

MONTREAL NEUROLOGICAL
INSTITUTE
and
MONTREAL NEUROLOGICAL
HOSPITAL



McGILL UNIVERSITY

THIRTY-FOURTH ANNUAL REPORT
1968-1969

Thirty-fourth Annual Report
of the
MONTREAL NEUROLOGICAL
INSTITUTE
and
MONTREAL NEUROLOGICAL
HOSPITAL
and the
DEPARTMENT OF NEUROLOGY
AND NEUROSURGERY
of
McGILL UNIVERSITY

1968-1969



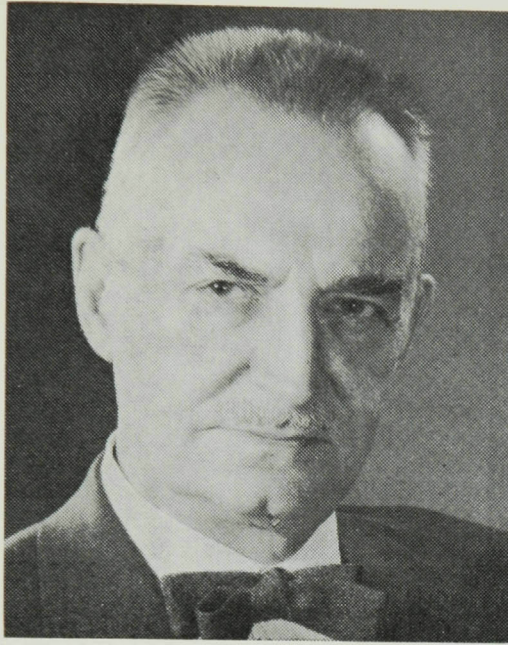
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“Where there is much desire to learn,” John Milton wrote in his *Areopagitica*, “there of necessity will be much arguing, much writing, many opinions, for opinions in good men is but knowledge in the making”.

It is in this spirit that the many facets of the activities at this Hospital and Institute—the care of patients, the teaching of neurology and neurosurgery, and the exciting acquisition of new knowledge about how the brain works — are highlighted here by representative members of our staff. We are indebted to them for their reports and to the clerical and editorial staff for helping to produce them in this form.

W.F.
Editor.



Courtesy Studio de Photographie "Pierre"

DR. JEAN SAUCIER (1899-1968)

We honour the memory of Jean Saucier, who was Consulting Neurologist to this Institute from its foundation in 1942 until his death in 1968.

A Montrealer by birth, Dr. Saucier graduated from l'Université de Montréal "Magna cum laude" in 1922, and was awarded a second M.D. from the University of Paris on the completion of his postgraduate studies there in 1927. His career as neuropsychiatrist, university teacher and medical author was a distinguished one. In 1947 he became Chief of the Neurological Service at l'Hôtel Dieu, and in 1948 Professor of Neurology at his Alma Mater. He took an active part in many professional societies in Canada and was elected a member of the American Neurological Association. He was also a charter member of the Canadian Neurological Society, and in 1952 served as its President.

Dr. Saucier developed a wide reputation as a medico-legal expert, and when he retired from his University post in 1961 with the title of Professor Emeritus, he chose this branch of Neurology as his "second career", and pursued it with obvious enjoyment.

Apart from his purely professional activities, Dr. Saucier had many personal interests. He was a gifted writer in both French and English, always displaying a delicate wit and a subtle feeling for the meaning of words. Music in all its aspects was a lifelong passion. He was a fine violinist, though only his closest friends were privileged to hear him perform. A portrait of Jean Saucier appears in the M.N.I. mural with other senior members of the Institute staff, and in his hand he carries a symbol of his devotion to music, a violin concerto by Brahms!

At a memorial meeting of the Montreal Neurological Society, held on February 12th, 1969, Dr. Roma Amyot, a devoted friend and colleague of Dr. Saucier, summed up his remarkable personal qualities. "Saucier était un homme racé, d'une haute culture et distinction, sociable, aimant la vie et sachant vivre, un neuropsychiatre de classe et un humaniste."

We, his friends and close associates, in the Montreal Neurological Institute join with Dr. Wilder Penfield in these final words of tribute. "No one through all the past forty years has done more for Neurology and for understanding and common friendship in Montreal than Jean Saucier. We salute him with honour as a distinguished neurologist, a cultured gentleman and a much-loved friend."

CHAIRMAN'S REMARKS

DR. WILDER PENFIELD

This is the 34th Annual Meeting of the Staff of the Montreal Neurological Institute and the Montreal Neurological Hospital. The honour of acting as Chairman in place of the Principal, Dr. Rocke Robertson, has fallen to me. Our report today is made to McGill University and, through it, to the people of this Province and the Nation. Let me take this opportunity to pay tribute now to our Principal and the great university of which he is the wise and patient leader.

At this moment in Quebec history, it is well to recall that McGill University is the major contribution which English-speaking citizens and scholars have made to the people of this Province, from the time of the fur-traders down to 1969. This Institute and Hospital are the same. We are bilingual in our work, bicultural in our allegiance. We serve all who need our help here and in the world of science beyond. This is the time to say that we are proud of the English-Canadian tradition of service and scholarship. We are proud of our relationship to this great university.

MONTREAL NEUROLOGICAL INSTITUTE AND HOSPITAL

REPORT OF THE DIRECTOR

DR. THEODORE RASMUSSEN

Another year has raced by, and spring once again brings with it the opportunity and the obligation to report on the past year's work and activities. As in the past, this is a double report, addressed to the Principal and the McGill Board of Governors for the Institute, and to the Corporation and the Provincial Government for the Hospital. It is also a report to the community and to our patients, to the many friends whose gifts of time and money have contributed so much to the year's record, to the Federal Government for its important financial support of the scientific work of the Institute through the Medical Research Council, and to the other Federal and Provincial governmental agencies and the various foundations and societies, whose grants have aided both the clinical and scientific activities of the year.

We reached an important milestone last September, when Dr. McNaughton turned over some of his heavy administrative responsibilities to Dr. Robb. As Professor and Neurologist-in-Chief, Dr. Robb takes in hand the important tasks of planning the evolving undergraduate and graduate training programmes in neurology, and in planning the expansion of both clinical and research aspects of our medical neurological activities. The change permits Dr. McNaughton, who continues in charge of the Neurology Service "A", to spend more time in both undergraduate and graduate teaching. Some interesting and informal pictorial highlights of Dr. McNaughton's career were displayed three weeks ago at the Annual Staff Dinner and Handicraft Display, which was, once again, a highly successful occasion and a tribute to the organizing committees and to the many participants.

Another milestone was reached this year with the arrival of applications for neurosurgical training from sons of three of our neurosurgical Fellows of earlier years. This era has been foreshadowed, in the past few years, by the appearance on our wards of a couple of medical students with the familiar names of Rabinovitch and Robb.

It would require a sizeable monograph to report adequately each year on the activities of former Fellows of the Institute, but we want to mention particularly this year the opening of the Neurosurgical Service at the Jewish General Hospital under the direction of Dr. Harold Rosen, who has returned to Montreal, his home town, after providing the great majority of the neurosurgical care of the entire Province of New Brunswick, ever since he finished his training here in 1951.

Staff turnover is one of the functions and facts of life of educational institutions. This year we are getting used to the gaps left by the departures of Dr. Fred Brindle to head the Department of Anaesthesia at the University of Sherbrooke Medical School, Dr. Phanor Perot to take charge of the Department of Neurosurgery at the Medical College of South Carolina, Dr. Charles Branch to enter private neurosurgical practice with an affiliation

with the new University of Texas Medical School at San Antonio, Dr. Roger Broughton to the University of Ottawa, Dr. Agapito Lorenzo to the University of Nebraska, and Dr. Anibal Galindo to a new anaesthesia post in Seattle.

We welcomed three new anaesthetists to the Staff, Dr. Georges-Henri Sirois, Dr. Davy Trop and Dr. Alexander Straja. Dr. Francis LeBlanc stepped into Dr. Perot's place on the Third Neurosurgical Service, and Dr. Robert Hansebout, who finished his training here in 1966, will return on July 1st, to take Dr. Branch's place on the First Neurosurgical Service.

We mourn the death on December 30th, 1968, of our good friend, Dr. Jean Saucier. One of Quebec's and Canada's outstanding neurologists, he has been a member of our Consulting Staff since the opening of the Institute, covering a period of nearly 36 years. Final tribute was paid to him at a special meeting of the Montreal Neurological Society, on February 12th, 1969. Dr. Saucier was a man of many talents and many friends, and his stimulating and vital presence will be missed in many quarters.

The changing pattern of undergraduate and graduate medical education in Quebec has kept the lights burning late in the McIntyre Medical Sciences Building this year, and has involved many of us in an unusually heavy load of committee meetings. The resulting changes in the undergraduate curriculum will, we hope, enable us to do a better job of introducing the medical student to the nervous system, although the time allotted is considerably less than would be desirable. This deficiency, however, is at least partially compensated for by a marked increase in available elective time, so that those students who become interested in the nervous system will have a better opportunity to study it in some depth. The increased scope of this elective programme brings into sharp focus our urgent need for more space and for improved facilities that we have been planning for and working toward, during the past year and a half.

The planning for our proposed new wing is progressing satisfactorily. Our Building Sub-Committees have completed a rigorous examination of the future needs of the various clinical and supporting services, the research laboratories and the teaching and administrative functions, and have juggled sketches by the score. Plans have now been brought into reasonable harmony, and there is general agreement that the proposed new wing, as presently planned, along with a moderate amount of renovation of the original building, will provide a physical plant that will enable us to meet our expanding clinical, teaching and research responsibilities effectively during the decade ahead. It is time now to push on to the next step.

Our application to Quebec's Department of Health for permission to proceed with preparation of preliminary architect's plans has been languishing in Quebec since last fall. Our application to the Federal Government's Health Resources Fund, for a grant to help finance this programme, awaits matching money from either the Provincial Government or from private sources. We suspect some progress in the latter area will be required, before the Govern-

ment's permit will be issued, and we hope to be able to report some steps in this direction soon.

The familiar financial hospitalization problems of the past eight years persist. The Hospital operating expenditures of \$3,373,810 were only slightly over the budget we submitted at the beginning of the year. Despite our record of operating close to our submitted budget each year since the start of the Q.H.I.S., and despite the fact the Q.H.I.S. has agreed to date, by virtue of their ultimate year-end settlements, that our original budgets have been correct and necessary, our 1968 budget, as submitted, was arbitrarily reduced 14.8% by the Q.H.I.S. As a result, we have an operating deficit for 1968, pending the final settlement, of \$223,255. The combination of inadequate initial budget-approval by the Q.H.I.S. at the beginning of the year, and the habitual two-year delay between the filing of the year-end audited financial statement and the final settlement, continues to constitute a serious hindrance to efficient management and planning, and a serious financial burden on McGill.

The Government's passion for province-wide uniformity is of concern to the teaching hospitals. The Government has just published Order-in-Council #288, which spells out all-encompassing regulations for the hospitals of the Province. Despite repeated and energetic protests, these regulations make no distinction between small, rural community-hospitals, the major university general teaching-hospitals such as the Royal Victoria and the Montreal General, and the specialty teaching-hospitals such as the Montreal Children's and the Montreal Neurological Hospitals. Unless certain aspects of these regulations are interpreted in the light of the special needs and the special responsibilities of the primary teaching hospitals, they will face serious difficulties in training the medical and para-medical manpower the Province will require in the future, and in attracting the outstanding medical scientists who set the pace for improvement in all aspects of medical care.

With Quebec on the threshold of full-scale Medicare, there will be a still greater premium on maximum efficiency in all the hospitals, and, in particular, in the teaching hospitals. It is important that the Government reverse its tendency of taking over decision-making responsibility at lower and lower levels of the administrative structure. Increased local autonomy of the teaching hospitals' administrative and medical staffs, with assurance of maximum flexibility in handling the budget and hospital regulations, is essential to promote efficiency and economy in meeting the constantly changing challenges of today's medical scene, which ignore budgetary deadlines and Q.H.I.S. accounting compartments.

Problems of the present and the immediate past unavoidably tend to blur the view of the future, but this is where the real importance of reports such as these lies. Today's rapid growth of scientific knowledge, medical and non-medical, is steadily widening the vistas of potential future advances in the investigation and treatment of patients with ailments of the nervous system. These advances however are not easily won. Two keystones are necessary if we and our successors are to maintain and improve the Institute's and the

Hospital's long record of contributing significantly to such advances. The first is the expansion of the Institute's endowment funds. Support by the community in this regard has been magnificent in the past. It is, however, clear that we must widen the scope of our research activities, both basic and clinical, and the steadily increasing costs of modern research on the nervous system are straining our present resources. In addition, we are concerned about our growing dependence on uncertain short-term research-project grants, which hinders the planning of major long-range research programmes. The second keystone is the assurance of adequate hospitalization budgets that will guarantee the maintenance of the high level of patient care that is so important to the neurological and neurosurgical patient. The potentiality of the highest possible level of medical care is of little use if the personnel and facilities are not on hand to carry it out effectively.

The fabulous technological achievement of Apollo 10, and the fantastic precision of the vast supporting network of men and machines that have put man on the threshold of the era of space travel and exploration are matched, and then some, by the complexity of the everyday function of the human nervous system. Exploration of this inner space has limitless potential for benefiting mankind, and warrants Society's strongest possible support.

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Neurologist-in-Chief

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†Deceased

MONTREAL NEUROLOGICAL INSTITUTE AND MCGILL UNIVERSITY TEACHING STAFF

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<i>Associate Professor, Neurological Radiology</i>	ROMÉO ETHIER

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G. VEEMAN, M.D. A. WHITE, M.D.

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C. NEEDHAM, M.D. (Albany Med. Coll.)*

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A. OLIVIER, M.D. (Univ. of Montreal)

Neurosurgical Research:

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LESLIE STERN, M.D. (Univ. of Manitoba) — Killam Scholar — (at M.G.H.)

*6 months on this service

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(from January 1969) MRS. J. BRUNT

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Assistant Director of Nursing MISS IRENE MACMILLAN, B.A., R.N.,
M.Sc. (App.)

Assistant Director of Nursing (Night) MISS ELIZABETH BARROWMAN, R.N.

Nursing Supervisors (Night) MISS LILLIAN MCAULEY, R.N.
MISS MARILYN MANCHEN, R.N.

Nursing Supervisors (Day) MISS ANNIE JOHNSON, R.N.
MISS ANNE CARNEY, B.N., R.N.

Nursing Supervisors (Evening) MISS NOELENE MCGUIRE, R.N.
MRS. BARBARA PETRIN, R.N.

Assistant Director of Nursing Education MISS HELENA KRYK, B.N., R.N.

Clinical Co-ordinator MISS CAROLINE ROBERTSON, B.N., R.N.

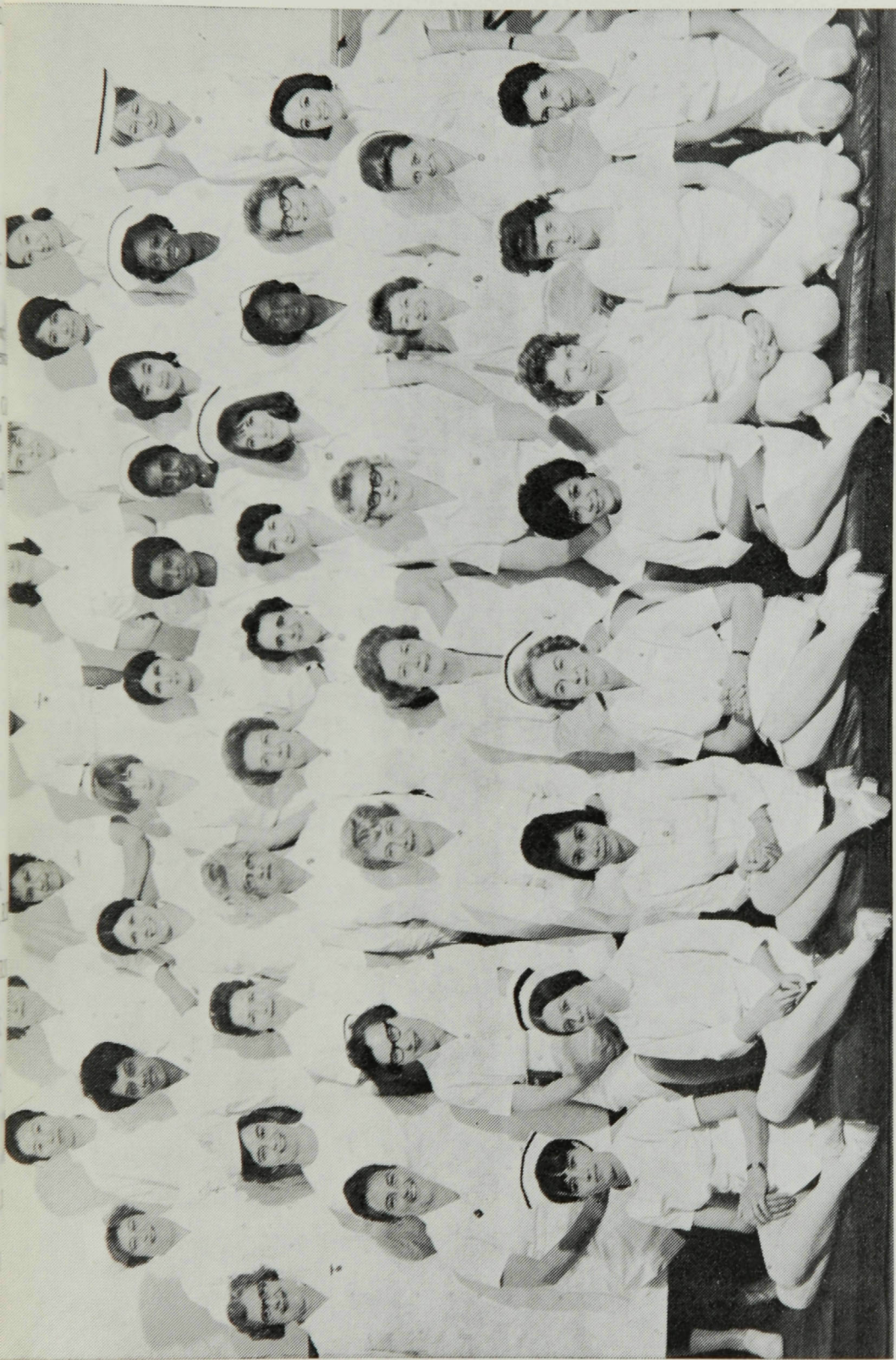
Clinical Instructor MRS. RUBY PARKES, R.N.

Operating Room Supervisor MISS PATRICIA MURRAY, B.N., R.N.

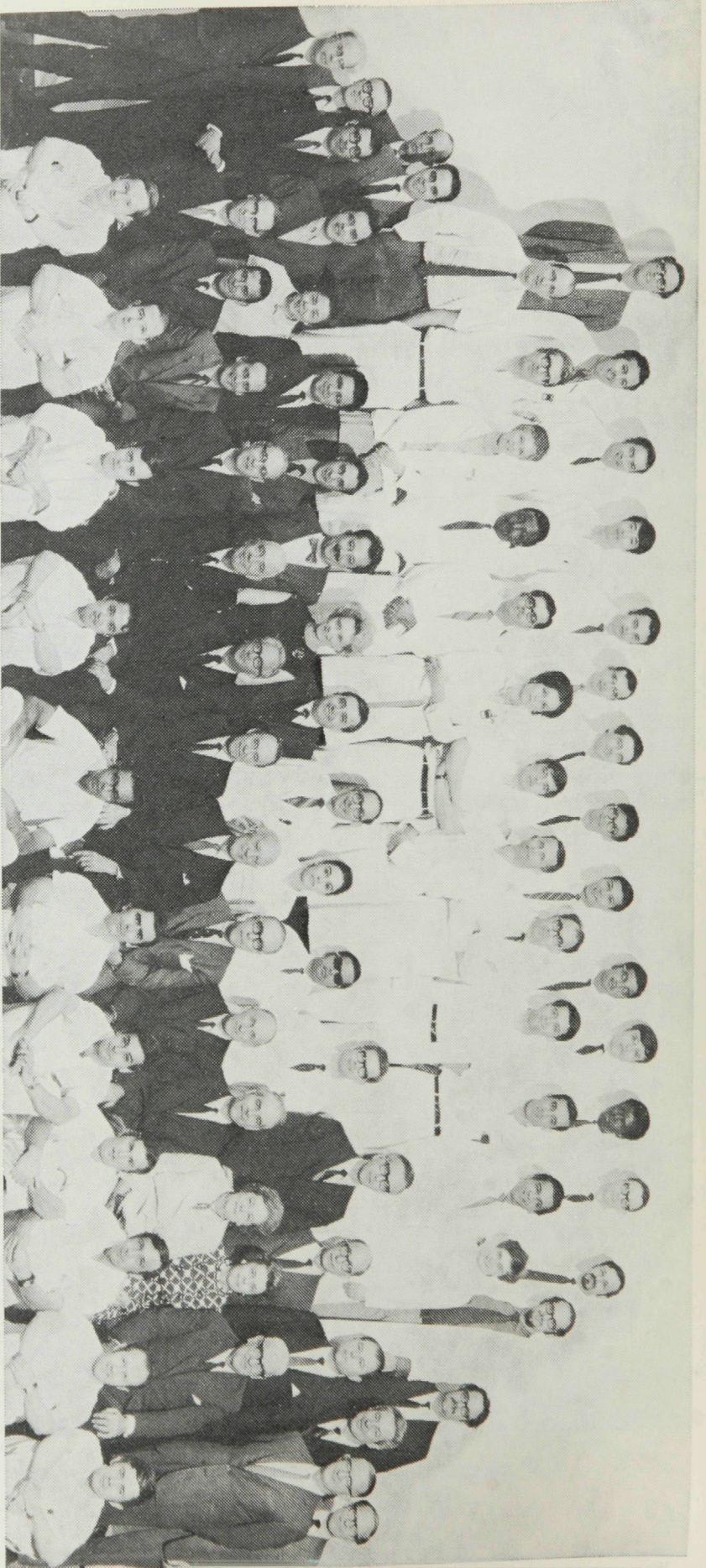
HEAD NURSES

MISS ALICE CAMERON, R.N.
MISS MARY CAVANAUGH, R.N.
MISS LUCY DALICANDRO, R.N.
MISS MARION EVERETT, R.N.

MISS DELTA MACDONALD, R.N.
MISS FLORA MCCORMACK, R.N.
MISS URSULA STEINER, R.N.



First Row (left to right): Miss J. O. Lee, Mrs. L. Gorman, Miss M. Pinto, Mrs. W. Wason, Miss F. McCormack, Miss D. MacKinnon, Miss D. Demerin, Miss P. G. Chan.
 Second Row: Miss U. Steiner, Miss C. Dixon, Miss A. Senecal, Miss B. Johnson, Miss S. MacDonald, Miss O. Mbundu, Miss K. Devadason, Miss N. Y. Goh, Miss N. Isaacs, Miss M. Everett.
 Third Row: Miss N. Siddons-Grey, Miss J. Henry, Miss M. Cavanaugh, Mrs. L. Fletcher, Miss A. Cameron, Mrs. R. Boyer, Miss L. Carvell, Mrs. V. Earle, Miss M. Lee, Miss A. Gauvreau, Miss H. Zatylny.
 Fourth Row: Miss N. McGuire, Miss A. Johnson, Miss I. MacMillan, Miss B. Cameron, Miss B. Barrowman, Miss H. Kryk, Mrs. R. Parkes.
 Fifth Row: Mrs. L. Menard, Miss C. Forsyth, Miss J. Azarraga, Miss D. MacDonald, Miss T. Dona, Miss J. Redpath, Miss



Top Row: Mr. D. Skuce, Drs. M. Lechter, R. Tjaden, Y. Ushio, C. Pace-Asciak, Mr. J. Callahan, Drs. J. Clarke, T. Chiang, O. Espinas, P. Khare, J. Peyronnard, C. Orimalade, J. Grimes, H. Mars.
Second from Top: Drs. B. Graham, L. Renaud, J. Norris, G. Erba, Dorothy Young, J. Nabeanagu, R. Mendez, Miss K. Moravcska, Drs. G. Patry, B. Krystofak, Z. Elazar, J. Bulcke, A. Anzarut, O. Encinoza, Marie Joubert, Mr. R. Surwit, Dr. H. Courville.
Third from Top: Drs. G. Mathieson, J. Cosgrove, M. Molot, D. Melançon, Mrs. Clara Strauss, Drs. Y. Yamamoto, A. Eisen, J. Dietic, Hanna Pappius, G. Karpati, A. Sherwin, Lise Prescott, G. Bablad, J. Woods, I. Heller, H. Jasper, F. Andermann, L. Wolfe, Mr. C. Gard, Mr. L. Taylor.
Fourth from Top: Drs. D. Lloyd-Smith, F. LeBlanc, R. Ethier, W. Feindel, Mr. S. M. Finlayson, Professor H. Hydén, Drs. T. Rasmussen, W. Penfield, P. Robb, F. McNaughton, P. Gloor, Miss B. Cameron, Miss C. Griffin, Dr. J. Turner.
Bottom Row: Drs. S. Myles, D. Fecser, C. Needham, S. Ambhanwong, G. Mathews, A. Oltzner, P. Fragatos, H. Laurelli, C. Dila, H. Goodman, J. Spire.

GRADUATE STUDIES AND RESEARCH

DR. PIERRE GLOOR

The research performed in the laboratories of the Institute during the past year has opened up a variety of new fields and has also extended our knowledge in areas on which our previous research had been focussed. It will only be possible to summarize very briefly here some of the main highlights of the research activities of the past year. In Neurochemistry important new work has been carried out on degenerative brain diseases in children; some of these have for the first time been precisely identified in biochemical terms. This brings us one step closer to the solution of the pathogenetic riddle presented by these conditions. A new programme of biochemical studies in experimental brain infarction and anoxia has been initiated and has yielded promising results. In Neuroanatomy, hitherto unknown detailed patterns of projections of cerebellar nuclei to the thalamus have been established which clarify many important aspects of cerebello-thalamic connections and their further projections to other parts of the motor system. In the Neurophysiology Laboratories, research on single hypothalamic cells involved in thermoregulatory mechanisms has demonstrated the existence of an important inhibitory pathway between the anterior preoptic control mechanism which responds directly to changes in brain temperature and the posterior hypothalamic control mechanism responsible for mobilizing the organism's defences against cold exposure. In the William Cone Laboratory for Neurosurgical Research, new advances in the understanding of collateral flow in cerebral circulation have been made. The research laboratories of the Neurology Department have successfully extended their previous work on isoenzymes and muscle histochemistry. It has been found that antibody formation against specific enzymes can be elicited, a finding that may have many far reaching theoretical and practical implications. In Neuropsychology further quantitative analyses of complex higher nervous functions in man have been pursued. An important new finding has been that the two hippocampi are not equivalent in memory function, but that left sided hippocampal lesions affect predominantly verbal components of memory, whereas spatial memory tasks are more impaired with right hippocampal lesions. The electron-microscopical laboratories in Neuropathology have collaborated in studies on muscle diseases carried out in the Neurology Laboratories. In the Anesthesia Laboratories, physiological problems arising during the conduct of general anesthesia have been investigated.

However, rather than to elaborate on further details of these various research projects, I would like to take this opportunity of reviewing our research work to put forward some thoughts about what I believe should be the fundamental aims of the research and graduate teaching programme of this Institute. Especially the educational aspect of these activities within the framework of the Faculty of Graduate Studies and Research of McGill University has given us cause for much thought over the past few months and has forced us to look more closely at the broad aims which our research and graduate teaching programme ought to pursue. Apart from undergraduate

teaching, this Institute has to fulfill an important rôle in two areas of post-graduate training. The first is concerned with the training of skillful and knowledgeable clinical specialists in neurology, neurosurgery and in allied clinical disciplines such as neuropathology, neuroradiology, electroencephalography and electromyography. The second is to train neurological scientists who, although clinically oriented to a variable degree, are not primarily practitioners of a clinical specialty and are more aptly described by the term "physician-scientists" which I am borrowing from a recent report to our Faculty of Medicine prepared by Dr. Charles Hollenberg. If I take the liberty to consider in particular this second postgraduate teaching responsibility in basic science aspects of neurology, it is not because I am unaware of the importance of our residency training programme, but because I believe that the problems raised by our scientifically oriented teaching programme have not always been clearly formulated in our own minds and require urgent rethinking. Graduate teaching in the neurological sciences must be conducted by staff members whose training in scientific techniques has been such that they can be rightly regarded as being "physician-scientists" in their own right. Dr. Hollenberg's report, which I have just mentioned, outlines these requirements with admirable clarity and conciseness: "An individual aiming for a career as a physician-scientist must receive a training in research as professional as the one we require in the clinical discipline for a person aspiring to specialty qualifications. Usually this means a research experience equivalent to that demanded of a Ph.D. candidate in the basic science department. Excellent modern medical research requires this kind of background; the developments in modern biology, both in concept and in instrumentation, are such that a full three or four year research programme is usually required before an adequately trained scientist is produced." It is obvious that a training of this kind requires a great deal of motivation on the part of the student and a great deal of dedication and educational skill on the part of the teacher together with the freedom of time to impart his knowledge. It is equally obvious that such a programme has requirements that differ fundamentally from those which prepare our resident staff for the various clinical specialty examinations as defined in this country or in the United States. Such a graduate teaching programme aimed at producing physician-scientists therefore must be defined separately from that governing residency training. Such a distinction, which in the past was probably unnecessary, is today a vital requirement for maintaining a viable graduate teaching programme oriented towards basic science aspects of medicine. What the education of the physician-scientist should aim at is to enable him to translate into diagnostic and therapeutic action at the bedside the new basic science knowledge and techniques that are continuously produced along the vast and ever advancing front of new knowledge in the neurosciences. We have been fortunate in this Institute to be able to fulfill this function and to act as a bridge between basic science and clinical medicine. Much of our past pioneering in such fields as the surgical treatment of epilepsy can be regarded as the embodiment of this tradition; in recent years too we have progressed further along this road, as testified, e.g. by the elegant, single cell recording in the human thalamus carried out by Dr. Bertrand in the operating room,

by the biochemical identification of complex, but clearly definable cerebral lipids in certain lipidoses which have been performed in Dr. Wolfe's laboratory and by the application of immunochemical techniques to the study of neurological problems performed in Dr. Sherwin's and Dr. Karpati's laboratories. I submit, however, that to justify our existence as an Institute, distinct from a hospital department, our efforts in this direction should be expanded and carried forward with even greater vigor and determination. It is our responsibility as the only neurological institute in this country to provide leadership in this field. To render this rôle fully effective, however, a number of requirements have to be met and must be given the necessary priority. They can be defined as (1) the necessity of providing for modern, up-to-date, scientific equipment adaptable to the needs of clinically oriented basic research, (2) the insulation of competent physician-scientists from too many routine clinical and administrative chores, (3) the availability of sufficient funds derived from nonclinical sources to pay adequate and competitive salaries to first-rate scientists, and (4) the necessity to concentrate and to extend in depth our graduate teaching in the areas of our greatest competence and to seek a closer interdigitation of our graduate teaching with that offered by the various basic science departments of our University.

Of these four requirements, that concerning equipment is probably the least thorny. Although funds for scientific research from United States sources have become scarcer than in the past, first-rate research in this country has so far experienced not too much difficulty in obtaining from the Medical Research Council of Canada the necessary funds for equipment, salaries of ancillary personnel at the technician level and support for graduate and postdoctoral students. The availability of these funds however is contingent upon the presence on the staff of researchers who are not only competent, but also capable of devoting the major part of their time to research. In some areas this can probably be achieved only by recruiting additional scientific staff. This need is particularly pressing at the moment in both the clinical and experimental Neurophysiology Laboratories. Recruitment implies growth and expansion, including that of physical facilities. Fortunately our plans for the new wing of the Institute are by now well advanced and thus we can look forward to the day when our urgent need for the expansion of physical facilities can be fulfilled. It is a challenging opportunity to plan and design these new laboratories with an eye to the exciting and expanding future of the neurological sciences and the rôle we wish to play in furthering their growth.

NEUROLOGY

DR. PRESTON ROBB

The Roman god Janus, the guardian of the gates, is depicted with two faces, one looking backwards and the other forwards. Today, as guardians of the Institute, like Janus, we look back at the accomplishments of the past and forward to the future.

On this particular occasion I would take you back a few years. Neurology first came to McGill in 1903, when the medical board of the Montreal General Hospital decided to establish a "special outdoor clinic for nervous diseases." This was put under the direction of Dr. D. A. Shirres who came from Aberdeen having had some training in neurology. One of his first requests was for electrical equipment for diagnosis and treatment; he even ordered a magic lantern for the clinic! In 1914 Dr. Norman Viner joined the staff of the hospital, and became one of the outstanding teachers of the old Montreal General Hospital.

Dr. Shirres retired in 1920 and was succeeded by Dr. F. H. McKay, a man with an unusually sharp mind, and an uncanny ability to get to the meat of a problem. His consultations were masterpieces of logic, English and handwriting. He could move through the ward at a great speed, cigarette ashes falling on his coat, yet I can remember him stopping at some poor disabled patient's bedside, pull out a puzzle from his pocket and proceed to amuse the patient at length.

At the same time as Dr. McKay took over Neurology at the Montreal General Hospital, Dr. Colin Russel became the neurologist to the Royal Victoria Hospital. He had a distinguished record of service during the first great war, and returned to McGill full of ideas and enthusiasm. He worked on the relationship of exercise to the production of lesions in neurosyphilis, on lead poisoning as a possible etiological factor in multiple sclerosis, and experimental peripheral neuropathy. He delighted in telling the story of how some of his birds failed to develop a neuropathy on a thiamine free diet. Greatly puzzled, he sat watching the birds in their cages when he saw a large cockroach crossing the floor. As the cockroach approached the cage, the bird stuck out its head, bang and the insect was gone. Live cockroaches apparently have a good supply of thiamine.

When the M.N.I. opened in 1934, as a result of the vision and leadership of Dr. Wilder Penfield, Dr. Russel headed the neurological section. With him at that time were Dr. Arthur Young and Dr. Donald McEachern. They were soon joined by Dr. Norman Peterson and Dr. Francis McNaughton. Dr. Russel served the Institute and his country well and retired in 1945, to be succeeded by Dr. Donald McEachern. Don headed neurology at the Institute at a time when modern research was developing. Herbert Jasper was engrossed in electroencephalography and neurophysiology, and K.A.C. Elliott joined the Institute to start an era of exciting discoveries in neurochemistry.

Unfortunately in 1951 Dr. McEachern's life was cut short, and he failed to see his plans come to fruition. Dr. Francis McNaughton took command of neurology, and with this began an era of teaching and research that brought neurology to its present state.

Francis has been a most remarkable leader. Over a period of 17 years with his quiet determination he has been responsible for so many of the developments that we now take for granted. He fostered research and the

development of neuroanatomy and the neurology laboratories. As a clinician, Dr. McNaughton is unsurpassed. I am happy to report that he will be carrying on as the head of Neurology A, the first of three services that developed under his supervision. It is as our teacher that he will be revered. A long string of neurologists spread across the country are proud to say that they trained under Dr. McNaughton, and are happy to be able to call him a friend.

Neurology exists in this Institute for three reasons — medical care, teaching, and research. To these we address ourselves.

Clinical Services. We now have 11 full or part-time neurologists on our staff. There are three services each with their own staff, a resident, assistant resident and a medical rotator from either the Montreal General Hospital or the Royal Victoria Hospital. Including those in the laboratories, there are 17 training in neurology. Last year 1087 patients were admitted to the neurology services. There are two regular neurology clinics and specialty clinics for epilepsy, multiple sclerosis, and muscular disorders. Mr. Gurd will be reporting on the activities of these clinics.

At a time like this we ask ourselves — “what is our role as a special centre for the care of the neurologically ill?” Certainly it should not be one of struggling to keep ahead of the pack on inadequate financial resources. It goes without saying that this Institute should provide the best. But we must do more than this, we should be developing new diagnostic procedures, testing new drugs, and devising new methods of treatment. *In a word, our role is to provide leadership in patient care.* This leadership should not be confined to the walls of the hospital, but to the community at large. The advent of medicare will present a challenge to provide medical services with kindness and consideration in keeping with the dignity of the patient.

Research. The research teams in multiple sclerosis, epilepsy, immunology and muscle disorders, are making significant contributions. Cooperative clinics at the M.C.H. and here, provide clinical material for the muscle team of Karpati, Guzman and Eisen, and for the epilepsy absence study. Dr. Andermann continues his work on heredo-familial diseases in children.

It is my hope that in the next few years, as well as continuing the present research programmes, a broad attack may be made on the epilepsies with particular emphasis on the neuropharmacological aspects of the problem.

Teaching. Dr. McNaughton and I look back at the “good old days” when we were put to work on the ward, attended rounds once or twice a week, if we were lucky we got to “brain cutting”, and burned the midnight oil reading Ranson’s Anatomy, or Fulton’s Neurophysiology. We look back — and are thankful for the *better* days of today.

Time does not permit me to describe the undergraduate teaching programme. Suffice it is to say that the whole team, with Dr. Sherwin playing a leading role, has developed a teaching programme of which we may be justly proud. New courses in history-taking and physical examination have been well received by the second year. The already popular elective courses

have added to our teaching load, and the staff and residents have risen well to the challenge.

The residency training programme provides a broad experience in general neurology, pediatric neurology, and the specialties. As well, courses in the basic neurological sciences, conferences in neurology, psychiatry, neuro-ophthalmology, epilepsy; all enrich the neurology training programme. We are particularly happy with the rotating service through the Montreal General Hospital and Montreal Children's Hospital. We anticipate more changes at an undergraduate and graduate level — and look forward hopefully for "the best."

There is a great need in Canada for teachers of neurology, men who not only have the basic training but also have some special skill, be it in neurophysiology, neurochemistry, or neuropathology. I refer to men who have spent 3 or 4 years in a research programme learning to use the modern tools so necessary in research today. It is these men who will provide the leadership in the future. Money is needed to support likely candidates so that they may continue their research and teaching programmes and at the same time to live reasonably with their families and not go further and further into debt.

Time now only permits me, on behalf of Dr. McNaughton and myself to say thanks to all those who have contributed so much to making 1968 a rich and rewarding year for the neurology team.

NEUROSURGERY

DR. WILLIAM FEINDEL

This is a memorable year for neurosurgery. The Lister Centennial of last year is now succeeded by the Centennial of the birth of Harvey Cushing, a man described by Dr. Penfield as "A great leader, a brilliant, intolerant surgeon and also a delightful scholar and teacher". Although Sir Victor Horsley, before the turn of the century, broke the first ground in the specialty of brain surgery, it was Cushing, adapting the meticulous techniques of Kocher and Halsted, who brought the specialty to practical recognition.

McGill also has a large stake in the development of neurosurgery. Just 80 years ago, in the Canadian Practitioner of 1889, a paper entitled "On the Conditions of the Brain Suitable for Operative Interference" was authored by a physician, Dr. William Osler, who had just left McGill for Johns Hopkins. At that time Cushing was twenty years of age and Dr. Penfield, minus two. Osler's spirited humanism influenced neurosurgery through his later friendship with these two pioneer brain surgeons. Each has warmly declared his intellectual and inspirational debt to Osler.

As a medical student in the Osler Society at McGill I chose as my essay a report on Osler's contribution to neurology and neurosurgery. It was of interest to me that Osler presented a sympathetic point of view for neuro-

surgery. More than a third of his writings were concerned with neurological disorders. Since these were based on his work at McGill, many of them appearing in Canadian medical journals, he can be substantially claimed as the first Canadian neurologist.

Later at McGill, as Dr. Penfield has so well described, it was Dr. Edward Archibald, a student of Victor Horsley's (at the same time that Colin Russel also worked with Horsley) who took a systematic approach to cranial surgery and played a special rôle in 1928 in attracting Dr. Penfield, and with him Dr. Cone, to the Royal Victoria Hospital.

To-day, neurosurgery, like its sister-specialty neurology (and indeed, all branches of medical science) is irrevocably international. Canada now has almost twice as many neurosurgeons as either Great Britain or France. This Institute and Hospital is an outstanding example of the liaison which we Canadians have with our professional colleagues in the United States, Great Britain, France and many other countries.

The many world medical congresses meeting in Montreal in recent years emphasize further that medical science in Quebec and in Canada can no longer be considered parochial or provincial but only in its true international setting.

During 1968, there were 1,300 neurosurgical operations and major neuro-radiological procedures. There was a slight increase in spinal operations but some reduction in certain of the cranial procedures, such as brain abscess (a category in our classification whose absence causes the surgeons no great displeasure).

In just under 700 theatre cases, there were seven post-operative infections. Six of these were treated successfully by appropriate surgical measures and by antibiotic therapy. We appreciate the reviews of the Infections Control Sub-committee, Chaired by Dr. Garretson, with Miss Caroline Robertson and Miss Pat Murray. The Neurosurgical Residents are to be commended for their conscientious reports on any case of infection. This continual scrutiny of the medical, nursing and housekeeping staff is in large measure responsible for this low level of surgical infection rate of one per cent.

During the year the Cone Memorial Fund provided travel allowances for the attendance of three of our Nursing staff at postgraduate courses. Miss Robertson, the Clinical Co-ordinator, went to the course in surveillance and control of infections at the National Communicable Disease Center at Atlanta, Georgia, sponsored by the U.S. Department of Health, Education and Welfare. She was one of four nurses from Canada. Her excellent report summarizing her experiences will be of great value to our Infection Control Sub-committee.

Miss Pat Murray, Supervisor of our Operating Rooms, attended another meeting on operating room procedures and equipment, sponsored by the American Sterilizer Company. We expect her to be even more expert in giving us guidance in the many technical aspects of the operating room work.

Miss Anne Carney attended an organizational meeting of the Association of Neurosurgical Nurses at Cleveland, held in conjunction with the Harvey Cushing Neurosurgical Society meeting. A similar Canadian association is well under way and the Canadian Neurosurgical Society has already provided spiritual and financial support for this important venture.

The members of the Neurosurgical staff spent many hours during the past year in planning the extension of the clinical and laboratory floors in the proposed new wing. Integration of the operating theatre services with anaesthesia, radiology, and emergency and intensive care units will be greatly improved in this new scheme. In addition, much needed extension of space for neurosurgical research will be provided, including properly designed areas for the use of radio-active isotopes and for experimental stereotaxic and microvascular surgery.

The working arrangements for the Intensive Care Unit on 4-North have improved during the year. A combined unit of twelve beds as suggested by Miss Cameron and the nursing staff has reduced some of the complexities in providing nursing coverage. The medical staff have appreciated the high standard of care provided by the nurses and the auxiliary staff for the seriously ill patients in this unit. Dr. Gilbert and his staff have worked long and hard hours with our Residents to maintain this standard.

The pattern of research activities outlined last year has been continued by the neurosurgeons. As noted elsewhere in the report on the Cone Laboratory for Neurosurgical Research, we have continued to apply the techniques developed here for quantitative anatomical study of the cerebral circulation. It is gratifying to see our ten years' research development programme now coming to harvest.

The Neurosurgical Residents, Dr. George Mathews, Dr. Surapong Ambhanwong and Dr. Charles Needham, deserve congratulations for the high calibre of presentations which they and their Assistant Residents have produced at the Monday morning sessions and also for the general spirit of camaraderie which has prevailed throughout the year.

Dr. Pappius will be pleased to know that Miss Murray and I have finally succeeded in getting Elliott's artificial cerebral spinal fluid supplied by the Abbott Drug Company through the kind offices of Dr. Peter Nash the Medical Director and his research staff. This solution, which has been used for brain surgery since Dr. Elliott and Dr. Jasper produced it some twenty years ago, has been prepared by Dr. Pappius and her technicians at the rate of some 6,000 litres a year. The neurosurgeons express their appreciation of her careful control of this preparation and her characteristically cheerful attitude in taking on this chore. We are equally pleased that she now will be able, as it were, to liquidate her responsibility.

In clinical research we have found the new video-tape unit of particular value in the analysis of speech mechanisms during carotid amygdal testing and during electrical stimulation and mapping of the speech cortex during

operation, a study in which Dr. Brenda Milner, Mr. Laughlin Taylor and their associates have given such enthusiastic co-operation. Much precise and critical information can thus be recorded and played back for review. In addition to enhancing our understanding of the mechanisms of speech function this technique has been most useful for teaching of the Resident and Nursing staff and for display to visiting researchers.

I am sure that I voice the feeling of all the Neurosurgical staff in expressing our great loss when Mrs. Carmen decided to leave. Our warmest wishes go with her for much happiness. Characteristically, we note, she chose the right winter to substitute Florida for Montreal.

We are grateful to Mr. Gurd and his staff for organizing the extension of space for the brain scanning activities on third floor. Their help in changing a room with some rather odd medical plumbing into a well designed office and technical laboratory is much appreciated.

During the latter part of last year, Dr. Charles Branch followed Dr. Phanor Perot toward southern climes. His energetic approach toward neurosurgery was exceeded only by that which he devoted to sailing his 'Lightning' and we hope that he will continue to combine these talents equally well in Texas. Charles and Sylvia made generous contributions during their years in Montreal and we wish them well in their new life.

The Neurosurgical staff have presented clinical and research reports at a number of meetings. Dr. Rasmussen has been involved in the organization of the World Federation of Neurologists and of Neurosurgeons which will be held in September in New York. Various messages from our many neurosurgical friends in other countries indicate that there may be a veritable jet stream of neurologists and neurosurgeons going through Montreal this fall. Dr. Rasmussen also took part in the International Symposium on post-traumatic epilepsy held in Washington in January, under the auspices of the World Federation. Dr. Penfield continued his usual active programme of writing and lecturing and will be giving, next week, one of the distinguished opening lectures at the National Arts Centre in Ottawa. Dr. Elvidge, as one of the pioneers on this Continent in angiography, will be the person most appreciative of the remarkable new angiographic apparatus which Dr. Ethier and his associates have just begun to use in the past few weeks. We understand that the first trial proved conclusively that *vin rosé* was not entirely satisfactory as a contrast medium although it had certain other useful properties. Dr. Bertrand retired after his term of office as President of the Association of Neurosurgeons of the Province of Quebec and will be succeeded in that office by Dr. Joseph Stratford. Dr. Garretson attended a postgraduate course in microsurgery in November at Zurich. Dr. Francis LeBlanc, obtained his Fellowship from the Royal College of Surgeons of Canada. He is at present very busy with us in organizing the coming Canadian Congress of Neurological Sciences to be held in Montreal a few weeks hence. I have the privilege, as President of the Canadian Neurosurgical Society, of being also Director of this Congress, which was founded here

twenty years ago as the Canadian Neurological Society. It has now grown into a professional body which brings together the multi-disciplinary aspects of research and clinical treatment related to the nervous system and represents a widely based group to speak for the Brain Sciences in Canada.

As we close this academic year, there is a strong undercurrent of concern regarding the support of medical research in the neurosciences in Canada. The figures which are available suggest that in terms of research workers, laboratories, and money available for the brain sciences, Canada is operating at a per capita rate of only about 20% as compared to Great Britain and the United States. There appears to be no overall policy in Canada to determine any planning in neurosciences research nor indeed is there at the moment any group responsible for this. We are fortunate in having a Neurosciences Grant Committee within the Medical Research Council and the evidence indicates that they have done a remarkably able job in supporting this branch of research within the limitations imposed by the funds so far available. The recognition of the disadvantaged position in which we find ourselves, however, compels us, first of all, to enlighten those in authority about this situation and then to organize among ourselves a more effective group to support brain science and the training of scientists and clinicians in this important field. In 1959 at a Symposium in which Dr. Penfield took part, on "Memory, Learning and Language" at the University of Saskatchewan, I said, "We hear much to-day of stars and planets and outer space has captured the imagination of man. But perhaps we would do well to remember that each of us has in his possession the most remarkable of galaxies — twelve billion nerve cells with their myriads of subconstellations in the compact universe of the human brain. It is this inner space of the mind which surely, of all our natural resources, offers the most exciting potentialities".

ADMINISTRATION

MR. CHARLES S. GURD

During the past year the Montreal Neurological Institute and Hospital continued to make advances in the relief of neurological sickness and pain and in the teaching and research of neurology, neurosurgery and their associated disciplines.

The Hospital provided 42,363 days of patient care during the past year. This reduction of 3% over the previous year was caused by a shortage of suitable registered nurses during the summer and fall of 1968. The average stay per patient was reduced by 6% to 19.8 days and could have been further reduced if additional chronic care facilities had been available in the Montreal area.

A new Intensive Care Unit was opened in March of 1968 and now provides specialized care for patients with brain and spine disorders suffering from serious respiratory and cardiac complication. Preliminary sketches for a new addition to the Hospital and Institute are in the process of being prepared. They will take into consideration our requirements over the next 15 years.

Financial

The Hospital's operating expenditures for the year 1968 amounted to \$3,373,810, an increase of 8.3% over the preceding year. A comparison of cost over the five-year period 1964 to 1968 shows that while the total cost of the Quebec Hospital Insurance Service increased by 77%, the increase at the Montreal Neurological Hospital was at the lower rate of 52%.

The Hospital's annual operating deficit, prior to final settlement, decreased from \$411,854 in 1967 to \$223,255 in 1968. This significant reduction was the result of improved cost controls on the part of the Hospital and an upward adjustment of the original budget on the part of Q.H.I.S.

The accumulative deficit at December 31, 1968 with adjustments to May 25, 1969 was \$428,778. When requirements for current working capital are included, the Hospital is indebted to McGill University for approximately \$784,000. In order to reduce the financial burden on the University, it is imperative that the Quebec Hospital Insurance Service take steps to reduce the time lag between the filing of year-end audited statements and final cash settlements and that annual budgets be initially approved in a more realistic manner.

Labour Relations

Collective Labour Agreements between the Montreal Council of Hospital Syndicates and the United Nurses of Montreal expired on June 30, 1968. Negotiations towards a new contract are proceeding in a satisfactory manner and it is expected that agreement will be reached in the near future. The Agreement with the Association of Internes and Residents of Montreal will expire on June 30, 1969 and negotiations are about to commence.

Physical Plant

In addition to the opening of the Intensive Care Unit and preliminary planning for a new addition to the present building already mentioned, other physical changes were made to improve the overall operation of the Hospital and Institute. A rearrangement of the Paediatric Ward in January, 1969 reduced the number of cribs and increased the number of adolescent beds to correspond to the present demand for accommodation. A Sterile Supply Unit was established, combining in one location sterilization formerly carried

out in six separate dressing rooms. In the Department of Radiology, Room A was modernized, resulting in an upgrading of the quality of X-Ray films. Extensive alterations to the electrical distribution circuits were completed at the Nurses' Residence, 3661 University Street and on the 6th and 7th floors of the hospital building. The fire alarm system in the Hospital and Institute was modernized by the installation of new equipment.

Dietary

We are pleased to welcome Mrs. T. Guidote who, on April the 1st, 1969, became the first full time Dietitian on the staff of this Hospital. She assumes responsibilities formerly held by the Dietary Staff of the Royal Victoria Hospital.

Administration

The administration of individual hospitals in the Province has changed rapidly during the past few years. During this period, the central authority through orders-in-council have assumed responsibility for decisions at increasingly lower levels of the administrative structure. Though it is recognized that decisions of a monetary nature should be controlled by the government of the day, they should be administered in a less restrictive manner. In those areas where the central authority reserves the decision-making function, such decisions should be made rapidly by individuals familiar with the local situation. Referral to higher authority tends to result in delays with resulting frustration and inefficiency.

A hospital is a dynamic organization in a constant state of change. Budgets prepared 18 months in advance of expenditures tend to freeze the latitude permitted its management. I feel strongly that greater flexibility in the interpretation of budgets at the local level must be permitted. I suggest that this might be accomplished by the establishment of departmental norms which are acceptable to both the Hospital Insurance Service and the Association of Hospitals of the Province of Quebec. Individual hospitals should be given the authority to make decisions which fall within the limits of the approved norms without further approvals from the central authority.

I wish to thank most sincerely the members of the Women's Auxiliary of the Royal Victoria Hospital and in particular, Mrs. W. M. Garven and Mrs. J. Brunt for the many hours spent in managing the Coffee Shop. All who use its facilities are deeply indebted to their devotion.

In closing, I wish to thank the staff and employees of the Hospital for their dedicated service to the goals of this Institution and for their daily cooperation in attaining our objectives.

Statistics

	1967	1968
Admissions	2,056	2,122
Discharges	2,057	2,141
Patient Days	43,707	42,363
Occupancy Rate	88.7%	84.7%
Average Stay per patient	21.1 days	19.8 days
Operations	1,253	1,301
Deaths	93	89
Autopsy rate	75.3%	81.0%
Operating Expenditures	\$3,133,486.	\$3,373,810.
Equipment Expenditures	\$75,508.	\$97,220.
Net shareable cost per patient day	\$66.27	\$74.07
Reimbursement by Quebec Hospital		
Insurance per patient day	\$56.00	\$64.55
Difference between cost and income per patient day	\$10.27	\$9.42
Deficit on year's operation	\$411,854.	\$223,255.
Accumulated Deficit at Dec. 31 pending year end adjustment	\$727,545.	\$632,778.

NURSING DEPARTMENT

MISS BERTHA I. CAMERON

The Nursing Department has experienced another active and challenging year.

All hospitals are currently facing the dilemma of attempting to provide high quality nursing care within the limits of a tight budget and the restrictions presented by various Unions in regard to hours and conditions of work. The Montreal Neurological Hospital is no exception, indeed the problem is even more keenly felt in a teaching and specialized hospital. The challenge of providing the desired type of staff-education program increases with the continuous replacement of general duty staff nurses. The demands on a nurse in this field are very high and the supply of previously prepared nurses is limited. The efforts of all members of hospital staff are required in order that new nurses may function safely and securely. We are aware of this contribution in the past, rely upon it for the future and wish to express our appreciation to all members of staff at this time.

We are proud of our association with McGill University programs for nursing and of the affiliation of students from the Royal Victoria Hospital and Plattsburgh University.

The work-shops which have been presented by our hospital and the visits made by members of our staff to other centers have proved to be rewarding and most worthwhile.

Our Post-Graduate Course of six months' duration which is held twice yearly is known throughout the world. Many inquiries are being received for assistance in establishing similar programs elsewhere and visitors come to study the type of program at close hand.

To date 802 Post-Graduate Students from 37 countries have received their certificates (we are looking forward to seeing some of these and other former staff members during the International Council of Nurses' Congress Meeting in Montreal in June).

The past year has seen the establishment of our Intensive Care Unit and Central Supply Room in order to make the most efficient use of nursing personnel. The experiences gained thus far will be most useful for the future.

The function of the Admitting Office has been transferred from the Department of Nursing to the Business Office. We are also pleased to report the appointment of Mrs. T. Guidote as our first full time Dietitian.

In the light of these positive changes which effect the department of nursing directly, we are looking forward to maintaining and improving the quality of our nursing care.

SOCIAL SERVICE DEPARTMENT

DirectorMISS CYNTHIA GRIFFIN, B.A., M.S.W.

Social Workers:

MISS ANN CHANT, B.A., M.S.W.

MISS KATHLEEN MACDONALD, B.A., B.S.W.

MRS. SAROJ GUPTA, B.A., M.S.W.

MISS NOELLA VAILLANCOURT, B.A., M.S.W.

MRS. IRENA LIEBICH, B.A., M.S.W.

MRS. LOUISE VAN GELDER, B.A., M.S.W.

A review of past reports of our department reveals with monotonous regularity that we rendered service to approximately 1000 patients. The majority were referred by the medical staff and the proportion of $\frac{1}{3}$ in-patients to $\frac{2}{3}$ out-patients and of $\frac{1}{3}$ from neurosurgery to $\frac{2}{3}$ from neurology was accounted for mainly by the large Seizure Clinic and the large group of patients suffering from chronic neurological diseases with long-term social problems, e.g. multiple sclerosis. The majority of referrals of in-patients were for discharge problems and of out-patients for problems of adjustment to home, school or work and for financial difficulties. The volunteer aid we received both in time and in funds was invaluable. In helping patients and their families, the social worker made frequent contacts outside the hospital — in one year with over 125 different organizations. There was only one year in the past twenty when it was not stated or implied that the problems concerning discharge plans were worse, or more insoluble than ever before.

The activities of the past year were similar; I shall comment in more detail on a couple of items, and make one or two new observations.

Let me review for you a day in the life of a social service secretary. 8:54 a.m. — telephone call from Mrs. A. "May I speak to my social worker?" "I am sorry. She hasn't come in yet. I'll tell her you called." "I must speak to her." "I'm sorry, Mrs. A., the other phone is ringing. — Yes, I'll ask Miss Blank to call you." 8:59 on other line — Call from Mr. B. "I've only enough pills for three days and my next clinic appointment is not for three weeks — No, I can't go out by myself. No, my wife is at her cleaning job and can't go till after 5." During the day there are 30-35 other telephone calls as well as patients or relatives coming to the office. And, of course, she types and files letters, reports, forms, and master file cards, and keeps account of the petty cash fund. 3:30 p.m. Mrs. A. Calls back. Unable to talk immediately with the social worker or the doctor, she insists on describing in detail both physical symptoms and family troubles. 4:30 p.m. Secretary telephones Mr. B. to tell him that his medication costing \$8.35 will be at the Information Desk for his wife to pick up. 4:50 Quietly interrupts doctors and social worker, conferring about patients just seen at clinic, to ask if she can clear away the tea cups. 5 o'clock — home.

Voluntary aid of all kinds has become more important as the medically indigent have less available funds to meet their needs. Despite the trend for government to assume responsibility for the major financial needs of the less fortunate, the steady climb in the cost of living, and repeated promises by the Quebec government, there has been NO increase in the basic welfare rate for over five years. Therefore, non-governmental agencies must try to fill the gap, no matter how inadequately and how unevenly.

For generous donations to funds administered by our department, we are indebted (among others) to the Royal Victoria Hospital Women's Auxiliary, and to a number of service clubs and individuals. Over 90% of our expenditures were to help provide needed medical and related care for out-patients in their own homes or attending clinics, frequently preventing many days of expensive hospitalization.

In Volunteer Services, we are increasingly conscious of the importance of the help by RVH volunteers to patients and staff in the clinics and on the wards, and of the help of the Montreal Volunteer Bureau's drivers and shoppers for those confined to their homes.

This year although we had no active programme of student supervision, one student from the McGill School of Social Work met weekly for three months to lead group discussion with five night clinic seizure patients. There are plans to extend this successful project for parents of seizure patients. During 1968 in the Seizure Clinic, the social worker interviewed all *new* English-speaking patients. Of these about 70% needed social service help, some with immediate, others with long-term problems; still others returned later with unanticipated problems. We hope that this service may be extended soon to the French-speaking patients.

Last, but far from least, I return to the ever-present problem of the chronically ill. "Institutional beds and resources for home care, often the preferred alternative, are not available. We are told at hospital after hospital for patient after patient that the classification of chronic care prohibits admission, as the only patients accepted are for convalescence or for rehabilitation." The last two sentences were taken from my 1966 report, but they seem even more pertinent today. We hope that during the coming year we may see a breakthrough of the barriers to adequate care for the chronically ill.

ANAESTHESIA

<i>Anaesthetist</i>	R. G. B. GILBERT, M.B., B.S. (Lond.), F.R.C.P. (C), F.F.A.R.C.S., F.A.C.A. C.S.P.Q.
<i>Associate Anaesthetists</i>	A. PACE-FLORIDIA, M.D. (Malta), F.R.C.P. (C), C.S.P.Q. GEORGES-HENRI SIROIS, B.A., M.D. (Montreal), F.R.C.P. (C), C.S.P.Q. DAVY TROP, M.A., M.D. (Ghent), M.Sc. (McGill)
<i>Assistant Anaesthetist</i>	ALEX M. STRAJA, M.D. (Bucharest)

Residents:

M. ABOU-MADI, M.D. (U. of Alexandria)*	N. COUREY, M.D. (McGill)*
JENNIFER BARNES, M.D. (U. of St. Andrews)*	N. DER, M.D. (National Taiwan U.)*
F. BUNYI, M.D. (Manila Central U.)*	M. HUGEL, M.D. (U. of Heidelberg)*
S. BUTLER, M.D. (U. of Toronto)*	

*Six months on this service

During the past year there were a considerable number of staff changes in the Department of Anaesthesia.

Dr. Anibal Galindo, on completion of his Ph.D. Thesis, taken with Professor K. Krnjevic, left to join the Research Anesthesia Department of the University of Washington. This was a keen disappointment to all of us as it was hoped that he would continue his investigations of the central action of anaesthetic drugs in this Institute.

Dr. Andrée Pinault left at the beginning of August following a productive year as our assistant.

On September 1st, Dr. G. Fred Brindle left to accept the position of Chairman of the Department of Anaesthesia at the new medical faculty at Sherbrooke. In speeding him with our very best wishes, we can only thank him for all his contributions to this Department, the Institute and the University. We miss a wise councillor and good friend. Fortunately he has agreed to remain as a consultant.

We have been fortunate in gaining the services of Dr. Georges-Henri Sirois who was one of the outstanding students of his year at the Université

de Montréal. Dr. Sirois studied Anaesthesia at the Hôpital Hôtel-Dieu, Hôpital Notre-Dame and Hôpital Hôtel-Dieu de Québec.

We have also had the good fortune in enticing back Dr. Davy Trop. Dr. Trop, following a high quality postgraduate career in Ghent, came to this country where he worked at Hôpital Notre-Dame, the Montreal Neurological Hospital and the Montreal Children's Hospital as a resident. Following that he took an M.Sc. in Experimental Medicine in the Cardio-Respiratory Department. He returned to Belgium for a while where, in addition, he has nearly completed his "Agrégation" in respiratory physiology.

Our assistant, Dr. Alex M. Straja from Bucharest, was formerly an E.N.T. specialist. It is hoped that his special knowledge will be turned to good account in the clinical and research work of the Institute.

Dr. R. G. B. Gilbert continues as an Executive of the Academy of Anesthesiology and the Neuroanaesthesia Commission of the World Federation of Neurology. He has resigned from the Council of the Canadian Anaesthetists' Society but retains his University seat on the council of the Quebec Division.

Overall, there have been 1040 operations under anaesthesia and 1060 anaesthetic procedures. There were 2,690 procedures done in the Anaesthesia Laboratory of which research procedures number 469, or 17.4%.

There was one case of cardiac arrest in the operating room 2½ hours after induction. The heart was restarted but the patient never recovered consciousness and died two days later.

Five deaths within 48 hours of anaesthesia and surgical procedures were documented in detail.

Nineteen cases were done in sitting-up position. There was only one case where there occurred an alarming drop in blood pressure (68-51) despite the G-Suit and this probably was related to the patient being cold. All others had a remarkably stable cardiovascular status notwithstanding the long duration frequently of operation.

All patients had an excellent postoperative course. Two patients had an unexplained neuromuscular paralysis at end of operation from which they recovered. Both had previously been for some weeks on a centrally acting muscle relaxant (Mephenesin "Tolseram") and one wondered at the time if Penthrane potentiated the synaptic depressant effect of Tolseram at the spinal cord level. One of the patients was reopened because of a suspected epidural but the operative site was clear. Careful investigation with regard to ingestion of this drug, Tolseram, is a prerequisite prior to administration of Anaesthesia. (This drug is administered for its alleged benefit in relief of tic — both patients were operated upon).

In the middle of 1968, pilot work commenced in a section of the hospital modified to form our first Intensive Care Unit. There have been

239 patients treated in this area. Our appreciation of the nursing care given is emphasized. It is the secret of this department.

Our clinical and research equipment is up-to-date and well taken care of by Miss Helena Tracz, Mr. Campbell and Mr. Henry who are in our debt for their interest and devotion.

Research Work:

A number of studies are under way:

Ventilation — a) respiratory mechanics during and after prolonged anaesthesia; b) ditto following ventilator control; c) ditto in the unconscious patient; d) effect of pO_2 on A-2 difference.

Circulation — cardiac output under varying circumstances and the effect on it of altered ventilation.

Drugs and techniques — clinical investigations on the application of Ketalor and Valium continue, those on the latter have recently been published.

Research Fellows working in our department are Dr. Ney Louzada from Brazil who is following up the work of Dr. John Cocco. Dr. Louzada's studies have been facilitated by the Ford Foundation. We wish to express our thanks to Dr. Margaret Backlake for her help and interest.

More recently, Dr. Jacques Couture from the Université de Montréal, has commenced respiratory studies with us using Isotope Techniques under the direction of Dr. Milic Emili.

Prior to leaving, Dr. Anibal Galindo completed fairly sophisticated microelectrode studies according to the Eccles technique. These have formed the basis of the experiments for his Ph.D. Thesis, a copy of which is available in my office.

Undergraduate lectures have been given by Dr. R. G. B. Gilbert. One student elected to spend his summer on a project with the Department of Anaesthesia of the Montreal Neurological Hospital.

Postgraduate seminars have been conducted by Dr. A. Pace-Florida, Dr. G.-H. Sirois and Dr. D. Trop. Nurses lectures have been given by Dr. R. G. B. Gilbert.

Dr. R. G. B. Gilbert was honoured by being asked to organize and chair a symposium on Neuroanaesthesia at the IVTH International Congress of Societies of Anesthesiology in London, last September.

NEURORADIOLOGY

<i>Radiologist</i>	ROMÉO ETHIER, B.A., M.D.
<i>Associate Radiologist</i>	JEAN VÉZINA, B.A., B.M., M.D.
<i>Assistant Radiologist</i>	DENIS MÉLANÇON, B.A., M.D.
<i>Teaching Fellow</i>	MICHAEL MOLOT, M.D. (U. of Ottawa)*

Residents:

G. BABLAD, M.D. (U. of Manitoba)*

J. E. CALLAGHAN, M.D. (Western U.)*

B. W. MCKEE, M.D. (McGill)*

G. MORRISON, M.D. (RVH Rotator)*

R. J. TJADEN, M.D. (U. of Manitoba)*

J. WRINCH, M.D. (RVH Rotator)*

*SIX months on this service

For the first time, more than 12,000 examinations have been carried out in a calendar year. Needless to say, this was possible only with the co-operation of the medical staff and personnel. For that reason, I take this opportunity to express my most sincere thanks to the radiographers, orderlies, nurses and secretaries who have worked long hours with a devotion difficult to surpass. I would also like to thank in particular the anesthetists who assisted us with the special procedures, which are steadily increasing in number.

My most sincere thanks go also to Drs. J. L. Vézina and D. Melançon for their magnificent support with the various lectures, with the teaching in the department and also the increasing work-load.

The Neuroradiology seminars were resumed in the Fall of 1968. Various subjects were covered during the Monday afternoon sessions between 4:30 and 6:00 o'clock.

In addition, we carried a full complement of neuroradiology trainees. Dr. J. Chan has completed a year of residency in July and was followed by Dr. R. J. Tjaden. From the McGill affiliated hospitals, we had Drs. M. Molot, J. M. Dumas, H. Patriquin, B. McKee and J. E. Callaghan for periods varying from 3 to 6 months.

In July, Dr. M. Molot returned to us as a clinical fellow for a period of 6 months. He obtained both his certification and fellowship in radiology, for which he deserves our congratulations and admiration.

Most of the planning for the renovation of the x-ray department has been achieved in 1968 and modifications were started in Room A which is going to become the main angiographic room. The facilities of that room will consist of a stereoscopic bi-plane unit, fluoroscopy, as well as ciné and videotape recordings which we hope will improve the quality of the angiographic examinations and therefore the service to the patients. It will be feasible to obtain stereographic magnification arteriograms which I presume would be of a high interest in very small lesions.

The renovation plans of the x-ray department have been approved by the special governmental committee on equipment and the changes will be carried out in three major steps.

NEUROCHEMISTRY

<i>Consultant</i>	DR. K. A. C. ELLIOTT, M.Sc. (S. Africa), Ph.D., Sc.D. (Cantab.), F.R.S.C.
<i>Neurochemist and Medical Research Council Associate</i>	LEONHARD S. WOLFE, M.Sc. (N.Z.), Ph.D. (Cantab.), M.D.
<i>Associate Neurochemist</i>	HANNA M. PAPIUS, M.Sc., Ph.D.
<i>Assistant Neurochemist, Clinical</i>	IRVING HELLER, B.Sc., M.Sc., Ph.D., M.D., C.M.
<i>Research Associate and Medical Research Council Scholar</i>	C. PACE-ASCIAK, B.Sc., Ph.D.
<i>Visiting Scientist</i>	LINA PUGLISI, Dr. Biol. Sci., Institute of Pharmacology, University of Milan*
<i>Post-doctoral Fellow</i>	FLAVIO COCEANI, M.D. (Bologna) Docent in Human Physiology*

Fellows:

JOHN W. CALLAHAN, B.Sc., M.Sc.
(Windsor Univ.)

MARIA K. MORAWSKA, B.Sc.

JOE T. R. CLARKE, B.Sc., M.D.,
Medical Research Council Fellow

JOHN W. NORRIS, M.B., Ch.B., M.R.C.P.,
Medical Research Council Fellow

Senior technicians:

MRS. A. KURNICKI

MRS. H. SZYLINGER

*Left October, 1968.

CLINICAL LABORATORIES

The total number of procedures performed in the 7th Floor Neurochemistry Laboratory on spinal fluid, blood and urine during 1968 was 18,530 (19,319). Figures for 1967 are given in parentheses. In addition, 5,502 (5,958) litres of irrigation solution were prepared for the Operating Rooms. We have discontinued the preparation of this solution since it has now become available from a commercial source.

We are continuing to perform serum creatine phosphokinase determinations. The urinary chromatographic analysis has been replaced by a series of 8 chemical screening tests for multiple metabolic disorders in children.

The 3rd Floor Ward Laboratory performed 15,732 (15,036) separate hematological determinations and 4,918 (5,147) urinalyses were done. In addition 7,455 (6,434) samples of blood were drawn for biochemical analysis at the R.V.H. and 13,836 (15,303) for our 7th Floor Laboratory and the Provincial Laboratories. About 429 (405) stool examinations for occult blood were also made.

The results indicate a certain levelling off of the work load when compared to the steep rise in demand during the early 1960's.

We enjoy excellent cooperation from the Royal Victoria Hospital Biochemistry Laboratory and from the Anesthesia Departments of the Royal Victoria Hospital and M.N.H.

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 the neuropilidoses.*

In the past year we have made considerable advances in our studies of this group of diseases. G_{M1} -gangliosidosis is now clearly recognized as an inborn error of metabolism quite distinct from Tay-Sachs disease (G_{M2} -gangliosidosis) and other forms of the neuropilidoses. In this disease the normal major monosialoganglioside (G_{M1}) and a ceramide tetrahexoside, the asialo-derivative of G_{M1} -ganglioside, accumulates excessively in the nervous system. The infantile form of this disease has been called by O'Brien and coworkers 'generalized gangliosidosis' whereas the late infantile form

has been described by Gonatas and Suzuki and associates as 'systemic late infantile lipidosi'. Visceromegaly and distinctive skeletal abnormalities resembling those seen in Hurler's disease are not a prominent clinical feature of the late infantile form. Our biochemical studies strongly suggest that this disease is a single genotypic entity with variable phenotypic expressions depending upon the age of onset.

We have made a detailed study of a three-year old Mohawk Indian girl with progressive neurological deterioration since 10 months of age who was diagnosed as G_{M1} -gangliosidosis by chemical analysis of the brain following cerebral biopsy. A 10-year old brother had previously died after a similar clinical course. Visceromegaly and marked bony abnormalities were absent in both. On the clinical side, we have had the cooperation of Dr. F. Andermann and Dr. C. R. Scriver. The pathological studies were done by Dr. J. S. Fawcett. Mr. John Callahan has carried out excellent biochemical studies which have resulted in many new findings. Dr. L. Pinsky has been most helpful in the setting up of the fibroblast cultures. This is the first study of this disease during life. Only a brief summary of the results can be included here. Morphological examination showed a marked neuronal lipidosi associated with the accumulation of membranous cytoplasmic bodies, many pleomorphic abnormal organelles and previously undescribed membrane-limited organelles packed with fine parallel arrays of tubule-like structures. Fibroblasts contained highly water soluble metachromatic material and empty cytoplasmic vacuoles. There was a large increase of G_{M1} -ganglioside in the cerebral cortex gray matter. β -galactosidase activities of the leucocyte from both parents were significantly reduced. This enzyme assay is therefore useful in early case finding and for counselling of families as to carrier status of this recessive mutant autosomal allele. The patient's urine yielded positive Toluidine Blue and Alcian Blue reactions even though the urinary uronic acid excretion/gm creatine/24 hrs. was normal. A marked increase in two types of undersulfated keratan sulfate glycosaminoglycans was found. Mr. John Callahan has also isolated the glycosaminoglycans stored in the liver from another child who had died of this disease and shown its relationship to the material excreted in the urine. We are now carrying out detailed structural studies on this glycosaminoglycan and are also investigating the synthesis of these compounds in normal and abnormal fibroblast cultures using radioactive precursors. These studies have led us to the conclusion that three biochemical criteria enable the unambiguous and specific diagnosis of G_{M1} -gangliosidosis. These are, (1) the excessive accumulation in the nervous system of G_{M1} -ganglioside, (2) a profound deficiency of a β -galactosidase in brain and other tissues and (3) the accumulation in varying degree in the viscera but not in the brain of a highly water soluble undersulfated glycosaminoglycans of the keratan sulfate type and their excessive excretion in the urine.

We have initiated chemical studies of the brain of Jansky-Bielshowsky and Spielmeyer-Vogt types of cerebromacular degenerations. It seems clear now that there are several different diseases included in this classification. The chemical nature of the storage material is still far from clear.

Mrs. A. Kurnicki has given excellent technical assistance in these investigations.

We express our appreciation to the Donner Canadian Foundation for a grant to cover part of the salary of a Research Chemist.

(b) *Studies on prostaglandins*

In the past year research in the prostaglandin field in many parts of the world has expanded greatly. However the physiological significance and the primary site of action of these unique compounds which are formed from certain essential polyunsaturated fatty acids is still unknown. At the present time there are indications that these lipids are formed locally in tissues and act there by either influencing the activity of the cyclic adenosine monophosphate synthesizing enzyme or control the distribution and availability of calcium by a direct action on the plasma membrane.

Dr. Coceani and Dr. Puglisi made a detailed study of the influence of prostaglandin E₁ (PGE₁) on calcium movements in the smooth muscle of the rat stomach. Interesting and unexpected results were obtained. Utilizing ⁴⁵-Calcium, influx and efflux of this cation from the muscle was studied. PGE₁ had no effect on calcium influx but decreased significantly the calcium efflux. Exceedingly low doses of PGE₁ which were insufficient to elicit contraction (10⁻¹¹ — 10⁻¹⁰ g./ml) caused an increase in the total tissue calcium content. This calcium was retained in a slowly exchangeable pool which was likely in the cell membrane. These results explain the previously reported long-lasting enhancement effects to various other spasmogens caused by prior exposure to non-contracting doses of PGE₁. A new mechanism of prostaglandin action was proposed.

Our previous work had shown that PGE₂ and PGF_{2α} were formed and released by the rat stomach following stimulation of the vagus nerve in a stimulus-dependent fashion. The prostaglandins in these studies were characterized by combined chromatographic and bioassay techniques. Dr. Pace-Asciak has shown that these prostaglandins are indeed formed in stomach tissue from arachidonic acid by isolating and purifying the compounds and determining their structure by mass spectrometric methods. These studies utilized tritiated arachidonic as the precursor for prostaglandin synthesis. A new prostaglandin-like compound formed from arachidonic acid has been identified, purified and its complete structure is at present being determined. This work has been difficult and tedious since less than a milligram of material is available for the chemical characterization. The ways in which the essential fatty acid, arachidonic acid is interconverted into the other compounds enzymatically or by peroxidation is of considerable importance. Now that we know some of the properties of this compound its identification in brain, blood and other tissues is greatly simplified.

Miss Maria Morawska (Klara in the laboratory) is investigating the metabolism of the prostaglandin most commonly found in tissues including brain, i.e. PGF_{2α}. It has been found that PGF_{2α} is converted enzymatically

into a number of less polar compounds. These compounds are being isolated and purified and their structures will be determined by combined gas chromatographic and mass spectrometric techniques coupled with a variety of selective chemical degradative procedures followed by chemical characterization of the products.

Dr. Joe Clarke has attempted to show the synthesis of prostaglandins by brain tissue with labelled arachidonic acid as precursor. But so far these studies have been unsuccessful even though it has been clearly shown by us that $\text{PGF}_{2\alpha}$ is formed from endogenous free arachidonic acid in brain. We do not know as yet the explanation for this.

(c) *Chemical studies on vincristine myopathy*

With the cooperation of Dr. George Karpati, Dr. Joe Clarke has commenced a study on the biochemical changes caused in muscle in this experimental myopathy. These studies are of considerable interest in relation to the primary myopathies in man.

(d) *Studies of edema*

The study of effects of dexamethasone on cerebral edema induced in cats by a localized freezing lesion, which Dr. Pappius and Dr. W. P. McCann started some time ago was completed during the last year. It showed that dexamethasone (0.25 mgms/kg/day) significantly diminished the edema, measured both as the increase in weight and in RISA uptake in the traumatized hemisphere 48 hours after the lesion was made. The effect of dexamethasone was not significant at 24 hrs. Dexamethasone dramatically improved the EEG abnormality present after the lesion in untreated animals. No correlation could be demonstrated between the degree of edema and the extent of EEG abnormality and between the effects of dexamethasone on the two parameters. It was suggested that clinically beneficial effects of steroid therapy may not be fully explained by effects on cerebral edema.

With Dr. J. W. Norris, Dr. Pappius has started a systematic investigation into effects of asphyxia, hypoxia, hypercapnea and hypoxia with hypercapnea on water and electrolyte content of brain tissues of cats. Preliminary experiments fail to demonstrate any edematous changes up to 24 hours in brains of animals completely deprived of oxygen for periods compatible with subsequent survival (5-7 minutes), as well as in animals subjected to prolonged periods of severe hypoxia (blood pO_2 approx. 25 mm Hg), even though these animals become neurologically damaged and show pathological changes in the brain usually attributed to hypoxia.

Some years ago, Drs. Wolfe and Lowden found that gangliosides are altered by hypoxic or anoxic conditions. For this reason in the animals studied by Drs. Pappius and Norris the N-acetylneuraminic acid (NANA) content of brain is also being determined. NANA is an important component of gangliosides and it is hoped to clarify what respiratory and metabolic conditions lead to changes in structure of gangliosides in the brain and how, if at all, are these changes related to irreversible neurological damage.

(e) *Investigations on experimental cerebral infarction*

Because of the clinical interest of Dr. Norris in cerebral vascular disease, it was decided to develop a reproducible experimental model of cerebral infarction and to examine the associated edematous and other chemical changes in the brain. This work has been carried out in dogs using the operating room facilities of the McIntyre Animal Centre. After initial failure to produce consistent lesions with intracarotid homologous clot emboli, diffuse patchy hemispheric infarcts were obtained with intracarotid injection of plastic microspheres 50-100 μ in diameter. In addition, large, focal infarctions have been consistently induced by open clipping of the middle cerebral artery. Preliminary results indicate that the cerebral edema which develops is characterized by similar changes in water and electrolytes as those previously described by Dr. Pappius for edema induced by freezing lesions. Determination of the NANA content of various areas of cerebral cortex indicate that there is a decrease in the area surrounding the infarction.

Mrs. H. Szylinger continues to provide excellent technical assistance in all aspects of the investigations on cerebral edema and associated problems.

During the past year, members of this department have engaged in many activities at home and abroad. Dr. C. Pace-Asciak was awarded a Medical Research Council Scholarship and Dr. Joe Clarke and Dr. John Norris received Medical Research Council Fellowships. Dr. Pace-Asciak presented a paper at the 3rd International Symposium on Drugs Affecting Lipid Metabolism at Milan in September 1968. Dr. Coceani was invited to present a paper on Prostaglandins and Membrane Function at the Joint Meeting of the Italian and British Pharmacological Societies at Florence in September 1968. Dr. Wolfe was an invited lecturer to the University of Michigan, Neuropsychopharmacology Training Program, was the Spring Speaker at the Michigan Section of the Society of Experimental Biology, and lectured at the Hospital for Sick Children, Toronto in February 1969, and the Toronto Neurological Society in February 1969. Dr. Wolfe participated in the NINDS Symposium on the Basic Mechanisms of the Epilepsies at Colorado Springs in November 1968. Dr. Wolfe during the past year was Vice-President of the Society of the Sigma Xi, McGill Chapter, Secretary of the Montreal Physiological Society and President of the McGill Osler Reporting Society. Research papers have been presented at a number of conferences in Canada and the United States. Dr. Pappius was invited to participate in a Workshop on "The Fluid environment of the brain: interrelationships between blood, brain and CSF compartments and barriers", which was held in Williamsburg, Virginia in May 1968, sponsored by NCI and NINDB. In September 1968 she attended a conference on Brain-Barrier Systems at the Downstate Medical Center, State University of New York, Brooklyn. In collaboration with Dr. R. Katzman, Chairman of the Department of Neurology, Albert Einstein College of Medicine, Dr. Pappius is preparing a monograph on "Brain Fluid and Electrolyte Metabolism".

ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

<i>Consultant</i>	HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M., F.R.S.C.
<i>Electroencephalographer</i>	PIERRE GLOOR, M.D., Ph.D.
<i>Assistant Electroencephalographers</i>	FREDERICK ANDERMANN, M.D., B.Sc. DONALD LLOYD-SMITH, B.Sc., M.D., C.M., F.R.C.P. (C)
<i>Electromyographer and Assistant Electroencephalographer</i>	ANDREW EISEN, M.D., F.R.C.P. (C)
 <i>Clinical Fellows:</i>	
MICHEL COPTI, M.D. (Lebanon)*	OSCAR ESPINAS, M.D. (Philippines)
EMILIEN DAIGLE, M.D. (Laval)*	JOHN GRIMES, M.D. (Univ. of Ottawa)*
MICHEL DROLET, M.D. (Laval)*	PRAKASH KHARE, M.D. (India)
YVES DUCHASTEL, M.D. (Montréal)*	GEORGE PATRY, M.D. (Laval)
OSCAR ENCINOZA, M.D. (Venezuela)	JEAN-MARIE PEYRONNARD, M.D. (France)
 <i>Electromyography Fellow:</i>	TSING-YUN CHIANG, M.D. (Taiwan)
<i>Research Fellow:</i>	JOHN WOODS, M.D. (Ireland)
<i>Chief Technician</i>	LEWIS HENDERSON

*Six months on this service or less

In 1968, 3,700 electroencephalograms and 464 electromyograms were recorded in our laboratory. The number of operating room recordings from the exposed cortex was 63. This represents a moderate increase in the number of EEG examinations and a marked increase in the number of electromyographic examinations.

Many of the electroencephalographic examinations used time-consuming specialized techniques such as sphenoidal electrode recordings, the intravenous activation by a combination of metrazol and valium, a new technique we have introduced this year, and the intracarotid injection of sodium amytal and metrazol.

Teaching of electroencephalography and clinical neurophysiology to the Fellows-in-training has been strengthened by weekly seminars in an informal atmosphere of mutual give and take. Weekly teaching sessions for technicians have also been conducted and have proved most valuable.

We regret that Dr. Roger Broughton and Dr. Agapito Lorenzo left us at the end of June 1968 to take up positions elsewhere. We are pleased that Dr. Andrew Eisen has taken Dr. Lorenzo's position and is in charge of our Laboratory of Electromyography. He also took over Dr. Lorenzo's position as assistant electroencephalographer. The vacancy created by Dr. Broughton's departure has still not been filled and the lack of a second fulltime clinical neurophysiologist has been sorely felt.

A lack of highly skilled professional staff has produced a certain lag in our research activities. Dr. John Woods has completed his studies on sensory evoked potentials and the influence of incompletely cancelled background activity upon the wave morphology of these potentials. Important studies on the EEG changes in diffuse encephalopathies in cerebral grey and white matter diseases have finally been completed and have reached the stage of publication.

Much of my own time has been devoted to the translation into English of the fourteen original papers on the human electroencephalogram published between 1929 and 1936 by Hans Berger, the founder of electroencephalography. This work has included a study of his rôle in the historical development of neurological thinking and of our physiological understanding of brain function.

I wish to thank all my collaborators, staff members, Fellows, technicians, clerical staff and laboratory assistants for their dedicated and conscientious work.

EXPERIMENTAL NEUROPHYSIOLOGY

<i>Consultant</i>	HERBERT JASPER, M.D., C.M., Ph.D., D.ès Sci., F.R.S.C.
<i>Neurophysiologist</i>	PIERRE GLOOR, M.D., Ph.D.
<i>Biomedical Engineer</i>	RALPH JELL, M.Sc.
<i>Fellows:</i>	
CARL DILA, M.D. (Wayne State Univ.) NIH Fellow*	CHARLES NEEDHAM, M.D. (Albany Medical College), NIH Fellow*
ZEEV ELAZAR, Ph.D. (Weizmann Inst.)	STEPHEN NUTIK, M.D. (McGill Univ.), MRC Fellow*
JYOTI MITRA, Ph.D. (Cambridge)	DOUGLAS SKUCE, B.Sc. (Univ. of Miami), Killam Scholar
<i>Nurse in Charge of Neurophysiology Laboratories and Animal Quarters</i>	MARY ROACH, A.R.R.C., R.N.
<i>Chief Electronic Technician</i>	EDWARD PUODZIUNAS

*Six months on this service

One of the main research interests in the Experimental Neurophysiology Laboratories has been the study of the activity of single hypothalamic neurons involved in thermoregulatory mechanisms. The location of thermosensitive neurons in the anterior hypothalamic and preoptic area, as reported by other investigators, has been confirmed by using the method of direct heating and cooling of the preoptic region by means of implanted thermodes. The firing characteristics of these cells, their response curves to temperature changes and the modification of these functions under the influence of a variety of anesthetics have been studied in collaboration with Mr. Jell. Dr. Nutik, applying the technique of anterior hypothalamic and preoptic heating and

cooling, has investigated the responses of nerve cells in the posterior hypothalamus, an area thought to be involved in the organism's defence against cold. He has been able to demonstrate that some posterior hypothalamic neurons decrease their firing rate upon heating of the anterior hypothalamus. He has further demonstrated that the same posterior hypothalamic cells are inhibited by electrical stimulation of the anterior thermosensitive area. This indicates the existence of an inhibitory pathway connecting the anterior with the posterior thermoregulatory center of the hypothalamus.

Dr. Mitra who joined our group in the fall has devised techniques for heating and cooling the hypothalamus which do not necessitate the direct implantation of thermodes into this brain region, a procedure which always causes a considerable amount of tissue damage. Cooling of the brain through the carotid circulation has been attempted first, but a simpler technique was finally devised which consisted of cooling the brain through the nasal cavity. Preliminary results have shown that significant changes in brain temperature can thereby be achieved and that thermosensitive neurons in the anterior hypothalamus and preoptic area respond to this temperature change in a fashion similar to that observed with direct heating and cooling of this region by means of implanted thermodes.

Dr. Needham and Dr. Dila have completed their study on experimental epilepsy by using topically applied cobalt powder as an epileptogenic agent. Subcortical application of this agent in the brainstem reticular formation only infrequently leads to generalized epileptogenic discharge, whereas cortical application is quite effective in inducing clinical and electrographic seizure manifestations. They have shown, in addition, that stimulation of the reticular formation is capable of activating these cobalt-induced seizure discharges.

Dr. Dila spent the second half of his year in the laboratory studying single cell activity in the centre median nucleus of the thalamus. He analyzed the responses of these cells to stimulation of the midbrain reticular formation and to somatosensory stimuli. Both stimulations evoke an identical slow wave response in the centre median. Spinoreticulothalamic and midbrain reticulothalamic pathways seem to converge upon common neuronal elements in the centre median nucleus. This work is a valuable addition to our understanding of the connections and physiology of this prominent thalamic nucleus which, as part of the thalamic reticular system, is thought to exert an important influence upon the electrical activity of the cerebral cortex.

Dr. Elazar has taken up again the study of changes of hippocampal unit activity in the course of epileptic seizure discharge. The work in progress has included an extension of previous studies carried out in his laboratory by using intracellular recording techniques.

Mr. Skuce has continued his studies on computer analysis of electroencephalographic phenomena in an attempt to devise programmes and techniques which will allow computers to recognize certain well defined EEG patterns. This work is carried out under the supervision of Dr. Levine of the Dept. of Electrical Engineering at McGill University.

Mr. Jell and Mr. Skuce have given us most valuable assistance in all areas of electronic instrumentation and modern methods of data analysis. Mr. Puodziunas and Mr. Archambault deserve our thanks for their technical assistance. Finally I wish to express our appreciation to Miss Mary Roach and her assistants for their efficient and devoted work.

NEUROPATHOLOGY

Neuropathologist GORDON MATHIESON, M.B., Ch.B., M.Sc.,
F.R.C.P. (C)

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

Fellows:

VITAL MONTPETIT, M.D. (U. of Ottawa)
KILLAM SCHOLAR

M. NISAR AHMED, M.D. (Lahore,
Pakistan)*

JAMES NABWANGU, M.D. (Kenya and
Johns Hopkins University)*

ROBERT HOLLENBERG, M.D.
(Harvard University)*

ZAHEER SAYEED, M.D. (Madras Medical
College)*

ROSENDO MENDEZ, M.D. (University of
Madrid) (Rotator from Pathological
Institute)*

YUKITAKA USHIO, M.D. (Osaka
University, Japan)

Chief Technicians:

BARBARA NUTTALL, B.A., A.R.T.

JOHN GILBERT, R.T.

*Six months on this service

While the three main functions of this department — as of any similar department — remain unaltered and are conveniently categorized as hospital service, teaching, and investigation, subtle changes of emphasis have been taking place in the work of the department which reflect the changing character of neuropathology and its place as a major bridge between basic science and clinical practice. While neither the physical plant nor the case load have changed very much in the past year, and our teaching commitment has changed only by growing rather larger, we are tending to think less in terms of classification of diseases and more about mechanisms. It is there that the future of neuropathology lies, in close relationship with clinical neurology and the “new pathology”.

The hospital service load shows little alteration from last year. A total of 491 surgical specimens were examined, of which 84 required immediate operating room diagnosis. Examination of the CSF cytology by the Sayk sedimentation technique was carried out in 130 cases. Of the 89 patients lying in Montreal Neurological Hospital during calendar 1968, 72 were the subject of autopsy examination, an autopsy rate of 81%. In addition, some 7 examinations were made of tissues received from other hospitals; most of these were examinations of the brain.

Dr. Vital Montpetit, a Killam Scholar, completes three years training in neuropathology this June, and has been appointed Assistant Professor of Neuropathology at the University of Ottawa, and Attending Neuropathologist at Ottawa General Hospital. The gradual spread of trained, full time neuropathologists across the country, together with the recognition of the subject by the Royal College of Physicians and Surgeons of Canada, suggest a more stable and assured future for the subject than has sometimes seemed the case in the past. Formal accreditation of this department by the College is pending.

Since the opening of the Electron Microscopy Laboratory in January 1968, tissue from 51 patients has been examined. These specimens comprise 32 muscle biopsies, 9 nerve biopsies, 4 brain biopsies, 3 cardiac biopsies, and 5 samples of nervous tissue obtained at autopsy. Plastic embedded sections from all of these have been examined by phase microscopy. Tissue from 16 patients has been given the more exhaustive examination with the electron microscope. Papers have been, or are being written on topics which include polysaccharide accumulation in muscle, centronuclear myopathy, cardiomyopathy and Guillain-Barré syndrome. Most of these papers necessarily involve or are originated by members in other disciplines — a necessity in the research of today. Electron microscopy is only one window on the world. Electron microscopic study of experimental animal material is also in progress, including a study of vincristine myopathy, and a preliminary exploration of plasmocid encephalopathy. For the future, while pursuing further investigations on biopsy and autopsy material, when it promises to be informative, we hope to make the realm of ultrastructure more familiar to members of the Institute.

NEURO-ISOTOPE LABORATORIES

<i>Director</i>	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.
<i>Assistant Professors of Neurosurgery</i>	HENRY GARRETSON, B.S., M.D. (Harvard), Ph.D. LUCAS YAMAMOTO, M.D., Ph.D. (Hokkaido)
<i>Research Fellow</i>	MORTIMER LECHTER, B.Sc., M.D. (Queens)
<i>Research Assistant</i>	KATHRYNE PHILLIPS, B.Sc. (Acadia)
<i>Brain Scan Technicians</i>	DAVID FITZPATRICK, RONALD MILLER
<i>Electronic Technician</i>	GEORGE LOOTUS

1. *Brain Scanning and Cerebral Circulation Laboratory.*

During 1968, there were 2,298 brain scans on 1,238 patients as compared to 1,812 scans on 963 patients in 1967, an increase of 27%. There were, in addition, special radio-active circulation studies, studies on surgical biopsy material and the continuing programme of special clinical studies

related to normal pressure hydrocephalus. About 40% of these examinations were completed on patients referred from the out-patient clinic, or from the various departments of the Royal Victoria Hospital. This percentage indicates the value which the clinicians are placing on our brain scanning technique and interpretation in relation to early diagnosis of intracranial disorders.

The transfer during the past year of the clinical activities of brain scanning to new space on the third floor has greatly improved the technical and clerical control of radio-isotopic diagnostic procedures, the supervision of electronic equipment and the handling of records and reports.

We received approval recently from the Quebec Hospital Insurance Service to arrange a six months' trial of the new Dynacamera scanning device. We are grateful to Mr. Peter White and the Picker X-ray Company, for a special lend-lease agreement which will allow us to investigate the value of this device which will not only speed up diagnostic brain scanning procedures, but will provide sophisticated computerized data for the increasing numbers of examinations on patients with cerebral vascular disorders. The original Saskatchewan design of the Contour Brain Scanner, in use since 1960, will gradually be phased out by this more modern apparatus. Within the next two weeks this equipment will have completed 10,000 brain scans, so that one need make no apology for its honourable discharge. It may be well to point out here that this original brain scanner was purchased from research funds of the Institute before Quebec hospitalization was introduced and has never been charged against the hospitalization budget. In addition, most of the technical help, as well as the supervision of the brain scanning laboratory, was only partly supported by hospital funds up until quite recently. Moreover, it is of interest to record that the professional services associated with brain scanning including the laboratory design, the selection and purchase of various radio-isotopes, the technical supervision of the use of these radio-isotopes, the careful administration to patients and finally, the professional interpretation of the brain scanning, have all been provided to the Q.H.I.S. and to our patients, at less than 50% of the actual cost.

It should be emphasized that patients are scanned only on the recommendation of a neurological or neurosurgical consultant and brain scanning may be only the first of a series of co-ordinated diagnostic studies. The localizing value of the brain scan is of particular aid to the neurosurgeon. For example, in metastatic carcinoma, a single scan focus may merit further investigation by contrast studies. Again, an unexpected operable lesion, such as a subdural haematoma may be detected by the brain scan when it was not clinically suspected or when the patient was considered to be a problem of "stroke", a term which is becoming too vague in neurological parlance. Scanning is of maximal value when closely co-ordinated with the clinical and laboratory work-up of a patient with suspected intracranial disease. The presence of "false positive scans", which we have described in relation to burr holes, in the post-craniotomy period and in patients with superficial trauma to the head, places much importance on the experienced interpretation of the brain scan record. The methods which we have devised for quantitative

studies on the cerebral circulation transit times have proven of value in correlation with the brain scanning to distinguish between tumour and cerebral infarct. Here again, close co-operation with the attending neurologist or neurosurgeon is essential to obtain the most effective diagnosis and treatment. Over the past few years we have also introduced subarachnoid injection of radio-active human serum albumin to identify the presence of obstructive hydrocephalus. This test has now become the most satisfactory means of confirming the diagnosis of this condition and can lead, of course, to treatment by ventriculo-atrial or other type of shunting of the cerebral spinal fluid. The results in this special series on the brain scan are being correlated with cerebral spinal fluid pressure recording and with radio-active Xenon blood flow studies. Under these circumstances the brain scan serves once more as only one aspect of the carefully planned investigation of the neurological patient.

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

The expansion of the brain scanning laboratory space provided much needed research space in the Cone Laboratory on the sixth floor, though with additional staff taken on during 1968, we still remain reduced to the least common denominator of square footage per person. We now have bench space for two additional research assistants and for the summer student assistants but are not yet able to accommodate properly enough of the applicants who wish to work in the research programme.

Our main research interest continues to be centered on the problems of the cerebral circulation. The combined technique for fluorescein angiography of the blood vessels of the brain and the quantitative study of focal cerebral blood flow by radio-active tracers has been applied both in the laboratory and in the operating room.

In the experimental projects, supported in part by a Medical Research Council Operating Grant, Dr. Yamamoto, Miss Phillips and the research team have explored further the question of the importance of collateral circulation in the brain. During carefully timed occlusion of small brain arteries the area of brain deprived of blood flow is demarcated by fluorescein angiography. This provides a visualization of this area which no other technique, so far, has been able to do. The visualization of the blood flow patterns is recorded in colour photography by Mr. Hodge and his team using the technique which we have developed here at the Institute. In addition, intra-arterial injection of radio-active Xenon is monitored by miniature radiation detectors placed on the surface of the brain. In this way a quantitative measure of changes in cerebral blood flow in small volumes of cerebral cortex under these experimental conditions of arterial occlusion can be achieved. It has been shown conclusively that increasing the carbon dioxide level of the inspired air and in turn of the circulating blood produces an increase in cerebral blood flow both in the ischemic area and in the normal brain. In contrast, reducing the carbon dioxide by having the animal overbreathe also reduces the cerebral blood flow. These findings are relevant to the therapeutic problem of the

patient with a "stroke", that is, with pathological occlusion of some of the cerebral blood vessels. The experimental findings indicate that increasing the carbon dioxide content of the air breathed by the patient would tend to give not only an overall increase in cerebral blood flow, but also a definite increase in the region of brain tissue which had been subjected to a reduced blood flow by pathological vascular occlusion. This quantitative anatomical study is the first series of experiments which have been completed using direct fluorescein visualization and measurement of cerebral blood flow under dynamic conditions in the living brain. Previous results on this problem have been derived from extracranial radio-isotope monitoring which fails to define the local changes in different parts of the brain of the blood flow and by pathological studies on the brain after the animal has been killed and the brain fixed.

The combined fluorescein angiography and radio-isotope technique has also been used in the operating room in selected patients with vascular abnormalities of the brain. Again, for the first time, we have been able to demonstrate an increase in the capillary perfusion flow following the surgical removal of an arteriovenous angioma and the closure of its short circuiting effect on the surrounding normal brain.

Other results in the operating room have included the study of cerebral blood flow in patients with epileptogenic lesions. The fine vascular details demonstrated by fluorescein angiography have shown defects in the filling and clearing of the cortical capillary bed in such patients during craniotomy whereas the standard X-ray angiography failed to define such changes.

An advance in technique during the past year has been the use of new solid state miniature radiation detectors for direct measurement of radio-isotope flow curves from the surface of the brain. The small volume of tissue monitored by these detectors provides an exquisitely local measurement of cortical blood flow. The Simtec Company of Montreal who developed these detectors in collaboration with us have reported that they are in great demand by other workers interested in studying the cerebral circulation. At present we are arranging to have these detectors exhibited at Expo' 70, in Osaka, Japan.

During the past year our research results were reported to the American Congress of Neurological Surgeons in Toronto, at the Royal College of Physicians and Surgeons of Canada in Vancouver and at a recent International Symposium on cerebral blood flow in Mainz, Western Germany. Mr. Hodge again reviewed the photographic techniques associated with fluorescein angiography at the American Association of Biological Photography. Dr. Feindel presented papers on the history and recent advances in cerebral circulation to the Institute for the Study of Science in Human Affairs at Columbia University and to the Montreal Chapter of the Sigma XI. Two reports are also being presented next week at the 4th Canadian Congress of Neurological Sciences as part of a symposium on recent research in the cerebral micro-circulation which we have planned. We are happy to have Dr. Penfield as

Chairman of this Symposium and his long association with problems of the cerebral circulation will add lustre to our proceedings.

Over the past 6 months, Dr. Mortimer Lechter has given much assistance in brain scanning and has reviewed the results of extracranial radio-active brain circulation curves in patients with occlusive disease of the carotid and vertebral arteries. These findings are relevant to the evaluation of new surgical treatments carried out to improve blood flow through the brain.

LABORATORY FOR NEUROLOGICAL RESEARCH

(a) *Section of Immunochemical Research.*

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

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

Medical Student Summer Fellow ROOPNARINE SINGH

Technicians:

MRS. CAROL SANDERS

ROBERT J. WHITE

Studies of the patterns of enzymes and the immunological specificity of individual isoenzymes in nervous tissue and skeletal muscle were continued. The detection of organ specific isoenzymes in blood or cerebrospinal fluid has proved to be of increasing value in the investigation of neurological disease.

Dr. Jan Bulcke completed the preparation of an antiserum to the muscle isoenzyme of creatine phosphokinase (CPK) and developed new immunoenzymological techniques which showed that this isoenzyme was specific to skeletal muscle. It could be distinguished immunochemically from the CPK found in brain. In a joint project with Dr. Karpati it was possible to demonstrate the cellular localization of CPK in human skeletal muscle for the first time by means of the fluorescent antibody technique. It was present in the intermyofibrillary space, and higher concentrations were found in Type II fibers which are physiologically fast contracting and employ predominantly anaerobic metabolic pathways. This information will be useful in studies of the pathogenesis of diseases of muscle.

Mr. R. Singh, a medical student, showed that skeletal muscle isoenzymes were released into the blood following strenuous exercise or epileptic seizures. It was also possible to identify and compare immunochemically the isoenzymes present in the serum of various patients, including studies following cardiac transplantation.

In collaboration with Dr. John Norris a study of CPK in the cerebrospinal fluid of 193 patients was completed. Elevated levels were found in a wide variety of neurological and neurosurgical disorders. The isoenzyme of CPK present in cerebrospinal fluid was shown to originate in nervous tissue

and was independent of that of blood. Significantly higher levels were found in cerebrospinal fluid obtained from patients with epilepsy within 48 hours of a major seizure.

Dr. Sherwin presented a paper, on isoenzymes, at the annual meeting of the Canadian Society for Clinical Investigation in Vancouver in January 1969. Dr. Bulcke presented the results of his work on the organ specificity of muscle CPK at the meeting of the American Academy of Neurology in Washington, D.C. in April 1969.

(b) *Section of Neuromuscular Research.*

Ch (Del)

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

Technician R. STANFORD

In 1968, 58 muscle and 15 peripheral nerve biopsies were studied with histochemical techniques. As a result, one unique and rare muscle disease has been identified representing disturbance of phospholipid metabolism and Z band proteins respectively. In collaboration with Drs. Klassen and Tanser correlative histochemical and in vivo metabolic study of muscle has been started in patients with denervation and disuse atrophy, and various dystrophies. The histochemical localization of creatine phosphokinase by immunofluorescent techniques has been determined in collaboration with Drs. Sherwin and Bulcke, and a study of pathological muscles with this new method is underway. A systematic study of the vincristine induced myopathy in rats has been initiated, which may serve as an animal model for a rare human muscle disease. The investigation of embryonic denervation by experimental toxic neuropathies in pregnant animals continues.

NEUROPSYCHOLOGY

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

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

Research and Clinical Assistant ALICE DAVID, L.Ps. (Paris)

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

The psychology department has by now spent more than a year in its new quarters, and we can report progress both in current research and in the application of earlier findings to clinical diagnostic problems. As in the past, Mr. Taylor has born the brunt of the clinical load, ably assisted by Alice David and Philip Corsi. Valuable additional service was provided by Mr. Graham Ratcliff, who spent two months with us in the fall. Mr. Ratcliff is a graduate student in Dr. Freda Newcombe's Neuropsychology Unit at the Churchill Hospital, Oxford. Other welcome visitors were Dr. Valeria Cavazzuti from the University of Bologna and Dr. Natalia Chapanis from the Johns Hopkins University.

We continue to study the effects of temporal and frontal-lobe lesions in man. On a simple spatial memory task, Mr. Corsi has found greater deficits after right temporal lobectomy than after left, the degree of impairment depending upon the extent of right hippocampal removal. This result complements his earlier findings for verbal memory loss after left temporal lobectomy. After frontal lobectomy, no memory defect in the usual sense is found, but Corsi is discovering an impairment in the normal "time-tagging" of events in memory. The patient with a frontal-lobe lesion makes mistakes when he has to say which of two stimuli was presented more recently. In addition, a right-left difference is emerging from these frontal-lobe studies. Left frontal-lobe lesions appear to interfere more with verbal recency judgments, right with nonverbal.

Quantitative appraisal of somesthetic discrimination in patients with cortical lesions continues to be one of our main research interests. Last year Mr. Avrum Gottlieb extended these methods to the study of sensory and motor function in patients of Dr. Gilles Bertrand, who were undergoing thalamic surgery for Parkinson's disease. This work was made possible by a student summer research bursary, which has been renewed for the coming year.

Because of the special opportunity provided by the long series of patients undergoing unilateral brain operation for the relief of epilepsy, the main concern of the psychology department has been research into cortical localization of function. The outcome of this research does, however, have certain practical applications: for example, in the early diagnosis of brain tumour. Thus, in a short series of consecutively studied patients with cerebral neoplasm, Mr. Taylor has been able to demonstrate selective deficits appropriate to the locus and laterality of the lesion. He reported these findings at this year's meeting of the Congress of Neurological Surgeons. Similarly, patients who develop focal epilepsy following a post-natal head injury may show surprisingly selective deficits on psychological testing, despite the ill-defined and probably diffuse nature of the original injury. Dr. Milner reported these results at the recent international conference on the Late Effects of Head Injury, held in Washington last March. The study underscores the need for systematic assessment of perception, memory and problem-solving activity in order to determine the possible long-term behavioral effects of a head injury.

This year, as in the past, we are indebted to former patients who have returned for extensive follow-up study, sometimes many years after the brain operation that controlled their seizures. We are also most grateful to the nursing and technical staff of the hospital for their continued help in the development and standardization of new tests.

NEUROANATOMY

<i>Neuroanatomist and Medical Research Council Scholar</i>	JACQUES COURVILLE, B.A., M.D., M.Sc., dr.med.
<i>Teaching Assistant</i>	ALLAN MORTON, M.D., C.M., Ph.D.
<i>Fellow</i>	LEO P. RENAUD, M.D., M.R.C. Fellow
<i>Technicians</i>	HÉLÈNE TREMBLAY GIOVANNI GAGGI GIOVANNI FILOSI

The last year has been marked by the development of a laboratory for electron microscopic techniques shared with the Department of Neuropathology. A number of important additions to our equipment were made, especially for photomicrography.

Research activities have been sustained and a long term project on the efferent connections of the nuclei interpositus anterior and lateralis (emboliform and dentate homologues) of the cat has been completed in close collaboration with Dr. Leo Renaud who joined the Department for one year. This study has already been reported at the meeting of the American Association of Anatomists. Other projects initiated include: the normal ultrastructure of the red nucleus in the cat, the projection of the crus secundum region of the cerebellar cortex to the nucleus lateralis in cat and monkey, and a project on the efferent cerebellar projections in the monkey.

Teaching activities are now taking place early in the year and are distributed over a shorter period of time. The participation of many members of the Institute and of Professors from the Departments of Physiology and Psychology has been maintained for this integrated course. The introduction to Clinical Neurology which is a vital part of that course is now conducted jointly by Drs. Karpati and McNaughton. A number of M.N.I. Fellows participated in the Neuroanatomy Laboratories and have used this opportunity to review neuroanatomy as well as acquire some experience in teaching. Efforts have been made to enhance more direct participation in the course organization by all who teach it. Contacts and discussions with the students' Curriculum Committee took place and many valid suggestions for improvement were obtained.

The Annual Neuroanatomical Lecture has been given by Dr. Louis Poirier, Laboratoire de Neuropsychiatrie expérimentale, Département de Physiologie, Université Laval, on "The implication of the rubro-olivary tract and of certain upper brain stem monoaminergic mechanisms in the production of postural tremor".

NEUROPHOTOGRAPHY

C. P. HODGE, R.B.P., F.B.P.A.

This department had a very successful and extremely busy year. More than the usual number of photographs were taken. This was an increase both on the clinical and the research side.

We were extremely interested to see that a new area in the use of Audio Visual equipment in teaching, multiple projection techniques, was so well received.

A number of single concept Super 8 movies have been completed this year. These short films have been well received by the students.

Television is now in use in the Neuro. McGill University supplied this department with a closed circuit television set-up for teaching purposes. Although television has greatly increased the workload of this department, this medium has opened up many new fields. It has been extensively used in the teaching of nurses, students and post-graduates.

Last August a four day course on photography of small objects was given by myself at the University of California Los Angeles. This course was sponsored by the Biological Photographic Association. In the spring of this year I attended the Cerebral Blood Flow Meeting at Lund, Sweden. These meetings have been a great help to this department in understanding the problems of the medical side and to greatly assist in our fluorescein angiographic studies.

Mr. Edward Rupnick has been very ably replaced by Mr. Cyril Hatter. Mr. Hatter comes to us via the Royal Victoria Hospital Department of Visual Aids. This is the first time we have been able to take on an experienced biological photographer. Mr. Hatter has been of great assistance to me during this busy year.

TUMOUR REGISTRY

DR. ARTHUR R. ELVIDGE

The records of 204 patients with suspected tumour, directly or indirectly involving the nervous system, have been processed through the Tumour Registry during the year 1968. They represent 9.6 percent of the total admissions to the Montreal Neurological Hospital. Tumour was verified in 115 of these cases. Ninety-eight surgical operations were performed, which represents 13.9 percent of the total number undertaken at the Montreal Neurological Hospital. Roentgenotherapy was employed for 64 patients. There were 189 clinic visits.

The main function of the Tumour Registry is to record all cases of tumour, and suspected tumour, of the nervous system. Information is obtained from Outdoor Clinics, private offices, referring doctors, and, when necessary, from the Department of Demography of the Province concerned. Patients are reminded to return for follow-up examination and treatment. Failing this a follow-up letter is sent so that yearly contact can be maintained with all tumour cases. The records serve as source material for evaluation of treatment under various conditions.

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, which was established in 1961. They have published annual reports since 1962, which will be a valuable source of basic data in the future, with regard to general tumour statistics. These statistics are obtained from all the hospitals of the Province of Quebec.

Mrs. G. Guthro continues as secretary of the Tumour Registry and is to be thanked for her capable and willing efforts. Dr. Charles Needham succeeded Dr. R. Romero as Fellow of the Tumour Registry in July 1968.

Apart from routine problems some basic research has been undertaken by Drs. B. Barone, William McCann, and Bryce Weir, on various types of brain tumors.

FELLOWS' LIBRARY

DR. LEONHARD S. WOLFE

In the past year, the total library circulation increased by 22% over the previous year. 1,846 loans of books and journals were made and there were 161 requests for interlibrary loans. There were 394 requests for loans by our staff from other libraries. The interlibrary loan service has greatly increased over previous years. The xeroxing of journal articles and parts of books has greatly increased. 270 requests in all were made, an average of more than one request per working day. The total number of exposures made was 3,443. The Library receives a total of 170 journal and serial publications of which 70 represent paid subscriptions and the remainder gifts or free material. Three new subscriptions were begun and two subscriptions were discontinued. 98 new books were purchased and we received 31 gifts. This year the total acquisitions by the library represented 27 linear feet of shelf space. The day is quickly approaching when there will no longer be any linear feet left to accommodate the yearly additions. Even now it is necessary to remove out-of-date books from the shelves in order to replace them with new ones.

A thorough shelf reading was completed in January and it was ascertained that 57 volumes are missing from the Library. A list of these was circulated to the Staff, Residents and Fellows and the response has already been good. Some of the recent and important publications that were missing are finding their way back to the library.

During the year a number of new developments have taken place. Cards for reprints are available in the library. A new typewriter has been purchased. Five library chairs were re-covered. A locked cupboard was built to house frequently lost books and out-of-print and valuable volumes. A new journal Holdings List was produced. Dr. Lipowski and Dr. Melzak assisted Miss Duchow in pruning the Psychology section of unnecessary volumes.

The McGill Medical Library presented a plan to restrict the loaning of journals and substitute xerox copies. After discussion with a number of

Hospital Librarians this plan was not adopted but referred to committee for more intensive study. Sooner or later a no-loan policy is likely to be implemented. This will present a number of problems to our library.

Our Librarian, Miss Sandra Duchow attended several meetings of the McGill Campus Librarians. These meetings are designed to facilitate communication concerning development in campus libraries. The first meeting dealt with the acquisition of a Telex machine by the McLennan Library and the second was devoted to interlibrary loan procedures and policies. Miss Duchow attended a training session for designing of research profiles for the National Science Library's Selective Dissemination of Information (SDI) System. Miss Duchow has done excellent work in making the library efficient, and has been a great help to our staff and Fellows. The Members of the Library Committee wish to express their thanks for the fine service the library is giving. Miss Duchow is assisted by Mrs. Sala Baumholz.

MONTREAL NEUROLOGICAL SOCIETY

<i>President</i>	DR. ANDRÉ BARBEAU
<i>Vice-President</i>	DR. JOSEPH STRATFORD
<i>Secretary-Treasurer</i>	DR. HENRY GARRETSON

The Society officers for the 1969-70 year are: President, Dr. Joseph Stratford; Vice-President, Dr. Raymond Lafontaine; Secretary-Treasurer, Dr. Henry Garretson.

Twenty meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held from October 2nd, 1968 to May 28th, 1969.

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

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

DR. NORMAN DOTT, Department of Neurosurgery, Edinburgh Royal Infirmary: "Mechanisms and Syndromes of Cerebral Displacement by Expanding Lesions."

DR. J. D. SPILLANE, Welsh National School of Medicine; Consultant Neurologist, The United Cardiff Hospitals: "Tropical Neurology".

DR. ALLAN L. SHERWIN, Department of Neurology, Montreal Neurological Institute: "Isozymes — New diagnostic aids in neurology".

DR. LEONARD ROSENTHALL, Director, Division of Nuclear Medicine, Montreal General Hospital: "Gamma Camera Investigation of the Effect of Contrast Material on Normal and Abnormal Brain Tissue".

DR. ROBERT FORD, Division of Neurosurgery, Montreal General Hospital: "Echoencephalography".

- DR. ALAIN WALTREGNY, Docteur en neurophysiologie, Université de Liège: "L'épilepsie hypoglycémique expérimentale — aspects cliniques, polygraphiques et biochimiques".
- DR. FRANK RISCH, Chief, Epilepsy Rehabilitation, Veterans' Administration Center, Los Angeles, California: "Epilepsy in the Competitive Labor Market".
- DR. J. C. PANISSET, Associate Professor Pharmacology, Université de Montréal: "Polypeptides and the C.N.S.".
- SYMPOSIUM, Learning Problems 1969. Drs. S. Rabinovitch, R. LaFontaine, L. Taylor, F. Andermann.
- DR. M. D. LOW, Associate Professor of Medicine, University of British Columbia; Director, Department of EEG, Vancouver General Hospital: "An Electrographic Correlate of Preparation Set? — The Phenomenology of the Contingent Negative Variation".
- DR. W. KING ENGEL, Chief, Medical Neurology Branch, National Institute of Neurological Diseases and Stroke, Bethesda, Maryland: "Selective and non-selective susceptibility of muscle fiber types — A new approach to human neuromuscular diseases".
- DR. A. GODON, Département de Neurochirurgie, l'Hôpital Hôtel-Dieu: "Microchirurgie Vasculaire".
- DR. J. RANSOHOFF, Chief, Dept. of Neurosurgery, New York University School of Medicine: "Pathology of spinal cord injury and some correlated clinical experiences in early and late surgery for spinal cord trauma".
- DR. M. USHER, Radiologist in Radioisotope Laboratory, Jewish General Hospital: "Brain Scans and Cerebrovascular Disease".
- DR. LOUIS POIRIER, Laboratoire de Neuropsychiatrie expérimentale, Département de Physiologie, Université Laval: Annual Neuroanatomy Lecture — "The implication of the rubro-olivary tract and of certain upper brain stem monoaminergic mechanisms in the production of postural tremor".
- PROF. HOLGER HYDEN, Professor, Institute of Neurobiology, University of Goteborg Faculty of Medicine: Annual Hughlings Jackson Lecture of the M.N.I. — "Some Brain Protein Changes Reflecting Neuronal Plasticity at Learning".

The Annual Dinner of the Society was held on April 30th, 1969, at the Auberge le Vieux Saint-Gabriel.

The Montreal Neurological Society regrets the passing of a distinguished member and Past President of the Society on December 30th, 1968. A memorial meeting of the Society was held on February 12th, 1969 with Dr. Saucier's family in attendance as honored guests. Tribute was paid to Dr. Saucier on his contributions to international Neurology by Dr. W. Penfield,

on Dr. Saucier as a physician by Dr. A. Barbeau, Dr. Saucier as a neurologist by Dr. R. Amyot, and Dr. Saucier as a humanist by Dr. P. Dumas.

FELLOWS' SOCIETY

<i>President</i>	DR. IVAN (J. F.) WOODS
<i>Vice-President</i>	DR. DAVID GRIMES
<i>Secretary-Treasurer</i>	DR. JAMES NABWANGU

It was an interesting year for the Fellows, leaving many pleasant memories for those who could participate in our activities. One of our principal objectives was to enhance esprit de corps among the Fellows — who come from widely varying backgrounds to work in the many departments of the Institute and Hospital. Several social functions, including the welcoming party and Christmas party, served this purpose.

We reserved the three best loges at Place des Arts for “La Jeunesse Musicale” series, enabling fifteen fellows and their wives to meet regularly in that pleasant milieu.

The annual skating party was very well supported and thoroughly enjoyed by all.

Perhaps the most pleasant and memorable social event of the year was a banquet in honour of Dr. McNaughton to mark his retirement as Neurologist-in-Chief. His charming recitation of several M.N.I. classics of “literature” will long be fondly remembered.

Academically, the year saw the usual seminar sessions for the fellows by selected visiting experts. A welcome innovation was the series of Residents Rounds on each Saturday, made possible by the generous cooperation of Dr. McNaughton and Dr. Heller. It is hoped these will become a permanent item in the M.N.I. calendar.

Towards the close of the academic year, the Neurology fellows outlined their impressions of the academic aspects of the Institute and suggested possible improvements for the consideration of the Teaching Staff.

The Annual Fellows Lecture was given on the 6 June 1969 by Dr. Kenneth M. Earle of the A.F.I.P. His subject was “Viral Encephalitis.” By general consent it was one of the most instructive and entertaining lectures we have heard. Dr. Earle was a delightful guest of honour at the Annual Banquet later that evening at Hotel Sonesta, regaling us with new insights into the M.N.I. of 25 years ago.

“The Penfield Award of Excellence” — an annual award presented to the departing Fellow who did most for the Institute during his stay here — was presented by Dr. Rasmussen to Dr. George Matthews.

The Executive wish to extend gratitude to all those who helped with the arrangement of our activities and in particular to Miss Ann-Marie Crosby for her secretarial help.

The Officers for the coming year are:

President DR. JOHN ARMSTRONG
Vice-President DR. DEREK FEWER
Secretary-Treasurer DR. TERRY MYLES

MONTREAL NEUROLOGICAL WOMEN'S SOCIETY

1968 - 1969

Honorary President MRS. W. PENFIELD
Staff Consultant MRS. T. RASMUSSEN

Officers:

President: MRS. S. NUTIK (Rhoda) *Treasurer:* MRS. M. LECHTER (Bunny)
Vice-President: MRS. I. WOODS *Secretary:* MRS. J. BULCKE (Germaine)
(Letha)

The Montreal Neurological Women's Society began their year with a swinging programme which Barbara Sherwin and her programming Committee presented at the dessert and coffee party held at the home of Mrs. T. Rasmussen on October 2. This party as usual was a hit as evidenced by an extremely high turnout of new members mixing easily with the 'veterans' in the charming atmosphere of a spacious but nonetheless crowded basement.

This was not the first confrontation of new arrivals with a society especially conceived to make their stay in the M.N.I. family as enjoyable as possible. Gayle LeBlanc, Chairman of the Welcoming Committee had already broken the ice with an informal party in her home. The annual tea given by Dr. and Mrs. Rasmussen at the Faculty Club shortly thereafter provided an opportunity to meet with the M.N.I. community at large.

Several of the subsequent meetings were devoted to the 'homo ludens'. We were introduced to the charms of the Karl Orff method in music education by a talented teacher, Miss Myriam Samuelson. At the beat of drums, xylophones and tambourines she evoked in us for a moment the world of spontaneous and creative expression of the child. We all went home with a tinge of nostalgia for a "lost paradise". Another musical evening brought in our midst a smashing set of creative pop-jazz, Rock-and Folk-music performers. Were our Society not a really young one, it would surely have been rocked by the invigorating and refreshing sounds of that night.

A guided tour of a "Rembrandt and his Pupils" exhibition at the Montreal Museum of Fine Arts concluded over a cup of coffee at the "Crêpe Bretonne" in Mountain Street. As this activity did not present a space-problem, the husbands were invited. Their enthused turnout made us reflect upon the need of providing more similar "co-ed" opportunities.

We further exercised "feminine arts" at a workshop of smocking, carpet-hooking, paper-flower and wall-hanging confection, demonstrated by members

of the group, as well as at the social service meeting organized at Marianna Garretson's home, that produced 16 colourful scrapbooks for the youngest patients of the Neuro.

The year was concluded with a fabulous "pot-luck" dinner. Fabulous it was for the range of delicious national dishes, — a real homage to the ethnic diversity and culinary art of the members. — it was tempting enough to lure any gourmet from any gastronomic happening.

The skating party given by the nurses was, as usual delightful, and was particularly enjoyed by the children.

We are grateful to the following staff wives for providing their homes for hospitality — Mrs. T. Rasmussen, Mrs. I. Heller, Mrs. F. McNaughton, Mrs. F. LeBlanc and Mrs. D. Lloyd-Smith.

Kay Dila has been elected to head up the Society next year. Without giving the show away I can tell you that the programme she and her team are working on will give a "new look" to the Society's activities and a slightly different approach to the pursuit of its objectives. We wish her and her executive the best of success.

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 internship 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 112, 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 internship 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 above appointments should be made to the Director, Montreal Neurological Institute, 3801 University Street, Montreal 112, 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

List of Publications

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MONTREAL NEUROLOGICAL HOSPITAL
BALANCE SHEET AS AT DECEMBER 31, 1968
ASSETS AND DEFICIT
GENERAL FUND

ASSETS

Cash		12,191
Accounts receivable — less provision for doubtful accounts		194,486
Grant receivable — Government of Quebec		90,000
Inventories of supplies — at the lower of cost or replacement cost		59,013
		355,690

DEFICIT (note)

		632,778
		988,468

PLANT FUND

ASSETS

Cash		241
Due from Quebec Hospital Insurance Service		27,099
Equipment — at cost	1,372,583	
Accumulated depreciation	739,803	632,780
		660,120
		\$1,648,588

LIABILITIES AND CAPITAL
GENERAL FUND

LIABILITIES

Accounts payable		470
Amount due to Royal Institution for the Advancement of Learning —		
Current account		355,220
Advances to cover deficit		632,778
		988,468

PLANT FUND

LIABILITIES

Due to Royal Institution for the Advancement of Learning		27,340
CAPITAL		632,780
		660,120
		\$1,648,588

AUDITORS' REPORT

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

April 17, 1969

We have examined the balance sheet of Montreal Neurological Hospital as at December 31, 1968 and the statements of operations, general fund deficit and plant fund capital 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, 1968 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.

McDONALD, CURRIE & CO.
Chartered Accountants

MONTREAL NEUROLOGICAL HOSPITAL
STATEMENT OF GENERAL FUND DEFICIT
(FOR THE YEAR ENDED DECEMBER 31, 1968)

	Shareable	Non- shareable	Total
BALANCE — BEGINNING OF YEAR	497,400	230,145	727,545
Adjustment of prior years' deficit	5,427	(2,929)	2,498
Amounts received from the Quebec Hospital Insurance Service			
1965 final payments	(9,778)		(9,778)
1966 final payment	(4,742)		(4,742)
1967 interim payment	(306,000)		(306,000)
Reclassification of expenses on advice from the Minister of Health — 1965	9,778	(9,778)	
— 1966	(40,885)	40,885	
	151,200	258,323	409,523
Net operating deficit (surplus) for the year	265,545	(42,290)	223,255
BALANCE — END OF YEAR (note)	\$ 416,745	216,033	632,778

STATEMENT OF PLANT FUND CAPITAL
(FOR THE YEAR ENDED DECEMBER 31, 1968)

BALANCE — BEGINNING OF YEAR	614,330
Quebec Hospital Insurance Service — grants for purchases of equipment	
— current year	97,220
— adjustment of previous year	7,016
	718,566
Depreciation on equipment	85,786
BALANCE — END OF YEAR	632,780

STATEMENT OF OPERATIONS
(FOR THE YEAR ENDED DECEMBER 31, 1968)

	Shareable	Non- shareable	Total
OPERATING EXPENDITURE			
Salaries and wages	2,425,628		2,425,628
Medical and surgical supplies and drugs	193,923		193,923
Sundry supplies, services and expenses	747,859	6,400	754,259
	3,367,410	6,400	3,373,810
OPERATING REVENUE			
Hospital Insurance Service			
In-Patients (note)	2,011,222		2,011,222
In-patients, other	805,325	48,713	854,038
Out-patients	115,782	(23)	115,759
Grants —			
Government of Quebec	90,000		90,000
City of Montreal	67,500		67,500
Sundry revenue	12,036		12,036
	3,101,865	48,690	3,150,555
NET OPERATING DEFICIT (SURPLUS) FOR THE YEAR (note)	\$ 265,545	(42,290)	223,255

NOTE TO FINANCIAL STATEMENTS (For the year ended December 31, 1968)

SHAREABLE DEFICIT

Interim payments under the Quebec Hospital Insurance Act are based on budgets approved by the Quebec Department of Health and are subject to adjustment following a review of actual expenditures by the Minister of Health as provided under the terms of the Act. Accordingly, the hospital is appealing to the Minister of Health for recovery of the 1968 shareable deficit of \$265,545 and the unpaid balance of the 1967 shareable deficit amounting to \$151,200. Recoveries in respect of these amounts will be reflected in the statements of general fund deficit of future years.

MONTREAL NEUROLOGICAL INSTITUTE

RESEARCH AND TEACHING EXPENDITURE SUMMARY FOR THE YEAR ENDING DECEMBER 31, 1968.

from Major MNI Endowment Funds	\$300,851.30
from MNI Special Funds and Donations	272,766.36
from General University Funds	17,840.00
from Medical Research Council Block Term Grant	18,750.00
from Various Annual Research and Fellowship Grants	316,342.14
TOTAL EXPENDITURE	\$926,549.80

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 GRANT

- 1947 — Medical Research Council Block Term Grant (January 1 to March 31, 1968 — terminated on March 31).

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. Carpenter
— Dr. Courville
— Dr. Feindel
— Dr. Gloor
— Dr. Milner
— Dr. Pappius
— Dr. Sherwin
— Dr. Wolfe
- Medical Research Council of Canada Associateships — Dr. Milner
— Dr. Wolfe
- Medical Research Council of Canada Scholarships — Dr. Courville
— Dr. Pace-Asciak
- Muscular Dystrophy Association Research Grant — Dr. Karpati

DONATIONS TO SPECIAL FUNDS — 1968-69

ANAESTHESIA RESEARCH FUND:	
Anonymous	\$15,000.00
BRAIN RESEARCH FUND:	
Mrs. Howard Pillow	4,000.00
Mr. A. Murray Vaughan	500.00
Mrs. A. Murray Vaughan	500.00
CANCER CLINICAL RELIEF FUND:	
WILLIAM CONE MEMORIAL RESEARCH FUND:	
Dr. David Berger	25.00
Mr. Thomas Cairns	500.00
Harold Crabtree Foundation	1,000.00
Earl-Beth Foundation	500.00
Colonel K. B. Jenckes	100.00
Mr. John Langdon	500.00
Oaklawn Foundation	1,000.00
Mrs. H. Y. Russel	5.00
COSGROVE RESEARCH FUND:	
Mr. J. A. DeLalanne	200.00
Mr. R. C. Jarvis	10.00
Mrs. Treva Troutman	25.00
In Memory of the Late Mrs. Dorothy Smith	55.00
DICK EPILEPSY FUND:	
Anonymous	1,000.00
GORDON LIBRARY FUND:	
HARVEY CUSHING CLINICAL RELIEF FUND:	
Women's Auxiliary of the Royal Victoria Hospital	4,000.00
Miss Lillian Sandler	35.00
Miss Hazel W. Burrell	50.00
Mr. J. Clare Wilcox	100.00
Mrs. Evelyn Garelick	10.00
Mrs. M. McAlary	5.00
Montreal Council of Social Agencies	25.00
Mr. F. N. Haden	17.00
Mrs. Joseph Shapiro	10.00
Miss Suzann Cohen (In Memory of Mr. George W. Cohen)	5.00
In His Name Society	62.00
Mr. S. Dewdney (In Memory of the Late Mrs. Assna Bernstein)	50.00
HOSPITAL EQUIPMENT FUND:	
Mr. and Mrs. B. Blumenthal	5.00
Miss Tsuya Watanabe	11.00
MARY MASSABKY FOUNDATION RESEARCH FUND:	
MISCELLANEOUS SPECIAL FUNDS:	
In Memory of the Late Miss Gail Budd	344.50
In Memory of the Late Mrs. Birdie Bessner	15.00
In Memory of the Late Miss Joan Cusiak	107.50
In Memory of the Late Mr. Louis Derosa	75.00
In Memory of the Late Mr. G. Harry Elsey	25.00
In Memory of the Late Mr. Ben Fraid	25.00
In Memory of the Late Mr. Robert Hampson	380.00
In Memory of the Late Mr. H. B. Herzog	2.00

In Memory of the Late Miss Mary H. Lang	5.00
In Memory of the Late Major John R. McGrath	185.00
In Memory of the Late Mr. John McGrath	5.00
In Memory of the Late Mr. Leslie A. Pinder	214.00
In Memory of the Late Mrs. M. D. Rheaume	10.00
In Memory of the Late Mr. George Watts	122.00
M.N.I. NEUROSURGICAL RESEARCH FUND:	
M.N.I. STAFF LOAN FUND:	
MULTIPLE SCLEROSIS CLINICAL RELIEF FUND:	
Multiple Sclerosis Golf League	550.00
Kiwanis Club of St. George, Inc.	600.00
Montreal Association for Multiple Sclerosis	500.00
MULTIPLE SCLEROSIS RESEARCH FUND:	
McNAUGHTON NEUROANATOMY RESEARCH FUND:	
Mr. E. Gordon Gowling	250.00
FRANCIS McNAUGHTON NEUROLOGICAL RESEARCH FUND:	
Mrs. Samuel Reitman	500.00
Mr. Donald F. King	2,500.00
NEUROLOGICAL RESEARCH FUND:	
The Staff of Fraid's Inc. (In Memory of the Late Mr. Ben Fraid)	100.00
Mr. George Hampson	100.00
Mrs. Peter Laing	3,000.00
Estate of the Late Mrs. Clara S. Graves	1,000.00
J. W. McConnell Foundation	3,000.00
United Church of Canada Board of World Mission	3,500.00
Mr. Michael G. McConnell	200.00
Mr. David W. McConnell	200.00
Mr. Barnard Skolnick	12.00
NEUROPHYSIOLOGY RESEARCH FUND:	
NEURORADIOLOGY RESEARCH AND TEACHING FUND:	
NURSING FUNDS:	
EILEEN C. FLANAGAN NURSING BURSARY FUND:	
Mr. George Hampson	50.00
Mrs. R. Hampson	200.00
Women's Auxiliary of the Royal Victoria Hospital	500.00
M.N.I. NURSING EDUCATION FUND:	
Mrs. Samuel Reitman	500.00
Mr. H. Wyatt Johnston	5.00
OAKLAWN FOUNDATION FELLOWSHIP FUND:	
Oaklawn Foundation	2,000.00
PENFIELD AWARD FUND:	
Dr. Harry Brandman	10.00
PENFIELD RESEARCH FUND:	
REUBEN RABINOVITCH MEMORIAL FUND OF THE CANCER RESEARCH SOCIETY:	
REUBEN RABINOVITCH MEMORIAL LIBRARY FUND:	
REUBEN RABINOVITCH MEMORIAL TRIBUTE FUND:	
LEWIS REFORD FELLOWS' FUND:	
WOMEN'S AUXILIARY FUND:	
Women's Auxiliary Fund of the Royal Victoria Hospital	1,866.82

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 BEQUESTS 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 112, P.Q.

STATISTICS

CLASSIFICATION OF DISEASES

Nervous System Generally:

Multiple Sclerosis	89	
Motor Neurone Disease	12	
Friedreich's Ataxia	2	
Spastic Paraplegia	3	
Miscellaneous	7	113

Meninges:

Meningocele & Myelomeningocele	5	
Acute Purulent Meningitis	4	
Labyrinthitis	4	
Vertigo	7	
Subdural Haematoma	13	
Epidural Haematoma	4	
Intracerebral Haematoma	10	
Subdural Hygroma	1	
Subarachnoid Haemorrhage	38	
Intracerebral Haemorrhage	12	
Adhesive Arachnoiditis	3	
C. S. F. Rhinorrhea	2	
Miscellaneous	10	113

Brain:

Congenital Anomalies	11	
Hydrocephalus	28	
Abscess	2	
Syncope	10	
Contusion, Laceration, Traumatic Encephalopathy	59	
Concussion	75	
Epilepsy	368	
Headache	39	
Migraine	33	
Parkinsonism	39	
Thrombosis, Encephalopathy due to Arteriosclerosis	160	
Transient Ischemic Attacks	36	
Pontine Lesions	2	
Cysts	3	
Berry Aneurysm	4	
Encephalocele	2	
Encephalitis	10	
Hypothyroidism	1	
Global Amnesia	2	
Speech Disorders	2	
Athetosis	3	
Breath Holding Spells	2	
Craniostenosis	2	
Miscellaneous	20	913

Tumours:

Gliomas	14
Meningeal Fibroblastoma	24
Craniopharyngioma	11
Glioblastoma Multiforme	24
Astrocytoma	22
Medulloblastoma	1
Ependymoma	2
Chromophobe Adenoma Pituitary	8
Oligodendroglioma	4
Sarcoma	5
Malignant Melanoma	2
Neurinoma	8
Granuloma	2
Metastatic Carcinoma	28
Bronchogenic Carcinoma	4
Carcinoma of Breast	3
Carcinoma of Bladder	1
Hodgkin's Disease	1
Brain Tumour — Suspected	12
Papilloma	2
Miscellaneous Tumours	12
	<hr/> 190

Spinal Cord:

Contusion of Spinal Cord	3
Compression of Spinal Cord	2
Guillain-Barré Syndrome	4
Myelopathy	23
Syringomyelia	7
Cervical Spondylosis	20
Radiculopathy	4
Spondylolisthesis	2
Transverse Myelitis	6
Spina Bifida	4
Paraplegia	4
Miscellaneous	12
	<hr/> 91

Cranial & Peripheral Nerves:

Optic Neuritis	7
Trigeminal Neuralgia	28
Menière's Syndrome	7
Compression Ulnar Nerve	2
Carpal Tunnel Syndrome	24
Bell's Palsy	5
Paresis — Cranial Nerves	18
Meralgia Paraesthesia	2
Hemianopsia Homonymous	2
Nerve Deafness	3
Other Neuralgias	7
Miscellaneous	13
	<hr/> 118

Muscles:

Myasthenia Gravis	4
Muscular Atrophy	9
Muscular Dystrophy	7
Myopathy	4

Spasmodic Torticollis	6	
Dystonia Musculorum Deformans	2	
Sydenham's Chorea	3	
Miscellaneous	4	39

Mental Diseases:

Mental Retardation	27	
Depression	11	
Anxiety State	19	
Conversion Hysteria	7	
Alzheimer's Disease	19	
Schizophrenia	5	
Psychoneurosis	3	
Drug Intoxication	2	
Miscellaneous	5	98

Other Systems:

Protrusion Discs — Lumbar	190	
Cervical	72	
Fracture and/or Dislocation Vertebral Column	29	
Fracture Skull	50	
Low Back Pain	29	
Pain — Miscellaneous	20	
Traumatic Lesions & Infections	25	
Diabetes Mellitus	2	
Gunshot Wounds	4	
Skull Defect	4	
Rheumatoid Arthritis	8	
Collagen Disease	2	
Miscellaneous	15	450
		2125

CLASSIFICATION OF OPERATIONS

Craniotomy and Craniectomy:

and Biopsy	7	
and Decompression	4	
and Drainage of Subdural Haematoma	16	
and Drainage of Intracerebral Haematoma	8	
and Drainage of Extradural Haematoma	5	
and Elevation of Depressed Skull Fracture	16	
and Excision of Epileptogenic Focus (Lobectomy)	49	
and Excision, Clipping or Wrapping of Aneurysm	12	
and Excision Under Profound Hypothermia	1	
and Exploration	3	
and Hemispherectomy	2	
and Hypophysectomy for Endocrine Control	4	
and Hypophysectomy for Pituitary or Intrasellar Tumour	7	
and Incision, Drainage or Removal of Cyst	2	
and Plastic Repair of Dura (CSF, Rhinorrhea or Fistula)	3	
and Plastic Repair of Skull Defect (Plate, Bone or Plastic)	9	
and Removal of Arteriovenous Malformation	4	
and Removal of Cerebral Tumour	66	
and Removal of Posterior Fossa Tumour	12	
and Trigeminal Massage or Decompression	2	
and Trigeminal Rhizotomy	7	
and Ventriculocisternostomy (Torkildsen's)	2	
and Endarterectomy, Middle Cerebral Artery	1	242

Trepanation:

and Biopsy	2	
and Drainage of Subdural Space	6	
and Exploration	5	
and Ventricular Puncture	1	
and Ventriculography	11	25

Shunt Procedure:

and Lumbar Subarachnoid — Peritoneal	1	
and Ventricular Caval	33	
and Ventricular Peritoneal	4	38

Stereotaxic Procedure:

and Ventriculography	2	
and Second Stage	26	28

Laminectomy and Hemilaminectomy:

and Anterolateral Cordotomy — Cervical	2	
and Anterolateral Cordotomy — Thoracic	5	
and Decompression or Exploration of Spinal Cord (Trauma)	5	
and Decompression or Exploration of Spinal Cord for Spondylosis (Dentate Ligament Section)	16	
and Discoidectomy — Lumbosacral	87	
and Discoidectomy — Thoracic	1	
and Discoidectomy — Cervical	4	
and Incision and Drainage of Abscess	1	
and Incision and Drainage of Intramedullary Cyst (Syringomyelia)	5	
and Removal of Haematoma	1	
and Removal of Tumour — Intramedullary	2	
and Removal of Tumour — Extramedullary, Intradural	1	
and Removal of Extradural Tumour — Metastatic, Bone, etc.	6	
and Rhizotomy	8	
and Spinal Fusion with Bone Graft — Autogenous or Bone Bank	56	
and Spinal Fusion with Wire or Plate	8	
and Spinal Fusion — Cervical — Occipital	7	
Discoidectomy — Anterior Approach — Cervical	27	242
Plastic Repair of Spina Bifida	3	3

Nerve Explorations:

Avulsion or Section	11	
Excision of Neuroma	1	
Neurolysis, Transplantation or Decompression	10	22

Artery Exploration:

Endarterectomy (Patch-graft)	14	
Ligation	5	
Progressive Occlusion (Selverstone Clamp)	4	23

Wound Re-Opening:

Drainage of Infection	2	
Evacuation of Haematoma	6	
Exploration	3	
Further Removal of Brain Tissue	1	
Further Removal of Tumour	1	
Removal of Bone Flap, Tantalum Plate or Wire Mesh	2	
Repacking	5	
Resuturing	5	25

Miscellaneous:

Diagnostic Spinal Anaesthesia	9	
Miscellaneous	16	
Nerve Blocks	57*	
Plaster Casts	4*	
Tic Injection	3*	
Tracheostomy	29	
Suture of Lacerated Wound of Scalp	2	56

Radiological Procedures:

Cerebral Angiography :

— Percutaneous, Carotid, Vertebral or Subclavian	360	
— Catheterization — Brachial, Femoral or Carotid	158	
— Pneumograms under Anaesthesia	79	597

1301

*Not included in total.

CAUSES OF DEATH

Intracranial aneurysm (haemorrhage & haematomata due to aneurysm)	25	
Cerebrovascular disease (thrombosis, infarction, haemorrhage)	23	
Head Injury (concussion, contusion, haematomata, etc.)	20	
Intracranial tumour, primary	7	
Intracranial tumour, metastatic	7	
Intracranial hypertension	3	
Coronary Occlusion	3	
Other systems	1	
TOTAL		89

