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MNF

MONTREAL NEUROLOGICAL INSTITUTE

and

MONTREAL NEUROLOGICAL HOSPITAL

McGILL UNIVERSITY

THIRTY-THIRD ANNUAL REPORT
1967-68

Thirty-third Annual Report

of the

MONTREAL NEUROLOGICAL INSTITUTE

and

MONTREAL NEUROLOGICAL HOSPITAL

and the

DEPARTMENT OF NEUROLOGY AND NEUROSURGERY

of

McGILL UNIVERSITY

1967-1968

CONTENTS

Over the past third of a century these annual reports have served as a record of the continuing growth of this institute and hospital. This year's report, summarizing the clinical, research and teaching activities of some twenty sub-departments and laboratories, further substantiates that growth. This brief editorial note is to thank those who authored the various sections as well as the secretarial and clerical staff who provided the material and assured its accurate publication.

"A hospital," said Dr. John Shaw Billings, at the opening of the John Hopkins in 1889, "is a living organism. The stream of life which runs through it is incessantly changing; patients, nurses and doctors come and go... Its work is never done; its equipment is never complete; it is always in need of new means of diagnosis, of new instruments and medicine; it is to try all things and hold fast to that which is good."

These characteristics of the teaching hospital are well-documented in the pages that follow.

W.F.
Editor


André Laroze

CHAIRMAN'S REMARKS

DR. WILDER PENFIELD

This is the Annual Staff Meeting of two institutions — 1) The Montreal Neurological Institute of McGill University and 2) The Montreal Neurological Hospital. L'Institut et l'Hôpital sont les frères siamois de la science et de la médecine. They are twins of science and treatment, nourished by two financial hearts. Each twin will always add to the other's strength.

I have the honour to act as Chairman in the absence of Mr. S. M. Finlayson, President of the Hospital's Board of Management.* It is eight years since Professor Theodore Rasmussen took command as Director of Quebec's world-famous Neurological Institute and Hospital. In this period, the staff has been strengthened by an increasing number of French Canadians as well as English Canadians. I have watched, with profound admiration, a steady improvement in the care of the sick and seen thrilling advances in science and teaching.

The recent Governments of the Province of Quebec have done great things for public hospitalization. But one fact has been overlooked at times by government and by public alike. It is this: the teaching hospitals, associated with our universities, must be granted a special status. They train the medical practitioners and the medical specialists. For every student in medical school there are one-and-a-half graduate doctors in hospital training. They train the nurses, the dieticians and the paramedical specialists such as physiotherapists and technicians.

The other hospitals, the practitioners, and the public depend on them for the high level of medical performance in this province. The cost is high in teaching hospitals, but the service to science and practice is basic, essential in this modern society.

This budget of the Montreal Neurological Hospital presented today is realistic. There is no padding. There never has been. The government has been recognizing this. But they do so only after a recurring delay that may last as long as two and a half years. This is inefficient and unnecessary.

This M.N.I. and M.N.H. Annual Report is made to the people of Quebec, on the one hand, and to McGill University on the other. Wisdom and progress, in the difficult field of medical care, demand that the Provincial Government should consult the universities and the teaching hospitals with an open mind. This must always be in addition to their discussions with those who organize and debate in the interests of professional remuneration.

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* I speak, then, for the other members of the Board, Vice-President Arnold Heeney, Senator Hartland Molson, H. Greville Smith, Principal Rocke Robertson, Dean M. McGregor, Theodore Rasmussen the Director, and Francis McNaughton who now replaces Preston Robb as the representative of the Medical Board.

MONTREAL NEUROLOGICAL INSTITUTE AND HOSPITAL

REPORT OF THE DIRECTOR

DR. THEODORE RASMUSSEN

This is the 33rd time that we have paused to look back and report on the record of the year just ended, and to take a quick look at the road that lies ahead. It is also an occasion when we can publicly express our sincere appreciation to the individuals, foundations, governmental departments and other organizations, whose generous donations during the year have helped to support the work of the Institute and Hospital.

There are physical changes to report: completion of the electron microscopic laboratory on the 6th floor, with its air-conditioning penthouse on the floor above, completion of the basement renovation programme, with new homes for the Laboratory of Electroencephalography and Clinical Neurophysiology, the Psychology Department, the Neuroelectronics Unit and the Housekeeping Department, as well as improved facilities for other services.

Welcome news has been received that our application for a Federal-Provincial Hospital Construction Grant, to help finance this project, which cost approximately $500,000 has been approved in the amount of $96,600 from the Federal Government, with an equal amount from the Province. Still to be heard from is our application for an additional $86,000, towards the cost of this project, from the Health Resources Fund of the Federal Government. The remainder will have to come from our own funds.

More recently, the 4-North Ward has been converted into an Intensive Care Unit. In addition, a beginning has been made in transferring the films in the X-ray storage area to a downtown warehouse, in preparation for conversion of this space into an up-to-date X-ray viewing and reporting unit.

There are also staff changes to report. In 1936 Miss Anne Dawson came over from the Royal Victoria Hospital to work as office secretary of this fledgling Institute. By 1940, she was Department Secretary, and since 1945 she has been Executive Secretary of the Institute, taking on steadily increasing responsibilities as this institution has grown in size and complexity. At the end of 1967, she brought this career of loyal outstanding service to a close. We are pleased to report that as a part of her second career she is bringing her unequalled knowledge of the Institute's history and affairs to the task of putting its archives, including Dr. Penfield's papers, into order for proper preservation.

The coming summer will bring more staff changes. Dr. Brindle's outstanding work in the Anaesthesia Department over the past 15 years, has led to an invitation from the new University of Sherbrooke Medical School. When he takes up his new appointment there, as Professor and Chairman of the Department of Anaesthesia, he will leave big shoes to fill here.

The Department of Anaesthesia will also lose Dr. Anibal Galindo and Dr. Andrée Pinault this summer. Dr. Galindo will go to a new post in Seattle, and Dr. Pinault will return to the University of Montreal.

The roster of university neurosurgical departments, directed by former M.N.I. Fellows, will be increased again this summer when Dr. Phanor Perot takes up his new post of Professor and Chairman of the Division of Neurosurgery at the Medical College of South Carolina in Charleston. Dr. Francis LeBlanc will take Dr. Perot's place on the Third Neurosurgical Service with Dr. Gilles Bertrand.

Dr. Roger Broughton has been awarded a Medical Research Council Associateship to continue his work in clinical neurophysiology at the University of Ottawa.

Dr. Agapito Lorenzo will return to the U.S.A., to continue his career in neurology, electromyography and electroencephalography. The work in the E.M.G. Laboratory, that he has started on a firm foundation, will be carried on by Dr. Andrew Eisen.

Dr. Robert Nelson will be leaving to accept an appointment in the Department of Neurology at the University of Ottawa.

So we say to each, thanks for work well done and for valuable contributions to the Institute's clinical, scientific and social life, and best wishes for happy and productive years in the new posts. Our best wishes go also to those members of the Fellowship and Resident Staff who will be completing their training this summer, and taking up new responsibilities in the coming year.

Some of the problems of the past year require further comment. The many achievements of the Q.H.I.S. continue to be marred by two perennial and serious problems, first, inadequate and unrealistic budget approvals at the beginning of the year, and second, unduly long delays in the ultimate year-end financial settlements. Each year, since the beginning of the Quebec Hospital Insurance Service in 1961, we have lived within 1, 2 or 3% of our own budget, which the Q.H.I.S. has finally approved and recognized as legitimate by its own year-end settlements to date. Each year our own tightly-drawn budget is returned cut by 10 to 20%. This past year was no exception, with the result that our 1967 hospital deficit at the end of the year was approximately $412,000. To have stayed closer to the Q.H.I.S. approved budget, it would have been necessary to reduce the quality of hospital care, well below the level we have striven so hard to maintain. Two weeks ago we received an interim payment of $290,000, reducing our 1967 year's deficit to $122,000, pending the ultimate final settlement; but if we are entitled to this $290,000 in April of the following year, it should have been approved at the beginning of the year, in view of our record of adherence to our own submitted budget, year in and year out. Based on past experience, moreover, we will not know, for another year or more, how much of this remaining $122,000 deficit will be covered by the ultimate final settlement for 1967.

We are not alone in our inability to live within the Q.H.I.S. approved budget, and the mounting financial crisis facing the major McGill Teaching Hospitals strongly suggests that the importance of such institutions in the Province's health structure is *not* adequately appreciated at government levels. Accordingly, the four major Teaching Hospitals of McGill University submitted a combined brief this past year to the Castonguay Health and Social Welfare Inquiry Commission, to spell out as clearly as possible the special rôles and the special needs of the principal university Teaching Hospitals, in the context of the present and future health needs of the citizens of Quebec and Canada.

The quality of a medical school is determined to a considerable extent by the quality of its teaching hospitals, where pursuit of excellence must be the watchword. Economic strait-jackets that result in lowering standards of patient care, in reducing the quality of undergraduate and graduate training programmes, and in reducing the ability of the teaching-hospital staff to play its appropriate rôle in exploring the frontiers of medical knowledge, will quickly and inevitably bring about a downward spiral in the quality of health care available to the citizens of the Province. The McGill Teaching Hospitals' steadily worsening financial plight and its implications for the Medical School are of great concern to the University, and have led to the formation of a top-level joint hospital-university committee, to study these immediate and urgent financial needs and to press for prompt and effective remedial measures. The headlines in today's newspapers give added emphasis to the problem we face. Excellence in the health field *is* expensive in dollars, but the mediocrity that unwise financial restrictions, applied to the university teaching hospitals, quickly and inevitably produce, will be much more expensive in terms of suffering and disability, and the drain of skilled medical and paramedical man and woman power to more hospitable areas and into more attractive fields of endeavor.

Our needs for more space and facilities have been mentioned with increasing frequency in the reports of recent years, and in the last two years it has became clearly apparent that active steps toward construction of a new wing could no longer be postponed. A few comparative figures are illustrative. In 1954, the first year after the McConnell Wing was opened, the expanded M.N.I. housed, just comfortably, 22 senior staff members and 40 Fellows, including all rotators. Now, the senior staff has increased to 38, nearly double the 1954 roster, and the Fellowship and Resident groups, including the rotators, has increased from 40 to 66. The secretarial and technical staff has, of course, also expanded proportionately. Although these figures give some evidence of our growth over the past 15 years, they only hint at the expansion of the clinical and research activities during this period and do not tell the story of the need for the future.

During the past year departmental committees have assessed the space requirements that are essential if we are to meet the challenges of the next 10 to 15 years in all areas, patient care, teaching and research. The University Senate Development Committee has reviewed this submission, and has approved in principle the construction of a new wing in the space

een the present structure and the old Pathological Institute buildin
he next step, skeleton plans, floor by floor, have been outlined as a basi
he preparation of preliminary plans by an architect, when the necessar
iissions are received.

The problem of financing now raises its familiar head. We look at onc
e Health Resources Fund of the Federal Government. Our submissio
)een approved by the McGill Teaching Hospitals Development Collabc
n Committee, as one of the first priorities of the McGill group fo
ort from this Fund. Even a maximum grant from this Fund, howeve
provide for only half of the cost, and matching funds will need to b
ght before more definite steps can be taken to turn plans into substanc

Expanding knowledge in many facets of the neurological disciplines
the progressive development of more precise and more sophisticate
ods of diagnosis and treatment, bring an increasing variety of ailment
e nervous system tantalizingly close to definite understanding and cure
uctive areas of investigation in both the basic neurological discipline
in the clinical fields are multiplying at an ever-increasing rate. Th
nded facilities we are now considering are essential if we are to continu
ing modern science's increasingly potent and effective weapons to bea
ır patients' clinical problems, and if we are to train the growing number
cientifically-oriented clinicians and clinically-oriented basic neurologica
tists that the community needs, and to exploit fully our ability to stud
the patterns and the threads of the tapestry of the nervous system, usin
ate Lord Brain's perceptive analogy.

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Neurosurgical Research Fellows:

FRANCIS LEBLANC, M.D. (Univ. of Ottawa) Medical Research Council Scholar
GEORGE MATHEWS, M.D. (Madras, India) Medical Research Council Fellow

* 6 months on this service

THE WOMEN'S AUXILIARY OF THE ROYAL VICTORIA HOSPITAL

President (to April 1968) ..... MRS. J. W. DUNCAN
President (from April 1968) ..... MRS. RONALD L. MARKS
Chairman, M.N.I. Coffee Shop Committee ..... MRS. W. M. GARVEN

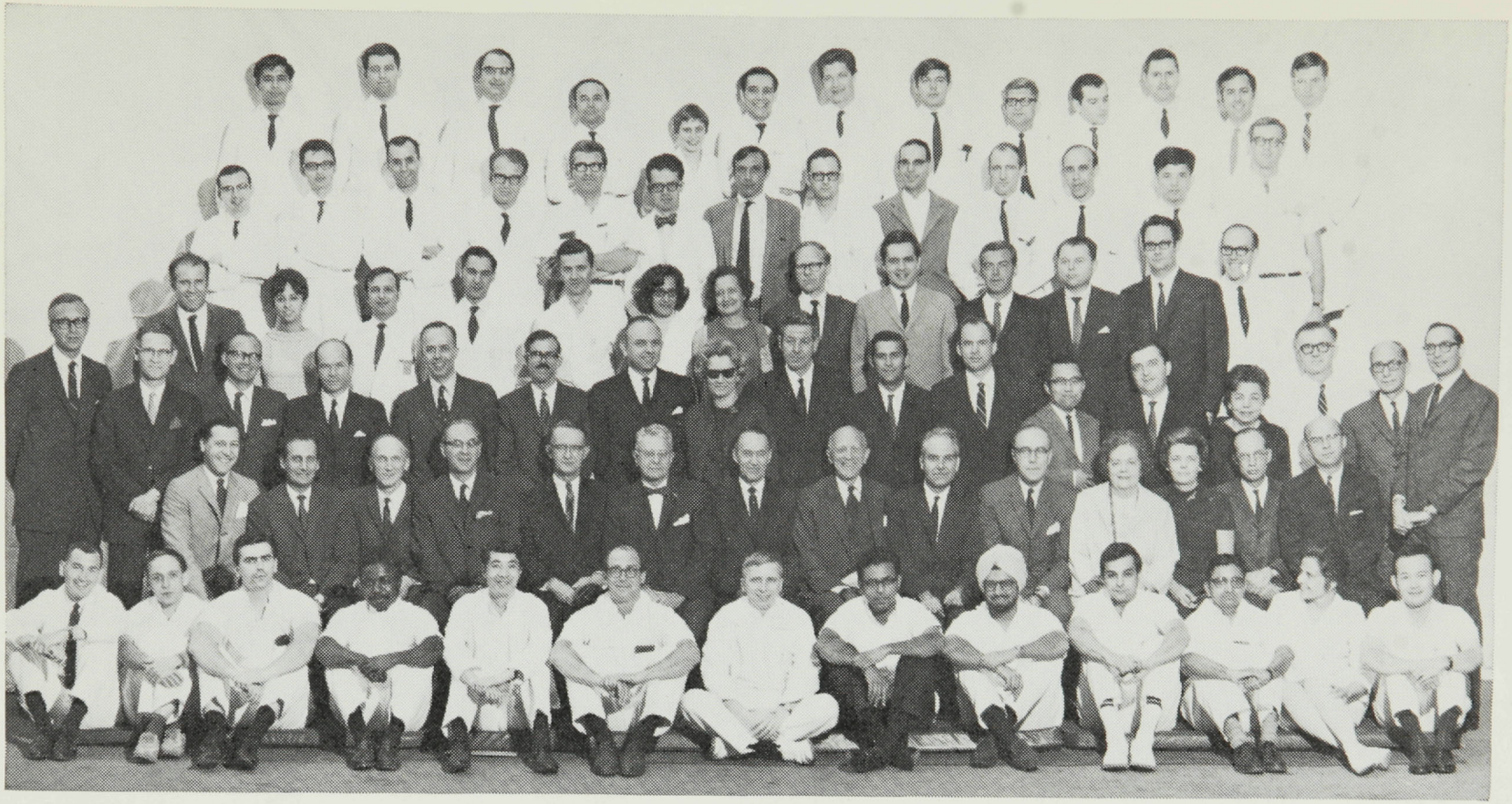
NURSING STAFF

Director of Nursing ..... MISS BERTHA I. CAMERON, R.N.
Assistant Director of Nursing ..... MISS IRENE MACMILLAN, B.A., R.N. M.Sc. (App.)
Administrative Assistant ..... MRS. ELEANOR CARMAN, R.N.
Supervisor Dressing Rooms ..... MISS ANNIE JOHNSON, R.N.
Assistant Director of Education ..... MISS HELENA KRYK, B.N., R.N.
Clinical Coordinator ..... MISS CAROLINE ROBERTSON, B.N., R.
Clinical Instructor ..... MRS. RUBY PARKES, R.N.
Supervisor Auxiliary Nursing ..... MISS ANNE CARNEY, B.N., R.N.
Night Supervisor ..... MISS ELIZABETH BARROWMAN, R.N.
Assistant Night Supervisors ..... MISS LILLIAN MCAULEY, R.N.
MISS NOELENE MCGUIRE, R.N.
MISS MARILYN MANCHEN, R.N.
Operating Room Supervisor and Instructor ..... MISS PATRICIA MURRAY, B.N., R.N.

HEAD NURSES

MISS MARY AGNEW, R.N.
MISS ALICE M. CAMERON, R.N.
MISS MARY CAVANAUGH, R.N.
MISS MARION EVERETT, R.N.
MISS DELTA MACDONALD, R.N.
MRS. BARBARA PETRIN, R.N.
MISS URSULA STEINER, R.N.

First Row (Bottom): Miss H. Rose, Miss D. Brough, Miss P. Mabuti, Miss S. Paquin, Miss T. Dona, Miss F. Tolentino, Miss P. Van der Heide, Mrs. J. Paton.
Second Row: Miss A. Carney, Mrs. E. Carman, Miss A. Johnson, Miss I. MacMillan, Miss B. Cameron, Miss H. Kryk, Miss C. Robertson, Mrs. R. Parkes, Mrs. L. Fletcher.
Third Row: Miss D. Allsopp, Miss A. Cameron, Mrs. R. Boyer, Miss S. Laporte, Miss C. Dixon, Miss J. Parker, Mrs. G. Jotic, Miss D. MacDonald, Miss M. Pinto.
Fourth Row: Mrs. A. Mattey, Mrs. C. Jethi, Miss F. McCormack, Miss L. Dalicandro, Miss J. Spruce, Miss C. Ledgister, Miss M. Everett, Miss H. Zatylny, Miss H. Taylor, Mrs. N. Niklaus, Miss L. Juteau.
Fifth Row (Top): Mrs. L. Gorman, Miss S. MacKinnon, Miss C. Holyk, Miss V. Gurr, Miss S. MacDonald.



First Row (Bottom): Drs. G. Ashby, R. Hollenberg, A. Olivier, J. Nabwanga, Y. Ushio, L. Stern, W. McCann, G. Mathews, R. Sidhu, P. Fragatos, K. Kalyanaraman, H. Patriquin, J. Chan.

Second Row: Drs. G. Bertrand, R. Ethier, F. McNaughton, W. Feindel, Mr. C. Gurd, Drs. K. Elliott, T. Rasmussen, W. Penfield, P. Gloor, P. Robb, Miss B. Cameron, Miss C. Griffin, Drs. B. Graham, G. Mathieson.

Third Row: Drs. I. Heller, D. Lloyd-Smith, R. Broughton, P. Perot, C. Branch, S. Carpenter, H. Garretson, Hanna Pappius, L. Wolfe, F. LeBlanc, Mr. R. Jell, Drs. A. Lorenzo, G. Karpati, Mrs. C. Strauss, Drs. J. Cosgrove, H. Jasper, A. Sherwin.

Fourth Row: Dr. J. Davis, Miss S. Duchow, Drs. H. Mars, A. Eisen, A. Roberge, Lina Puglisi, Brenda Milner, Mr. L. Taylor, Drs. J. Melançon, J. Vézina, F. Andermann, J. Courville, J. Nelson.

Fifth Row: Mr. John Callahan, Drs. C. Pace-Asciak, S. Nutik, F. Cociani, G. Erba, C. Needham, C. Dila, J. Grimes, G. Rohrer, J. Norris, V. Montpetit, N. Wang, M. Brown.

Sixth Row: Drs. R. Romero, D. Bulcke, M. Copti, E. Gaba, Marie Joubert, M. Drolet, E. Daigle, G. Patry, Y. Michaud, E. Garcia-Flores, J. Eisenring, M. Lechter, J. Murphy.

GRADUATE STUDIES AND RESEARCH

DR. PIERRE GLOOR

During the past year many research programs pursued in the laboratories of the Institute and the clinical services of the Hospital have contributed valuable new information to our fund of knowledge in the neurosciences. That this is no small achievement is realized by all of us who have increasingly felt the urgent need for expansion of space, facilities and research staff in our laboratories. Most of our research activities have been carried out under the most difficult physical circumstances. All laboratories are bursting at their seams and crying for additional space. The situation in some of them has reached crisis proportions, to the point where even the purchase of a necessary piece of equipment becomes a major problem for the simple reason that there does not seem to be any space into which it can be fitted. Fellows and some members of the staff have inadequate office space or simply no desk at all and therefore some laboratories have to function as offices part of the time. The recruitment of urgently needed additional scientific staff is impeded by the impossibility to find the necessary laboratory and office space for these new research workers. The demands for space have become so pressing that unless they are met within the very near future, meaningful research activities will be very seriously hampered. We are therefore greatly encouraged that McGill University has in principle given the green light to proceed with the planning of an additional new wing of our Institute devoted primarily to research and teaching activities.

Space is undoubtedly the most serious and compelling problem facing our research establishment at this moment. Others, however, although less immediately obvious, are also being felt. It is common knowledge that during the last few years external pressures have brought about a far-reaching reorganisation of hospital practice. The adjustments we had to make were many, they were often trying and sometimes, in view of their urgent and inevitable nature, we had to act quickly and in an atmosphere of emergency. In contrast to these urgent needs in the field of hospitalization, the problems in the area of medical research may have appeared to be somewhat less compelling. The relative calm on this front may, however, be deceptive and there is much to suggest that the time is now opportune to review our problems related to research and to reevaluate our aims and policies in this field, for changes equally profound as those which revolutionized hospital practice are affecting the scientific side of medicine. The mushrooming of new scientific knowledge, the increasing development of highly effective, but expensive technological procedures and as a consequence of this the increasing role of government financing and government policy in nurturing and promoting scientific growth and progress are the most obvious among these. This, coupled with the ever-accelerating expansion of new scientific knowledge has made the world of the research scientist emotionally far more tense and insecure than in the past. To keep in touch with the new frontiers of modern science is becoming an evermore time-consuming undertaking, and yet the time available for continuing study and scientific self-education seems to shrink. The world of the organization man increasingly intrudes into our

scientific lives and many of us are threatened with the prospect that paper work and administrative chores, all basically designed to erect the framework to ensure the smooth running of our research activities, eats up so much time that too little is left for the very purposes these activities were designed to serve in the first place. There is no easy remedy to this problem. It requires, however, the most careful consideration. One factor undoubtedly is that too few are trying to do too much. By enlarging our scientific staff it should be possible to ease these pressures and to maintain the creativity of our research scientists at the expected high level of excellence.

What is the record of our achievements during the past year on which we can report? On this score we can be justly proud, for in spite of the serious difficulties that have beset us and which are reviewed here, our scientific productivity has been good, the problems with which we have wrestled have been exciting and all of us engaged in research have been able to derive much satisfaction from our scientific endeavors. It is obviously impossible to review in detail all the research programs in progress in the various laboratories and clinical departments of the Institute. It will be necessary to restrict this review to a few examples that will illustrate the general trend.

In the Laboratory of Neuroanatomy Dr. Jacques Courville has continued his elegant and precise study on the cerebellum. The contributions to neuroanatomical knowledge he has made during the past year will rank as an important milestone in cerebellar anatomy.

In the Laboratories of Experimental Neurophysiology we had a successful and rewarding year. We gained new and important insight into hypothalamic physiology by studying the activity of single nerve cells and their responses to a variety of influences such as those originating in the limbic system or to changes of local brain temperature. Much credit is due to Drs. John Murphy, Jean-Jacques Dreifuss and Leo Renaud who have completed a series of valuable papers. This year marks the end of Dr. John Murphy's and Dr. Jean-Jacques Dreifuss' fruitful association with our Institute, since both of them will be leaving Montreal this year, Dr. Murphy to join Sir John Eccles at the Department of Physiology in Buffalo and Dr. Dreifuss to return to Switzerland where he will take up a post in the Department of Physiology at the University of Geneva. The smooth running of the laboratory has largely been made possible by the expert attention Mr. Ralph Jell and Mr. Douglas Skuce have given to our equipment, which they have rescued from the brink of obsolescence. They have provided us with new recording systems which combine great efficiency and versatility. We are also indebted to the Medical Research Council of Canada for having granted us a major equipment grant which enabled us to update our equipment.

The Donner Laboratories of Experimental Neurochemistry as in the past have been bustling with activity. The research activities of these Laboratories have again been very productive and exciting. Dr. Leonhard Wolfe and his associates have extended further our biochemical and physio-

logical knowledge of lipids, especially of prostaglandins, and their role in the function of the nervous system. Dr. Wolfe has been ably assisted in this work by Dr. Flavio Coceani, who will leave the Institute this summer to take up a position at the Sick Children's Hospital in Toronto where he will develop a neurophysiological research laboratory. Dr. Hanna Pappius in her studies on experimental cerebral edema has been able to demonstrate a definite effect of corticosteroids upon brain edema and thus contributed to our understanding of the beneficial effect of steroid treatment in the postoperative care of neurosurgical patients.

In the neurological and neurosurgical research laboratories one of the most welcome developments has been the opening of a muscle histochemistry laboratory under Dr. George Karpati's direction. In the short time since his return from Washington he has developed a most stimulating and promising program, including the study of experimental neuropathies. Dr. Allan Sherwin in the neurological research laboratories has made important contributions to the application of enzyme studies in the investigation of a variety of neurological diseases. Dr. James Cosgrove has spent a sabbatical year in Boston studying some aspects of neuro-ophthalmology. The neurosurgical research laboratories under Dr. William Feindel's and Dr. Lucas Yamamoto's direction have continued their beautiful studies on cerebral circulation. Mr. Charles Hodge of our photography department has added dash and glamor to this project by recording the results in a set of magnificent serial color photographs and movies. Dr. Roger Broughton has continued his studies on sensory evoked potentials in humans and it is with regret that we heard of his recent decision to leave our Institute to join the University of Ottawa. We similarly regret Dr. Agapito Lorenzo's decision to move to the United States. We thank him for having set up our electromyographic laboratory and for having inaugurated a research program, which together with the clinical electromyographic services will be continued by Dr. Andrew Eisen.

In the Department of Psychology one of the most important developments has been the occupation of new quarters in the basement. This has greatly facilitated the streamlining and integration of the activities of the Department. Under Dr. Brenda Milner's experienced guidance the precise analyses of various defects in higher nervous function, attributable to a variety of lesions of the human cerebral cortex, has been continued by our team of psychologists.

In the Department of Neuropathology an electron microscope has been installed and is now in operation. It has greatly extended the research potential of this laboratory by adding to it the most modern tools of the trade. Dr. Sterling Carpenter has made use of this new equipment for ultrastructural studies of lesions of the peripheral nerves and of muscle biopsies.

Our research activities formed an important part of our postgraduate training program. A number of our young research workers were registered for graduate degrees in the Department of Neurology and Neurosurgery,

which in this capacity functions as a department of the Faculty of Graduate Studies and Research of McGill University. The number of students registered for a graduate degree during this academic year has been 11. Of these, four have pursued their studies with the aim of obtaining a Ph.D. degree and the remainder were M.Sc. students. Four of our research workers, Dr. Allan Morton, Dr. Roger Broughton, Dr. John Murphy and Dr. Henry Garretson, have earned a Ph.D. degree during the past academic year. We congratulate them for their achievements and extend to them our best wishes for their scientific future.

I wish to conclude this report by thanking all those, too numerous to name individually, who in their capacity as technicians, photographers, secretaries, laboratory assistants and animal caretakers have made it possible for us to carry on in this exciting venture of extending further the frontiers of knowledge in the neurosciences.

NEUROLOGY

Dr. Francis McNaughton

It is usual to begin a report with some statistics and I will summarize this part of my report very briefly by saying that the volume of neurological work in the wards and out-patient department has remained at about the same level as in 1967. We will all agree that statistics tell us little of what actually goes on within the walls of a hospital. Statistics are not patients! Unless you or I have been ill recently, we medical people are quick to forget that illness is an intensely personal event, an unpleasant, and sometimes catastrophic experience for the sick person and his family. It can only be handled adequately in a very personal way by the doctors, the nurses, technicians, and everyone else involved in patient care. I recall being irritated by the insistent calls by the husband of one of my patients, and indicated to him that he was unduly demanding on the doctor. I have not forgotten his tolerant reply — "I know you have a great many patients, doctor, but please remember that I have only *one* patient". With the urge towards greater efficiency, and with all the problems of Government financing of hospitals, we are always in danger of forgetting this intensely personal quality of illness. A hospital cannot be administered like the branch of a chartered bank!

If we have been able to maintain a reasonably high standard of patient-care during the past year, it is due to the devoted work of every member of the hospital team and I would give particular credit to the residents and the nurses who have the most continuous contact with our patients. I also wish to emphasize the high quality and quantity of service we receive from all our diagnostic laboratories, and would mention in particular Dr. Ethier and his staff in Neuroradiology, and Dr. Lorenzo of the new laboratory of Electromyography.

In this connection, it is also important to mention our close interrelationship with the Royal Victoria Hospital. If you watch the constant flow

of human traffic across the Third Floor Bridge, you will note that the stream flows strongly in both directions. To mention only a few elements in this stream, at least a dozen assistant residents in Medicine cross the Bridge each year to work in our Neurological Service, and we recognize how much they contribute to the every-day work of the Hospital. We are constantly requesting consultation and advice from our colleagues across University Street. We in turn, provide the manpower for the Neurological out-patient clinics, and see over 5,000 patients a year in the Neurological Clinics, not to mention those in Neurosurgery. Each year, our Staff also provides over a thousand neurological consultations for in-patients at the R.V.H.

I regret to report that we will be losing Dr. Robert Nelson to the University of Ottawa at the beginning of July. Dr. Nelson has contributed a great deal during his four years with us, and he carries our best wishes with him.

Friends of one of our distinguished Fellows, Dr. J. C. Jacob, will be interested to know that he has returned to Canada with his wife Mary, after three years at the Christian Medical College, Vellore, India. He has joined Dr. Max House and a growing M. N. I. "Colony" in St. John's, Newfoundland and will add to their strength at a time when a new medical school is in the making. Fortunately, another of our outstanding Fellows, Dr. Taori, has filled the gap at Vellore. He will head the Neurological Department with full facilities for training Neurologists for India.

The increasing activities of the Laboratory for Research in Chronic Neurological Diseases will be reported elsewhere. The research work of Doctors Cosgrove, Sherwin, Karpati, and their junior associates is most encouraging and brings new strength and hope to the Department of Neurology.

One of the most important activities of the Department of Neurology and in fact of all Institute Departments, is teaching. The new McGill curriculum will enlarge our teaching role, for it provides students with a considerable block of elective time during the school year. Within the next two years, we will begin to receive a number of students of the 2nd, 3rd and 4th years for supervised work in the various laboratories of the Institute and Hospital in addition to carrying on our present teaching duties. The responsibility for planning our share of the new curriculum has fallen mainly on the shoulders of Doctors Sherwin and Courville, and we thank them for their contribution to this important new development.

Graduate teaching in Neurology, including our Residency Training Program, is under constant review. As many of you know, the Faculty of Medicine at McGill has just assumed responsibility for the evaluation and approval of all Residency Training Programs in the McGill teaching hospitals, including our own. This is surely a progressive step, though it places a new and heavy responsibility on the University. We have appointed a Faculty Sub-Committee for Residency Training in Neurology, which will represent all the McGill Departments of Neurology in this regard.

Perhaps the most important teaching development of the year in the M.N.I. has been the establishment of a weekly Psychiatric Conference headed by a gifted clinician and teacher, Dr. Z. J. Lipowski. Dr. Lipowski is an Assistant Professor of Psychiatry at McGill, and a member of the staff of the A.M.I. He also recently became a Consulting Psychiatrist to this Hospital. Although we have always relied a great deal upon members of the A.M.I. for consultation, this is our first regular joint teaching conference and it fills an important gap in the Residency Training Program. At this Conference, patients from our services are presented for discussion of diagnosis and management, in a very practical and stimulating manner.

The late Dr. Stanley Cobb once wrote that "Progress is achieved by ignoring the boundaries of academic disciplines". His own distinguished career as a Neurologist and Psychiatrist was a very good example of this teaching. By ignoring (in this way), the boundary between the M.N.I. and the A.M.I., between the Brain and the Mind, between Neurology and Psychiatry, let us hope that we too will achieve true Progress.

NEUROSURGERY

Dr. William Feindel

It is always a satisfactory experience to listen to Dr. McNaughton, whether as a recorder of neurological activities or as a neurologist who activates no mean recorder! Those who attended the M.N.I.-M.N.H. Annual Dinner evening will remember the talented recorded trio of Dr. McNaughton, Miss Ursula Steiner, the head nurse in charge of our Intensive Care Unit, and Miss Joan Broadley, the senior neuroradiological technician. They were among the many versatile performers arranged into an entertaining programme by our impressario, Dr. Francis LeBlanc, at this gay annual gathering initiated several years ago by Dr. Preston Robb.

Dr. Thomas Willis, the seventeenth century founder of neurology, would have been quite at home, one imagines, listening to the delightful baroque tunes of this trio. Those who know their Willis will recall his view that people "destitute of the Faculty of Musick have hard cerebellums" while musical people have soft cerebellums. We are easily persuaded that Dr. McNaughton and his two charming companions must be endowed with some of the softest cerebellums in these parts.

There have been many other pleasant interludes during the past year bringing different groups of the staff together and contributing to the spirit of this Institute, but my main task is to present on behalf of the neurosurgical staff a brief review of their work.

The number of surgical theatre cases in 1967 was 717, slightly more than in 1966. This was despite the period of only emergency surgery when, over several months, the government and the radiologists of this province had discussions (as well as non-discussions) on their difficulties. The level

of surgical care during that particular time reflects the support from all members of the staff, particularly the nursing and residence staff and from Dr. Roméo Ethier and his colleagues, Dr. Leger and Dr. Maltais, who gave us valuable consultation. We are especially indebted to our team of competent radiological technicians who, since their expert musical performance at the same Annual Dinner mentioned above, are now known colloquially as "Roméo's girls."

In this total of some 700 theatre cases, five post-operative infections brought the incidence to 0.7%. Though these spoil a perfect record in Lister's centennial year, the incidence is nonetheless gratifyingly low. For the past six months, a renewed scrutiny of prevention and control of infection on the wards has been made by Dr. Garretson, Miss Murray and Miss Robertson. We appreciate their revisions and recommendations which have been incorporated into the ward procedures.

For some time there has been need for a geographic area for patients who require an unusual amount of medical and nursing supervision involving complex equipment and emergency or urgent resuscitative measures. The pilot intensive care unit on 4 North, consisting of six beds, now serves this need and we owe many thanks to a committee of Dr. Fred Brindle, Miss Robertson, Dr. Charles Branch and Mr. Gurd as well as to many of the members of the staff who contributed so much to the initiation of this project.

A valuable record of the anaesthesia techniques and procedures developed and used at the Montreal Neurological Institute over the years has been published in monograph form by Drs. Gilbert, Brindle and Galindo. Dr. Brindle has accepted the distinguished post of Professor and Chairman of Anaesthesia at the new medical centre at the University of Sherbrooke. We shall very much miss his quiet competence in the operating room and his occasional first-hand reports on sporting car events provided from his enviable position as Consulting Physician to the Montreal Motor Racing Club. We wish him, Lorraine, and their family much success and happiness in this new appointment.

We view also with mixed feelings the departure this summer of Dr. Phanor Perot who will become Professor of Neurosurgery at the Medical College of South Carolina in Charleston. During his dozen years here, Phanor completed substantial studies in neurophysiology, in the pathophysiology of epilepsy and introduced significant improvements in the surgical treatment of torticollis and of certain spinal lesions. We will miss him as a warm and scholarly friend whose contributions have enhanced the neurosurgical reputation of this hospital. We wish him well and hope that next year he and Elizabeth and all the lively small Perots will remember us when they are basking under the magnolias.

We have all enjoyed Dr. Penfield's comings and goings this past year on the sixth floor. His biography of Dr. Alan Gregg appeared, a document of the life and achievements of a man whose work in medical education touched many areas and profoundly influenced, of course, the early history

of this Institute. We welcome Dr. and Mrs. Penfield back from a recent tour of some of their favourite haunts in the Grecian Isles. Those interested in the Osler Library and the flourishing new Department of the History of Medicine will be glad to know that the Curators last week appointed Dr. Penfield as continuing Honorary Osler Librarian. It would be difficult to imagine a more apt or happier appointment.

Dr. Arthur Elvidge continues to inspire the younger neurosurgeons to publish reports on the brain tumour follow-up material. Last week the members and wives of the Montreal Neurological Society were treated to one of Arthur Elvidge's travelogues, distinguished as usual by his elegant artistic photographs and garnished with the well-known Elvidgean humour.

In the past week, too, Dr. Henry Garretson successfully defended his Ph.D. thesis based on a long-term analysis of brain tumour transplants using radio-active cell tracers. Dr. Brindle, Dr. Yamamoto, Dr. Garretson and myself, have been involved in a project assessing the value of ventriculoatrial shunts for patients with occult hydrocephalus associated with impairment of memory and gait. Recording of arterial, venous and cerebrospinal fluid pressures together with a measure of cerebral blood flow by radio-active techniques are being compared with psychological findings on these patients by Dr. Milner and her staff. This multi-faceted study, which involves some of the many disciplines available here at the Institute, should give some insight into the pathogenesis of this condition which is now subject to amelioration by appropriate surgery.

Dr. Charles Branch has been elected President this year of the Society of University Neurosurgeons and is active in the program arrangements for the Congress of Neurosurgeons who are meeting in Toronto next September. Dr. Rasmussen last fall was invited to his ancestral country of Denmark as Visiting Neurosurgeon in Copenhagen. Dr. Bertrand reported at several societies his neurophysiological and surgical findings garnered during the surgical treatment of Parkinsonism in collaboration with Dr. Jasper.

A detailed report of the work of the team in the Cone Laboratory for Neurosurgical Research appears in another part of the Annual Report. We were delighted that the award for the best presentation at the Annual Meeting of the Biological Photographic Association in Toronto (representing all the medical and biological photographers of this continent) went to Mr. Charles Hodge for his demonstration of the elegant fluorescein angiographic photographic technique which he has developed. Some of the work in this field is also being reported at the International Conference on Cerebral Blood Flow in Lund and Copenhagen this week and has been presented at two other conferences sponsored by the National Institute of Health and the American Heart Association.

The newest member of the staff, Dr. Francis LeBlanc, will transfer here from the Queen Mary Veterans' Hospital and continue his experimental work on cerebral vasospasm.

All the neurosurgical residents deserve our gratitude for their excellent help during the year. Among the senior residents, Dr. Bill McCann is taking off for a U.S. Army base hospital in Japan. Dr. Jerome Davis will be neurosurgeon in Plattsburg, N.Y. after spending six months as a Cone Research Fellow studying the collateral blood flow in the brain. Dr. André Roberge completes his term next month as resident on the second surgical service with Dr. Garretson and myself. Dr. Gary Ashby continues his residency for another six months on the third service.

It has been a privilege to be able to work with these young men who have distinguished themselves by their organization of busy neurosurgical services, by their help in undergraduate and nursing teaching and by their contribution in so many ways to the life of this Institute. This student-teacher relationship is as unique in many ways as the patient-doctor relationship. It is equally difficult to define. To some extent there is a contract involved, in the one case to teach and in the other to treat the patient's illness. But the terms of reference and the values involved in these complex inter-personal relationships cannot be precisely defined and often go beyond the matter of contract. Some of these values were wisely described by the Cambridge author, E. M. Forster, perhaps best known for his novel "A Passage to India."

"One must be fond of people," Forster wrote, "and trust them if one is not to make a mess of life, and it is therefore essential that they should not let one down . . . But reliability is not a matter of contract — that is the main difference between the world of personal relationships and the world of business relationships. It is a matter for the heart, which signs no documents."

ADMINISTRATION

Mr. Charles S. Gurd

I have the honour to present this my first report on the administrative aspects of the Montreal Neurological Hospital and Institute.

The year 1967 was one of progress in many areas, marred only by the dispute between the Association of Radiologists and the Minister of Health of the Province of Quebec. The hospital provided 43,707 days of patient care, an increase of 2.7% over the previous year. Extensive alterations to the 6th Floor and basement were completed in October resulting in the addition of new space and the rehabilitation of areas which had become obsolete. A new Personnel Department was formed, Employees' Health Service opened and a centralized Stores Room inaugurated.

During the radiologists' dispute, which extended over a period of two months, admissions were restricted to those of an emergency nature. During this period the weekly occupancy rate fell to a low of 59%. This restrictive admitting policy affected adversely the number of patient days, the annual occupancy rate and the hospital gross revenues.

The average length of patient stay increased from 18.9 days in 1966 to 21.1 days in 1967. The increase resulted in part from a lack of suitable convalescent and chronic care facilities and from the effects of the radiologists' dispute.

Accreditation:

The Montreal Neurological Hospital was accredited on July 19, 1967 by the Canadian Council on Accreditation for a further three-year period.

Financial:

The principal financial problem was one of maintaining adequate hospital services, yet remaining within the approved Quebec Hospital Insurance Service budget. The gap is still significant and may only be closed by continuous efforts on the part of hospital management, coupled with a more realistic budget from the Hospital Insurance Service. Any expenditures over budget obviously increases the hospital deficit hence agggravating the overall financial situation. The hospital deficit for 1967 was $411,854. and the accumulated deficit at December 31, 1967 was $727,545. The deficit at December 31, 1960, at which time the Quebec Hospital Insurance Service was inaugurated, amounted to $454,578. No indication has been given by the Province that they will assist in the retirement of this deficit.

Following receipt, on April 25, 1968, of an interim payment of $290,000. for 1967 the accumulated deficit at May 1, 1968 was reduced to $437,545.

The operating expenditure of the hospital rose by 10.7% over the preceding year to $3,133,486. Capital expenditure for equipment amounted to $75,508. Net shareable cost per patient day was $66.27 on which we were reimbursed at the rate of $56.00 resulting in a difference of $10.27 per patient day pending year end adjustments.

Labour Relations:

A new Personnel Office was opened in May 1967 under the direction of Mr. H. Heavysege. Individual records for each employee of the hospital and institute were initiated. They now contain the information required to administer the various labour contracts.

Besides labour contracts with the Montreal Council of Hospital Syndicates and the Building Service Employees Union CLC which have been in force since 1966, the hospital signed labour agreements with the United Nurses of Montreal on February 26, 1968 and with the Association of Interns and Residents of Montreal on March 15, 1968. We look forward to satisfactory relationships with each of these groups.

Health Service:

Under the direction of the personnel officer, a Health Service for employees of the hospital and institute was opened in June of 1967. Dr. R. E. Dollfuss was appointed Medical Director of the Health Service and Mrs. J. Mallory, R. N. Health Service Nurse. The centre is conducting

pre-employment and annual medical examinations and is available for consultation on a daily basis. Visists to the centre are at the rate of 1500 per year.

Centralized Stores:

Following renovations to the basement area during the autumn of 1967, a central store for supplies was opened in December. Procedures for receiving, stock recording and the establishment of re-order points were established to maintain material stock at an economic level.

Building Alterations and Maintenance:

Major alterations and additions to the present building were completed during the year. An addition to the 6th Floor provided space for the new electron microscope plus additional space for the Neuropathology Department. Rehabilitation of the basement area provided improved facilities for the Departments of Electroencephalography and Electromyography, Neuropsychology, Electronics Laboratory and improved locker and rest room facilities.

In closing, I wish to thank the staff and employees for their wholehearted co-operation during the past year. It has been both challenging and rewarding to be associated with the remarkable activities taking place daily within the walls of this famous Institute and Hospital.

Statistics

	1967	1966
Admissions	2,056	2,229
Discharges	2,057	2,220
Patient Days	43,707	42,542
Occupancy Rate	88.7%	86.3%
Average Stay per patient	21.1 days	18.9 days
Operations	1,253	1,301
Deaths	93	101
Autopsy rate	75.3%	79.2%
Operating Expenditures	$3,133,486.	$2,908,075.
Equipment Expenditures	$75,508.	$40,749.
Net shareable cost per patient day	$66.27	$60.66
Reimbursement by Quebec Hospital Insurance per patient day	$56.00	$54.40
Difference between cost and income per patient day	$10.27	$6.26
Deficit on year's operation	$411,854.	$163,205.
Accumulated Deficit at Dec. 31 pending year end adjustments	$727,545.	$593,086.

NURSING DEPARTMENT

Miss Bertha I. Cameron

The year 1967 has been a memorable one for the entire nursing profession. The impact of the changing role of the nurse has been felt in all spheres of nursing-hospitals, schools of nursing, public health and community organizations. The effect of this changing role of the nurse in this period of transition makes an increasing demand on the Department of Nursing to integrate the services of professional and non-professional personnel so as to provide a high standard of nursing care for all patients in all areas of the hospital. It also entails implementation of uniform conditions of work for the staff involved in the nursing of the patient for the entire 24 hours of each 7 day week of the year.

Although the quota of staff nurses in 1967 remained at a fixed number (68), the turnover in this hospital continues to be high. Of the members of staff on January 1st, only 37 had remained on staff by December 31st. In addition, 73 new nurses were engaged for longer or shorter periods of time within the one year to maintain our quota. The consequent instability of staff membership presents both a problem and a challenge to the nursing department. There is an increased need for orientation programs for new members of staff as well as a continuous program of education for all members of the staff to keep pace with the changes in all departments of the health team.

A Health Center was opened in June 1967 with Mrs. Joan Mallory as nurse. Dr. R. E. Dollfuss was appointed Director of Health Services on October 1st 1967.

During the year, 32 post-graduate students received certificates. This now brings the total to 760 nurses representing 34 countries — Canada 68% (517), U.S.A. 10% (79) and other countries 22% (164).

The annual prize for proficiency in neurological-neurosurgical nursing for undergraduate students affiliating from the Royal Victoria Hospital was awarded to Miss Diane Norman.

We were honoured by the invitation from the Administration of St. Joseph's Hospital, Barrow Neurological Institute, Phoenix, Arizona to have a nursing consultant visit them to assist in the development of a teaching program. Our representative, Miss Helene Kryk, B.N., R.N., Assistant Director of Education ably fulfilled this commission.

Miss Jean MacMillan, B.N., R.N., was engaged from September 1st to December 31st in compiling information for a paper to be presented on nursing care of a patient with cervical injury. It is intended that the information will be used as the basis for an eventual publication by the Nursing Department of the Montreal Neurological Hospital.

We shall continue to cooperate to the best of our ability with all departments of the Hospital and Institute in providing the overall care of the patient. We wish to express our appreciation to all staff members for their cooperation and assistance to us.

SOCIAL SERVICE DEPARTMENT

Director ..... Miss Cynthia Griffin, B.A., M.S.W.

Social Workers:

Miss Ann Chant, B.A., M.S.W.
Mrs. Saroj Gupta, B.A., M.S.W.
Mrs. Irena Liebich, B.A., M.S.W.
Miss Kathleen MacDonald, B.A., M.S.W.
Miss Noella Vaillancourt, B.A., M.S.W.

Reflected in the activities, changes, and problems of our department are those of the community at large, with emphasis on economy and with the stark reality of rising costs, with still no legislation on proposed needed welfare changes, with still no solution to the lack of institutional and home-care resources for the chronically ill of all ages; on the other hand there have been encouraging ripples for the future in the inquiry by the Castonguay Commission on Health and Welfare, in the combining into one Federated Fund drive of seven former separate appeals for 122 agencies, and in the increasingly active, aggressive community committees.

Our department statistics again show that, of approximately 1000 patients referred during the year or carried over from the previous year, about two-thirds were out-patients. The division between Neurology and Neurosurgery was almost equal for in-patients, but for out-patients the majority came from the Neurology services which include large groups of seizure and multiple sclerosis patients, so many of whom for years require continuing or periodic help with related social problems.

We were pleased that a student from the McGill School of Social Work chose our centre for a survey on recreational facilities for multiple sclerosis patients in the Montreal area. Otherwise, this year marked an unfortunate break in our traditional and valuable association with schools of social work (McGill, l'Université de Montréal and Carleton University, Ottawa) due mainly to the common problem, lack of funds. We hope that a way may be found, for the future, to finance social work teaching in the field either through the schools or by a direct grant to our department for this purpose.

Brief case illustrations from the staff will show some of the needs encountered and some of the services rendered by our department:

Mrs. H., a 67-year old widow, after serving for years as housekeeper, cook and nurse for her three now totally dependent adult children with a progressive familial disease, this year reached the point of near collapse. A forceful letter from the social worker to the Ministry of Family and Social Welfare with an equally forceful accompanying report by the staff neurologist brought a supplement of $14. per day for a Home Aide, a decided saving to the government over the cost of placing three invalids; the humanitarian value to this closely knit family is incalculable.

Mr. O. and Miss P., aged 23, Mr. Y., and Mr. D., 45 have found jobs for varying lengths of time, but have lost them because of seizures. These are a few of the patients wanting to work but needing sheltered workshops, for some as a stepping-stone back into the community, for others as permanent job placements.

Unattached, 39-year old Mr. H., dependent upon physical strength to earn a living, was left with a moderate hemiparesis following surgery for a brain tumour. Due to pressure for beds here and inadequate resources in the community, he was discharged to a chronic care hospital which provided a lodging and elderly, bed-ridden fellow patients; it did not provide the stimulation and active rehabilitation programme needed to help him adapt to his handicap. His continued regular contact with our social worker helped him out of the resulting depression and pre-occupation with his condition.

20-year old post-seizure surgery patient, Mr. S., had additional severe family relationship problems. During a trying 2-week period while he was awaiting admission to A.M.I., the social worker was constantly available to him, his parents and neighbors, and to community agency representatives, to help with practical arrangements and with the intense feeling engendered by the situation.

Social workers are caught in the dilemma of wanting to help to release beds and at the same time to ensure that discharged patients will continue to receive adequate care, which is essential in order not to waste the benefits of the expensive and excellent care here. We have wondered about the possibility of a half-way house, a temporary placement or clearing centre for patients waiting appropriate placement or for those awaiting admission here. We do not know who would set up and run such a centre!

Mr. C., with a promising career cut short in his twenties by multiple sclerosis, has made a better than expected adjustment thanks to an RVH volunteer visitor, trained for such service. She has conferred repeatedly with the social worker, has been available in person and on the telephone to encourage Mr. C., but also, with firmness, to urge him out of black moods and into activities such as typing, going for walks and joining a class.

There are many Mr. C's who could benefit from such a service, which one day I hope may be expanded. The impressive total of 1223 hours of service by RVH volunteers to Neurology and Neurosurgery patients included, in addition to the above, the invaluable service in the clinics, in the Coffee Shop, and visiting on the wards.

Special dentures, wheelchairs and transportation to clinic are among the items made possible by generous donors, including the Royal Victoria Hospital Women's Auxiliary, the Montreal Volunteer Bureau, cancer and multiple sclerosis groups, In His Name Society, Rotary, Kiwanas and other service clubs. Our thanks to all of them and to the medical, nursing, and other staff members with whom we have worked.

We look forward to continued collaboration for patients and in community efforts to obtain higher standards, smoother procedures and more adequate resources.

ANAESTHESIA

Consultant ..... H. R. Griffith, M.D., C.M., F.R.C.P. (C), F.F.A.R.C.S., F.A.C.A.

Anaesthetist ..... R. G. B. Gilbert, M.B., B.S. (Lond.) F.R.C.P. (C), D.A., R.C.S. & R.C.P., F.F.A.R.C.S., F.A.C.A.

Associate Anaesthetists ..... G. F. Brindle, B.A., M.D., C.M., F.R.C.P. (C).
Anibal Galindo, M.D.

Assistant Anaesthetists ..... A. Pace-Floridia, M.D. (Malta), F.R.C.P. (C).
Andrée Pinault, M.D.

Residents:

A. Barber, M.D. (Univ. of Western Ont.)*
I. Binns, M.D. (U. of Liverpool)*
J. Couture, M.D. (Univ. of Montreal)*
E. Fok, M.D. (McGill)*
A. Gagnon, M.D. (Univ. of Ottawa)*
K. Goodwin, M.D. (McGill)*
A. Katz, M.D. (McGill)*
R. Lapierre, M.D. (Univ. of Montreal)*
D. Morison, M.D. (U. of Edinburgh)*
P. Rothbart, M.D. (U. of Edinburgh)*
B. Taylor-Lewis, M.D. (Birmingham)*
J. Tourangeau, M.D. (U. of Ottawa)*

*Six months on this service.

This year a total of 1,105 anaesthetics were given, the most common procedures being cranial operations, protruded intervertebral discs and angiograms. Twenty-six cases were operated on in the sitting position. Studies have been made of the central venous pressure in the prone, supine and sitting positions under controlled respiration, and following the application of the G-Suit. Studies in these positions have also been made concerning respiratory mechanics, oxygen consumption and alveolar-arterial oxygen differences.

There were no anaesthetic deaths. There were four instances of cardiac arrest, an incidence of 0.18%. Two of the patients resuscitated had no sequelae.

Clinical procedures and research procedures comprised 85% and 15% respectively of the year's work.

The equipment has been cared for by Miss H. Tracz, Mr. Campbell and Mr. Henry. We received additional research equipment for which we are grateful, as this will enable us to perform better clinical studies. The laboratory is now able to produce sodium/potassium levels in all emergency cases. 1,793 examinations, or 15% more than in 1966, have been carried out, the most common being blood gas analyses and osmolarities.

Dr. Sever Kovachev's place on the staff was taken by Dr. Andrée Pinault. Dr. Pinault took the Diploma Course at McGill and spent one year at Seattle studying regional anaesthesia with Dr. Daniel Moore.

Dr. G. Brindle remains Secretary of the Quebec Division of the Canadian Anaesthetists' Society and the Association of Anaesthetists of the

Province of Quebec. He also continues as consultant physician of the Montreal Motor Racing Club. In appreciation for his services as Secretary of the Montreal Motor Racing Club he was awarded the annual prize of honour.

Dr. R.G.B. Gilbert continues as a member of the Executive of the Academy of Anesthesiology and of the World Federation of Neurology, the Neuroanaesthesia Commission.

Undergraduate students, postgraduate students, and nurses have been given lectures and clinical demonstrations by Doctors Gilbert, Brindle, Galindo, Floridia and Pinault.

Dr. Brindle, together with Dr. Garretson completed a study of aspects of C.S.F. circulation and respiration in patients with occult hydrocephalus, who were examined for selection for surgery.

Dr. Galindo has continued in the Department of Anaesthesia Research with Professor K. Krynjevic.

Clinical studies this year have been made in cooperation with Professor Becklake of the Cardio-Respirtor Department concerning respiratory mechanics and oxygen consumption during prolonged anaesthesia in the curarized subject. We thank Dr. Becklake for equipping two of her doctoral fellows to undertake these studies with us. Our work suggests that we are in agreement with the results of Professor Nunn of Leeds, England and different from those of Dr. Beecher at the Massachusetts General Hospital. It would appear that lowered oxygen tension following a prolonged operation under these circumstances is a result of a reduction of the cardiac output. The intermittent sigh procedure advocated by many and followed by us for considerable periods of time, does not seem to effect the overall oxygen tension. Indeed our studies appeared to show over-ventilation of already well-ventilated, but possibly poorly perfused alveoli, as the main condition.

At the request of the neurosurgeons and some neurologists, members of the department participated in the care of respiratory, electrolyte and circulatory problems, and patients suffering from prolonged unconsciousness. At the end of the year, plans were being made to commence a pilot project which will become permanent when a new wing of the building has been built. All members of our department are very thankful that this move has been made.

NEURORADIOLOGY

Radiologist ..... Roméo Ethier, B.A., M.D.
Associate Radiologist ..... Jean Vézina, B.A., B.M., M.D.
Assistant Radiologist ..... Denis Mélançon, B.A., M.D.

Residents:

R. Carrier, M.D. (Laval)*
J. Chan, M.D. (Manila)
J. Dumas, M.D. (Laval)*
M. Molot, M.D. (Univ. of Ottawa)*
H. Patriquin, M.D. (McGill)*

*Six months on this service.

The Centennial Year has been our shortest, but relatively speaking, our busiest year. A total of 10217 examinations have been carried out in ten months, that is an average of just over 1000 examinations a month, the highest average so far.

Scanning through the annual statistics, we observe that the special procedures, including catheterization studies, still dominate the picture. We are now doing twice as many arteriograms as pneumograms. This is a complete change in the pattern of investigation of neurological diseases. It is our duty and responsibility to see that those procedures should be carried out efficiently and safely. I take this opportunity to thank the neurosurgeons, the neurologists and the anesthetists for their very keen cooperation by which we can achieve so much, and on which we will be counting more heavily in the future.

Taking over as Dr. McRae's successor was not an easy task — the least I can say is that it was a challenging one. Being one of his disciples made things easier, but also, at the same time more difficult. I do not have to stress that Dr. McRae's outstanding personality, capabilities and experience have been missed by all of us. His love and devotion for this Institute will remain in my mind as a guide line to follow.

Working with Drs. D. Mélançon and J. Vézina has indeed been a pleasant experience. They have coped with the many responsibilities that have faced them during the year. I take this opportunity to thank them for their spirited support.

I would also like to express my gratitude to radiographers, nurses, nursing aides, orderlies and secretaries for their constant help and cooperation.

The Monday morning neuroradiological sessions have been given on a regular basis between January and May, but after September, only at appropriate times.

Because of the crisis between the Government and the radiologists which led to our resignation, the course in neuroradiology had to be abolished. Plans are being made to renew this activity in a modified way next year.

NEUROCHEMISTRY

Consultant ..... K. A. C. Elliott, M.Sc. (S. Africa), Ph.D., Sc.D. (Cantab.), F.R.S.C.

Neurochemist and Medical Research Council Associate ..... Leonhard S. Wolfe, M.Sc. (N.Z.), Ph.D. (Cantab.), M.D.

Associate Neurochemist ..... Hanna M. Pappius, M.Sc., Ph.D.

Assistant Neurochemist, Clinical ..... Irving Heller, B.Sc., M.Sc., Ph.D., M.D., C.M.

Visiting Scientists ..... Flavio Coceani, M.D., (Bologna), Docent in Human Physiology

Lina Puglisi, Dr. Biol. Sci., Institute of Pharmacology, University of Milan

Post-doctoral Fellow ..... Cecil Pace-Asciak, B.Sc., Ph.D.

Fellows:

John Callahan, M.Sc. (Windsor Univ.)

Francis LeBlanc, M.D. (Univ. of Ottawa) Medical Research Council Scholar

CLINICAL LABORATORIES

The total number of procedures performed in the 7th floor Neurochemistry Laboratory on spinal fluid, blood and urine during 1967 was 19,319 (16,869). Figures for 1966 are given in parenthesis. In addition, 5,958 (5,907) litres of irrigation solution were prepared for the operating rooms. The clinical services were provided with 186 (217) litres of Nupercaine solution.

The 7th floor Laboratory is now carrying out the routine determination of creatine phosphokinase in serum and sulfatase in urine. In addition, we are doing routine urinary amino acid screening tests. We are prepared to enlarge the scope or special procedures as the demand requires.

The 3rd floor Ward Laboratory performed 15,036 (16,040) separate blood determinations and 5,147 (5,367) urinalysis were done. In addition, 6,434 (4,309) samples of blood were drawn for biochemical analysis at the R.V.H. and 15,303 (10,623) specimens for our 7th floor Laboratory and the Provincial Laboratories. About 405 stool examinations for occult blood were also made.

The results indicate further increases in the demand for biochemical analysis of blood and points to the necessity of planning an expansion of our facilities on the 7th floor. It is to be hoped that provision for this steadily increasing demand will be made in the new plans for hospital expansion.

We would like to acknowledge the continued advice and assistance given by Dr. L. Wolfe. The Neurochemistry and Ward Laboratories are administered by Dr. I. H. Heller and Dr. Hanna M. Pappius.

DONNER LABORATORY OF EXPERIMENTAL NEUROCHEMISTRY

(a) *Studies on brain gangliosides*

Research on this complex group of membrane glycosphingolipids which contain N-acetylneuraminic acid continues. An improved chromatographic method utilizing long silica gel columns has been developed by Mr. John Callahan for the preparative separations of the individual ganglioside types in brain. Each of these ganglioside types has been chemically degraded by reaction with ozone followed by alkaline hydrolysis to liberate the sialic acid containing oligosaccharides in good yields. The mechanism of this reaction has been studied. The individual oligosaccharides have been purified and crystallized. They can be further degraded into the individual sugars by enzymic and acid hydrolyses. These methods are being used to investigate the biosynthetic pathways for these lipids from radioactive labelled precursor molecules in the developing central nervous system.

(b) *Studies on cerebral lipidoses*

The cooperation of Dr. F. Andermann, Dr. J. S. Fawcett and Dr. S. Carpenter has enabled us to start a careful clinical pathological and chemical re-examination of the sub-groups of amaurotic family idiocy and childhood

cerebromacular degenerations in general. These entities at the present time are undergoing considerable modification as new information on the lipid chemistry and specific enzyme deficiencies are obtained. Already two families with late infantile systemic lipidosis (so-called generalized gangliosidosis or pseudo-Hurler's disease) have been identified. The ganglioside which accumulated in the central nervous system is the normal major monosialoganglioside (GGNTI). However, storage of this ganglioside in other organs was not found. The chemical nature of the material accumulating in the kidney, spleen and other organs in this disease is being studied and also the material which gives a positive metachromatic reaction with toluidine blue in the urine.

With Mr. John Callahan glycolipid analyses have been carried out on normal appendixes and those from children with Tay-Sach's disease. These studies have shown that Tay-Sach's disease can be specifically identified from lipid analyses of the appendix. The Tay-Sach's ganglioside accumulates in the neurones of the myenteric plexus. The appendix appears to offer good prospects for chemical diagnoses in this group of diseases without the need for cerebral biopsy. Research is also progressing on the measurement of ganglioside neuraminidase activities in normal and abnormal human cerebral cortex. In Tay-Sach's diseases fresh biopsy pieces show a very much lower specific activity of a neuraminidase with disialoganglioside as substrate than normal brain obtained at craniotomy. This type of neurochemical work would not be possible without the excellent cooperation of neurologists, neurosurgeons and pathologists.

In all these investigations Mrs. A. Kurnicki has given excellent technical assistance.

(c) *Studies on prostaglandins*

A great deal of productive but difficult research has been done in the Laboratory this past year by Dr. C. Pace-Asciak, Dr. Flavio Coceani and Dr. L. Wolfe with the excellent technical assistance of Miss Klara Morawska. They have investigated the physiological action and biosynthesis of the prostaglandins, a new group of biologically active fatty acids that appear to function as local regulatory hormones in many tissues including brain. This is a rapidly expanding field at the present time. Experiments with innervated isolated intact stomach preparations have shown a relationship between vagal nerve stimulation and prostaglandin E_2 and $F_{2\alpha}$ formation and release from the serosal surface. Hyoscine as well as simultaneous sympathetic nerve stimulation blocked the response to vagal stimulation. Accelerated prostaglandin formation could also be elicited by the addition of low concentrations of carbamyl choline and 5-hydroxytryptamine. The prostaglandins originate from the conversion of an arachidonic acid fraction which is present esterified in membrane phospholipids. A relationship appears to exist between the acceleration of a postsynaptic membrane phospholipase A type enzymatic activity by nerve stimulation and the formation and release of prostaglandins. A similar mechanism could account for the release of prostaglandin from the surface of the brain and studies on this are now in progress. A difficulty was encountered in studying the

biosynthesis of prostaglandins in stomach and brain tissue *in vitro*. Tritiated arachidonic acid was only converted in small amounts to PGE_2 and $PGF_{2\alpha}$. However the tissues showed considerable capacity to synthesize the prostaglandins from endogenous precursors. The reason for this has been shown to be due to the simultaneous activity of phospholipase A which releases polyunsaturated fatty acids particularly arachidonic acid during homogenization and incubation. This rapidly diluted the added label and thus resulted in low conversion. Further, and also likely of considerable significance, the so-called essential fatty acids, linoleic and linolenic acids were found to be strong inhibitors of prostaglandin synthesis. By modification of methods of tissue preparation it has been possible to demonstrate considerable prostaglandin synthetase activity in tissues which previously had been thought to contain very little of the synthetic enzyme.

Dr. Lina Puglisi, a visiting scientist for six months from the Institute of Pharmacology, University of Milan, Italy, with Dr. Flavio Coceani have been investigating the effects of prostaglandins on the influx and efflux of calcium in smooth muscle. They have found that prostaglandin E_1, in minute amounts (1×10^{-10} g./ml) increases significantly the uptake and exchange of ionized calcium.

(d) *Studies of edema and related problems*

Considerable progress has been made in Dr. Pappius' studies of cerebral edema since the last annual report. Uptake of RISA present in the circulation at the time a freezing lesion is made to induce edema proved to be a sensitive method for measurement of total edema fluid only during the first few hours following the lesion. RISA content of the traumatized hemisphere 24 hours after the lesion was less than would be expected from the increase in the total weight of the hemisphere. No further increase was found in RISA content of brain 48 hours after the lesion. This was not due to repair of the blood-brain barrier and indicates removal of labelled protein (or label) from the brain. Weight increase of the traumatized hemisphere continued up to 48 hours. At 72 hours a significant diminution of edema was demonstrated.

With Dr. Beverly Murphy of Queen Mary Veterans' Hospital, it was shown that in cats cortisone injected intraperitoneally was only poorly absorbed, which probably explains its failure to alter edema in this species. Dexamethasone significantly diminished blood levels of corticosteroids in cats hence it is biologically active under these conditions. In a series of cats pre-treated with dexamethasone it was demonstrated that both the increase in weight and the RISA uptake in the traumatized hemisphere was decreased 48 hours after the lesion. The resolution of edema after 48 hours did not appear to be affected by dexamethasone therapy.

Dr. McCann's studies showed a striking improvement of the EEG patterns 48 hours after the lesion in dexamethasone-treated animals as compared with untreated animals. The E.E.G. records were graded blindly by Dr. Christian Vera.

Continuing the investigation of the distribution of so-called extracellular markers in brain tissues *in vivo*, and using the ventriculocisternal perfusion

technique Dr. Pappius showed that thiocyanate at relatively high blood and CSF concentrations equilibrates with 25-30% of brain tissue volume but that its penetration from CSF to brain seems to be slower than in the reverse direction. At lower thiocyanate concentrations a barrier to thiocyanate at the blood-brain interface appears to operate and delay the equilibration time.

Mrs. H. Szylinger continues to provide excellent technical help in these studies as well as doing special techniques for the Clinical Laboratory.

Dr. K. A. C. Elliott, particularly during his weekly Neurocheminars, continues to stimulate us.

Dr. Wolfe and Dr. Coceani were invited to participate in a Symposium on Prostaglandins in Washington at the American Pharmacology Society Annual Meeting in August 1967 and, with Dr. Pace-Asciak, at a Conference on Prostaglandins at the Worcester Foundation of Experimental Biology, Shrewsbury, Mass. in October 1967, dedicated to the late Dr. Gregory Pincus. Dr. Wolfe was invited to participate in two sessions of the Neurosciences Research Programme, Massachusetts Institute of Technology. Dr. Pappius and Dr. Wolfe attended the First International Neurochemistry Meeting in Strasbourg, France in July 1967. Dr. Pappius has contributed a chapter titled "Water Spaces" and Dr. Wolfe a chapter titled "Biologically Active Lipids" to the new Handbook of Neurochemistry being prepared by Dr. A. Lajtha, New York State Research Institute for Neurochemistry and Drug Addiction. Dr. Pappius has been elected a Member of the New York Academy of Sciences.

ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

Consultant ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M., F.R.S.C.

Electroencephalographer ..... PIERRE GLOOR, M.D., Ph.D.

Associate Electroencephalographer ..... ROGER BROUGHTON, M.D., C.M., Ph.D.

Assistant Electroencephalographers ..... FREDERICK ANDERMANN, B.Sc., M.D.
DONALD LLOYD-SMITH, B.Sc., M.D., C.M., F.R.C.P. (C).

Electromyographer and Assistant Electroencephalographer ..... AGAPITO LORENZO, M.D.

Clinical Fellows:

MICHEL COPTI, M.D. (Lebanon)*
EMILIEN DAIGLE, M.D. (Laval)*
MICHEL DROLET, M.D. (Laval)*
ANDREW EISEN, M.D. (Leeds Univ.)*
EMILIEN GABA, M.D. (Roumania)
EDUARDO GARCIA-FLORES, M.D. (Mexico)*
YVON-CLAUDE MICHAUD, M.D. (Laval)
GEORGES PATRY, M.D. (Laval)

Fellow in Electromyography: ANDREW EISEN, M.D. (Leeds)*, Killam Scholar

Research Fellow: JOHN WOODS, M.D. (Dublin, Ireland), M.R.C. Fellow

Chief Technician ..... LEWIS HENDERSON

*Six months on this service.

1967 has again been a busy year for the laboratories of electroencephalography and clinical neurophysiology. 3,506 examinations were carried out in the EEG laboratory, an increase of 71 over the total of 1966. Undoubtedly this increase would have been greater had the demands on services not been partially reduced during last summer's dispute between the radiologists and the Provincial Government. 49 recordings were carried out in the operating room in the course of surgical interventions for the cure of focal epilepsies. This number is lower than that in 1966, but this decrease is entirely to be attributed to the necessity of curtailing these elective procedures during the duration of the unavailability of radiology services mentioned above.

In October, our electromyographic laboratory was reactivated under the able direction of Dr. Agapito Lorenzo. At last this very important diagnostic service has again become available within the Montreal Neurological Hospital of which undoubtedly it forms a most essential part. From the moment of its inauguration in October to the end of the year, a total of 92 patients were examined in the EMG laboratory.

An important and most welcome development in the course of the past year has been the opening of our new EEG and Clinical Neurophysiology Laboratories in the reorganized basement of our Hospital. Our new quarters are now specifically designed to serve our particular needs. They are well designed laboratories for clinical electroencephalography, electromyography and the recording of evoked potentials by averaging techniques. This has provided a much more congenial working atmosphere and has thereby increased the efficiency and quality of our work.

Research has continued especially in the Clinical Neurophysiology section under Dr. Roger Broughton's direction. With Dr. John Woods he has continued his studies on sensory evoked potentials, with special attention to the problems created by the ongoing EEG background activity acting as "physiological noise" which can be extremely disturbing especially in evoked potential interaction studies. In conjunction with Dr. Gilles Bertrand and Dr. George Mathews, Dr. Broughton has studied some of the thalamocortical relationships in human patients undergoing stereotactic surgery for Parkinsonism.

Research in the electromyographic section of the laboratory has been pursued by Dr. Lorenzo and Dr. Eisen with the aim of clarifying the mechanism of the blink reflex.

The analysis of complex seizure problems with intracarotid injections of Sodium Amytal and Metrazol in patients with generalized epileptiform EEG abnormalities has been continued in collaboration with Dr. Rasmussen and Dr. Garretson.

We regret that at the time this report will appear in print, both Dr. Roger Broughton and Dr. Agapito Lorenzo will have left us, Dr. Broughton to take up the direction of a clinical neurophysiology research laboratory at the University of Ottawa and Dr. Agapito Lorenzo to return to the United States to carry on with his career in neurology and electromyography. Both will be missed and we thank them for the outstanding contributions they have made to our laboratory.

It is fitting to conclude this report by expressing our thanks to our technicians for their loyal and dedicated work. We also wish to thank Mr. R. Jell, Mr. E. Puodziunas and Mr. R. Archambault for their expert technical assistance.

EXPERIMENTAL NEUROPHYSIOLOGY

Consultant ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M., F.R.S.C.

Neurophysiologist ..... PIERRE GLOOR, M.D., Ph.D.

Biomedical Engineer ..... RALPH JELL, B.Sc.

Fellows:

CARL DILA, M.D. (Wayne State Univ.)* NIH Fellow

JEAN-JACQUES DREIFUSS, M.D. (Geneva, Switzerland)*

JOHN MURPHY, M.D., (New York), Ph.D., NIH Fellow

CHARLES NEEDHAM, M.D. (Albany Med. Coll.) NIH Fellow

STEPHEN NUTIK, M.D. (McGill)*, M.R.C. Fellow

LEO RENAUD, M.D. (Univ. of Ottawa), M.R.C. Fellow

DOUGLAS SKUCE, B.Sc. (Ottawa), Killam Scholar

Nurse in Charge of Neurophysiology Laboratories and Animal Quarters ..... MARY ROACH, A.R.R.C., R.N.

Chief Electronic Technician ..... EDDIE PUODZIUNAS

*Six months on this service.

During the past year, research on several aspects of hypothalamic electrophysiology, using extracellular microelectrode techniques, has been continued. Dr. Jean-Jacques Dreifuss and Dr. Thomas Murphy have completed a searching analysis of the influence of the amygdala and other limbic structures upon hypothalamic neurons, especially those of the ventromedial nucleus. The body of this research has been incorporated in a series of four papers with have since been published or are in press. After Dr. Dreifuss' departure last summer, work along similar lines has continued with Dr. Leo Renaud taking Dr. Dreifuss' place. The investigations then zeroed in on the identification of inhibitory neurons in the ventromedial nucleus of the hypothalamus. These cells have been found, their firing characteristics have been defined and it has been established that they receive inputs from both major amygdaloid projection pathways, namely the stria terminalis and the ventral amygdalo-fugal system.

With Mr. Ralph Jell and Dr. Stephen Nutik another aspect of hypothalamic physiology has been studied. It is concerned with the responses of thermosensitive units in the preoptic area to local heating and cooling of the brain and to the influence of anesthetic agents upon them. In addition Dr. Nutik has approached the problem of the interrelationship between these anterior hypothalamic and preoptic thermosensitive neurons and posterior hypothalamic nerve cells involved in thermoregulation.

Drs. Charles Needham and Carl Dila under Dr. Perot's guidance have taken up the study of experimental epilepsy using topically applied cobalt as an epileptogenic agent. The epileptogenic action of this substance applied to cortical and subcortical grey matter has been studied as well as the influence of stimulation of the reticular activating system upon cobalt induced cortical epilepsy.

Mr. Douglas Skuce has started a project of applying highly sophisticated computer methods to the study of some EEG phenomena. This work has been carried out in collaboration with Dr. Levine of the department of Mathematics at McGill University. Mr. Skuce in addition has conducted an extremely valuable, almost continuous tutorial on instrumentation, computer techniques and basic physics for the Fellows in training in Neurophysiology.

Mr. Jell and Mr. Skuce, ably assisted by Mr. Puodziunas and Mr. Archambault, were in charge of our equipment and have revamped most of it, replacing older pieces of apparatus with newer and more versatile recording instrumentation.

We gratefully acknowledge receipt of a major equipment grant from the Medical Research Council of Canada which has allowed us to update our equipment, especially by purchasing tape recorder and special purpose computer facilities which have greatly enhanced the scope of our data analyses.

A RAX terminal has been installed in our laboratories which gives us direct access to the general purpose computer IBM 360 Model 50 in the McGill computing center. This terminal, although located within our laboratory space, is being used actively by other departments of the Institute and Hospital.

In closing I wish to thank Miss Mary Roach and her assistants for taking care of the numerous administrative and housekeeping chores involved in the running of a laboratory.

NEUROPATHOLOGY

Neuropathologist ..... GORDON MATHIESON, M.B., Ch.B., M.Sc.

Associate Neuropathologist ..... STIRLING CARPENTER, A.B., M.D.

Fellows:

VITAL MONTPETIT, M.D. (Univ. of Ottawa)* Killam Scholar

MICHEL DROLET, M.D. (Laval)*

ROEL ROMERO, M.D. (Philippines)

GIUSEPPE ERBA, M.D. (Univ. of Pavia, Italy)*

DEAN UPHOFF, M.D. (McGill)

JOHN GRIMES, M.D. (Univ. of Ottawa)*

NAI-SAN WANG, M.D. (Univ. of Taiwan)*

Chief Technicians:

BARBARA NUTTALL, B.A. ART

JOHN GILBERT, RT

Six months on this service.

Pride of place in this years' Annual Report must go to the completion of our new electron microscopy laboratory suite. The Hitachi HU-11 C electron microscope, which we were able to purchase by a major equipment grant from the Medical Research Council of Canada, has been installed, gone through its running-in period, been checked out for satisfactory resolution, and is now in regular use. The furnishing and equipping of the preparation rooms has gone on apace and we are settling down nicely. With this development, we have filled a long felt want in the Institute.

There are many specific projects which merit the rather laborious type of study involved in electron microscopy. The subjects under investigation so far in our laboratory include a peculiar type of polysaccharide accumulation in skeletal muscle in a case of cardiomyopathy, nerves and nerve roots in an acute fatal case of Guillain-Barré syndrome, and membranous cytoplasmic bodies in an appendix of Tay-Sachs' disease. Further work planned in the immediate future includes examination of human nerve biopsies, of which several have been embedded in the past few months, and examination of intramuscular nerve twigs in motor neurone disease. From this list, it is apparent that our emphasis so far has been in seeing what the magnification of the electron microscope and the meticulous tissue preparation inseparable from its productive use can show us in human disease states which have already been described by conventional light microscopy. During the coming year, we hope to move into the more basic investigation of pathological mechanisms which is only possible from animal experimentation.

Miss Barbara Nuttall, Chief Technician, spent three months in the fall working in the Laboratory of Electron Microscopy at the Armed Forces Institute of Pathology in Washington, becoming familiar with all aspects of electron microscopic techniques, concentrating especially on specimen preparation.

Dr. Vital Montpetit has been working on a unique group of cases of subacute necrotizing encephalomyelopathy, the results of which he will present at the Canadian Congress of Neurological Sciences in Vancouver.

The task of preparing histological sections for anatomical controls on neurophysiological animal experiments, which has been carried out for so many years in this department, has now been transferred to Dr. Courville's Neuroanatomical Laboratory, where it properly belongs.

During 1967 a total of 485 surgical specimens were examined. Of these 95 required an immediate operating room report. There were 93 deaths in the Institute during the calendar year 1967 and 70 of these were the subject of autopsy examination, an autopsy rate of 75%. This represents another small drop in the autopsy rate from last year, which itself fell below our long term 80% or more rate.

NEURO-ISOTOPE LABORATORY

Director ..... WILLIAM H. FEINDEL, B.A., M.Sc., D.Phil. (Oxon.), M.D., C.M., D.Sc. (Acadia), F.R.C.S.(C), F.A.C.S.

Research Associate ..... LUCAS YAMAMOTO, M.D., Ph.D. (Hokkaido).

Assistant Professor of Neurosurgery ..... HENRY GARRETSON, B.S., M.D. (Harvard), Ph.D.

Fellows ..... JEROME DAVIS, B.S., M.D. (Switzerland).
MARIUS HEUFF, M.D. (Ultrecht, Holland).

Research Assistant ..... KATHRYNE PHILLIPS, B.Sc. (Acadia).

Chief Technician, Brain Scan ..... NOBUO TAKASHITA, B.Sc.

Electronic Technician ..... GEORGE LOOTUS.

1. *Brain Scanning and Cerebral Circulation Laboratory.*

This Laboratory again increased its activities: in 1967, there were 1,812 brain scans on 963 patients as compared to 1,578 scans on 810 patients in 1966, an increase of over 15%. It is important to emphasize that in considering the budgetary support for this Laboratory, the steady expansion of the demand for its services has increased each year since 1960 when it was first opened. Restriction of the budget to a fixed level, however attractive it may appear to be fiscally, is unrealistic when viewed in terms of the increasing patient load and the valuable new techniques which continue to become available for improvement of diagnostic methods by use of radio-isotopes.

It is again noted that 30% of the patients examined were referred from the Royal Victoria and outside hospitals. This indicates clearly the recognition of brain scanning as an essential diagnostic test for patients with suspected intracranial disorders.

Over 100 radio-isotopic intravenous circulation studies were completed during the year. This is one of the more recent methods offering in some patients a differential diagnosis between cerebral ischemia, angioma or brain tumor. This technique was developed by the research team and is now being applied at the clinical level.

Two special methods of diagnostic studies were also expanded during the year. The first of these involve the use of a Picker rectilinear photoscanner using radio-active iodinated serum albumin. This was set up in a former storage room on 3-North. Using this apparatus radio-isotopic ventriculography has been carried out in a group of patients undergoing investigation for suspected hydrocephalus associated with the syndrome of impaired memory, ataxia and confusional states. Where failure of subarachnoid distribution of the RISA is obtained, further examination with X-ray contrast studies and careful measurement of cerebral spinal fluid, arterial and venous pressures have been performed to elucidate this important clinical condition. Certain of these patients benefit remarkably in their mental state following ventricular shunting of the cerebral spinal fluid. Measurement of cerebral

blood flow with radio-active Xenon before and after the surgical shunting is being used to analyse the rôle of cerebral circulation in these patients. One of the first patients in this series showed pathological evidence on brain biopsy of Alzheimer's disease and in the protocol for this study all patients undergoing surgery have a cortical biopsy.

The rectilinear scanning has been of value also in the examination of patients with suspected cerebral spinal fluid leak. Dr. Yamamoto has outlined a protocol for investigation of such patients.

Increasing use has been made during the past year of the radioactive intracarotid Xenon technique for measurement of cerebral circulation. This can be combined with X-ray angiography so that selective arterial injections provide for an index of regional cerebral blood flow. The shortage of space and equipment at present is a serious handicap in applying this valuable method to patients who might otherwise benefit from this quantitative diagnostic information. The combination of the intravenous isotopic circulation technique, the brain scan, and the Xenon clearance procedure offer new methods by which changes in cerebral circulation can be objectively measured so that medical and surgical therapy can be assessed. Thus, any serious expansion of the methods of treatment which are now becoming available for this very large group of patients is dependent upon proper budgetary support from the Department of Health so that patients can receive the maximum benefits and help which they seek.

The needs of the Radio-isotopic Laboratory are as follow:

(1) Realistic budget support to provide new equipment including Xenon clearance apparatus for proper study of patients with stroke syndromes. The purchase of a gamma-camera is now becoming an urgent item and its justification is based on the fact that brain scanning was first developed in this Province at the Montreal Neurological Institute and we have, so far, the most active programme in combined brain scanning and radio-isotopic circulation studies in Canada. Special consideration must, therefore, be directed to the support and expansion of this Laboratory if patients are not to be deprived of new methods of treatment now available.

(2) Additional staff is required for the expanding activities of the Laboratory. Inadequate hospital budgets in past years have made it necessary to pay staff salaries from Research Funds. But this approach can no longer be maintained.

(3) Space for additional equipment and more adequate administrative space for the Radio-isotopic Laboratory have not yet been properly met. The booking of patients for clinical examinations, review and preparation of brain scan and circulation records and storage of these records, as well as staff and equipment to ensure servicing of the radio-isotopic apparatus, have all been made available through the Research Laboratory. This area is now required to expand the Research activities and additional space within the hospital must be found for the clinical services to be continued.

I am again grateful to the Technical staff for their loyal support and hard work during the year. We are all indebted to Miss Pamela Bottomley for her efficient supervision on the clerical side both of the Brain Scanning Laboratory and the Research Laboratory.

2. *The William Cone Laboratory for Neurosurgical Research.*

This Laboratory continues to be supported by the William Cone Research Fund and additional contributions by others who are listed separately in the Annual Report's statistics. We are, once again, grateful to Mrs. Howard Pillow and to Mr. and Mrs. Murray Vaughan for continuing generous donations and to many other individuals who have made contributions. 1967 was the last year in which the Laboratory came under the block term grant provided to the Institute as a whole by the Medical Research Council. Our research funds for 1968 have increased because of favourable support for our expanding experimental programme when it was submitted to the Medical Research Council as a separate application.

The research activities were, in general, an expansion of those outlined in considerable detail in last year's report. The results of our M.N.I. fluorescein angiographic technique combined with radio-isotopic blood flow studies as applied to patients in the operating room have continued to be fruitful. A number of progress reports of this work were made during the year. Dr. Feindel was invited to attend the Symposium on Cerebrovascular Diseases held at Princeton, and the Workshop on Cerebrovascular Disease research programmes under the auspices of the National Institutes of Health, held at San Diego. Some aspects of research were also presented at the Colloquium on Cerebral Vascular Physiology and Pathology included in the programme of the American Association for Neurological Surgeons in March. Dr. Feindel and Mr. Hodge attended the Third International Symposium on Regional Cerebral Blood Flow held at Lund and Copenhagen, in May. Thus, the members of the Cone Laboratory have been actively involved in the research on cerebral circulation at an internation level and we in turn have benefited much from exchange of views with neuro-scientists in many other countries who are engaged in basic research in this field.

We have continued our collaboration with Dr. Richard Saunders and Miss Mary Bell at Dalhousie University, Halifax. Dr. Feindel visited the new research quarters in the Sir Charles Tupper Building into which Dr. Saunders and his team have now moved and will be able to expand their activities. Miss Jane Harris was replaced by Miss Kathryne Phillips as Research Assistant during the past year.

Dr. Marius Heuff completed his term at the mid-year to take up a neurosurgical position at St. John's, Newfoundland, where we wish him well. His survey of the value of brain scanning for brain tumor follow-up is being continued.

Dr. Jerome Davis will be completing six months in the Laboratory in mid-summer. He has given invaluable help with the experimental studies on the cerebral circulation and the animal projects have gone ahead more rapidly

because of his expert neurosurgical talents. One of his main interests was the programme for study of the distribution of blood flow after temporary occlusion of epicerebral arteries of various sizes in the dog. This has given interesting results in relation to the extent of collateral blood flow on the surface of the brain.

Mr. Louis Bouchard, a Medical Student at the University of Ottawa, put in an enthusiastic summer's work in the Laboratory, defining the diffusion coefficient in various types of brain tissue for radio-active Xenon.

The overall supervision of both the Brain Scanning and the Cone Laboratory would have been impossible without the experienced help of Dr. Lucas Yamamoto. He continues as a Visiting Scientist at Brookhaven National Laboratory and will be visiting there again this summer to carry on with the development of the multidetector scanning system and its potential as a new method for cerebral blood flow study. Dr. Yamamoto prepared a review of extensive material assessing the value of intravenous circulation and brain scanning in patients with various types of intracranial lesions. This was presented at a Symposium on 'Brain Scanning' at the University of Buffalo by Dr. Davis.

Dr. Garretson completed his Doctorate thesis on the analysis of glioma transplants in the guinea pig eye. This work was supported by Grants from the National Cancer Foundation, as well as the Cone Research Fund. He was able to establish stable tumour growth to four transplant stages and defined the generation time in glioblastoma multiforme as being of the order of seven days. He also made the observation that there were changes in the host reaction to the tumour involving disappearance of the eosinophile cells at the later transplant stages. Dr. Garretson attended the Meeting of the New York Academy of Sciences which was devoted to the topic of brain tumours and their experimental analysis.

Preliminary plans for the expansion of the Laboratory in the new wing have been drawn up with the representatives of the other Institute laboratories. Additional space and facilities will be most welcome.

The work in the experimental Laboratory as well as in the Operating Room procedures has involved again the expertise of Mr. Charles Hodge and his staff who have taken on this additional load with enthusiasm. The colour photographs of fluorescein angiograms have particularly attracted much attention at the scientific meetings where they have been demonstrated. Their scientific value has contributed much to our understanding of the cerebral microcirculation.

LABORATORY FOR RESEARCH IN CHRONIC NEUROLOGICAL DISEASES
SECTION OF MULTIPLE SCLEROSIS RESEARCH

Director ..... J. B. R. COSGROVE, M.D., M.Sc., M.Sc. (Cantab.)

Research Assistants ..... MORVEN MCILQUHAM, B.A., M.D., C.M.
ROBERT F. NELSON, M.D., F.R.C.P. (C)

Technician ..... MRS. E. MEHLHOSE

This year Dr. Cosgrove has been on sabbatical leave and the work of the Multiple Sclerosis Clinic at the Royal Victoria Hospital has been ably done by Dr. McIlquham and Dr. Nelson. New plans have been initiated for improvement of the records of the clinic and a long-term study of the natural history of Multiple Sclerosis has begun.

Dr. McIlquham is completing a clinical review of patients who have been treated with intrathecal prednisolone during the past five years. Preliminary results indicate that this treatment reduces spasticity but does not prevent progression of the illness.

Dr. Nelson has studied the value of CSF cytology and the effect of cerebrospinal fluid on lymphocyte cultures from patients with multiple sclerosis. During the summer months he was ably assisted by a second year medical student, Mr. Howard Bergman.

SECTION OF IMMUNOCHEMICAL RESEARCH

Research Associate ..... ALLAN L. SHERWIN, M.D., Ph.D., F.R.C.P. (C)

Fellow ..... JAN A. BULCKE, M.E., M.R.C. Fellow

Technicianss
R. HILL, B.Sc. R. WHITE

Studies of the immunochemical and biochemical properties of brain enzymes were continued over the past year. The isozyme pattern of creatine phosphokinase was shown to differ markedly in brain, peripheral nerve and muscle. Corresponding variations were found in the serum and cerebrospinal fluid of patients with various neurological disorders such as epilepsy, strokes and brain tumor.

Mr. George Siber, a medical student, carried out a laboratory project during the summer and on a part-time basis during the academic year. He won the prize in biochemistry in part for his studies on brain and muscle isozymes. Dr. Philip Valle spent part of last year studying tumor specific antibodies to malignant gliomas. Gliomas serially cultured by Dr. Garretson have been shown to maintain many of their original immunochemical and enzymatic characteristics.

Dr. Jan Bulcke joined the laboratory as a Medical Research Council Fellow January 1st, 1968 and has been able to prepare antibodies which react

specifically with enzymes. This new approach has permitted the histochemical localization of certain enzymes in muscle and brain for the first time.

Studies have been started on the distribution in the body of anticonvulsant drugs in an effort to understand the action of these drugs and achieve better seizure control in patients with epilepsy.

SECTION ON NEUROMUSCULAR RESEARCH

Director ..... GEORGE KARPATI, M.D., F.R.C.P. (C)
Killam Scholar

Technician ..... R. STANFORD

After a new routine for muscle and nerve biopsies was adopted at the Institute, we were able to study about 50 biopsies (in seven months) with histochemical techniques. With the co-operation of Dr. S. Carpenter, concomitant electron microscopic study of the more interesting material has been arranged. As a result, in the past few months, two unique types of myopathies have been detected, and with the help of Dr. Leonhard Wolfe in one case, the biochemical abnormality has been partially defined. In co-operation with the Cardiology and Cardiac Surgery Departments of the Royal Victoria Hospital, five myocardial biopsies from patients with various cardiomyopathies have been studied. Histochemical investigation of single, teased peripheral nerve fibers is being adopted to nerve biopsies in patients and experimental animals.

Experimental investigation included the study of the effect of functional overload on the motor unit in reinnervation models. The effect of embryological denervation is being studied by experimental toxic neuropathies in pregnant animals. In conjunction with Dr. Allan Sherwin and Dr. Jan Bulcke an immunofluorescent method is being developed for the histo- and cytochemical localization of the enzyme creatine phosphokinase.

NEUROPSYCHOLOGY

Neuropsychologist and Medical Research Council Associate ..... BRENDA MILNER, B.A., M.D., Ph.D.

Assistant Neuropsychologist ..... LAUGHLIN TAYLOR, B.Ed., M.Sc.

Research and Clinical Assistants ..... ALICE DAVID, L.Ps. (Paris)
RICHARD S. HALLAM, B.A., Dip. Psych. (London)*

Graduate Student and Clinical Assistant ..... PHILIP CORSI, M.A.

*Six months on this service.

This year is particularly memorable because the department has at last acquired a headquarters, in the form of a suite of rooms in the basement, instead of being spread out all over the Institute. This centralisation greatly simplifies our work schedule and provides the opportunity for a constant interchange of ideas about work in progress. It comes as no surprise, however, to find that already we have outgrown the space allotted.

The clinical and research activities of the department continue to grow, and we were therefore fortunate in having the able assistance of Mr. Richard Hallam during the busiest six months of the year. Mr. Hallam was trained at the University of London, and came to us via the Toronto Sick Children's Hospital. He has now returned to England to take up a research position at the Maudsley Hospital, and we wish him every success. During his stay here Mr. Hallam initiated some perceptual experiments which are providing us with a new way of looking at the performance of patients with left and right temporal-lobe lesions.

Mme Alice David has played a big part in the assessment of French-speaking patients undergoing cortical excisions for the relief of seizures. She has also set up some new tasks for investigating complex visual function. In the field of memory, Philip Corsi has shown that performance on verbal memory tasks after left temporal lobectomy is related to the extent of hippocampal removal. Mr. Corsi has also developed a group of tests for further delineating the effects of left and right frontal-lobe lesions. Mr. Taylor continues to investigate sensory function, as well as being responsible for much of the regular clinical testing.

The department maintains its collaboration with Professor H.-L. Teuber's group at M.I.T. and with Professor Ritchie Russell's Neuropsychological Unit at Oxford. In addition, Dr. Milner and Mr. Taylor were fortunate in being invited by Dr. R. W. Sperry to study patients at the California Institute of Technology who had undergone transection of the corpus callosum and other cerebral commissures. By applying special auditory tests, we were able to bring out the dominance of the contralateral over the ipsilateral auditory projection system. We hope to follow up this work in the future.

This year has brought us many foreign visitors, including Dr. Susan Iversen (Cambridge), Dr. Donald Broadbent (Cambridge), Dr. L. Vignolo (Milan), Professor E. Bay (Düsseldorff), Dr. Karl Pribram (Stanford), Professor H.-L. Teuber (M.I.T.), Mr. Malcolm Piercy (London), Dr. J. Barbizet (Paris), Dr. G. Castellanos (Mexico City) and Dr. Inesa Koslovskaya (U.S.S.R.). Foreign meetings also provided a welcome interchange of ideas: Dr. Milner was an invited speaker at the 2nd Pan-American Congress of Neurology in Puerto Rico, the International Parietal-lobe Symposium in Mexico City, and the International Neuropsychology Symposium in Brittany.

As in the past, the activities of this department owe much to the co-operation of the nurses and technical staff who served as normal control subjects for many tests. We also thank Mr. Charles Hodge and his staff for their skill in modifying our test material.

NEUROANATOMY

Neuroanatomist ..... JACQUES COURVILLE, B.A., M.D., M.Sc.
Teaching Assistant ..... ALLAN MORTON, M.D., C.M., Ph.D.
Technicians ..... MR. GIOVANNI GAGGI
MR. GIOVANNI FILOSI

The department of Neuroanatomy has grown considerably during the last year due to the development of a new Histology Laboratory and the addition of a secretariate dealing with the organization of material for the CNS course. The department has also assumed the responsibility for the histological processing of research material for the Neurophysiology Department.

Most of the research activities during the past year have been devoted to studying the morphology of the cerebellar nuclei of the monkey. It has been possible to recognize four distinct nuclei in the cerebellum of the monkey and it is likely that each of these nuclei will prove to be a distinct functional entity when further studies establish the details of their respective connections. Much attention has been paid to the characteristics of cells in each nucleus. Measurements of cell sizes of large populations of cells by means of a Zeiss particle size analyzer have been made and they have confirmed the presence of a large number of interneurons in these nuclei. In addition to this work, the analysis of the connections of the fastigial and posterior interposed nuclei in the cat has been continued. A morphological study of the cerebellar nuclei in man has also been initiated with the intention of preparing a stereotaxic atlas. A communication on the analysis of the cerebellar nuclei of the monkey has been presented at the meeting of the American Association of Anatomists by Miss C. Cooper who worked on the project as a summer student.

At the same meeting Dr. Allan Morton presented a paper on his work concerning "the rate of retrograde neuron loss in the human supraoptic nucleus after hypophysectomy"; Dr. Morton obtained a Ph.D. this year for his thesis on this subject.

Teaching at the undergraduate level has been conducted in close collaboration with many members of the staff at the M.N.I. and members of the Department of Physiology at McGill. The course integrates neuroanatomy, neurophysiology, neuropsychology and an introduction to clinical neurology. At the graduate level, a neuroanatomy review course of 20 hours has been offered to the M.N.I. Fellows.

The Annual Neuroanatomy Lecture has been delivered by Professor F. Walberg, Director of the Anatomical Institute of the University of Oslo on "Experimental light and electron microscopic observations on cerebellar relay nuclei".

Two other conferences were also organized in collaboration with the Fellow's Society, one by Dr. T. Blackstad from the University of Aarhus, Denmark on "Correlated light and electron microscopical approach in neuroanatomy", and another by Dr. J. Massion from Marseille on "Rhythmic activity in ventrolateral nucleus and central predetermination of movement".

NEUROPHOTOGRAPHY

Supervisor ..... GILLES BERTRAND, B.A., M.D., M.Sc., F.R.C.S. (C)

Photographer ..... CHARLES HODGE, R.B.P., F.B.P.A.

Assistant Photographer ..... EDWARD RUPNIK

Technical Assistant ..... LINDA CORY

This Department, serving all departments and laboratories in the Hospital and Institute, maintained a continued growth again this past year. We are pleased to say that some of the movie films that have been on the shelves for a number of years have been edited with the help of Dr. Sherwin and are now being used as teaching films. At present, there are six other films being completed but there are many more on the shelf.

The chart and graph section of this department has had an extremely busy year, completing over 100 charts each month. Some of these were very complicated.

This department has been very active in the circulation studies with Dr. Feindel and Dr. Yamamoto. A technique of photographing these fluorescein studies has been developed by this department. A paper presented at the Annual Meeting of the Biological Photographers Association in Toronto this year won the department the Communications Award for presenting the best paper at an annual meeting.

THE TUMOR REGISTRY

DR. ARTHUR R. ELVIDGE

During 1967 the records of 250 patients with suspected tumour, directly or indirectly involving the nervous system, have been processed through the Tumour Registry. This is a slight decrease over 1966, which, however, was the highest figure since 1961. They represent 12% of the total admissions to the Montreal Neurological Hospital. Tumour was verified in 140 cases, an increase of 19 over that for 1966, and the greatest number since 1961. There were 120 surgical operations, the largest number since 1962. They represent 16% of the total operations performed at the Hospital. Roentgenotherapy was employed for 64 patients, a figure which has remained fairly constant since 1961.

Patients paid 219 visits to the Neurological and Neurosurgical clinics, an increase of 48 over 1966, and the most since 1961.

The main function of the Tumour Registry is to record the follow-up data on patients treated at the Montreal Neurological Hospital for tumour of the nervous system. Information is obtained or gathered from Outdoor Clinics and private offices, referring doctors, and, when necessary from the Department of Demography of the Province of Quebec or the Province

concerned. Patients are reminded to return for follow-up examination and treatment and many have written letters to the secretary, Mrs. Guthro, in appreciation for help, service and interest shown. The records serve as source material for evaluation of treatment under various conditions.

The secretary of the Tumour Registry is Mrs. G. Guthro. She is thanked for consciencious and most efficient service. Dr. W. McCann was appointed Fellow of the Tumour Registry, February 1967, succeeding Dr. B. Weir, who left to take up an appointment as neurosurgeon in Edmonton. Dr. W. McCann was replaced in July by Dr. R. Romero.

The Registry of the Montreal Neurological Hospital is a branch of the Central Tumour Registry of the Royal Victoria Hospital, which is under the supervision of Dr. E. J. Tabah. Annual returns are made via the Royal Victoria Hospital to the Central Tumour Registry of the Province of Quebec. This was established in 1961. Annual reports since 1962 from the hospitals of the Province of Quebec will be a source of basic data in the future with regard to general tumour statistics.

Apart from the routine follow-up of patients, problems have been undertaken with Fellows and Staff. Follow-up is complete since 1950 but most patients have been followed since 1928.

Dr. Solis has completed his observations on a sampling of 112 cases of the unclassified gliomas, 1950-1959 inclusive. The average survival is nearly doubled when radical surgery is combined with x-ray therapy. A correlation of site of tumour with function of speech was attempted in the group. Dr. B. Barone reviewed the ependymomas. Dr. E. Berger is updating the statistics of an unpublished study on carcinoma involving directly or indirectly the nervous system. He hopes to give some of this material at the forthcoming Third Canadian Congress of Neurological Sciences. Dr. W. McCann and Dr. B. Weir have reported on the long-term survival of two patients after removal of metastatic melanoma of the brain. Dr. Weir reported a detailed review of oligodendrogliomas to the Canadian Neurosurgical Society at Quebec City. Dr. Romero is studying physiological problems of brain stem involment by tumour. A report on long-term survival in the astrocytoma series has been accepted for publication. Patients treated as early as 1928 are included. Most of these underwent surgery without x-ray therapy and still enjoyed long survival. However, the more malignant the glioma the greater the chance that x-ray therapy will help. There seems little doubt that a benign piloid astrocytoma with radical removal, under favourable conditions, will never recur. Clinical studies on the biological behaviour of brain tumours continues.

FELLOW'S LIBRARY

Dr. Leonhard S. Wolfe

In the past year, the loans of books and journals to our Staff and Fellows as well as loans outside of the Institute and Hospital to McGill University and other universities has increased. 1,533 loans of books and

journals were made to our staff and 107 requests for interlibrary loans. There were 242 requests for loans by our staff from other libraries. The total number of registered users of the Library is 182. This year Xerox facilities were made available, and already since February 548 exposures have been requested.

The Library receives a total of 150 journal and serial publications, of which 69 represent paid subscriptions and the remainder gifts or free material. Five new journal subscriptions were started this year. 72 new books were purchased and we received gifts of 25 books from nine members of our staff.

A number of new services have been added to the Library facilities. Mrs. M. Campbell was appointed in October 1967 as a half-time Library Assistant. A duplicate collection has been organized and catalogued. A bibliography of sources of information in the Neurological Sciences was compiled by Miss Duchow.

Miss Sandra Duchow, our Librarian, has done excellent work in making the Library efficient and has helped our staff in many ways such as searching for references and assisting in bibliographies. The Members of the Library Committee wish to express their thanks for the fine work that Miss Duchow is doing for the Library.

There are of course problems. Space, as might be expected, is foremost. Approximately 150 volumes of non-neurological and non-current journal materials were weeded out and sent to the National Science Library in Ottawa. This relieves a little pressure, but it is not enough. We have been under pressure from the McGill Library to completely open our Library to borrowing by anyone registered at the Medical Library. We cannot do this with the present Library facilities. One of the most important aspects of our Library is that it is a working library for all members of staff. Consequently, books and journals must be available in the Library or within the Hospital and Institute.

The cost of library operation has risen sharply. Subscription rates of many of our journals as well as the cost of book purchases have markedly increased in the last year. This year in general, acquisitions and the number of volumes added is down from previous years. With the increase in Hospital and Institute staff the number of truly needed requests for books and journals is increasing, yet we do not have funds to provide for this. Many important volumes in the clinical and basic neurosciences cannot be purchased by the Institute or by the McGill Medical Library. Thus, they are not available anywhere in the McGill Library system. If we are to maintain our leadership as a Neurological Library, we will need more funds to keep apace with the rapidly expanding literature. This problem is of course closely associated with the problem of space.

We continue to lose books and single journal issues from the Library. The total loss last year was 15 items, some of them irreplaceable. This is a disturbing problem, and no really good solution can be foreseen. Miss Duchow has tried to control this aspect by making sign-out slips readily

available and circulating light-hearted reminders to all staff to carefully inspect their book shelves. The results were only fair.

I would like to thank all the Members of the Hospital and Institute who have donated books and journals to the Library. We appreciate this interest and support. I thank also the Members of the Library Committee for their excellent advice and help in the past year.

MONTREAL NEUROLOGICAL SOCIETY

President ..... Dr. Irving Heller
Vice-President ..... Dr. André Barbeau
Secretary-Treasurer ..... Dr. Allan Sherwin

Twenty-six meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held from September 20th, 1967 to May 1st, 1968.

Clinical meetings were held at l'Hôpital Maisonneuve, l'Hôpital Ste-Justine, l'Hôpital Notre-Dame, the Mackay Center for Deaf and Crippled Children, the Montreal General Hospital, l'Hôpital Hôtel-Dieu and the Montreal Neurological Institute.

Papers read before the Society by distinguished visitors and local colleagues were as follows:

Dr. John N. Walton, Regional Neurological Centre, Newcastle-upon-Tyne: "Clumsy Children" (Developmental apraxia and agnosia).

Dr. P. K. Thomas, The National Hospital, Queen Square, London, England: "Diabetic Neuropathy".

Dr. Nico M. Van Gelder, Université de Montréal: "Some Aspects of GABA Metabolism".

Dr. N. Mukai, Montreal General Hospital: "Minamata Disease" (Studies of organic mercurial poisoning).

Dr. Henry J. M. Barnett, University of Toronto (Visiting Professor of Neurology, M.N.I.): "Experience with the Management of Carotid Artery Disease".

Dr. Brenda Milner, Neuropsychologist, M.N.I.: "Psychological Assessment of Epileptic Patients".

Dr. Ron Millar, Anaesthetist, Addenbrooke's Hospital, Cambridge; Visiting Scientist, University of Pennsylvania: "Observations on Neural Control of Cerebral Circulation".

Dr. Jean Schlag, Department of Anatomy, University of California: "Le rôle joué par le cortex orbito-frontal dans le contrôle des ondes en présence de l'EEG".

Dr. Thomas J. Speakman, Department of Neurosurgery, University of Alberta: "Ruptured Intracranial Aneurysms Treated as Surgical Emergencies".

Dr. Francis E. LeBlanc, Department of Neurosurgery, Montreal Neurological Institute: "Neurological Complications of Aortic Coarctation".

Dr. Guy Lamarche, Chairman, Division of Basic Medical Science, Faculté de Médecine, Université de Sherbrooke: "Chronic Epilepsy in the Cat".

Dr. Thomas L. Perry, Professor of Pharmacology, University of British Columbia: "Homocystinuria, Cystathioninuria, and Neurological Disease".

Dr. George Karpati, Department of Neurology, Montreal Neurological Institute: "The Neural Influence on the Cytochemistry of Muscle Fibers".

Dr. Clifford Richardson, University of Toronto, (Centennial Visiting Professor): "The Late Assessment of Brain Injury".

Dr. Fred Walberg, University of Oslo: Annual Neuroanatomical Lecture — "Experimental Light and Electronmicroscopic Observations on Cerebellar Relay Nuclei".

Dr. George Selby, Senior Lecturer in Neurology, University of Sydney, Australia: "Observations on Parkinson's Disease".

Dr. Francis Murphey, University of Tennessee, (R.V.H. Post-Graduate Board Visiting Professor of Neurosurgery): "Some Aspects of Research in Cerebrovascular Disease with Emphasis on Experimental Infarction".

Dr. Neill B. Rewcastle, Senior Neuropathologist, Toronto General Hospital: "Some Thoughts on the Subarachnoid Space".

Dr. André Barbeau, Université de Montréal: "The Biochemistry of Parkinson's Disease — Recent Advances".

The Annual Dinner of the Society was held on May 3rd, 1968, at the Club St-Denis.

FELLOWS' SOCIETY

President ..... Dr. Andrew Eisen

Vice-President ..... Dr. John Woods

Secretary-Treasurer ..... Dr. Charles Needham

This year has been pleasantly active for the Fellows' Society. We managed to institute several new social events, which we hope will continue in future years.

One of the most successful of these was the regular attendance of twelve or so fellows and their wives to "La Jeunesse Musicale" series held at Place des Arts.

The Society's formal welcoming party was a great success in the form of a Carribean evening, with music supplied by the steel band of Trinidad and Tobago, from Expo '67.

An active Ski Club was well attended, the season however was unfortunately short, because of the unique lack of snow this year.

The Annual Skating Party and Christmas Party were, as in previous years, very successful.

Although the custom of inviting guests of the Montreal Neurological Society to speak to the fellows on the same evening has now been abandoned, quite a number of these visitors were able to put on special clinical rounds during the daytime. This we feel was very worthwhile and hope it continues.

The Annual Banquet this year was held at the Bonaventure Hotel, preceded by cocktails around the swimming pool. Our guest lecturer, Dr. Edwin B. Boldrey, gave an interesting talk entitled "Sensory Levels and Configuration Association with Painful Lesions Affecting the Spinal Roots and Peripheral Nerves in Man".

This year's banquet was unique in the initiation of a new tradition, "The Penfield Award of Excellence". The first one was given to Dr. Robert Nelson. It was a great pleasure to have Dr. Penfield present to personally give this award.

The Society, and executive in particular, wish to extend grateful thanks to Mrs. R. Fudge for her continued and excellent secretarial help.

The officers for the coming year are:

President ..... Dr. John Woods
Vice-President ..... Dr. David Grimes
Secretary-Treasurer ..... Dr. James Nabwangu

CLINICAL TRAINING OPPORTUNITIES
NEUROLOGY

The Department of Neurology and Neurosurgery of McGill University offers opportunities for clinical training in Neurology in the four major McGill Teaching Hospitals — The Montreal Neurological Hospital, the Royal Victoria Hospital, the Montreal General Hospital and the Montreal Children's Hospital.

Residency training is available at three levels and is open to graduates who have completed a year of interneship and a year of Internal Medicine at approved hospitals:

Assistant Resident (1 year)
Resident (1 year)
Teaching Fellow (1 year)

The Assistant Resident and Resident appointments are each divided into two six-month periods, with rotations arranged among the McGill Hospitals.

The Teaching Fellow appointment offers a third year of clinical experience open to candidates who have completed their earlier training in this Department.

Laboratory training fellowships are available in Electroencephalography, Clinical Neurophysiology and in Neuropathology. Appointments are usually made for periods of twelve months, though some appointments may be for six-month periods.

Other Departmental Laboratories will accept Fellows for graduate training by individual arrangement. Residents and Fellows may attend the graduate courses listed below by individual arrangement. The Diploma in Neurology offered by McGill requires at least four years of training, including periods of investigative work, and Psychiatry. (See the McGill Faculty of Medicine Calendar).

A limited number of training stipends are provided by the Quebec Hospital Insurance Service and from Institute funds, and, for United States citizens, from a U.S. Public Health Training Grant.

Appointments are usually made about one year in advance, with July 1st, the usual starting date.

Applications for all the above appointments should be made to the Director, Montreal Neurological Institute, 3801 University Street, Montreal 2, P.Q.

NEUROSURGERY

The Department of Neurology and Neurosurgery of McGill University offers opportunities for clinical training in Neurosurgery in three of the major McGill Teaching Hospitals, The Montreal Neurological Hospital, The Montreal General Hospital, The Montreal Children's Hospital and in the Queen Mary Veterans Hospital.

The initial appointment is normally made to one of the Institute's Laboratories for a six or twelve-month period. An interneship and/or a year of general surgical training in an approved hospital is required.

The Assistant Resident appointments are divided into six-month periods with rotation among the three Neurosurgical Services at the Montreal Neurological Hospital. The Resident appointments, six and twelve-months in duration, are rotated among the McGill Teaching Hospitals listed above.

The various Departmental Laboratories will accept Fellows for graduate training by individual arrangement. Residents and Fellows may attend the graduate courses listed below by individual arrangement. The Diploma in Neurosurgery offered by McGill requires at least four years of training including periods of investigative work (See the McGill Faculty of Medicine Calendar).

A limited number of training stipends are provided by the Quebec Hospital Insurance Service and from Institute funds.

Appointments are usually made about one year in advance, with July 1st, the usual starting date.

Applications for all the the above appointments should be made to the Director, Montreal Neurological Institute, 3801 University Street, Montreal 2, P.Q.

COURSES OF INSTRUCTIONS

Undergraduate

The Department of Neurology and Neurosurgery cooperates closely with the Department of Medicine, Surgery, Pathology, Anatomy and Radiology in their undergraduate teaching. Thus the teaching of neurology, neurosurgery, neuropathology, neuroanatomy and neurological radiology is carried out as part of the regular course planned by the Chairman of each of the above departments. See McGill booklet "Faculty of Medicine". Electives are available in clinical and laboratory subjects. See McGill Booklet "Elective Catalogue".

Graduate

In the Faculty of Graduate Studies and Research, courses are offered leading to the degree of Master of Science and Doctor of Philosophy. Throughout the year, the following elective courses are given for graduate students, Fellows and members of the house staff, and are open to undergraduates by arrangement. See McGill booklet "Faculty of Graduate Studies and Research".

Neuroanatomy

600. This course is given in combination with Undergraduate Course Neurology and Neurosurgery 2A "Anatomy and Physiology of the Central Nervous System".

601. Graduate seminars in coordination with Course 611.

602. Preparation of a term paper on a neuroanatomical subject as arranged.

603. Advanced Neuroanatomy for selected group; times to be arranged.

Professors Courville, McNaughton and Staff

Neurophysiology

610. Lectures and examination together with undergraduate Neurology and Neurosurgery course 2A "Anatomy and Physiology of the Central Nervous System".

611. Weekly seminars and demonstrations coordinated with Course 2A (4 months, beginning in December), Mondays, 4:30 — 6:00 p.m.

612. A term paper on a neurophysiological subject or a written examination may be approved as a substitute for 610.

Professors Gloor and Wolfe

Clinical Conferences

620. Colloquium in Clinical Neurology: 1 hour weekly, clinics and lectures, Wednesdays, 5:00 p.m. M.N.I. (9 months).

Staff and Visiting Lecturers

630. Seizure Mechanism and Cerebral Localization: Clinical Electroencephalographic and Roentgenographic Conference. Alternate Thursdays 4:00 — 5:00 p.m.

Professors Rasmussen, Gloor, Ethier and Milner

Neurochemistry

640. Outline of Neurochemistry: Instruction in Neurochemistry in addition to that provided in course 611 may be obtained by special arrangement.

Professors Wolfe and Pappius

Neuropathology

650. Six or twelve months laboratory work in Neuropathology.

651. Conference in Neuropathology, alternate Thursdays, 4:00 — 5:00 p.m.

652. Introduction to Histopathology of the Nervous System. A short basic course for a limited number. By special arrangement with Professor Mathieson.

For graduate credit, courses 650 and 651 are required. Under special circumstances written and/or oral examination may be substituted for 650 and 652.

Professors Mathieson and Carpenter

Neurological Radiology

660. Lecture demonstrations (3 months beginning in September). Mondays 4:30 — 5:30 p.m.

661. Six or twelve months practical instruction in techniques and interpretation.

Professors Ethier, Vézina and Mélançon

Electroencephalography and Clinical Neurophysiology

670. Laboratory work in Electroencephalography (minimum 6 months with active participation, seminars and clinical conferences).

671. Seminar in Electroencephalography, Fridays 4:30 — 6:00 p.m. October and November, January and February.

Professors Gloor, Lloyd-Smith and Andermann

Neuropsychology

680. Training and research methods for selected graduate students.

Professor Milner

MONTREAL NEUROLOGICAL INSTITUTE
and
MONTREAL NEUROLOGICAL HOSPITAL
Publications
1967-1968

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Electroencephalography and Clinical Neurophysiology, v. 23, 1967, p. 492.

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The Japanese Journal of Brain Physiology, v. 84, 1967, pp. 3116-3126.

ELLIOTT, K. A. C. (De Feudis, F. V.) Delay or Inhibition of Convulsions by Intraperitoneal Injections of Diverse Substances.
Canadian Journal of Physiology and Pharmacology, v. 45, 1967, pp. 857-865.

ELLIOTT, K. A. C. (Strasberg, P.) Further Studies on the Binding of γ-Aminobutyric Acid by Brain.
Canadian Journal of Biochemistry, v. 45, 1967, pp. 1795-1807.

ELLIOTT, K. A. C. (Krnjevic, K., Schwartz, S. and Strasberg, P.) Penetration of Blood-Brain Barrier by γ-Aminobutyric Acid at Sites of Freezing.
Journal of Neurochemistry ,v. 14, 1967, pp. 755-760.

FEINDEL, WILLIAM, HODGE, CHARLES P., and YAMAMOTO, Y. LUCAS. Epicerebral Angiography by Fluorescein during Craniotomy.
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Neurology, v. 18, 1968, pp. 95-98.

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The Canadian Journal of Surgery, v. 10, 1967, pp. 151-160.

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MONTREAL NEUROLOGICAL HOSPITAL

BALANCE SHEET AS AT DECEMBER 31, 1967

ASSETS AND DEFICIT

GENERAL FUND		
ASSETS		
Cash		17,366
Accounts receivable — less provision for doubtful accounts		182,403
Grant receivable — Province of Quebec		90,000
Inventories of supplies — at the lower of cost or replacement cost		33,153
		322,922
DEFICIT (note 1)		727,545
		1,050,467
PLANT FUND		
ASSETS		
Cash		53,890
Equipment — at cost	1,455,989	
Accumulated depreciation	834,643	621,346
		675,236
		$1,725,703

LIABILITIES AND CAPITAL

GENERAL FUND		
LIABILITIES		
Accounts payable		396
Amount due to the Royal Institution for the Advancement of Learning —		
Current account		322,526
Advances to cover deficit		727,545
		1,050,467
PLANT FUND		
LIABILITIES		
Amount due to Quebec Hospital Insurance Service		4,649
Amount due to the Royal Institution for the Advancement of Learning		56,257
		60,906
CAPITAL (note 2)		614,330
		675,236
		$1,725,703

AUDITORS' REPORT

To the Board of Management,
Montreal Neurological Hospital,
Montreal, Que.

April 5, 1968

We have examined the balance sheet of Montreal Neurological Hospital as at December 31, 1967 and the statements of operations and deficit for the year then ended. 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 these financial statements present fairly the financial position of the hospital as at December 31, 1967 and the results of its operations for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year except for the change in accounting for depreciation as outlined in note 2 to the financial statements with which we concur.

McDonald, Currie & Co.
Chartered Accountants

MONTREAL NEUROLOGICAL HOSPITAL

STATEMENT OF GENERAL FUND DEFICIT

(For the year ended December 31, 1967)

	Shareable	Non-shareable	Total
BALANCE — BEGINNING OF YEAR	364,201	228,885	593,086
Adjustment of prior years' deficit	4,944	(2,633)	2,311
Amounts received from the Quebec Hospital Insurance Service			
1964 final payment	(36,411)		(36,411)
1965 final payment	(91,028)		(91,028)
1966 interim payment	(152,267)		(152,267)
Reclassification of expenses on advice from the Minister of Health — 1964	(15,873)	15,873	
— 1965	(27,939)	27,939	
	45,627	270,064	315,691
Net operating deficit (surplus) for the year	451,773	(39,919)	411,854
BALANCE — END OF YEAR (note 1)	$ 497,400	230,145	727,545

STATEMENT OF PLANT FUND CAPITAL

(For the year ended December 31, 1967)

BALANCE — BEGINNING OF YEAR	705,329
Depreciation on equipment (note 2)	90,999
BALANCE — END OF YEAR	$ 614,330

STATEMENT OF OPERATIONS (For the year ended December 31, 1967)

	Shareable	Non-shareable	Total
OPERATING EXPENDITURE			
Salaries and wages	2,239,576		2,239,576
Medical and surgical supplies and drugs	180,588		180,588
Sundry supplies, services and expenses	707,778	5,544	713,322
	3,127,942	5,544	3,133,486
OPERATING REVENUE			
Hospital Insurance Service In-Patients (note 1)	1,727,496		1,727,496
In-patients, other	690,814	46,635	737,449
Out-patients	87,646	(1,172)	86,474
Grants —			
Province of Quebec	90,000		90,000
City of Montreal	67,500		67,500
Sundry revenue	12,713		12,713
	2,676,169	45,463	2,721,632
NET OPERATING DEFICIT (SURPLUS) FOR THE YEAR (note 1)	$ 451,773	(39,919)	411,854

NOTES TO FINANCIAL STATEMENTS (For the year ended December 31, 1967)

1. SHAREABLE DEFICIT

Interim payments under the Quebec Hospital Insurance Act are based on budgets approved by the Provincial Department of Health and are subject to adjustment following a review of actual expenditures by the Minister of Health as provided for in the Act. Accordingly the hospital is appealing to the Minister of Health for recovery of the 1967 shareable deficit of $451,773 and the unpaid balance of the 1966 shareable deficit amounting to $45,627. Recoveries in respect of these amounts will be reflected in the statements of deficit of future years.

2. DEPRECIATION

Allowances are no longer payable under the Quebec Hospital Insurance Act for depreciation of equipment. However, allowances will in future be granted for equipment purchases.

Accordingly the hospital has discontinued charging depreciation in the statement of operations and has adopted the practice of charging depreciation to plant fund capital as directed by the Quebec Hospital Insurance Service.

MONTREAL NEUROLOGICAL INSTITUTE

RESEARCH AND TEACHING EXPENDITURE SUMMARY FOR THE YEAR ENDING DECEMBER 31, 1967.

from Major MNI Endowment Funds	$344,633
from MNI Special Funds	98,610
from General University Funds	13,340
from Medical Research Council Block Term Grant	75,000
from Various Annual Research and Fellowship Grants	302,514
TOTAL EXPENDITURE	$834,097

ENDOWMENTS

1934 — Rockefeller Endowment
1951 — Donner Canadian Foundation Grant
1954 — Lily Griffith McConnell Endowment
1957 — Hobart Anderdon Springle Memorial Endowment
1958 — Rupert Bruce Memorial Endowment
1959 — Percy R. Walters Memorial Endowment
1960 — William Cone Memorial Endowment
1963 — Walter Chamblet Adams Memorial Endowment
1964 — MNI Research Endowment Fund
1966 — Izaak Walton Killam Memorial Endowment

FELLOWSHIP ENDOWMENTS

1948 — Duggan Fellowship
1950 — Lewis L. Reford Fellowship
1956 — Dr. and Mrs. Charles F. Martin Fellowship
1966 — Izaak Walton Killam Memorial Fund for Advanced Studies

RECURRING ANNUAL GRANTS

1947 — Medical Research Council Block Term Grant

GRANTS FOR SPECIAL PROJECTS

Federal-Provincial Health Grants — Dr. McNaughton
— Dr. Rasmussen
U.S. Public Health Neurological Training Grant — Dr. McNaughton
Medical Research Council of Canada Grants — Dr. Courville
— Dr. Milner
— Dr. Sherwin
— Dr. Wolfe
Medical Research Council of Canada Associateships — Dr. Milner
— Dr. Wolfe
Medical Research Council of Canada Scholarships — Dr. Courville
— Dr. LeBlanc
Medical Research Council of Canada Major Equipment Grants — Dr. Gloor
— Dr. Mathieson
Multiple Sclerosis Society of Canada Research Grant — Dr. Nelson
Muscular Dystrophy Association Research Grant — Dr. Karpati

DONATIONS TO SPECIAL FUNDS — 1967-68

ANAESTHESIA RESEARCH FUND:	
Anonymous	$15,000.00
BRAIN RESEARCH FUND:	
Mr. A. Murray Vaughan	500.00
Mrs. A. Murray Vaughan	500.00
Mrs. Lucille Pillow	4,000.00
CANCER CLINICAL RELIEF FUND:	
WILLIAM CONE MEMORIAL RESEARCH FUND:	
Mr. and Mrs. J. C. Conrad	75.00
Harold Crabtree Foundation	1,000.00
Estate of the Late Mrs. Lucille Gagnon	5,000.00
Col. K. B. Jenckes	100.00
Mr. John Langdon	500.00
Judge J. Gordon Nicholson	50.00
Mrs. Edna J. Roberts	100.00
Mrs. Edna J. Roberts (In Memory of Mrs. Herbert Jordan)	15.00
Mrs. Alice Russel	5.00
Mr. Hugh Seybold	50.00
In Memory of the Late Mr. W. L. Cox	100.00
COSGROVE RESEARCH FUND:	
Anonymous	200.00
Mrs. Treva Troutman	25.00
DICK EPILEPSY FUND:	
GORDON LIBRARY FUND:	
HARVEY CUSHING CLINICAL RELIEF FUND:	
Mrs. Rita Breitman	10.00
Miss Suzanne Cohen (In Memory of Mr. George William Cohen)	10.00
Mrs. Evelyn Garelick	10.00
In His Name Society	30.00
Kiwanis Club of St. George, Montreal, Inc.	300.00
Lions Club of Montreal Welfare Fund	96.00
Rotary Club of Verdun	32.33
Mrs. Lilian Sandler	15.00
Mrs. J. Shapiro	10.00
Mrs. Clare Wilcox	100.00
Women's Auxiliary of the Royal Victoria Hospital	2,250.00
HOSPITAL EQUIPMENT FUND:	
Mr. R. Hipps	1,443.03
Women's Auxiliary of the Royal Victoria Hospital	500.00
MARY MASSABKY FOUNDATION RESEARCH FUND:	
Mr. A. G. Massabky	186.39
MISCELLANEOUS SPECIAL FUNDS:	
In Memory of the Late Mrs. Birdie Bessner	84.00
In Memory of the Late Master Joseph Bernath	10.00
In Memory of the Late Mr. William Clayman	2.00
In Memory of the Late Mr. G. Harry Elsey	108.00
In Memory of the Late Mr. Norman J. Esdon	230.25
In Memory of the Late Mr. Walter R. Girling	115.00
In Memory of the Late Mr. Victor M. Lynch-Staunton	425.30
In Memory of the Late Mr. Leo A. McIsaac	4.00
In Memory of the Late Mr. Marc Nadeau	55.00
In Memory of the Late Mr. Edward J. St. James	120.20
In Memory of the Late Mr. Silver	2.00
In Memory of the Late Mr. Frank Stall	5.00
In Memory of the Late Dr. George Welter	271.00
In Memory of the Late Mr. John G. Winfield	60.00

M.N.I. Neurosurgical Research Fund:

M.N.I. Staff Loan Fund:

Multiple Sclerosis Clinical Relief Fund:

In His Name Society	20.00
Dalse Welfare Club	42.00
Montreal Association for Multiple Sclerosis	750.00
Multiple Sclerosis Golf League	450.00

Multiple Sclerosis Research Fund:

McNaughton Neuroanatomy Research Fund:

Mrs. Anna Aron	100.00
Mr. E. Gordon Gowling	500.00

Neurological Research Fund:

Mr. G. M. Bell	20,000.00
Estate of the Late Mr. Harry Bronfman	11,484.00
Harry Bronfman Family Foundation	3,516.00
Estate of the Late Mr. Samuel Jackson Bennett	200.00
J. W. McConnell Foundation	3,000.00
Mr. Michael G. McConnell	200.00
Mr. David W. McConnell	200.00
Mr. James Coulter	50.00
Mrs. Ben Fraid	500.00
Mrs. Opal Holst	50.00
Mrs. Peter Laing	3,000.00
Miss Barbara McIntosh	5.00
Mrs. Joyce McIsaac (In Memory of Mr. Leo McIsaac)	175.00

Neurophysiology Research Fund:

Neuroradiology Research and Teaching Fund:

Nursing Funds:

Eileen C. Flanagan Nursing Bursary Fund:

Mrs. R. Hampson	100.00
M.N.H. Graduate Nurses' Society	100.00

M.N.I. Nursing Education Fund:

Mrs. Ben Fraid	500.00
Mrs. Samuel Reitman	300.00

Oaklawn Foundation Fellowship Fund:

Oaklawn Foundation	2,000.00

Penfield Award Fund:

Dr. Wilder Penfield	2,500.00
Mr. G. M. Bell	5,000.00

Penfield Research Fund:

Reuben Rabinovitch Memorial Fund of the Cancer Research Society:

Reuben Rabinovitch Memorial Library Fund:

Reuben Rabinovitch Memorial Tribute Fund:

Mrs. Dorothy McCormack	25.00
Miss Betty Yellon	5.00

Lewis Reford Fellows' Fund:

Women's Auxiliary Fund:

Women's Auxiliary Fund of the Royal Victoria Hospital	250.00

Donations to the Montreal Neurological Institute may be made to any of the above funds or for other purposes as specified by the donor. Receipts for such contributions are valid for income tax purposes in Canada. Donations from the United States will also qualify for income tax purposes if cheques are made out to the Friends of McGill University, Inc., and sent to the Secretary, Mrs. Ernest Rossiter, Jr., Box 533, Hempsted, N.Y., with the notation that they are for the Montreal Neurological Institute.

SUGGESTED FORMS OF REQUEST

UNRESTRICTED

I give and bequeath the sum of dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, both the principal and income to be derived therefrom to be used in such manner as the Board of Governors of the said University shall from time to time determine.

RESTRICTED ONLY AS TO PRINCIPAL

I give and bequeath the sum of dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, to constitute part of its general endowment funds, the income to be derived therefrom to be used in such manner as the Board of Governors of the said University shall from time to time determine.

RESTRICTED AS TO PURPOSE

I give and bequeath the sum of dollars to the Montreal Neurological Institute, McGill University, both the principal and the income to be derived therefrom to be used for the purpose of (stating purpose) in such manner as the Board of Governors of the said University shall from time to time determine.

FOR FOUNDING FELLOWSHIPS AND STUDENT AID

I give and bequeath the sum of dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, for the purpose of founding in the said University one or more fellowships or bursaries to be known as " Fellowship or Bursary", the net annual income from this fund to be awarded annually in such amounts, under such conditions and to such recipients as may be determined from time to time in accordance with the directions of the Board of Governors of the said University.

For information and suggestions, address
The Director
Montreal Neurological Institute
3801 University St.
Montreal 2, P.Q.

STATISTICS
CLASSIFICATION OF DISEASES

Nervous System Generally:

Multiple Sclerosis	83
Motor Neurone Disease	16
Meningo-Vascular Lues	2
Spastic Paraplegia	5
Miscellaneous	2

Meninges:

Meningocele & Myelomeningocele	4
Acute Purulent Meningitis	3
Headache	55
Vertigo	5
Subdural Haematoma	39
Intracerebral Haematoma	12
Subdural Hygroma	2
Subarachnoid Haemorrhage	26
Intracerebral Haemorrhage	5
Adhesive Arachnoiditis	7
C.S.F. Rhinorrhea	2
Miscellaneous	6

Brain:

Congenital Anomalies	8
Hydrocephalus	26
Abscess	2
Syncope	7
Contusion, Laceration, Traumatic Encephalopathy	54
Concussion	113
Epilepsy	311
Migraine	18
Parkinsonism	30
Thrombosis, Encephalopathy due to Arteriosclerosis	158
Pontine Lesions	4
Cysts	7
Berry Aneurysm	37
Encephalitis	6
Transient Ischemic Attacks	27
Arteriovenous Malformation	5
Hypothyroidism	4
Global Amnesia	2
Miscellaneous	9

Tumours:

Gliomas	17
Meningeal Fibroblastoma	30
Craniopharyngioma	8
Angioma	2
Glioblastoma Multiforme	26
Astrocytoma	21
Medulloblastoma	4
Ependymoma	6
Chromophobe Adenoma Pituitary	12
Oligodendroglioma	7
Sarcoma	4
Malignant Melanoma	2
Von Recklinghausen's Disease	3

Neurinoma — 8th Nerve	12	
Malignant Teratoma	2	
Eosinophilic Granuloma	3	
Myeloma	2	
Hemangioma	3	
Granuloma	3	
Metastatic Carcinoma	48	
Bronchogenic Carcinoma	1	
Brain Tumour — suspected	5	
Miscellaneous Tumours	9	230

Spinal Cord:

Contusion of Spinal Cord	3	
Compression of Spinal Cord	10	
Guillain-Barré Syndrome	7	
Myelopathy	17	
Syringomyelia	9	
Diastematomyelia	1	
Cervical Spondylosis	6	
Radiculopathy	8	
Spondylolisthesis	1	
Transverse Myelitis	2	
Miscellaneous	6	70

Cranial & Peripheral Nerves:

Optic Neuritis	9	
Trigeminal Neuralgia	33	
Menière's Syndrome	6	
Compression Ulnar Nerve	4	
Other Neuralgias	6	
Neuropathy	19	
Carpal Tunnel Syndrome	4	
Bell's Palsy	3	
Paresis — Cranial Nerves	9	
Schwannoma — 8th nerve	4	
Meralgia Paraesthesia	2	
Astigmatism	3	
Tinnitus	4	
Miscellaneous	9	115

Muscles:

Myasthenia Gravis	5	
Muscular Atrophy	2	
Muscular Dystrophy	2	
Polymyositis	2	
Myopathy	3	
Spasmodic Torticollis	5	
Dystonia Musculorum Deformans	5	
Sydenham's Chorea	2	
Miscellaneous	6	32

Mental Diseases:

Mental Retardation	17
Depression	10
Anxiety State	16
Conversion Hysteria	16
Alzheimer's Disease	9
Schizophrenia	3

Personality Change	5	
Habit Spasms & Tremors	2	
Reading & Learning Disability	2	
Miscellaneous	6	86

Other System:

Protrusion Discs — Lumbar	165	
Cervical	41	
Fracture and/or Dislocation of Vertebral Column	63	
Fracture Skull	49	
Low Back Pain	34	
Pain — Miscellaneous	14	
Traumatic Lesions & Infections	18	
Diabetes Mellitus	17	
Gaucher's Disease	2	
Miscellaneous	19	422

CLASSIFICATIONS OF OPERATIONS

Craniotomy or Craniectomy:

and Biopsy	1	
and Decompression	3	
and Drainage of Abscess	3	
and Drainage of Subdural Haematoma	26	
and Drainage of Intracerebral Haematoma	8	
and Drainage of Extradural Haematoma	7	
and Elevation Depressed Skull Fracture	17	
and Excision of Epileptogenic Focus (Lobectomy)	44	
and Excision, Clipping or Wrapping of Aneurysm	25	
and Exploration	5	
and Hemispherectomy	1	
and Hypophysectomy for Endocrine Control	1	
and Hypophysectomy for Pituitary or Intrasellar Tumour	10	
and Incision, Drainage or Removal of Cyst	7	
and Plastic Repair of Dura (CSF, Rhinorrhea or Fistula)	3	
and Plastic Repair of Skull Defect (Plate, Bone or Plastic)	9	
and Removal of Adhesions	1	
and Removal of Arteriovenous Malformation	3	
and Removal of Cerebral Tumour	67	
and Removal of Posterior Fossa Tumour	23	
and Removal of Tumour of Skull	2	
and Trigeminal Massage or Decompression	1	
and Trigeminal Rhizotomy	6	
and Ventriculocisternostomy (Torkildsen's)	3	276

Trepanation:

and Aspiration of Cyst	1	
and Biopsy	5	
and Drainage of Subdural Space	11	
and Exploration	3	
and Ventricular Puncture	3	
and Ventriculography	5	28

Shunt Procedure:

and Lumbar Subarachnoid — Peritoneal	4	
and Ventricular Caval	53	
and Ventricular Peritoneal	1	58

Stereotaxic Procedure:

and Ventriculography	12	
and Second Stage	27	
Suture of Lacerated Wound of Scalp	2	41

Laminectomy and Hemilaminectomy:

and Anterolateral Cordotomy — Cervical	1	
and Anterolateral Cordotomy — Thoracic	8	
and Decompression or Exploration of Spinal Cord for Spondylosis (Dentate Ligament Section)	4	
and Decompression or Exploration of Spinal Cord (Trauma)	1	
and Decompression or Exploration of Spinal Cord Tumour or Vascular Malformation	7	
and Discoidectomy — Lumbosacral	82	
and Discoidectomy — Thoracic	2	
and Discoidectomy — Cervical	12	
and Incision and Drainage of Intramedullary Cyst (Syringomyelia)	4	
and Removal of Adhesions	3	
and Removal of Tumour — Intramedullary	4	
and Removal of Tumour — Extramedullary, Intradural	5	
and Removal of Extradural Tumour — Metastatic, Bone, etc.	4	
and Rhizotomy	7	
and Spinal Fusion with Bone Graft — Autogenous or Bone Bank	36	
and Spinal Fusion with Wire or Plate	10	
and Spinal Fusion — Cervical — Occipital	4	
Discoidectomy — Anterior Approach — Cervical	20	214
Plastic Repair of Spina Bifida	4	4

Nerve Explorations:

Anastomosis or Suture	1	
Avulsion or Section	5	
Excision of Neuroma	1	
Neurolysis, Transplantation or Decompression	14	21

Artery Explorations:

Endarterectomy	14	
Ligation	3	
Progressive Occlusion (Selverstone Clamp)	1	
Temporary Occlusion	1	19

Wound Re-Opening:

Evacuation of Haematoma	10	
Exploration	3	
Further Removal of Brain Tissue	1	
Further Removal of Tumour	1	
Removal of Bone Flap, Tantalum Plate or Wire Mesh	2	
Resuturing	1	18

Miscellaneous:

Diagnostic Spinal Anaesthesia	8*	
Miscellaneous	14	
Scalenus Anticus Muscle Section	1	
Suture of Laceration or Wound	1	
Nerve Blocks	13*	
Tracheostomy	22	38

Radiological Procedures:

Cerebral Angiography:		
— Percutaneous, Carotid, Vertebral or Subclavian	412	
— Catheterization — Brachial, Femoral or Carotid	77	
— Pneumograms under Anaesthesia	47	536
TOTAL		1253

*Not included in total.

CAUSES OF DEATH

Intracranial aneurysm (haemorrhage & haematomata due to aneurysm)	27	
Cerebrovascular disease (thrombosis, infarction, haemorrhage)	19	
Head Injury (concussion, contusion, haematomata, etc.)	15	
Intracranial tumour, primary	13	
Intracranial tumour, metastatic	5	
Carcinoma (generalized)	8	
Myelopathy	4	
Hydrocephalus	1	
Other systems	1	
TOTAL		93