier for the student. He will be able to see the drug in a form in which it is expected he will use it as a practitioner, while he reads about its actions. In our experience, such "streamlining" not only makes a museum more easy to use, but makes its lessons clear. This principle in pathology museums has been applied successfully by Professor William Boyd in his departments, first in Winnipeg and later in Toronto.

### Drug Classes

The student needs guidance as to which drugs are important. To provide this and to direct the emphasis in his studies, the drugs have been arbitrarily divided into two classes, separating the most important drugs from those of lesser importance. "Class I" drugs are those which must be known thoroughly,—dose, methods of administration, absorption fate and excretion, pharmacological actions, common synonyms, toxic effects and therapeutic applications. The number of these is made as small as practicable, and only those drugs which are likely to be used most frequently (and of these, particularly those in which the dose is a critical matter) are in this class. The number of these drugs usually comes to about 40. (The list is modified each year.)

In "Class II" are those drugs with which the student should have a good working knowledge, placing emphasis on major pharmacological actions, toxic effects and therapeutic application. No dose-memorizing is required for this class. The number comprising Class II is approximately 190, and these together with the 40 odd drugs in Class I should provide an adequate starting point for the application of pharmacology to therapeutics.

It should be noted that we use the official names of the drugs, even where these may be less familiar to clinicians. The student has to carry an extra,



RESULT OF A CLASS SURVEY

Penicillin Excretion in Urine Following Administration by Different Routes.

Each point represents the mean of 10-12 readings.

(Data compiled by Mr. Stanley Teale, 3rd year Medicine, as part of his class survey of the laboratory on *Penicillin Absorption and Excretion*, November, 1946.)

unnecessary burden in memorizing drug names because of the multiplicity of proprietary names. Strictly speaking, medical ethics demands that the official name be employed where possible by practitioners and especially by teachers in medical schools. Many an excellent product of a reputable firm marketed at a reasonable price stays on the druggist's shelf, because the proprietary name of some other firm's product, often considerably more expensive, happens to be the only name many physicians use for that particular drug. All official and accepted drugs must meet rigid standards, and the patient wastes money who pays a heavy premium for an official drug bearing a proprietary name.

Pharmacology should be taught at the bedside, as well as in the class room and laboratory, and a properly completed course calls for the clinical "follow through." A close relationship between the department of pharmacology and the various clinical departments is desirable in attaining this object, a relationship which benefits both staff and students. It would give the teaching of drugs much more significance if clinical evidences of the actions of drugs could be demonstrated about the time the student receives his lectures and laboratory exercises. For instance, it would be valuable for the junior student to see the characteristic evidences of a therapeutic dose of morphine in a patient who has received it in the line of treatment. Though he may see such things commonly later in his course, an early clinical demonstration given at the time the student is being introduced to the drug will give him a good fixation point for studying that drug.

#### Attitude to New Drugs

The well-known cliché, "Be up-to-the-minute in your reading and two years behind in your treatment" is a sound rule to apply to the use of new drugs. We feel that the newer potentially important drugs should be introduced to the students, and that a glimpse along some of the promising avenues of research may interest them in following the literature. If that interest is stimulated and extra reading done on that account, then the time so taken in the teaching programme is fully justified. Though it is important that the student have a keen interest in the application of new drugs, considerable care is taken in pointing out the dangers associated with their use. The student is strongly advised to use only those drugs which are official, or which have been accepted by the Council on Pharmacy and Chemistry of the A.M.A. (NNR). Strict adherence to this rule will avoid needless difficulties and tragedies in treatment.

#### Summary

The course in pharmacology at Dalhousie is being made largely one of *applied* pharmacology, with the emphasis on clinically useful information and on drugs most commonly used. As far as advisable, the lessons of drug action are demonstrated by the students on themselves. A simple system of classifying the important drugs has been found valuable. A new type of drug museum is being built up in the department.

#### Acknowledgment

Valuable teaching ideas were obtained during a visit to other pharmacology departments last summer. We are especially indebted to Professors J. K. W. Ferguson and G. H. W. Lucas (University of Toronto), Professor R. A. Waud (University of Western Ontario), Professor E. M. Boyd (Queen's) and to Professors R. L. Stehle, K. I. Melville and A. M. Fraser (McGill).

# Heavy Resistance, Low Repetition Exercises in The Restoration of Function in The Knee Joint

by

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IN the spring of 1945 it was my pleasure to be posted to a 1200-bed convalescent and reconditioning hospital where I was given charge of a ward of 165 knee cases. Considering the importance of the knee joint, to a soldier in particular, I was very pleased with the relative dignity of my position. I found out later that all newcomers to the hospital staff were given the knee ward to start with, the intention of the C.O. being to impress any new hand that Physical Medicine, or Physiatrics, in the newer terminology, was no bed of roses.

The C.O. certainly proved his point. Knee cases were notorious for not "doing well." For a hospital where the entire internal economy depended on the patient being mobile and able to attend dining hall, remedial P.T. classes, physiotherapy periods, occupational therapy periods and general recreation, the knee ward always managed to have a disproportionate number who failed to fit in the program and landed back in bed with an acute effusion and subsequent loss of ground gained. This was one of the knottiest problems of the whole hospital. It cropped up for discussion at every weekly staff conference; the literature was thoroughly combed; the brains of the best of the visiting dignitaries, who were many, were picked dry;—with disappointing results. Even the great Watson-Jones, who considered our setup a model for other nations to copy, could offer no absolute solution.

Since October 1945, with the publication of the brilliant article on restoration of muscle power by Captain T. L. Delorme, working in the Orthopaedic Section of the Gardiner General Hospital in Chicago, the answer to the knee problem has been solved, and all our previous mistakes have become crystal clear. His system was immediately adopted as a standard procedure for all D.V.A. H. & O. Centres, where it has proved its merit consistently and more than borne out the author's claims of efficiency and safety. I will demonstrate one case only, chiefly in respect to the technique of the exercises, their adaptability to home conditions, the simplicity of the equipment required, and the satisfactory way in which the patient's progress can be recorded.

Prior to Delorme's investigations the standard method of restoring function to the knee joint was centered on quadriceps exercises, and rightly so. The relationship between quadriceps atrophy and poor knee function was too obvious to be missed. Quadriceps setting, stair-climbing, walking and bicycling as standard procedures resulted in slow improvement in most cases. *But* when graduated remedial P.T., group games, or any activity carrying the possibility of an unguarded movement was begun, recurrence of effusion and further quadriceps atrophy and loss of ground gained, was all too frequently the result. This apparently was due to synovial trauma result-

ing from a weak quadriceps and unsupported ligaments. The error lay in using the wrong exercises which gave an undesired result. In other words, the low resistance—high repetition exercises mentioned above, are designed to promote muscle *endurance*. Delorme's proven contention is that the first prerequisite is to re-establish muscle *power* by means of heavy resistance low repetition *focal* exercises—*before* attempting muscle endurance exercises.

Other concepts arising out of these investigations include:

1. The rate and extent of muscle hypertrophy is proportional to the resistance that the muscle must overcome.
2. Maximal power can be developed *without* weight bearing.
3. Swelling and effusion with maximum exertion in non weight-bearing exercises is a very rare occurrence. In fact, most cases beginning with swelling and effusion show complete subsidence at the end of the course.
4. *After* muscle power is restored to equal that of the sound limb, endurance exercises of the high repetition, low resistance type, may be started.—Endurance is a quality of *normal* muscle.
5. Chronic muscle strain does *not* occur. Some quadriceps soreness may persist throughout the first week or ten days of the course.
6. Periodic maximal exertion will not injure even the most atrophied muscle.
7. The vastus medialis functions chiefly in carrying the leg through the last 15° of extension. If the final 15° of extension is not possible, the vastus medialis may still be developed by exercising with heavy resistance through the available range of movements with an extra effort at the point of maximal possible extension.
8. Increased range of motion invariably follows increase in quadriceps power. This is most important. Nicoll has stated, "Range without power is worse than useless, for in its extreme form we have a flail joint."
9. Focal muscle power restoration is a strictly individual problem and as such does not lend itself to group exercises. Complete cooperation, —concentration, and honesty of effort are essential.
10. Hard, apparently fibrotic, markedly weakened muscles rapidly soften, and assume the consistency of normal muscle on heavy resistance exercises.
11. With ligamentous instability, cruciate or collateral, *over-development* should be sought.

The following types of cases respond well to heavy resistance low repetition exercises if a weak quadriceps and joint limitation is present:

1. Fractures—femur, tibia, fibula, patella.
2. Dislocations—knee, patella.
3. Soft tissue wounds and scarring.
4. Tears of cruciate and collateral ligaments.

5. Post operative knee cases—menisectomy, synovectomy, patellectomy, chondrectomy, removal of foreign bodies.
6. Arthritis—Synovitis—following subsidence of acute phase.

Contraindications include:

1. Chondromalacia, with pain, swelling, fluid and no operation performed.
2. Acute phases of arthritis and synovitis.

The most dramatic results occur with cases of unstable knees—menisectomies and fractured femora.

The system is adaptable to any muscle group of the body by using table-pulleys, rope and a modicum of ingenuity.

### Equipment

A special boot with a modified bar-bell and weights has been devised by Delorme. This equipment has only recently reached the market through York Bar Bell Co., Scarborough, Ont. Improvization with buckets—double wrapped paper sandbags of one and two pounds weight, equipment which can be provided in any home, can produce equally good results.

### Technique

1. Pad bail of bucket and secure to dorsum of foot with free ends of shoe lace. A firm table is required with a firm pad under lower ends of femora. The bucket should come to rest on the floor in relaxed flexion of knee without causing painful forced flexion. Weight increments are gradually increased with ten repetitions at each increment until you have determined the greatest weight that can be lifted throughout the full available range of extension for ten repetitions. This is called the 10 M.R. (10 maximal repetition). Measured in pounds, it represents the basic limit for the daily exercise routine for the ensuing week.

2. After the 10 M.R. is determined, add further increments, with one contraction at each increment until you have determined the maximal weight that can be lifted throughout the full available range of extension for one repetition. This is called the 1 M.R. (1 maximal repetition) and represents the index of muscle power.

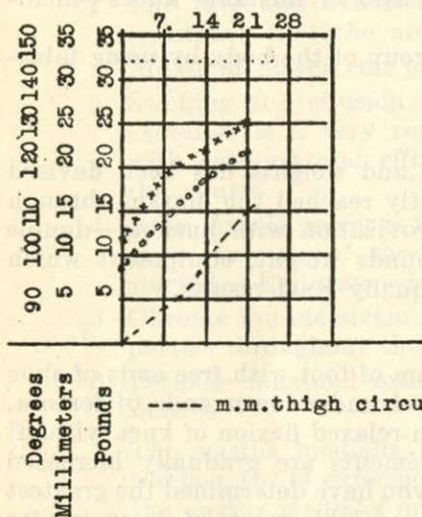
3. For the daily routine, begin with any convenient small fraction of the 10 M.R. and perform 10-15 contractions (not more than 15 with any one weight) and increase weights with 10-15 contractions at each weight increment so that when 10 M.R. level is reached, between 70 and 100 contractions have been performed.

4. The thigh should be marked with silver nitrate at the beginning to give a constant level for measurement. Each week, measure and record in graphic form, thigh circumference, degrees of movement, 10 M.R. and 1 M.R. If synovitis is or has been a consideration, circumference of knee joint too should be recorded. The rising curve of the graph is a strong boost to the patient's morale. Improvement is so certain that I have found that a copy of the progress graph tacked over the patient's bed is a useful stimulus to continued effort and cooperation.



5. Exercise five days and then rest for two days. Determine new 10 M.R., 1 M.R., degrees of movement and thigh circumference. Then begin next week's exercises with weight increments adjusted to the new 10 M.R.

6. Maximal results in menisectomy cases average about three weeks; though in long-standing cases of more complicated nature, improvement may be expected up to twelve weeks. Frequently  $2\frac{1}{2}$  inches are added to thigh circumference in six weeks.



Case of Hong Kong prisoner recovering from Dry Beri-Beri; wasting of quadriceps, weakness, stiffness and uncertainty in use of legs, no limitation of movement.

----- m.m. thigh circumference. oooo 10 M.R. xxxx 1 M.R.  
 .... degrees of movement.

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\*Paper presented at Dalhousie Medical Refresher Course, October 7, 1946

# Carcinoma of the Stomach-- A Case Report

ARTHUR L. MURPHY

**A** GAINST carcinoma of the stomach, most insidious killer of the cancer group, there has been little improvement in diagnosis, in recent years. Operatively, the picture is brighter. Advances in pre- and post-operative care have reduced sharply the mortality of partial and total gastrectomy. This not only brings added years of life to the early operative case who might otherwise have been a surgical tragedy; it makes desirable gastrectomies on many cases where metastases are already present. The lessened mortality justifies the operative procedure. If a man be doomed by cancer of the stomach, an extra few months or years of life, and the easier death from metastases, are real solace.

The patient with advanced cancer of the stomach is starved and thirsty. A blood picture and serum protein estimation are the best indices of his condition. He should not go to the operating room till his blood is within normal limits and his serum protein is over 7.0%. If he is vomiting, a high protein diet will not be alone sufficient, and he will require protein and saline intravenously, as well as blood. Vitamins, particularly C and B should also be given in large quantities.

Because of the danger of upsetting the diseased stomach, or of aggravating an already vomiting one, we make no attempt to cut down the bacterial growth of the upper bowel pre-operatively by sulfasuxidine. Penicillin is begun 48 hours before operation and continued postoperatively till the temperature is normal.

Twenty-four hours before operation the Levine tube is passed, attached to the Wangenstein suction, and oral fluids are forced. The tube is closed off at intervals, to permit of absorption, till a few hours before operation.

The operation is often lengthy and good relaxation is essential for total gastrectomy through the abdominal approach. Hence continuous spinal anaesthesia is the most satisfactory, and the amount given at any one time is small. It may well be that the transthoracic approach will prove the more desirable, giving better exposure of the oesophagus, and less postoperative discomfort. I have, as yet, no experience with it.

The patient under consideration was a man of 62 years, seen May 10 1946. His history was of gastric distress of three months' duration, of weight loss for six months past, of marked weight loss through the last four weeks with vomiting of most foods taken. Apart from the cachexia and debility, general physical examination was negative. The first gastric X-rays taken showed little. The second confirmed, fairly definitely, the clinical diagnosis of carcinoma of the stomach. There was a marked secondary anaemia. The serum protein was 6.25% and dropped to 5.8% with correction of the dehydration.

One week was given to preparing the patient for operation by a bland, high protein diet, of which he retained the great part; by amino acids, vitamins C and B intravenously, and by blood transfusions.

The abdomen was opened by a left paramedian incision. The stomach was involved in a growth from its junction with the oesophagus to within one

inch of the pylorus. There were two small, hard glands in the gastrohepatic mesentery. The liver was free of palpable metastases.

The incision was extended laterally to the eighth costal cartilage. It is sometimes necessary to cut the costal cartilages and reflect the lower part of the thoracic cage. In this case the right angled incision through the soft tissues gave adequate exposure.

The most important single step in the operation is the anastomosis of the jejunum to the oesophagus. The blood supply to the lower oesophagus is poor. If there is little of it below the diaphragm and it must be brought down from the thorax by dissection, the circulation is further impaired. Hence as little dissection should be done as is compatible with a well sutured anastomosis. The serosal suture was of silk, interrupted so as not to close off any blood vessels. A third row of six supporting sutures were placed around the whole circumference of the anastomosis to take the strain off the two rows of apposing sutures. The proximal end of the jejunal loop was slung slightly higher on the oesophagus than the distal, making the distal loop the more direct route for food.

The jejunal loop was brought through the mesentery of the transverse colon, high up. The distal loop was made very full, and allowed to "blouse" down to the mesentery. This served the dual purpose of taking the weight of the rest of the jejunum off the oesophagus anastomosis, and of providing a loop which would dilate to take on some of the function of the stomach as a food repository. The opening in the transverse colon mesentery was made snug, and at this level a jeju-jejunostomy was done. While not an essential, this gives liver and pancreatic juices a direct route to the active part of the bowel, without having to pass up to the oesophagus and down. It also offers a by-pass for food that slips down the proximal jejunal loop. I believe it to be an important step in the future comfort of the patient.

The patient received 1000 c.c. of blood through the operation. He showed no operative shock and his convalescence was uneventful. He was carried on intravenous feeding alone for four days, receiving 2000 c.c. of glucose saline and 60 grams of Parenamine daily. It was interesting to observe that on this his serum protein rose to 7.75 by the 4th postoperative day. Oral feedings were built up quickly after the first week. He was able to eat an average breakfast without distress, but a full dinner gave him "heartburn." Accustomed to thinking loosely of the sensation of hunger as being due to an empty, or hyperacid stomach, his nurses were surprised to find that he had the same ante-prandial yearnings as they.

The pathological report showed the tumor to be "a spheroidal cell carcinoma of diffuse scirrhous type of the stomach (total gastrectomy) but not involving the cardiac orifice of the oesophagus though extending through to the serous coat. One small lymph node from the greater curvature showed early spheroidal cell carcinomatous metastases."

Weight gain after the early convalescence was rapid. One month post-operatively the patient had reached the 162 pounds he considered his normal weight.

X-ray examination of the upper intestinal tract, two months post-operatively shows a rather small oesophageo-jejunal opening. Most of the barium passed into the distal loop which was wider than normal. The barium

passing into the proximal loop passed through the jejunal anastomosis without delay.

At this time the patient felt well. There was some regurgitation of jejunal juices into his oesophagus which distressed him, particularly at the onset of a meal. He had often to bring up the first few mouthfuls. He could then eat a good sized, well balanced dinner with enjoyment. He was taking hydrochloric acid capsules before meals, and liver to guard against anaemia.

October 27, 1946. After two weeks of general malaise of undetermined origin punctuated by chills, the patient suddenly developed a general peritonitis. At operation a malignant recurrence was found at the oesophageal-jejunal anastomosis, containing a perforation. This apparently had been leaking for some time. Convalescence was apparently satisfactory for a week when he developed peritonitis and died.

# The Semi-Annual Meeting of the Executive of The Medical Society of Nova Scotia

November 21, 1946

THE semi-annual meeting of the executive of the Medical Society of Nova Scotia was held on Thursday afternoon at 2.30 p.m. at the Dalhousie Public Health Clinic, Halifax, N. S. There were present: Dr. N. H. Gosse, President; Doctors R. O. Jones, A. G. MacLeod, W. L. Muir, H. W. Schwartz, H. G. Grant, A. L. Sutherland, H. B. Havey, D. Cochrane, S. Marcus, D. K. Murray, P. S. Cochrane, Eric MacDonald, and Dr. Hugh MacKinnon representing the Medical Health Officers' Association.

The President, Dr. N. H. Gosse, opened the meeting with a few remarks stating the main purpose of the meeting was to determine the time and place of the next annual meeting. After considerable discussion on the merits of holding the meeting at the regular time set down in the by-laws or later in the year, it was moved by Dr. P. S. Cochrane, seconded by Dr. H. B. Havey and carried that the 1947 annual meeting of The Medical Society of Nova Scotia be held in Halifax in conjunction with the Dalhousie Medical School Refresher Course. The exact date will be settled after conferring with the Dalhousie Refresher Course Committee but will probably be early in October. The choice of hotel was left to the secretary. Also it was decided to continue to sell advertising space at the hotel for displays and the secretary was instructed to look into the matter of a new rate for such displays.

Dr. Hugh MacKinnon, representing the Medical Health Officers' Association, asked that the program be arranged for next year so that the members of the Health Officers' Association could attend the scientific part of our program. This matter was thoroughly discussed and it was pointed out by several members that many of the papers given by the Health Officers were of considerable interest to the general practitioner and if possible should be given at the general meeting. It was finally moved by Dr. P. S. Cochrane, seconded by Dr. A. G. MacLeod and carried that the president and secretary meet with representatives from the Refresher Course Committee of Dalhousie University and also the Medical Health Officers' Association before arranging the program for the 1947 meeting.

The next item taken up was a letter from Dr. A. M. Arbuckle which was received last year after the program had been arranged, asking that the Director of Industrial Hygiene of the Department of Health and Welfare of Ottawa be invited to contribute a paper at our meeting. This request met with much sympathy from the members of the executive and many opinions were expressed on the increasing importance of industrial hygiene. It was finally agreed that this request should be considered when the program is made up for next year.

The next matter of business was a letter from Dr. J. E. LeBlanc of Pubnico asking that on account of its importance an historical paper be given at all annual meetings, preferably to be read at the annual dinner. There followed quite a discussion on the importance of medical history in which Dr. Hugh Schwartz, Dr. Eric MacDonald, the President, Dr. N. H. Gosse, Dr. Perry Cochrane and Dr. D. K. Murray were the chief contributors. It

was suggested that the secretary prompt the present historical committee that we are expecting a good contribution from them this year, and finally it was moved by Dr. H. G. Grant, seconded by Dr. Eric MacDonald that the president and the secretary approach Professor George Wilson of the Department of History at Dalhousie University, and Dr. D. C. Harvey, the Provincial Archivist, to see whether some of the advanced students in history could not be interested in medical research especially applying to Nova Scotia. It was felt that perhaps a scholarship to the amount of two or three hundred dollars a year should be offered to encourage interest in medical history.

Next was read a letter from Dr. A. L. Cunningham of New Germany, in which it was suggested that the Society look into the possibility of having special motor vehicle plates made for the members of the Society. Dr. Cunningham's idea was that we follow the method pursued in Ontario in which the letter Capital D prefixes the number, e.g., D. 1268. In considering this Dr. Muir questioned whether the number of doctors in Nova Scotia would justify the expense. Dr. Sutherland said the dealers had special numbers and paid extra for them. Dr. A. G. MacLeod suggested we might be given a block of numbers but Dr. Marcus felt that this would not be sufficiently distinctive. The president asked whether we could register the green cross and Dr. Marcus asked whether The Nova Scotia Medical Society could not have a distinctive crest. This brought up the crest which Dr. Gosse had been preparing but which was not yet complete on account of the lack of suitable materials to complete the design. Dr. Muir mentioned that he had been working on a crest for the Society. Dr. Schwartz said that a crest would be too elaborate for the car. It was agreed that the secretary should communicate with the Department of Highways to see whether a special plate could be secured to identify the members of The Medical Society of Nova Scotia.

The matter of sending copies of THE BULLETIN to members of council of the Canadian Medical Association was next discussed. Dr. Grant reported that although he had not called a regular meeting, he had conferred with the other two members of his committee and the committee was agreed that it would not be worthwhile to send THE BULLETIN each month to members of council. On the other hand the committee felt that the members of council of the Canadian Medical Association would be interested in the edition which gave an account of the annual meeting. It was moved by Dr. Grant, seconded by Dr. Jones and passed that a copy of the November edition be sent to each member of council of the Canadian Medical Association.

The next item was the expenses of the members attending the executive meeting. It was moved by Dr. R. O. Jones, seconded by Dr. P. S. Cochrane that a mileage of ten cents (10c) one way be paid all members and that in addition a grant of ten dollars (\$10.00) for hotel expenses be paid those coming from more than one hundred miles.

Dr. Grant reported that he had written Dr. Arthur Kelly, assistant secretary of the Canadian Medical Association, concerning travelling expenses for members of the Advisory Committee to D.V.A. living outside of Halifax. Dr. Kelly had replied that there was a ten dollar (\$10.00) allowance for each member attending the meeting but that there was no extra allowance for travel.

Under new business it was brought to the attention of the executive that Mrs. M. G. Currie, the clerical secretary, had suffered an accident result-

ing in the fracture of her right leg and that as a consequence she would not be able to continue her duties for three or perhaps four months. It was moved by Dr. A. L. Sutherland and seconded by Dr. P. S. Cochrane that Mrs. Currie's salary be paid up to four months provided that she be not reimbursed by the Insurance Company for a similar amount. Dr. Grant asked that an amount up to \$25.00 be allowed him for extra clerical help during Mrs. Currie's absence. It was moved by Dr. P. S. Cochrane, seconded by Dr. S. Marcus and agreed that Dr. Grant be allowed that amount.

The meeting adjourned at 5 p.m.

H. G. Grant  
Secretary

# Correspondence

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Camp Hill Hospital  
Halifax, N. S.  
November 21, 1946

Dr. H. G. Grant  
Dalhousie University  
Public Health Clinic  
Morris Street  
Halifax, N. S.

## Re—Victorian Order of Nursing Services

Dear Sir:

The Director General of Treatment Services for the Department of Veterans Affairs, has instructed this district office to request space in the NOVA SCOTIA MEDICAL BULLETIN for the purpose of making more widely known to practising physicians of the Province, the availability of the Nursing Services supplied by the Victorian Order of Nurses to Departmental patients.

The Superintendent of the Victorian Order of Nurses feels that Paragraph 12 of the instructions issued in June, 1946, when the Doctor of Choice plan was instituted, may have missed the attention of a number of physicians, since the Nursing Services authorized by that Paragraph are not being generally utilized.

The Department therefore desires to draw to the attention of the Medical Profession, that home nursing service as provided by the Victorian Order of Nurses, can be made use of by any physician who feels that such nursing care would be of assistance in treating any patient eligible for medical care under Department of Veterans Affairs regulations.

The only requirement is that the district office be notified that such services are being requested, and local arrangements can be made with the Nurse-in-Charge of the Branch concerned. Your co-operation in publishing this information is appreciated.

Yours very truly

C. J. Macdonald, M.D.

Departmental D. M. O.



November 1, 1943

Nova Scotia Medical Bulletin  
 Barrington Street  
 Halifax, Nova Scotia  
 Dear Doctor:

Please publish in the forthcoming issue of your journal the following notice:

*"Urology Award"*—The American Urological Association offers an annual award 'not to exceed \$500' for an essay (or essays) on the result of some clinical or laboratory research in Urology. Competition shall be limited to urologists who have been in such specific practice for not more than five years and to residents in urology in recognized hospitals.

"For full particulars write the Secretary, Dr. Thomas D. Moore, 899 Madison Avenue, Memphis, Tennessee. Essays must be in his hands before May 1, 1947.

"The selected essay (or essays) will appear on the program of the forthcoming meeting of the American Urological Association, to be held at the Hotel Statler, Buffalo, New York, June 30-July 3, 1947."

Yours very truly

Committee on Scientific Research

Miley B. Wesson, Chairman  
 Judson B. Gilbert  
 Anson L. Clark

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**Are You Going to "Be There" at Atlantic City  
 June 9-13, 1947?**

Cups and medals are the rewards. Also \$34,000 in Savings Bonds for the Special Contest "Courage and Devotion Beyond the Call of Duty" (in war and in peace).

The reward is also professional pride in the achievements of the medical profession in the field of fine art—and also what art can do for you personally—physically, mentally and spiritually. "Art is the best occupational therapy for physicians."

For further information write: Harvey Agnew, M.D., President, A.P.A.A., 280 Bloor Street West, Toronto 5, Canada, or to F. H. Redewill, M.D., Secretary of the A.P.A.A., or to the sponsor, Mead Johnson & Co., Evansville 21, Indiana, U. S. A.

## Personal Interest Notes

WORKS of four well known members of the medical profession in Halifax, particularly in regard to their long association with the staff of the Victoria General Hospital and on the teaching faculty of the Medical School of Dalhousie University were praised at a banquet held in the Nova Scotian Hotel on Dec. 5, 1946.

All four had resigned their posts in the two institutions during the present year and the banquet was tendered jointly by hospital staff and the medical faculty. Dr. C. M. Bethune, Superintendent of the Victoria General Hospital, presided and there was a large attendance, added evidence of the popularity of the men being honored and recognition of the worth of their endeavors through the years.

Those honored were Doctors H. K. MacDonald, Arthur E. Doull, Walter L. Muir, and Michael J. Carney. Among principal speakers were Doctors J. R. Corston, H. W. Schwartz, Kenneth A. Mackenzie and V. O. Mader. Dr. A. E. Kerr, President of Dalhousie University, also joined in tribute to the men. A. B. Wiswell attended as representative of the University's Board of Governors.

Messages of regret at inability to attend were received from Colonel K. C. Laurie, chairman of the Dalhousie Board of Governors; Mr. Justice W. J. Carroll, chairman of Board of Commissioners of the Victoria General Hospital; and Dr. A. F. Miller, Superintendent of the Nova Scotia Sanatorium at Kentville.

Colonel J. G. D. Campbell, who recently retired from the Royal Canadian Army Medical Corps, after serving in two world wars, has been appointed physician to the Pensions Medical Board at Camp Hill Hospital. Former District Medical Officer for M. D. No. 6, he was appointed as Officer Commanding No. 7 General Hospital on its organization, and was afterwards Medical Officer at Camp Borden, Ont., and officer commanding Debert Military Hospital until its disbandment. Colonel Campbell was then appointed officer commanding Halifax Military Hospital, Cogswell Street, and previous to his retirement held the appointment of District Medical Officer, M. D. No. 6 for the second time.

News from England that Dr. John Keatinge Hewat, formerly of Halifax, has been mentioned in despatches will be greeted with sincere appreciation by his many friends.

Graduating in medicine from Dalhousie University in 1935 he was engaged in post-graduate work in England when war broke out. He joined the Royal Army Medical Corps and was sent to Singapore attached to the 148 Field Regiment with the rank of captain. Taken a prisoner of war at the fall of that city he was sent to Thailand where his devotion to duty earned him his present award.

His experiences as a prisoner of the Japanese in a tropical climate had a serious effect upon his health and it was several months after his return to England before he was himself again. He now holds the rank of major (acting) and has resumed his duties on the staff of Napsbury Hospital.

It is recalled that Dr. Hewat, whose mother, Mrs. F. E. Hewat, lives at 265 Tower Road, is one of a family of seven, all of whom attended Dalhousie University and have served this province as citizens with distinction.

Dr. C. W. Holland, Halifax, has been appointed the J. C. Tory professor of medicine and head of the department in Dalhousie University, according to an announcement by the president's office.

Dr. Holland was born in Halifax and received his early education in Morris Street School and the Halifax County Academy. He then proceeded to Dalhousie where he first took the degree of Bachelor of Arts and later the degree of Doctor of Medicine and Master of Surgery. He interrupted his Arts course during the First World War to enlist in the Canadian Army with which he went overseas. After two years' service he transferred to the R. A. F. He completed his medical course in 1923, winning the University Medal. Then he went to the Old Country, where he carried on his studies in several of the leading hospitals. Returning to this side of the Atlantic, he received further training in New York.

In 1928, he became assistant in pathology and bacteriology in the Dalhousie Faculty of Medicine. During that year he was awarded a Rockefeller Fellowship in internal medicine and was given an appointment to the staff of the Peter Bent Brigham Hospital in connection with the Harvard Medical School. On the completion of this post-graduate work, he became assistant professor of medicine and clinical medicine in Dalhousie, on a part-time basis, and assistant attending physician in the Victoria General Hospital.

In 1939 he was made a Fellow in Medicine in the Royal College of Physicians and Surgeons of Canada. Dr. Holland secured this fellowship by examination and was the first successful candidate in the Maritime Provinces for the fellowship in medicine. Since 1931 he has been director of the Students' Health Service, Dalhousie University. He is also attending physician at Victoria General Hospital and consulting physician at the Grace Maternity Hospital.

In future Dr. Holland will restrict his private practice to consultation.

The J. C. Tory chair in medicine was founded by the generosity of the late Hon. Dr. J. C. Tory, former lieutenant-governor of the province, whose interest in the welfare of his native Nova Scotia was expressed in innumerable ways. He bequeathed the residue of his estate to Dalhousie University to be used for the purpose of medical research.

Dr. D. J. Tønning announces the opening of his office, 204 Robie Street, Halifax for the practice of medicine.

The BULLETIN extends congratulations to Dr. and Mrs. S. Scott Bland on the birth of a daughter (Sandra Joan) at Halifax, November 30, 1946.

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