

MONTREAL NEUROLOGICAL
INSTITUTE
and
MONTREAL NEUROLOGICAL
HOSPITAL



McGILL UNIVERSITY

THIRTY-SIXTH ANNUAL REPORT
1970-1971

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

1970-1971

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EDITORIAL NOTE

Annual reports of parliaments, businesses and societies of all sorts — including hospitals and institutes — seem useful to document activities, profits and losses, changes of staff, occasional changes of direction and future needs. This is all to the good providing we take the precautionary view of Dr. William Harvey, the discoverer of the circulation of the blood, who wrote in 1651 “Wherefore fond and erroneous is that method of seeking truth in use in our times, in which very many enquire diligently not what things are, but what they are said to be by others . . . ”.

Those who on our behalf have contributed these reviews covering our work during the past year deserve our thanks. I wish also to thank Mrs. Rose Slapack for her expert editorial assistance, and Mrs. Paul Blanchart for preparing the list of publications.

W.F.
Editor

REPORT OF THE DIRECTOR

DR. THEODORE RASMUSSEN

Thirty-six and a half years ago, on September 27th, 1934, the Montreal Neurological Institute was opened for McGill by its Chancellor, Sir Edward Beatty. Each year since that time, a report has been rendered, initially by the Registrar, but since 1941 by the Director, to McGill, to the City, the Provincial and Federal Governments and to the Community. The report has always been a tripartite one; a few time zones to the East it might have been termed a "troika". This report will again present some of the highlights of the past year from each of the three facets that make up this institution — patient care, research and teaching, to list them alphabetically.

Dr. Donald Lloyd-Smith and Dr. Albert Pace-Florida, to our regret, have gone to Toronto and Calgary, respectively, in search of a more peaceful political and medical climate. Our best wishes go with them in their new posts.

Dr. Francis LeBlanc accepted an invitation to assume the responsibility of developing a Department of Neurological Sciences at the new Medical School in Calgary, and also resigned his appointment last fall. We are sad to lose him, but are pleased to see his talents recognized by this important new assignment.

We welcome the addition to the staff of Dr. Elizabeth Wilkinson and Dr. K. P. Geevarghese in Anaesthesia and Dr. André Olivier in Neurosurgery.

Changing of the guard has brought two new speakers to this year's agenda. Miss Joy Hackwell, Director of Nursing, has made her first annual report, as successor to Miss Eileen Flanagan and Miss Bertha Cameron. We are all most pleased to have the important responsibility of the direction of the Nursing Department in Miss Hackwell's capable hands. Miss Cameron's retirement last fall brought to a close a distinguished career in Nursing that spanned a period of over forty years, initially at the Royal Victoria Hospital and then thirty-six years here, the last nine as Director of Nursing.

Our other new speaker, in the Administrator post, Mr. Christian Primavesi, succeeds Mr. Charles Gurd who requested early retirement, to concentrate on family business affairs. We are grateful to Mr. Gurd for his excellent work during his three years as Administrator, a new post established to strengthen the administrative functions of both the Hospital and Institute divisions. Mr. Primavesi, with his training and experience in hospital administration, brings new strength and vigor, and new approaches to the post of Administrator.

Mr. Geoffrey Thomas, Director of Finance, Mr. Hector Heavysege, Director of Personnel, and Mrs. Sophie Malecka, Executive Secretary in the Director's office, have all coped with the many demands of their posts with efficiency and devotion, and complete an administrative team that is well equipped to meet the problems that lie ahead.

The duties and responsibilities of an Institute such as this were well described by Gordon Holmes, in his Foundation Lecture at the opening ceremonies in 1934. "As a neighbour of the Royal Victoria Hospital, which has already gained a world-wide reputation, its most obvious function will be the care and the relief of those afflicted by diseases of the nervous system, while, being a unit of McGill University, teaching and instruction, worthy of the tradition of its parent, will be one of its duties. But a third, and I believe a more important function, will be to institute, direct and provide facilities for research and investigation into the factors determining or predisposing to such disease, and into its therapeutics or treatment. Hand in hand with the research there will, I hope, go the study of the normal function of the nervous system, in order to arm ourselves and our successors with knowledge, which is always the most potent instrument at our service in a life-long contest with illness and suffering".

There have been many changes in the Institute since that time, but these goals have remained unchanged. These goals have been relevant, to use the operative word of the 70's, as judged by the rising tide of patients, from near and far, who yearly tax our capacity, by the growing parade of brilliant, dedicated students of the nervous system who have come to study and learn, also from near and far, by the increasing number of those who apply but for whom we have no room, and by the steadily increasing financial support from the community and from the governments. As a result, the Institute was doubled in size in 1953 by the opening of the McConnell Wing, the endowment funds have increased tenfold, and support of research by the Medical Research Council of Canada has increased fivefold, since the original grant from the Federal Government was authorized by Mr. Mackenzie King in 1946.

Quebec, Canada and the world have also changed during this past third of a century, and the question may be asked — is an Institute, such as this, still relevant in the light of these changes?

The Castonguay Commission's extensive inquiry into the Health and Social Welfare of the Province spelled out the well-known deficiencies in the traditional North American pattern of health care, and proposed a blueprint for changes designed to correct them. Medicare is now in operation, after an unnecessarily painful and distressing start, but its growing pains are far from over. Some other aspects of the blueprint for changes in the delivery of health care are also of concern, since they hint at reduced support for the major teaching hospital centres, in order to concentrate on facilitating the entry of the patient into the health-care orbit via less costly and elaborate community health-centres. There is concern lest the Province's teaching hospitals may be discouraged or even prevented from updating and improving their facilities, in many instances already years out-of-date. The pace of medical research has quickened enormously, and translation of this growing fund of knowledge and new techniques into more effective, safer and more comfortable medical care is dependent, in large part, on the strength and effectiveness of the teaching hospitals.

There is concern lest this new blueprint serve to level off the standard of health-care, by cutting off the peaks, rather than by filling in the valleys. Increasing access to the family physician and building up his role in the over-all health scheme are laudable aims, but much of the benefit is lost if he can only provide yesterday's knowledge and standard of care, and of even greater importance, if the hospitals and specialists behind him are similarly handicapped.

It thus seems clear that the need to keep institutions, such as the M.N.I., in the forefront of all aspects of medical care and research is even greater now than in 1934. The increasing number of departments of neurological sciences, being established in both new and existing medical schools in Canada and the U.S.A., give eloquent testimony of the viability and relevance of the organizational structure we enjoy here.

The facilities provided by the McConnell Wing, which were ample in 1953, were not elastic, however, and the need for more space and more up-to-date facilities, both for patient-care and for research and teaching, became increasingly urgent before a decade had passed. In 1967, a major renovation of the basement floor was carried out, and an addition built onto the neuropathology portion of the sixth floor, to house an electron microscopic laboratory. These two projects were financed by M.N.I. funds, supplemented by a Federal-Provincial Hospital Construction Grant.

At the same time, our staff began an exhaustive analysis of each department's immediate minimal needs and its projected requirements for the ensuing 15 years, to enable us to fulfill our aim of providing leadership in the neurological field. This study led to McGill's approval to plan for the addition of a new wing, between the existing building and the Pathological Institute.

Generous support from five friends of the Institute, plus two earlier endowments given specifically for hospitalization purposes, provided half of the projected cost of this new wing and associated renovations, and led to the issuance, by the Provincial Government, of Order-in-Council No. 4084, on December 17th, 1969. The Government thus authorized the preparation of preliminary architectural plans, and approved an application to the Federal Health Resources Fund for the remaining half of the costs. These preliminary plans were in the process of being approved by the Department of Health when, in May 1970, the new Provincial Government halted all hospital planning and construction throughout the Province, pending study of the health requirements of the population under the proposed new health scheme. Meetings with the Government's Planning Committee are now being set up, but a valuable year has already been lost. We urgently need prompt review and approval of our preliminary plans and permission to proceed with the preparation of final plans and specifications, so that our proposed new and renovated facilities, planned with so much care after extensive consideration of our present and future needs, will become available with the least possible further delay. Pursuit of excellence runs the danger of becoming mere tokenism, as space becomes progressively more limited and facilities more obsolete.

We are concerned by policies that intentionally or unintentionally tend to discourage pursuit of excellence in the health field. Standards and procedures, established by accountants and economists and by accounting formulae without medical consultation and guidance, training policies that discourage or actually prohibit embryo-specialists from taking more than the minimum stipulated training, required by various certifying specialist boards, regulations of the Hospital Act that fail to provide for the special needs of the teaching hospitals, all favour a kind of Gresham's law whereby poor medicine tends to drive good medicine from the Province.

Tokenism is a dirty word in the field of race relations. It is a dangerous word in medicine. In the medical student's curriculum, a balance must be struck between tokenism across the whole rapidly expanding field of medical knowledge and concentration on too small a sampling of the field. Specialization in medical practice has developed of necessity to avoid the catastrophic effects of tokenism in the care of patients, as the horizons of medical knowledge and specialized techniques have widened.

Tokenism in research may be fostered in various ways and at various levels. Recognition that this may result from short-term annual research grants has finally come to many governmental and philanthropic granting agencies, so that longer-term research grants are now increasingly common. Greatest protection, however, is afforded by endowments which provide assured ongoing financial support, and thus promote long-term, effective and significant research planning. Restrictions of space and facilities, however, may also lead to tokenism, as advances in a field make previously adequate facilities inadequate, and this constitutes one of our principal and increasing concerns.

Research areas have developed at the M.N.I. in an orderly fashion over the past 36 years, as personnel, financial support and space became available. The research potential today in many of the basic and clinical areas of special interest to us, and in which we have special competence, has increased to the point that, unless we can provide more space and more modern facilities, there is danger that our research potential in both basic and clinical fields may deteriorate to tokenism. Our aim of providing leadership in the care of patients with ailments of the nervous system is equally in danger of becoming tokenism, if our expansion plans are too long delayed.

We, therefore, make an urgent appeal to the Government to remove the roadblock of May 1970, to review and approve our plans, and let us get on with the new wing and renovations we have laboured over and planned with so much discussion and consultation.

We have maintained our momentum during the troubled days of 1970. With these projected additional and updated facilities firmly under way, the prospects for even more productive years ahead are bright. However, if implementation of these plans is too long delayed, these bright prospects will surely elude us, as the daylight fades into twilight with each departing day.

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Poznan)*
P. LANGEVIN, M.D. (Laval Univ.)
J. LAVIGUEUR, M.D. (Univ. of Mtl.)*
J. LUCE, M.D. (Univ. of Manitoba)*
C. ORIMALADE, M.D. (Nigeria)*
S. ROTHMAN, M.D. (McGill)*

Montreal General Hospital Residents:

S. BEKHOR, M.D. (Baghdad Univ., Iraq)*
B. KRYSZTOFIK, M.D. (Univ. of Poznan)*

Montreal Children's Hospital Residents:

P. HUMPHREYS, M.D. (McGill)*
J. LAVIGUEUR, M.D. (Univ. of Mtl.)*

Mtl. General Hospital Assistant Residents:

H. S. CHUANG, M.D. (Taiwan)*
P. LANGEVIN, M.D. (Laval Univ.)
J. LUCE, M.D. (Univ. of Manitoba)*
C. MELMED, M.D. (Univ. of Manitoba)*

Assistant Residents:

D. AKMAN, M.D. (McGill)*
H. S. CHUANG, M.D. (Taiwan)*
L. DEMERS, M.D. (Univ. of Mtl.)*
J. NOBLE, M.D. (Univ. of Louvain)*
G. REMILLARD, M.D. (Ottawa Univ.)*
S. ROTHMAN, M.D. (McGill)*
S. ROUMANI, M.D. (Univ. of Beirut)*

Mtl. Children's Hosp. Assistant Residents:

S. BEKHOR, M.D. (Baghdad Univ., Iraq)*
J. NOBLE, M.D. (Univ. of Louvain)*
S. ROTHMAN, M.D. (McGill)*

Jewish Gen. Hosp. Assistant Residents:

C. MELMED, M.D. (Univ. of Manitoba)*
N. SCHAUL, M.D. (State Univ. of N.Y.)*

*6 months on this service

**3 months on this service

RVH Rotators:

C. BOMBARDIER, M.D.	B. CHAITMAN, M.D.	G. HENNING, M.D.	P. LEVINE, M.D.
I. BOWMER, M.D.	D. COTTON, M.D.	F. KATZ, M.D.	P. PARE, M.D.
C. BRESLIN, M.D.	R. DUKE, M.D.	P. KOCH, M.D.	J. SOUCIE, M.D.
P. CANFIELD, M.D.			

MGH Rotators:

J. ANTEL, M.D.	T. GREER, M.D.	P. LOWRIE, M.D.	K. TAUB, M.D.
R. DABRUSIN, M.D.	L. LESK, M.D.	J. POLACHEK, M.D.	A. WILLIAMS, M.D.

NEUROSURGICAL SERVICES

Residents:

R. HOLLENBERG, M.D. (Harvard)*
J. NABWANGU, M.D. (Kenya)*
S. NUTIK, M.D. (McGill)*
R. SIDHU, M.D. (Punjab, India)*

Mtl. General Hospital Residents:

E. GARCIA-FLORES, M.D. (Mexico)*
R. ROMERO, M.D. (Univ. of Philippines)*

Mtl. Childrens' Hospital Residents:

P. FRAGATOS, M.D. (Univ. of Ottawa)*

J. NABWANGU, M.D. (Kenya)*

Assistant Residents:

H. BLUME, M.D. (Wayne State)*
L. BOUCHARD, M.D. (Univ. of Ottawa)*
A. KLEIDER, M.D. (Univ. of Western Ont.)*
E. GARCIA-FLORES, M.D. (Mexico)*
D. MERCER, M.D. (Dalhousie)*
L. RAVVIN, M.D. (McGill)*
H. TUTT, M.D. (Univ. of N. Carolina)*
S. WOHL, M.D. (McGill)*

Mtl. General Hosp. Assistant Residents:

K. AMANO, M.D. (Tokyo)*
L. RAVVIN, M.D. (McGill)*

RVH Rotators:

A. HACHE, M.D. F. MARTINEZ, M.D.
M. KERNER, M.D. C. MOSELEY, M.D.

Neurosurgical Research:

HENRY LAURELLI, M.D. (Jefferson Med. Coll.) U.S.P.H. Fellow
MARCIAL LEWIN, M.D. (Catholic Univ. of Chile)
TERENCE MYLES, M.D. (Univ. of Alberta) — P.Q. MRC Fellow
LESLIE STERN, M.D. (Univ. of Manitoba) — KILLAM SCHOLAR — (at M.G.H.)

*6 months on this service.

THE WOMEN'S AUXILIARY OF THE ROYAL VICTORIA HOSPITAL

President MRS. PATRICK HENDERSON
Chairman, M.N.I. Coffee Shop Committee MRS. JACK BRUNT

NURSING STAFF

Director of Nursing MISS C. JOY HACKWELL, B.N., R.N.
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) MRS. ROBERTA CLEGG, B.N., R.N.
MISS LILLIAN MCAULEY, R.N.
Nursing Supervisors (Day) MISS ANNE CARNEY, B.N., R.N.
MISS ANNIE JOHNSON, R.N.
Nursing Supervisors (Evening) MISS CECILIA LARGO, B.Sc., (N), R.N.
MRS. BARBARA PETRIN, R.N.
Assistant Director of Nursing Education MISS HELENA KRYK, B.N., R.N.
Clinical Coordinator MISS JUDITH TRAINOR, B.N., R.N.
Clinical Instructor MISS GERALDINE HART, B.N., R.N.
Operating Room Supervisor MISS PATRICIA MURRAY, B.N., R.N.

HEAD NURSES

MISS ALICE CAMERON, R.N. MISS DELTA MACDONALD, R.N.
MISS MARY CAVANAUGH, R.N. MISS FLORA McCORMACK, R.N.
MISS LUCY DALICANDRO, R.N. MISS URSULA STEINER, R.N.
MISS MARION EVERETT, R.N.



Bottom Row: Miss M. Kochupurampil, Miss S. Eapen, Miss H. Jeffrey, Miss K. Devadason, Miss C. McKenzie, Miss L. Navera,
 Miss D. Demerin, Miss A. Navarro, Miss E. Ascano.
 2nd Row: Miss F. McCormack, Miss P. Murray, Miss A. Johnson, Miss I. MacMillan, Miss J. Hackwell (Director of Nursing),
 Miss H. Kryk, Miss A. Carney, Miss J. Trainor, Miss N. Isaacs.
 3rd Row: Miss E. Clarke, Mrs. J. Mallory, Mrs. P. Duben, Mrs. L. Gorman, Mrs. L. Fletcher, Miss M. Cavanaugh, Miss D.
 MacDonald, Miss L. Dalicandro, Miss A. Cameron, Miss G. Hart, Miss D. MacKinnon.
 4th Row: Mrs. G. Doig, Miss H. Zatylny, Miss M. Pinto, Miss D. Osback, Miss C. Largo, Mrs. L. Oclarit, Mrs. L. Simon,
 Miss N. Maeda, Miss M. Lee, Mrs. W. Wason.
 5th Row: Mrs. G. Gyarmati, Mrs. V. Perez, Miss M. Manchen, Miss F. Cabugnason, Miss U. Steiner, Mrs. R. Boyer, Miss G.



Bottom Row: Drs. D. Mercer; L. Bouchard; A. Kleider; C. Dila; S. Nutik; J. Nabucangu; H. Blume; R. Hollenberg; M. Levin.
 2nd Row: Dr. G. Bertrand; Mr. C. Primarosi; Drs. W. Feindel; P. Robb; Mr. A. DeGrandpre; Prof. C.N. Woolsey; Dr. T. Rasmussen; Dean M. McGregor; Drs. W. Penfield; P. Gloor; Miss J. Hackwell; Miss C. Griffin; Drs. Brenda Milner; F. McNaughton.
 3rd Row: Drs. J. Vézina; D. Melançon; B. Graham; F. Andermann; Eva Andermann; I. Heller; H. Garretson; Hanna Pappuis; L. Wolfe; Mr. L. Taylor; Drs. G. Mathieson; G. Karpati; S. Carpenter; Y. Yamamoto.
 4th Row: Mr. D. Skuce; Drs. D. Trop; R. Hansbont; A. Olivier; J. Woods; Mrs. M. Bernard; Mrs. M. Boski; Drs. B. Krysztofiak; A. Eisen; Miss U. Steeb; Drs. G. Testa; G. Cosgrove.
 5th Row: Mr. W. Burnham; Drs. S. Preleuc; L. Appeltaner; Mr. C. Thompson; Mr. J. Ives; Drs. Hiroka Katoh; Susan Meltzer; G. Scott; Miss M. Jones; Dr. P. Langerin; Mr. M. King; Dr. J. Luce.
 6th Row: Drs. C. Pace-Asciak; L. Raczin; P. Humphreys; H. Tutt; S. Shibata; J. Clarke; T. Myles; R. Senior; R. Sidhu; S. Roumani; J. Soucie.

GRADUATE STUDIES AND RESEARCH

DR. PIERRE GLOOR

There used to be a time, not so long ago, when the basic neurological sciences were regarded by many clinicians, and with some justification, as rather esoteric subjects with little relevance to the day-to-day problems of clinical neurology and neurosurgery. This situation over the past decade has been and still is, changing rapidly, as basic science concepts and techniques become increasingly applicable to clinical situations both with regard to the understanding of disordered function and to therapy. For many of our clinical colleagues, the goings on in the neurochemistry laboratories, for instance, must some years ago have seemed as remote from clinical neurology as the electronmicroscopist's attempts at taking a trip into the as yet unseen and fascinating world of the ultrastructure of the nervous system. Contrast this state of affairs with a rather common situation today: Dr. Andermann encounters a child in whom, on clinical and EEG grounds, he suspects a cerebral lipidosis; he calls upon Dr. Wolfe to elucidate the enzymatic defect in lipid metabolism which causes disordered function and requests Dr. Carpenter to peer down his electron-microscope to define specific ultrastructural changes which, in conjunction with the biochemical findings, may characterize the disease with a degree of precision which was inconceivable at the time when these so-called degenerative encephalopathies were only known by a string of weird sounding Teutonic eponyms. We can be justly proud that the work carried out in a number of laboratories in this Institute have added much new information regarding these hitherto rather baffling neurological conditions.

In the present decade, neurochemistry seems to be at the forefront of the basic neuroscience in its capacity to provide answers to many questions concerning some of the most fundamental biological mechanisms involved in the genesis and expression of neurological disease. Contributions from our own neurochemical laboratories have not been confined to investigations on degenerative diseases, but have also helped to clarify some problems of electrolyte and water metabolism, such as in anoxic conditions consecutive to vascular occlusion or in an experimental model of inappropriate ADH secretion. A collaborative effort involving the neurochemistry and the neurosurgical laboratories led to the demonstration of a potent vasoconstrictive action of prostaglandins upon small cerebral blood vessels. These investigations have shown once more how the close and fruitful collaboration of a number of departments may shed light upon areas of pathophysiology which are of potentially great importance for clinical neurology and neurosurgery.. Dr. Feindel, Dr. Yamamoto and their group in addition have studied cerebral blood flow under conditions of arterial hyper- and hypotension and for the first time have made a detailed exploration of the alteration of cerebral blood flow caused by obstruction of large cerebral veins.

In the Neurophysiology Laboratory, Dr. Nutik has finished a monumental three-year study of a most difficult subject of neurophysiology, namely, the microphysiological analysis of the activity of single nerve cells

in the posterior hypothalamus involved in the organism's defence against cold. This study, I am ready to predict, will be a landmark in the unfolding story of how the central nervous system regulates the thermal homeostasis of the organism. Three new avenues of investigation have been initiated in the Neurophysiological Laboratory during the past year: one deals with the organization of afferent input to the amygdala. A second one sets out to investigate in the animal and human cortex the relationship that must exist between slow electrical events characterizing the normal and abnormal EEG and the activity of single neurons. Finally a third project is under way which attempts to define more precisely the respective contributions of upper brainstem and cortical mechanisms to the elaboration of bilaterally synchronous generalized spike and wave discharge. This experimental study represents but a small aspect of a much larger research interest which is shared by a number of investigators at this Institute. It is concerned with the group of generalized epilepsies characterized by bilaterally synchronous spike and wave discharge, clinically associated with absence attacks, and for which we are still in search of a generally acceptable terminology. Dr. Preston Robb is attacking this problem from the point of view of clinical symptomatology; Dr. Ivan Woods using telemetric recordings of the electroencephalogram is attempting to define the conditions which favor or inhibit the occurrence of the epileptic discharges in these patients. He also uses prolonged telemetric recordings for assessing the effects of drug therapy, another collaborative effort which involves Dr. Sherwin's laboratory. Dr. Allan Sherwin and his collaborators have developed accurate methods of measuring anticonvulsant drug levels in the blood. They have demonstrated that patients vary widely in their capacity to metabolize these drugs and this often explains why a particular drug regime may fail to control seizures in a particular patient, while being effective in others who seem to suffer from the same seizure disorder.

Neuromuscular research has continued at an active pace during the past year. The pathogenesis of experimental nemaline rods and central cores, which are found in some myopathies, is being investigated by correlative ultrastructural, histochemical and electrophysiological techniques by Dr. George Karpati, Dr. Stirling Carpenter and Dr. Andrew Eisen, another collaborative effort involving the Neurology, the Neuropathology and the EMG Laboratories.

In the Neuropsychology Laboratory, further refined studies on higher cortical functions have been carried out by Dr. Brenda Milner and her team. Highlights of the work over the past year have been the continued investigations on differences between left and right side neocortical temporal and hippocampal lesions, the investigation of memory deficits under the influence of intracarotid Amobarbital injection and the use of visual imagery in assisting verbal learning in patients with verbal memory defects.

The Computer Laboratory under the direction of Mr. Christopher Thompson has been busy in assisting a number of investigators in designing methods that will bring the computer technology to bear on many problems of data analysis. These span the whole gamut from practical clinical

applications in electromyography, electroencephalography and stereotaxic surgery to the electrophysiological analysis of brain waves and single nerve cell discharges recorded in the experimental neurophysiology laboratory and in the neurosurgical operating room. We are still very much at the learning stage as regards the most effective applications of these modern computer techniques.

Our Neuroanatomy Laboratory has been orphaned since Dr. Jacques Courville's departure to the University of Montreal early last year. Unfortunately it has not yet been possible to replace him. The recruitment of a successor is very much hampered by lack of adequate laboratory space; shortness of space also adversely affects the work done in all the other laboratories. We were deeply disappointed when the Provincial Government, by its imposed freeze on new hospital construction, forced us to shelve temporarily our plans for the construction of a new wing. We hope that we will soon receive authorization to build it and that the present constraints under which we labor will be lifted.

Much of the research work carried out in the Institute has been performed as a collaborative effort between staff members and graduate students. Four Ph.D. students are presently registered in the Department of Neurology and Neurosurgery. Of these, three are working here at the Institute and one at the Montreal General Hospital. In addition, five M.Sc. students are registered in our Department. One reads much these days about the over-production of Ph.D. and other university graduates, and many begin to question the relevance of our academic postgraduate programs in the light of today's social realities and the situation on the academic labor market. It is hard to imagine, however, that these worries are justified with regard to the neurosciences. There is still a great need for skilfull investigators in all aspects of the basic sciences of neurology, but perhaps nowhere more than in those of direct clinical import. The need, as I see it, is particularly great in providing our medical schools with research-oriented neurologists and neurosurgeons who, in addition to their clinical training, have received sufficiently broad and thorough training in basic science concepts and techniques which will enable them to apply these successfully to clinical problems. To keep such training options open and attractive at our Institute is one of its main *raison-d'être* and must remain one of its distinguishing features. I am glad to report that our record for the past year has been worthy of our previous performance in this regard.

NEUROLOGY

DR. PRESTON ROBB

It is with a feeling of satisfaction that I report of the activities of the Department of Neurology for 1970. Significant advances have been made and we may feel justly proud. At the same time, we are cognizant of the many unsolved problems — the greatest being the need to improve and meet the demand for medical care.

During 1970 there were 1261 admissions to the three neurology services, an increase of 212 over the previous year. The average length of stay for neurology patients was 19.1 days. It would be our hope that the length of stay could be reduced in two ways. First by carrying out preliminary investigation on an out-patient basis and second by finding places for those chronically ill who can no longer benefit from the facilities of this hospital. We continued to operate three services, each with their special interest. Dr. McNaughton's service has provided leadership in the care of patients with Parkinsonism. The "B" service has concentrated on epilepsy and pediatric neurology. Dr. Irving Heller has replaced Dr. Lloyd-Smith as the head of the "C" service and has been joined by Dr. Karpati and Dr. Woods. In July, Dr. Heller will be going to London for a year to work with Professor Henry McIlwain. We wish him God-speed and expect him to return full of new ideas.

A word of congratulation and thanks should be given to the excellent support our residents have given during the year. They have worked well and, I hope, benefitted from the experience. Unfortunately, during the winter, Dr. Andrew Sereda, our resident in the R.V.H. took sick, and we were unable to replace him. The staff and residents have been most helpful in filling in. In order to improve consultation coverage in the R.V.H., one staff neurologist has been assigned to cover the Department of Medicine, and another for Surgery, Obstetrics and Gynaecology, and Psychiatry. This has been combined with Third Year undergraduate teaching and has proven satisfactory. As well, an emergency service has been established, so that one neurologist is on call everyday for emergency consultations regardless of where they are. As Chairman, I can't help but express my deep appreciation for the way the members of the group have pulled together through a very difficult year.

Medicare has had its toll. Dr. Donald Lloyd-Smith has joined a team in Toronto. He served the Institute with distinction and is missed by his colleagues and friends. Dr. Anthony Guzman who was doing such an excellent job at St. Mary's and the Montreal Children's was attracted to Ottawa. Dr. André Azarut, who was about to start a pediatric neurology service at the Jewish General Hospital has accepted a position in Vancouver. Finally, and I am sorry to report, Dr. Arthur Schwartz of the Jewish General Hospital is seriously ill and will be unable to practice for some time. Dr. Schwartz deserves great credit for the excellent work he did in the Parkinson study. He carried a heavy clinical load and is missed at the Jewish General and Queen Elizabeth.

The unfortunate manner and time in which Medicare was launched combined with sensational and inaccurate newspaper reporting, did little to develop a spirit of cooperation between the doctors and government. Although the vast majority of doctors wanted a form of medicare where medical facilities would be equally available to all, the last minute changes in the Bill, and bowing to the pressure of unions by the government created deep feelings of distrust: the spirit of cooperation was lost and it is doubtful if it will ever be regained.

Regular neurology clinics continue to be held in the Royal Victoria Hospital. There were 695 new patients seen (an increase of 112 over 1969) and there were 3,754 revisits (an increase of 585). These figures do not include the increasing number of consultations in the Emergency Department. It is apparent that the clinics are here to stay. Dr. Bernard Graham has taken over the work of clinic coordinator replacing Dr. Llyod-Smith. He has expressed the hope, as has been expressed by so many others, that it will not be too long before a new physical plant is available, and patients can be handled with more dignity and less confusion. He is anxious to see a regular appointment system so that the long waits can be avoided. He hopes diagnostic tests can be done more promptly, and when done, the reports made available immediately. None of these thoughts are new; they are part of the R.V.H. long-range development plans, but it is our hope that we can do something about them now. Special mention should be made of Mrs. Jacqueline Carey, the Clinic Secretary, who has done so much to keep the clinics functioning as well as they do.

Last week, we received the good news that the Epilepsy Clinic will continue to be supported for another year by the Government in Quebec. They are to be commended. A disease like epilepsy cannot be treated by a doctor alone. It is a team effort—doctors, social workers, psychologists, psychiatrists, and volunteers working together. Such clinics must be supported. The same can be said for other neurological disorders such as Parkinsonism, multiple sclerosis, mental retardation, etc. It is our hope that the Epilepsy Clinic may serve as a model of how efficient, dignified, high quality, medical care may be provided. At the same time, it provides a cohort of patients for the study of special problems, testing of new drugs and generally furthering our knowledge of the disorder.

Research

It is in the area of clinical research that the greatest strides have been made. Well-established laboratories are doing important and productive work.

In the Immunochemical and Anti-convulsant Drug Laboratory, Dr. Allan Sherwin and his team are combining basic research with efforts to develop practical techniques which could be utilized in community health services. The availability of plasma anti-convulsant drug levels is proving to be a significant aid in the management of patients with epilepsy. Mr. George Bock has developed a new rapid assay technique for diphenylhydantoin. Mr. Bock is a medical student who worked with Dr. Sherwin during the summer and has taken a year off from his course to work in the lab. It has been a very productive year for him and we expect he will be getting a Masters Degree in the fall.

Dr. Sherwin and Mrs. Jacqueline Loynd are studying the clinical pharmacology of Ethosuximide (Zarontin). Nearly 200 patients have been studied, mostly from Dr. Robb's Absence Study at the Montreal Children's Hospital. As well, with Dr. Graham's help, studies on serum levels of single daily doses of diphenylhydantoin were carried out at the Foyer Dieppe.

Dr. John Armstrong, in the same laboratory, succeeded in developing a new method to isolate and purify the enzyme creatine kinase from rabbit loin. Dr. Armstrong will be leaving us for Toronto for two years to further his studies. He has made a real contribution to the life of the Institute and we will welcome his return to Montreal.

In the Neuromuscular Research Laboratory, Dr. George Karpati, in close cooperation with Dr. Carpenter, continues the study of specific involvement of skeletal muscle and peripheral nerve in degenerative nervous system diseases with promising results. The pathogenesis of experimental nemaline rods and central cores is being investigated by correlative ultrastructural, histochemical and electrophysiological techniques. Mr. Jack Miller, a Muscular Dystrophy Association of Canada summer student, carried out an interesting study on the effect of vincristine upon fragmented sarcoplasmic reticulum from rat muscle in cooperation with Dr. J. Clarke. An experimental comparative study on the effects of various vasoactive substances upon skeletal muscle has been initiated. This may provide insight into the pathogenesis of Duchenne muscular dystrophy. As well, the laboratory provides us with a superb biopsy service which has added a new dimension to patient care.

Under Dr. Andrew Eisen, electromyography has become established as a separate laboratory and is becoming increasingly busy. The field of neuromuscular diseases is one that is rapidly growing and as such, requires the collaboration of muscle histochemistry, electromicroscopy, biochemistry and electrophysiology. It is a great source of satisfaction that Drs. Karpati, Wolfe, Carpenter, Andermann, Eisen and others have been able to work together so well. As well as providing clinical electromyography, Dr. Eisen has done a lot of teaching and the laboratory is now in a position to offer training for residents in the field of neuromuscular diseases.

Dr. Ivan Woods, the youngest member of our neurology team, working with Dr. Gloor, has introduced a new method of studying seizures in the E.E.G. laboratory. This is the use of telemetry for prolonged E.E.G. recording on ambulatory patients which enables us to study the effects of psychological and environmental factors on seizures. This method allows one to assess in a quantitative manner the degree of seizure activity during normal activities and in certain experimental situations. The correlation of this form of recording with analysis of seizure discharges by the PDP 12 Computer in the Department of Neurophysiology has already produced very interesting results. This will be of far-reaching importance in our understanding of seizures and eventually in our management of epileptic patients. When correlated with the blood levels of anticonvulsants, it permits an exact assessment of the usefulness of these drugs in a particular patient. These are just two examples of the many applications of this new technique which promises to have a very exciting future.

Dr. Fred Andermann continues to discover new and exciting problems in children with hereditary metabolic disorders. From several of his patients with a lipid storage disease, Dr. Stirling Carpenter has been able to demonstrate lipid deposits in the skin. The ability to diagnose a lipodosis

from a skin muscle and nerve biopsy is a significant advance. Dr. Andermann seems to work "out of his hat" and deserves great credit for having accomplished so much.

Although reference will be made in other reports to the research efforts of our neurologists, I have briefly reviewed them here to give some concept of the breadth of activities of our department. One of the biggest problems is to protect these men from the pressing demands of patient care, committee work and their activities that keep them from the lab.

Teaching

Teaching continues to be a major preoccupation of the staff. Special mention should be made of the Neurosciences course given to the Second Year McGill students. Under a very adverse time schedule, Dr. Francis McNaughton, with the help of most of his colleagues, was able to put on a coordinated course in the basic neurological sciences. Dr. Allan Sherwin worked very hard in coordinating the "Introduction to the Examination of the Nervous System" given to the Second Year, an effort that was well received.

Last year, reference was made to the sad state of the teaching of clinical neurology to the Third and Fourth Years at McGill. I am sorry to report that the situation is no better today. Hopefully, the increasing clamor of our students for more neurology may eventually get through to the Curriculum Committee. Clinical electives in neurology continue to be popular and attract students from Western Canada, the U.S., Wales as well as McGill.

At a graduate level, the McGill training program in neurology functions well. The excellent facilities for residency training at the Montreal General, the Montreal Children's and recently, the Jewish General Hospital provide a balanced program for our trainees. I would emphasize that it is a joint project and referred to as the McGill Neurology Training Program.

Although this report deals with the affairs of this hospital, I cannot help but comment on the development of neurology at the Montreal General Hospital under the direction of Dr. Donald Baxter. The recent additions of Dr. Garth Bray and Dr. Joe Martin completes a team that would be difficult to match anywhere. The quality of the clinical and research work they are doing speaks for itself.

What of our needs? They are many. The planned new wing is badly needed to provide more space for teaching and research. At the same time, we must find ways of meeting the demand for patient care. We do not envisage a need for more beds, but we must find space for more staff, and ways to facilitate investigation and care on an out-patient basis.

If this report seems lengthy, it is because a lot has been happening. The year has been a productive one. We look forward to the coming year with equal enthusiasm.



NEUROSURGERY

DR. WILLIAM FEINDEL

It smacks of the common place to say that the present can be more easily tolerated by looking at the past. Nonetheless, we can perhaps gain some perspective into our neurosurgical involvement during the past 12 months by glancing back 500 years. This picture,* *The Stone of Folly* was painted by Hieronymous Bosch in the year 1470 (by our Quebec medical calendar, 1470 BC, that is, Before Castonguay!). Note the many economies which then attended the delivery of medical care: open-air-conditioned operating room, the minimum of equipment, a limited but apparently dedicated staff and the submissive tax-paying and somewhat dubious patient. On the left we see the Neurosurgeon wearing what was called the "Funnel of Wisdom". You will note it is upside-down. On the far right, there is the attending Nursing Sister with the Book of Knowledge *on* rather than inside her head, appearing slightly bored. And, in the middle, we see the Medical Neurologist or the Anaesthetist, trying to distract the patient's attention from the discomfort of the surgery. The tactic was to convince the patient that his illness was due to stones in his head. The surgeon carried a supply of these and, after making a noticeable incision in the scalp, dropped them noisily into the receptacle hanging at his side to convince the patient that he was cured. Payment was no doubt made with equal dispatch before this community health team continued on to their next patient. It is of interest (and the significance of this will not be lost upon our wives), that the woman of the trio carries the money-bag. All very satisfactory — rien de Régie, no computers, no waiting for patient or doctor, the minimum of capital investment, prompt and efficient service.

To return to the past year, we must admit that things here have not gone quite so smoothly. But the medical-political events have been so extensively reported and misreported, there would be little value in bringing them up in review. It is enough to say that Operation Medicare started disastrously, shows now some signs of recovery but obviously needs continuing intensive care. The Government, having taken on the responsibility for the financing and supervision of medical care for the citizens of Quebec, quite clearly has committed itself to the support of medical education and research to help us to maintain excellence in the standards of medical and surgical treatment, and to keep Quebec medicine in the forefront of the application of new knowledge to the benefit of the sick, — in all, an awesome task. We welcome the politicians to our medical team and indeed, admire their courage. And we look forward to the new resources which they will bring to bear upon the many unsolved problems which afflict so many, particularly in the neurosurgical field. Epilepsy, cerebrovascular disease, brain tumours and brain trauma, to mention only a few, are in need of urgent support from public funds.

The influence of the Montreal Neurological Hospital and Institute on neurosurgery can be examined from a local, national and international

*I am indebted to Mrs. Feindel for the descriptive details of this painting.

view. In regard to the latter, it is of interest to point out the contributions made by present and former Neurosurgical Fellows at the recent meeting of the American Association of Neurological Surgeons which is now recognized, with its 1500 members, as the national society of North America in this speciality.

Dr. Penfield presented the Harvey Cushing Oration — the high point of the meeting. It was fitting that Dr. Guy Odom, the President-Elect of the Society, introduced Dr. Penfield before his lecture. Dr. Garcia-Flores and Dr. Garretson had the honour of reading the first paper on the 3-day Scientific Programme. Miss Murray, Mr. Hodge and myself were involved in two of the early morning seminars, one on Operating Room Function and Design in which Dr. Fred Brindle, our former anaesthetist also contributed, and one on Medical Documentation. The numerous M.N.I. Fellows of previous years who were listed as committee members or in the scientific programme, present concrete evidence of the widespread representation of the M.N.I. Dr. John Mullan was Chairman of the scientific programme and Dr. Richard Rovit of the breakfast seminar programme.

MEMBERSHIP ON COMMITTEES

<i>Education</i>	ARTHUR WARD, WILLIAM FEINDEL
<i>Workshop</i>	ROBERT KNIGHT
<i>Instrument</i>	ROBERT PUDENZ
<i>Neurosurgical Manpower</i>	ARTHUR WARD
<i>Planning</i>	JOHN THOMPSON, WILLIAM FEINDEL
<i>Medical — Legal</i>	EDWIN BOLDREY
<i>Representatives to Board of Neurological Surgery</i>	THEODORE RASMUSSEN, ARTHUR WARD
<i>A.M.A. Section</i>	ERNEST MACK
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PAPERS

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EXHIBITS

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GUY ODOM
NICHOLAS ZERVAS
WILLIAM FIELDS

A similar list might of course be drawn up from many other neurosurgical societies, both on the North American continent and throughout the world where M.N.I. Fellows play a leading role. Dr. Penfield and Dr. Rasmussen took part in a special meeting last year in Munich to celebrate the centenary of the first studies on the electrical stimulation of the cerebral cortex. Dr. Feindel, as one of the lecturers invited to take part in the 22nd Western Institute on Epilepsy, held in Vancouver in April, presented a review of the surgical results for temporal lobe seizures.

On the local scene the Neurology and Neurosurgical Units at Hôpital Notre Dame, the Montreal General Hospital, the Montreal Children's Hospital, and the Jewish General Hospital, founded or built up by men who had their major training at the M.N.I., continued their active contributions to the Montreal and Quebec community. Other graduates head up neurosurgical units across Canada from St. John's to Vancouver. Thus, this organization over the past 30 years or so of its existence has established a community, national and international reputation. We are happy that the Quebec government through its hospitalization and Medicare programmes now has the opportunity to support our activities in larger measure.

Some comments are in order on research and on changes of personnel. Dr. Francis LeBlanc and Dr. Albert Pace-Florida have moved to Calgary where we trust the geographic and political climate will continue to be somewhat milder than its Quebec counterpart. We miss their valuable services and wish them well. Miss Hackwell has recently received the resignation of Miss Pat Murray, Supervisor of our Operating Room. Miss Murray continued the long tradition of devoted service in what must be one of the highest pressure areas of the Hospital. Her dealings with her own staff, the surgeons and the radiologists have been distinguished by a judicious mixture of firmness and fairness. Her presentation in the recent seminar at the Cushing meeting on operating room function was an indication of the professional knowledge and skill which she has developed in this field. In a quiet way she has also been responsible far more than most of us know for advising young neurosurgeons in setting up their operating room suites in many parts of the world.

The resident staff under the leadership of Dr. Carl Dila continued to run the neurosurgical shop despite the major upheavals and we are grateful to them for their loyal interest and organization. Dr. Olivier has joined the neurosurgical staff and received his fellowship in the Royal College of Surgeons of Canada. Dr. Ambhanwong also gained his fellowship as well

as his Diploma of the American Board of Neurological Surgery, literally just a day or so before he and Sodsri took off for Bangkok. He will be remembered for his charm in dealing with staff and patients and for his female impersonations at the Annual Dinner Skits.

We have had an unusually active group of young neurosurgeons engaged in research this past year including Dr. Henry Laurelli and Dr. Terry Miles working on problems of the cerebral circulation, Dr. Marcia Lewin with Dr. Hansebout on problems of spinal cord cooling and trauma, Dr. Sidhu, Dr. Ambhanwong and Dr. Romero working in various laboratories and at the same time reviewing clinical series. Dr. Nutik completed several years of research on hypothalamic temperature control centres which he is submitting for a Ph.D. degree before returning for his final residency year.

As many of you are now aware from several talks that he has given during the year, Dr. Penfield is working on a history of the M.N.I. to which we look forward with great anticipation as a valuable and unique document.

Dr. Rasmussen is a member of the American Board of Neurologic Surgery and of the Medicare Advisory Committee to the National Institute of Neurological Diseases and Stroke on the Visual Prosthesis Project; the latter almost a science fiction programme to devise electronic means of putting messages directly into the visual cortex of the brain in blind patient

Dr. Bertrand, ably assisted by our Neuroradiologist-in-chief, Dr. Ethier, won some sort of a championship for landing a tuna fish of Prince Edward Island with a weight of just under a 1000 lbs. Dr. Bertrand also presented papers to the German Neurological Society last fall on fractures of the Odontoid, and at the University of Sherbrooke during their symposium on the motor system last June. He is at present involved in the application to stereotactic surgery of the new computer system centred in Dr. Gloor's laboratory. Dr. Garretson has continued his interest in the problem of normal pressure hydrocephalus and has presented several reports at the Canadian Neurological Sciences Congress, and another recently at a meeting in Washington on the same topic. Dr. Hansebout has recently been elected to the Conseil de l'Association de Neurochirurgiens de la Province de Québec.

In the Cone Laboratory for Neurosurgical Research we have continued our work on the cerebral circulation with Dr. Lucas Yamamoto, Mr. Charles Hodge and our active technical team. Reports were presented at the National Conference on Brain and Blood Flow organized by the Queen Square Group in September last year, at the American Congress of Neurological Surgeons and The Royal College of Surgeons of Canada. Mr. Hodge had the great distinction of winning the medal for medical photography offered by the combined Royal Colleges of Great Britain — the first ever awarded to a Canadian. The fluorescein angiography and radioisotope techniques for measuring focal cerebral blood flow proved of unique value in the operating room. We have recently acquired a high quality videotape system which has greatly enhanced the value of the information obtained by

fluorescein angiography by displaying it immediately to the surgeon during the operation. There was increasing clinical use of the operating microscope which was purchased from Cone Research Funds 10 years ago and a second one is now urgently needed.

Some exciting findings have also been made in collaboration with Dr. Leon Wolfe on the effects of the remarkable hormone Prostaglandin, on the cerebral blood vessels. A surprising reaction was the shut-down of the cerebral circulation during the intravenous or intra-arterial injection of this substance. The significance of this is based on the fact that this and similar substances are being used clinically on an investigational basis as one method of abortion since it is a powerful stimulant of smooth muscle. Our experimental results point to the need for considerable caution in their use since interference with the blood supply to the brain could well be a possible complication.

We are again glad to acknowledge the help and cooperation of our professional colleagues at the McGill teaching hospitals and of our own nursing, technical and clerical staff.

ADMINISTRATION

MR. C.M. PRIMAVESI

1970 was a difficult year for all of us and I will not elaborate. It must be said however that in such dark times it was our Medical Staff, together with Mr. Gurd, the previous Administrator, who accomplished something which is rare in hospitals. They actually effected the reduction of costs from the previous year's expenditures in certain areas. Expenditures for medical and surgical supplies were reduced by \$9,000, drug costs were reduced by \$12,000 and expenditures for laboratory tests, as purchased from the Royal Victoria Hospital, were reduced by \$23,000 for a total reduction of \$44,000 from the previous year. I say this as a tribute to our Medical Staff whose interest and understanding of Hospital and Institute problems are quite exceptional.

During the past year, the hospital provided 41,947 days of patient care and looked after 2,190 patients. The percent occupancy was 86.7% and the average length of stay was reduced to 19.1 days. The net result is that the hospital was more effective than in any year since 1966.

Expenditures for the year 1970 were \$4,436,452, compared to \$3,989,000 a year ago. The increase was mainly due to the rising salary scale. The deficit as of December 31, 1970 stood at \$205,468. The Government has since sent us interim adjustments, to bring the year's deficit to only \$85,468. This is better than any previous year at this point in time.

I am particularly grateful that Miss Hackwell, our new Director of Nursing is with us. There is not a single problem that has been mentioned in her presence that has not been looked into thoroughly and with excellent results.

Mr. Heavysége coped well with innumerable directives from the Government concerning changes in salaries and premium adjustments. But particularly, he was the major force in finally bringing a long-standing dispute between orderlies and the Government to a satisfactory resolution. A letter of appreciation of Mr. Heavysége's efforts was sent to us by the Quebec Government.

Our Housekeeping contract with Empire Maintenance was discontinued December 31, 1970 and we are glad to welcome to our fold Mr. Rochette, formerly of Empire Maintenance, in the position of Administrative Assistant, with major responsibilities in the area of maintenance and its control and effectiveness.

In order to dispel the cloud of depression that lies over the whole extended care problem in the City, our Director of Nursing, Director of Social Service, our Medical Staff and Admitting Officer have made contacts with extended care facilities. We are visiting them in an attempt to become more cognizant of this problem and by doing so, to improve utilization of our beds.

It was with regret that we heard of the cancellation of all orders in-council affecting hospital building programs throughout the province. Space continues to be a major problem in our Hospital and Institute. Clinical investigation services, medical records, storage, coffee shop, to mention only a few, could function much more effectively and economically if more space were available.

Last but by no means least, I wish to thank the Women's Auxiliary of the Royal Victoria Hospital for their continuous support. The gas chromatograph apparatus donated by them is helping our in-patients and is becoming of increasing value, for both clinical investigation and research to hospitals in the city and throughout the province. Other donations received from the ladies are proving to be indispensable for the redecoration of patients' rooms. We all appreciate their generosity.

In closing, I must say that I am sincerely proud that I work with a group of people whose humanity, courage and integrity is of such a high calibre. It is the quality of the people at the "Neuro", both professional and non-professional, that will help us over the difficulties of our time, and will help control change by innovation at a time when innovation is essential.

NURSING DEPARTMENT

MISS C. JOY HACKWELL

It is my privilege to present the annual report of the Department of Nursing from January 1, 1970 to December 31, 1970.

During the past year we have experienced an increase in the number of nurses that we have been able to recruit. For the first time in many

years it was not necessary to close a nursing unit during the summer months due to a shortage of nursing personnel. We sincerely hope that this trend will continue.

The recruitment of student nurses enrolled in the C.E.G.E.P.'s program, as nurses aides, during the summer months will be of great assistance to the nurses during the vacation period.

Members of the nursing staff participated in a symposium at the Canadian Association of Neurological and Neurosurgical Nurses' Convention held in Toronto in June. The meetings were of interest to many nurses from across the country.

Under the guidance of the inservice education staff a planned unit orientation has been established on each nursing unit to facilitate the detailed orientation required for new staff members. Seventy-four full-time nurses were on the staff during the year. Thirty-eight of these nurses were from other countries.

Classes have been given to the staff to familiarize them with the procedure to be followed on the nursing units in case of fire. Scheduled practice periods have been set up on each nursing unit.

A leadership development program has been organized for supervisors, head nurses, and assistant head nurses. It is planned to extend this program to staff nurses in the near future. This program should help the nurses to continue to give a high standard of patient care.

The nursing education staff assisted in the coordination of the clinical experience given to students in university schools of nursing. Forty-two university students received fieldwork experience throughout the year.

The education staff has also been responsible for planning tours and observations for visitors to the Hospital. Many of these visitors have been undergraduate student nurses from other hospitals in the city.

Thirty students have graduated from the post-graduate clinical course during the year. Graduate nurses from many countries are admitted to the course every March and September.

Miss Bertha Cameron, who was the Director of Nursing, retired on October 1, 1970. She was a real friend to her staff and she will be remembered, with affection and gratitude, for the contribution she has made to nursing in this hospital.

The first Director of Nursing, Miss Eileen C. Flanagan, and her successor Miss Bertha Cameron, were the pioneers in the Department. They have seen the Nursing Department grow and progress over the years since 1934. This development has been due in no small part to their deep loyalty and leadership.

The Hartland B. MacDougall Scholarship for Nurses was awarded to Miss Caroline E. Robertson. Miss Robertson, who was clinical coordinator, resigned in August in order to return to McGill University to obtain a

Master's Degree in nursing. We are grateful for her loyalty and dedication during her many years of service.

I would like to thank our President, Mr. Jean De Grandpré, the Director, Dr. Theodore Rasmussen, the Administrator, Mr. Christian Primavesi, the members of the medical staff and other departments for the co-operation we continue to receive.

In closing, I would like also to extend my sincere thanks to the members of the nursing staff for their excellent co-operation which has been deeply appreciated.

SOCIAL SERVICE DEPARTMENT

MISS CYNTHIA GRIFFIN

My report contains two themes, at the same time contradictory and complementary: one, outlining recent changes, with their effects on the services provided by our department and on the lives of the patients; the other, illustrating the adage "Plus ça change, plus c'est la même chose".

We have been fortunate in the continuity of our staff, and again the department enjoyed having two McGill School of Social Work students supervised by Miss Ann Chant. Our staff has also been well represented on community agency boards and committees.

Among in-patients and out-patients, regardless of the reasons for referral, the actual problems and needs with which social workers tried to help, fall into the following areas: (1) funds for basic maintenance and supplemental assistance; (2) special education; (3) employment in the open market or in sheltered workshops; (4) personal adjustment and/or family relationship problems; (5) extended care, i.e. placement or home care, and, frequently, a combination of two or more of these. We identified the two-pronged cause as personal and community inadequacies.

In the 1940's, one of my predecessors, Mrs. Elabel Davidson, whom some of you, certainly Dr. Penfield, will remember, wrote: "What, for example, do we do when confronted with the after-care of our chronically-ill patients for whom resources are so tragically lacking?" Sounds familiar, doesn't it? Today, fewer and fewer families are *able* to look after their own, in part because of the change in the whole family structure in Quebec. We understand that each month the Montreal Social Welfare Department adds another 75 names to its waiting list for placement, but has only 5 beds available per month. For us, there is an added problem. When resources are discussed in the majority of hospitals, the term "chronically-ill" is considered to apply mainly to "the aged", those over 65. In startling contrast, among our patients requiring social workers' assistance for extended care, over 80% were under 65, and 30% were under 40. It is small wonder that many of our patients and their families complain bitterly that in nursing homes and chronic care hospitals "Everybody is so *old*". And the majority of institutions are loathe to accept younger people because

“We would soon be filled with your patients and would have no beds for new admissions.”

The cost of medication continues to plague us, as there is no indication when or if it will be included under Medicare. There is now provision for payment for patients in receipt of social assistance, but difficulties often arise which could mean that the patient would go without medication. For such patients and for those on marginal incomes, after discussion with the R.V.H. Registration representative, we have paid prescription costs in part or in full from two main sources: (1) for seizure patients, from the government Epilepsy Grant allotment of \$2500,00 which was a welcome safeguard for the patients, and a relief for the social workers; (2) for other Neurology and Neurosurgery patients, from funds of over \$6000.00 donated so generously by organizations such as the R.V.H. Women's Auxiliary, the Cancer Aid League, Multiple Sclerosis groups and in His Name Society. Last fall, we were confronted with a new need — very costly medication (sometimes \$40. \$50. per month per prescription) for patients with Parkinsons Disease, previously provided from research funds. The needs for the coming year must be assessed with this group in mind, but we cannot forget that our funds must be used also to meet a variety of needs such as transportation, sickroom supplies and home aides.

Interesting trends in the community and in the hospital included: (1) A phenomenon of the age — the advent of grassroots, citizen group activities in hospitals, welfare offices, etc.; (2) The recognition in the Castonguay Commission Report of the place of the chronically-ill in the regionalization plan for comprehensive health care. (The changing status of Grace Dart Hospital to admit only long-term patients on a circumscribed, geographical basis is inconvenient for us at the moment, but is a tangible result of the plan.); (3) Legislation, e.g. the long-awaited Social Aid Act which slid in quietly, not unheralded but almost unnoticed, as it became effective on November 1st, the date of Medicare's birth. Although during this adjustment period, the confusion and number of tedious tasks seem to increase and the full benefits are not yet apparent, the scope of the new welfare programme is broader and more humane with needs figured on an individualized, budget-deficit basis and with provision for payment for special needs for those on marginal incomes.

Within the hospital there was collaboration through multi-discipline discussions and planning, e.g. the Grace Dart Committee, social workers continuing to meet regularly with doctors on several services, ward conferences of nurses, physio-therapists and social workers (it is hoped that doctors will be included more in the future); and, an innovation of Mr. Primavesi's, meetings to provide a forum for representatives from all departments and sub-departments to air and share their problems and often, jointly, to find solutions. Through visits to convalescent and rehabilitation hospitals, also by multi-discipline groups, closer liaison between hospital and community is being sought.

It is still the beginning of a decade. Perhaps in the 1970's we shall see implementation of more adequate programmes. In the meantime, is

there anything further we can do besides saying "The government should do something about it"? I think that in a variety of ways, all of us, individually and collectively, can add our weight to finding solutions — I mean *all of us* — executive, staff doctors, residents, nurses, social workers and volunteers — in fact, everyone here interested in patients and community.

ANAESTHESIA

<i>Anaesthetist</i>	R.G.B. GILBERT, M.B., B.S. (London), F.R.C.P. (C), F.F.A.R.C.S., F.A.C.A., C.S.P.Q. ^o
<i>Associate Anaesthetists</i>	A. PACE-FLORIDIA, M.D. (Malta), F.R.C.P. (C), C.S.P.Q. (to March 1971)
	GEORGE-HENRI SIROIS, B.A., M.D. (Montreal), F.R.C.P. (C), C.S.P.Q. (to Sept. 70)
	DAVY TROP, M.A., M.D., (Ghent), M.Sc. (McGill)
<i>Research Fellow</i>	R. CATCHLOVE, M.D. (Univ. of Sydney, Australia)
<i>Clinical Fellows:</i>	ELIZABETH WILKINSON, M.B.B.S. (London), F.F.A.R.C.S.
	JENNIFER BARNES, M.B., Ch.B. (St. Andrews)
<i>Residents — Six months on this service</i>	
E. BISHAY, M.D. (Univ. of Alexandria)	P. LEAVITT, M.D. (Dalhousie Univ.)
C. CHUNG, M.D. (Univ. of Taiwan)	P. RAUDZENS, M.D. (Queens' Univ.)
P. DWANE, M.D. (McGill)	A.P. SINGHAL, M.D. (Univ. of Agra, India, Colombo Plan Fellow)
B. JAVIER, M.D. (Far Eastern Univ., Manila)	J.E. SIOUFI, M.D. (Cairo, Egypt)
	V.H. VARTIZARMIAN, M.D. (Sofia, Bulgaria)

^oOn Sabbatical Leave

During the past year, Dr. Georges-H. Sirois left to join the Department of Anaesthesia at the Centre Hospitalier Universitaire of Laval and Dr. A. Pace-Florida, after five years here, moved to Calgary. They will be remembered by all their colleagues for their contributions and dedication to the medical profession.

Dr. Richard G.B. Gilbert left in June for a sabbatical year in France at the Centre Hospitalier et Universitaire, Montpellier, at the invitation of Doctor J. DuCailar, Professor of Anaesthesia.

Dr. Trop was thus left with the task of heading the Department with the result that the clinical and administrative problems gave little opportunity for teaching and research. We pay special tribute to our two excellent assistants, Dr. Elizabeth Wilkinson and Dr. Jennifer Barnes, who during

these difficult months handled the heavy workload without protest and who brought, by their feminine presence, a bit of sunshine during the tension we experienced.

During the past year 681 clinical and 539 radiological procedures were performed.

Anaesthetic techniques varied according to more recent published reports. From our own experience we became concerned with the possible detrimental effects of halogenated agents on the liver, and as a result we used the intravenous techniques with Innovar-Morphine more frequently than halothane and methoxyflurane.

Clinical Research

Clinical research was carried out in several directions:

a) *Carotid Endarterectomy:*

Since the surgical technique has changed from single endarterectomy to by-pass procedures, it was necessary for us to change our anaesthetic technique. General anaesthesia with spontaneous breathing was elected as the method of choice; during this procedure, arterial hypercarbia and systolic hypertension were being maintained. A capnograph received sometime during the year, has enabled us to monitor the CO₂ level continuously. Electromagnetic flowmeters and E.E.G. multi-channel monitoring were also used.

b) *Treatment of Pain:*

62 patients were referred for treatment. 53 patients received blocks (phrenic, intercostal, paravertrebral, obturator, occipital nerves, subarachnoidal, epidural, caudal) with analgesic agents. Bupivacaine (Marcaine) appeared to be an excellent drug, but unfortunately it has not yet been released by the Food and Drug Directorate. Since Dr. Pace-Florida was the recognized investigator, his departure brought a stop to all investigations.

Epidural steroid injections seemed to produce good results in many cases with low back pain and sciatalgia.

Intrathecal saline at 0° C. and an osmolarity of 600 mOsm. was utilized in 9 patients with intractable pain. The results were very satisfactory and the procedure looks rewarding. More studies are on their way to assess this technique further.

c) *Dissociative Anaesthesia:*

Ketamine was used in 105 cases, i.e. in almost all pneumoencephalograms and myelograms in children. It has replaced all previous utilized agents.

d) *Relaxants:*

A new curarizing agent, Pancuronium bromide, was utilized in 71 cases with much satisfaction. A full report has been presented to the firm Organon, and our results will be published in 1971, in Anesthesia and Analgesia.

e) *Blood Gas Analyses:*

A critical reappraisal of our measurement techniques has increased our accuracy and reproductivity. A new Astrup blood gas analyzer, a Unicam spectrophotometer for enzymes measurements and a chloride analyzer were received during the year.

f) *Intensive Respiratory Care:*

The involvement of the anaesthesia department in this field is now total. Uncountable hours were spent on the wards and especially in the Intensive Care Unit, for the management of respiratory problems in patients before and after surgery. The acquisition of a new volume controlled respirator, the Bennet AMI, has enabled us to provide better care for those patients who required a prolonged mechanical ventilation.

Two Bird ventilators Mark VIII were updated when oxygen cartridges were mounted; those additional pieces of equipment have allowed an accurate control of the oxygen content of the inspired mixture. New improved nebulizers were also purchase during the year to improve the humidification of the patient's airways, when on oxygen therapy.

g) *Radiological procedures:*

The study on hepatotoxicity of halogenated anaesthetic agents as analgesic agents during radiological procedures, was carried out with the aim of obtaining some statistical analysis of the results. Unfortunately, the accuracy of the laboratory techniques for the enzymatic measures were so low that no conclusion could be drawn.

Teaching

The staff provided supervision for the weekly seminars of the residents in anaesthesia.

Doctors A. Pace-Florida, Georges-H. Sirois, D. Trop and E. Wilkinson lectured to the postgraduate students on the McGill University Diploma Course. Dr. R.G.B. Gilbert continued the course for undergraduate students and in May, organized with much success, the Annual Refresher Course in Anaesthesia. Nurses, undergraduates and postgraduates as well as physiotherapists were, on various occasions, given lectures by the members of our department.

Finally, I would like to make special mention to all nurses, technicians and secretaries who, in the induction rooms, the operating rooms, the Intensive Care Unit, the wards and also in our anaesthetic office, participated most effectively in the work of the Department of Anaesthesia.

NEURORADIOLOGY

Radiologist ROMÉO ETHIER, B.A., M.D.
Associate Radiologist JEAN VÉZINA, B.A., B.M., M.D.
Assistant Radiologist DENIS MELANÇON, B.A., M.D.

Residents:

DARCY LAWRENCE, M.D. (Univ. of Toronto) ROBERTO WEE, M.D. (Univ. of Philippines)

*Residents from Neurosurgery:***

L. BOUCHARD, M.D. D. MERCER, M.D. P. MURRAY, M.D. S. WOHL, M.D.

*RVH Rotators:**

J. CLEMENT, M.D. K. KAAAN, M.D. M. LEFCOE, M.D. T. McLOUD, M.D.
J. NOONAN, M.D.

*MGH Rotators:**

P. UHRICH, M.D. H. YEH, M.D.

Chief Technician JOAN BROADLEY, R.T.

*Four months on this Service

**Three months on this Service

This past year has seen our renovation plans agreed upon by the government. Because of the major transformations, beginning early this summer, two or three months will be necessary to complete the changes. As a first step, a modern viewing room will be built and the entire department will be air conditioned. In a second stage, two more x-ray rooms will be renovated with modern equipment to increase the quality and the precision of our examinations.

Again this year, our annual statistics show an ascending graph with a total of 13,426 examinations in spite of the crisis between the physicians and the government. Fortunately, the increase in work has been more gradual than in the previous two years.

I would like to express my deepest gratitude to my associates, Doctors Vezina and Melançon, who contributed a great deal in maintaining the productivity of the department, both on the clinical and academic sides. As part of our residency training program, it has been a pleasure to work with Doctors R. Wee and D. D. Lawrence. Both of them should make great contributions in their own sphere. At the post-graduate level we had a very challenging, but also a very stimulating year with the men from the Royal Victoria and Montreal General Hospitals, and with the neurosurgical residents rotating through neuroradiology. We hope to extend our training facilities to neurology residents.

Finally, I also want to express my gratitude to the personnel of the department, radiographers, orderlies and secretaries for their devotion. I also wish to thank the nurses and the anaesthetists for their cooperation during the countless and delicate special procedures.

NEUROCHEMISTRY

<i>Consultant</i>	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. PAPIIUS, M.Sc., Ph.D.
<i>Assistant Neurochemist, Clinical</i>	IRVING H. HELLER, B.Sc., M.Sc., Ph.D., M.D., C.M.
<i>Research Associate and Medical Research Council Scholar</i>	CECIL PACE-ASCIAK, B.Sc., Ph.D.
<i>Fellows:</i>	
JOE T.R. CLARKE, B.Sc., M.D., Univ. of Toronto, Medical Research Council Fellow	
ROBERT G. SENIOR, B.Sc., M.Sc., Ph.D., Univ. of Sydney, Medical Research Council Fellow*	
SHOBU SHIBATA, M.D., Ph.D., Univ. of Nagasaki, Research Fellow.	
<i>Technicians:</i>	
MRS. A. KURNICKI; MRS. N. MACLEAN; MRS. M.K. ROSTWOROWSKI; MRS. H. SZYLINGER	

*Six months on this service.

The total number of procedures performed in the seventh floor neurochemistry laboratory on spinal fluid blood and urine during 1970 was 19,699 (18,040). (Figures in parenthesis are for 1969). Approximately 248 litres of nupercaine solution (155) were prepared for use on the ward.

The third floor ward laboratory performed 14,154 (14,220) separate hematological determinations and 4,348 (4,571) urinalyses were done. In addition, 9,884 (8,834) samples of blood were drawn for biochemical analysis at the R.V.H. and 18,029 (21,479) for our seventh floor laboratory and 1,134 (1,561) for the Provincial laboratories. About 368 (505) stool examinations for occult blood were also made.

The results indicate a continued levelling off of the amount of work done in our laboratory, a trend that has been consistent in the last three years.

The neurochemistry and ward laboratories are administered by Dr. I.H. Heller and Dr. Hanna Pappius.

DONNER LABORATORY OF EXPERIMENTAL NEUROCHEMISTRY

a) *Studies on lipid storage diseases*

A year ago Dr. Joe Clarke commenced biochemical studies on two patients who were being investigated by the Renal Service at the Royal Victoria Hospital for unexplained proteinuria. Histologic, histochemical and electron microscopic examination of tissue obtained at open renal biopsy by Dr. Juergen Knaack of the Pathological Institute revealed changes typical of Fabry's disease yet neither patient had any other manifestations of the disease. Angiokeratoma and corneal opacities were absent. Dr. Clarke confirmed the diagnosis by demonstrating excessive excretion of trihexosylceramide and digalactosylceramide in the urine. Furthermore, decreased activities of the lysosomal hydrolase, α -galactosidase, were found in the leukocytes and cultured fibroblast cell lines of both patients. Thus it seemed clear that we had uncovered a variant of this sex-linked inherited disorder

of glycolipid metabolism. This clinical situation was the starting point for a more detailed biochemical study of Fabry's disease by Dr. Clarke with the technical assistance of Mrs. Ania Kurnicki. These studies have developed very quickly and given new insights into the catabolism of neutral glycolipids. Galactosylgalactosylglucosylceramide was extracted and purified from normal human kidney and from a patient with Fabry's disease. Nuclear magnetic resonance studies (in collaboration with Dr. A. S. Perlin of the Department of Chemistry) revealed that the terminal galactose of this lipid has the alpha stereoconfiguration. Furthermore, this lipid was specifically labelled in the terminal galactose and shown to be hydrolysed by an α -galactohydrolase and not by β -galactohydrolases. Thus the commonly held view that the terminal galactose is in β -glycosidic linkage is erroneous and these new results indicate that the α -galactosidase deficiency in Fabry's disease is the primary enzyme deficiency leading to the excessive accumulation of the neutral glycolipids. One of the patients investigated has subsequently undergone a successful renal transplantation and Dr. Clarke is following closely the glycolipid levels in his serum and urine. There is considerable interest in organ transplantation as a possible practical approach to enzyme replacement in certain glycolipid storage diseases.

Dr. Clarke has prepared a number of glycolipids labelled with tritium in the terminal sugar which are being used in the specific diagnosis of the enzyme deficiencies in a number of the neuropilidoses. One example of this has been the chemical diagnosis of Krabbe's leukodystrophy in which galactosylceramide galactohydrolase is absent in the leukocytes and serum. The assay can also be performed on human amniocytes. The modern trend in this field is the use of the natural lipid substrates rather than of synthetic model substrates. The Neurochemistry Laboratory is being called upon more and more frequently to do these special enzyme assays. If we had more space, much more could be developed in this rapidly expanding diagnostic area.

Dr. Robert Senior is continuing chemical investigations on the structure of the keratan sulfates that accumulate in the viscera of patients with G_{M1} -gangliosidosis and the specific glycosylhydrolases involved in their degradation. It is important to determine the nature of the terminal galactose linkages since it should clarify why both ganglioside and keratan sulfate accumulate in this form of cerebromacular degeneration. It appears that the galactosylhydrolase involved normally in the initial step of catabolism of G_{M1} -ganglioside is also implicated in the initial step of the breakdown of keratan sulfates — a key glycosaminoglycan of the cartilaginous matrix. The bone abnormalities which are part of the clinical picture in this type of gangliosidosis are closely connected to the defect in the metabolism of the keratan sulfates.

b) *Studies on neuronal ceroid-lipofuscinosis*

In collaboration with Drs. Andermann, Carpenter and Karpati, we are attempting to determine the fundamental chemical abnormalities and enzyme defects in the group of inherited degenerative neurological diseases with the eponyms Jansky-Bielshowsky, Spielmeyer-Vogt, Batten and Kuf. From the histochemical and electron microscopic studies these are generalized diseases showing lysosomal accumulations of curvilinear and/or fingerprint profiles

or lipofuscin bodies. The chemical nature and origin of these storage substances is unknown and presents one of the important challenges to the neurochemist. In general in this group of diseases we have found no specific abnormality in brain or muscle in any of the lipid classes. There are non-specific changes in gangliosides in some of the cases and as well an increase in neutral glycolipid hexose which is due to a trihexosylceramide. The cellular deposits are autofluorescent (like ceroid and the so-called ageing pigment lipofuscin) and highly resistant to alkaline and acid hydrolysis or proteolytic enzymes. It is likely that the material is formed by polymerization reactions between protein and nucleic acids through interaction with autooxidized polyunsaturated fatty acids. But where do the proteins come from and what is the basic enzyme abnormality? What specifically triggers the accumulation of peroxidized lipids? How do they become linked to proteins or nucleic acids? In one group, a marked increase in both A and B forms of hexosaminidase has been found in the brain. This suggests that there may be a deficiency of another lysosomal hydrolase, but so far we have not succeeded in finding it. This is difficult, time-consuming and often unproductive research, but nonetheless of considerable importance to our knowledge of these tragic diseases.

c) *Studies on prostaglandins*

In the past year prostaglandin research has grown rapidly in importance and certain prostaglandins are in course of clinical trials. Dr. Cecil Pace-Asciak, with the technical help of Mrs. Klara Rostworowski, has made a further series of significant contributions in this field. A relationship between formation and release of prostaglandins under the influence of nerve stimulation has been clearly established. Using the rat stomach as experimental model, the influence of neurohormones on the biosynthesis of prostaglandins is being investigated. Prostaglandin synthetase is a membrane-bound enzyme which is resistant to solubilization. It is present in stomach tissue and its activity can be affected by a variety of substances and conditions. Dr. Pace-Asciak has isolated a new prostaglandin, 6(9)-oxy-11,15-dihydroxyprost-7,13-dienoic acid, which is formed in significant amounts from arachidonic acid in several tissues. He has characterized as well a number of new compounds derived by oxygenation of arachidonic acid. These studies have considerable relevance to the metabolic inter-conversions of free arachidonic acid in tissues through reaction with oxygen. A new method for analysis by gas-liquid chromatography of prostaglandins as their n-butylboronate derivatives has been developed.

In connection with clinical trials of prostaglandin $F_{2\alpha}$ in the Department of Obstetrics and Gynecology at the Montreal General Hospital, we have developed an isotope dilution — mass spectrometric assay capable of measuring blood levels of prostaglandin $F_{2\alpha}$ down to 1 nanogram/ml. This is the first time that blood levels have been monitored during clinical trials of these new hormone-like compounds. Although the procedure is tedious, it is highly specific and is unaffected by metabolites. The method enables us to correlate blood levels with side effects and other parameters. It will also be valuable in precise re-examination of tissue levels of prostaglandins and their concentration in venous effluents of various tissues.

In another collaborative project with Dr. Feindel and Dr. Yamamoto and their team, Dr. Wolfe is investigating the effects of various prostaglandins on the cerebral circulation. These studies will be reported in more detail elsewhere in the Annual Report. They are of considerable interest and indicate the need for awareness and caution when agents as powerful as prostaglandins are given parenterally in man. Furthermore, new light is being shed on the physiology of the cerebral vasculature.

d) *Studies on the effects of ischemia*

Dr Shobu Shibata, with Dr. Pappius and in collaboration with Mr. C.P. Hodge of the Photography Department, has continued the study of the effects of cerebral ischemia on water, sodium and potassium content of affected tissues in the dog. They have confirmed earlier results which showed that clipping of the middle cerebral artery has no immediate effect on the distribution of fluid and electrolytes in brain tissues in the area supplied by this artery. This is probably due to the fact that ischemia under these conditions is only relative. Collateral blood supply, as demonstrated by fluorescein angiography via the femoral artery is considerable. It is possible to induce nearly complete ischemia in the area of the brain supplied by the middle cerebral artery if clipping is followed by a period of hypotension (50 mm Hg) of 30 to 60 minutes. Then, after the blood pressure is restored to normal, an area of ischemia becomes evident. This has been demonstrated both by fluorescein angiography and injection of carbon particles. This situation has been described by others as the "no reflow phenomenon", i.e. a failure to restore normal cerebral blood flow after a period of ischemia. When this occurs, water and sodium increase sharply, especially in the affected cerebral cortex. At the same time, potassium loss is so extensive that necrotic rather than edematous changes must be suspected. Within 24 hours there are massive areas of infarction, in contrast to small localized infarctions seen after clipping of the middle cerebral artery alone. Also, the mortality in these animals is high.

e) *Experimental model of the syndrome of inappropriate secretion of antidiuretic hormone*

Experiments of Dr. C. Dila, done in collaboration with Dr. Pappius, showed that administration of fluid and pitressin in rats induced within 24-48 hours a condition which can be considered as an experimental model of the syndrome of inappropriate secretion of antidiuretic hormone. As the hyponatremia and hypo-osmolarity developed in the serum, the changes in muscle consisted of a fall in sodium content and an increase in water content, equivalent to 12% swelling. There was no loss of potassium from the muscle. In contrast, in brain the decrease in sodium was smaller, the water content increased only slightly but there was a significant net loss of potassium. These studies suggest that neurological dysfunction associated with this syndrome is unlikely to be due to cerebral edema but may be related to the decreased potassium content of brain tissue.

f) *Studies on traumatic edema of the spinal cord*

Drs. H. M. Pappius, M. Lewin and R. Hansebout have begun an experimental study of the effects of trauma on water and electrolyte content

of the spinal cord of the cat. The initial experiments were designed to develop a method for producing a standard lesion of the cord. Experiments are now in progress to study the spread of edema following standardized lesions in untreated and in dexamethasone-treated animals. Drs. Lewin and Hansebout are at the same time assessing the effect of dexamethasone on the clinical state of the animals.

In all of these studies Mrs. H. Szylinger has provided technical assistance.

In July, Dr. Wolfe returned from a very successful and happy sabbatical year at the Centre de Neurochimie in Strasbourg, France. Three publications, including two in *La Presse Médicale*, resulted from this sojourn and a number of excellent new associations were made. The Department was superbly looked after by Dr. Pappius. Dr. Wolfe has become an editor of the *Journal of Neurochemistry*, and has given invited lectures at the Research Institute of the Mead Johnson Company, Evansville, Indiana and in the Department of Physiology at Stanford University, California. Dr. Wolfe also chaired a section of the New York Academy of Sciences Conference on the Prostaglandins in New York City in October. Dr. Pace-Asciak and Dr. Clarke have given invited lectures at the Research Institute, Hospital for Sick Children in Toronto.

Dr. Pappius attended the Wates Symposium on the Blood-Brain Barrier in Oxford in July 1970. In March 1971, Dr. Pappius chaired a session on Transport and Axonal Flow at the Annual Meeting of the American Society for Neurochemistry at Hershey, Pa., and also was invited to give a lecture at Cornell University Medical College, Neurological Study Unit, on Biochemical Studies on Cerebral Edema with special emphasis on the effects of hypoxia and ischemia.

ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

<i>Consultant</i>	HERBERT JASPER, M.D., C.M., Ph.D., D. ès Sci., F.R.C.S.
<i>Electroencephalographer and Clinical Neurophysiologist</i>	PIERRE GLOOR, M.D., Ph.D.
<i>Associate Electroencephalographers</i>	FREDERICK ANDERMANN, M.D., M.Sc. DONALD LLOYD-SMITH, B.Sc., M.D., C.M., F.R.C.P. (C), (resigned Dec. 30, 1970.)
<i>Assistant Electroencephalographer</i>	IVAN WOODS, M.D., M.Sc., F.R.C.P. (C) (appointed Dec. 1, 1970)
<i>Electromyographer and Assistant Electroencephalographer</i>	ANDREW EISEN, M.D., F.R.C.P. (C)
<i>Biomedical Engineer</i>	JOHN IVES, M.Sc.
<i>Computer Systems Engineer</i>	CHRISTOPHER THOMPSON, M.Sc.

<i>University Exchange Fellow in Electroencephalography</i>	FERENC KEKESI, M.D., Pécs Univ., Hungary Hungary
<i>Senior EEG Fellow</i>	PRAKASH KHARE, M.D., Grant Medical College, Bombay
<i>Fellows:</i>	
SURAPONG AMBHANWONG, M.R., (Sirirat Univ. Thailand)*	MARCIAL LEWIN, M.D. (Univ. Catolica, Chile)*
EVA ANDERMANN, M.D., C.M., (McGill)	JOHN NOWIK, M.D. (McGill)
HOWARD BLUME, M.D. (Wayne State U.)*	SHAMIR ROUMANI, M.D. (Beirut, Lebanon)*
MONIQUE LEFEBVRE D'AMOUR, M.D. (Univ. of Mtl.)*	SURESH SONI, M.S. (Med. College of India)
ROBERT HOLLENBERG, M.D. (Harvard Medical School)*	JEAN PAUL SPIRE, M.D. (Univ. of Mtl.)**

Chief Technician LEWIS HENDERSON, (Resigned March 1970)

*Six months on this service.

**Three months on this service.

In the year 1970, 4,577 examinations were carried out; 2,252 of these were performed on in-patients and 2,325 on out-patients. Of the total number of examinations, 715 were electromyograms. Fifty-three electrocorticograms were recorded in the operating room during neurosurgical procedures for the treatment of focal epileptic seizures.

In the EEG laboratory, greater use has been made of a number of pharmacological activation procedures. Our studies with intracarotid Sodium Amytal and Metrazol injection have been continued and proved valuable in unravelling complex seizure problems. Other pharmacological methods have however also been used increasingly and are being evaluated for their diagnostic usefulness. These include intravenous Pentothal activation in an attempt to separate primary from secondary bilateral synchrony, and the intravenous injection of Brietal for elicitation of focal temporal spikes or bilaterally synchronous spike and wave discharge in patients suspected of suffering from temporal lobe epilepsy or from absence attacks.

Telemetering techniques have been introduced as a new method of EEG recording. Most of these studies have been carried out by Dr. Woods as a part of an investigation of patients with absence attacks. The aim of this study is to attempt to find factors, environmental or others, which may favor or inhibit the occurrence of spike and wave discharge. Telemetering the EEGs is also very valuable for the quantitative assessment of the effects of various anticonvulsant medications. This technique allows one to obtain prolonged records under conditions less artificial than those prevailing in the laboratory. Attempt to record spontaneous epileptic seizures in a variety of seizure disorders other than absence attacks were also made. However, this application is still hampered by the small number of channels presently at our disposal.

We have, during the past year, taken our first hesitant steps in applying computer technology to the analysis of the EEG, taking advantage of our

new PDP 12 computer and of Mr. Christopher Thompson's particular expertise in this area. Mr. Thompson has written a program which allows the computer to locate spike and wave discharges in a prolonged tape-recorded EEG. This application is useful in the analysis of records obtained by telemetry. Mr. John Ives has applied other computer programs to these records in order to assess the degree of synchronization of spike and wave discharges. Mr. Thompson has written a program which allows the computer to recognize epileptic spikes and to cross-correlate them. It is hoped that this may ultimately help to determine the leading side in apparently bilateral, independent temporal lobe foci. A computer program using a template method to classify electromyographic data has been prepared and will be used by Dr. Eisen in the electromyography laboratory.

The laboratory for Electromyography has proved to be a very active clinical investigative service. Over the three years in which it has been in existence the yearly work load has increased from 560 to 715 investigations. This increase has been due to many factors, but the most important has been the updating of fully transistorized equipment, with comfortable, spacious and practical surroundings for patients. The field of investigation of neuromuscular disease is expanding rapidly and our electromyographic unit in conjunction with the histochemical laboratory of Dr. Karpati, the electronmicroscopical laboratory under Dr. Carpenter's direction, and the neurochemical laboratory under Dr. Wolfe now offers an excellent training environment for young neurologists with a particular interest in developing their skills and knowledge in the field of neuromuscular disease. The laboratory of electromyography is now in a position to offer training to residents who are interested in this area. In this respect, a rotational course of six months to one year is being organized to include similar work at the Montreal General Hospital and the Montreal Children's Hospital. In addition, the Royal College of Physicians and Surgeons of Canada is being approached to accept formally the electromyographic training as part or whole of the required basic science year for training in Neurology.

We regret that Dr. Donald-Lloyd Smith, who had been with us for so many years, left us in November 1970. We miss him very much and wish him success in his new environment in Toronto. Dr. Lloyd-Smith's position has been filled by Dr. Ivan Woods and we are very pleased to welcome him to our staff.

Another departure from our staff has been that of Mr. Lewis Henderson, our Chief Technician, who left us after many years of service.

We had the pleasure of having a visiting electroencephalographer from Hungary, Dr. Ferenc Kekesi, working in our laboratory during 1970. Dr. Kekesi returned to his home university in Pécs at the end of the year and we wish him well in his future career.

In June 1970, Dr. Frederick Andermann was elected President of the Canadian Society of Electroencephalographers.

Last spring, Dr. Gloor was invited to participate in a symposium on "Centrencephalic Epilepsy: a reappraisal of its mechanisms and relationship

to other generalized epileptic seizures", organized by the Western Institute on Epilepsy at Palo Alto, California. Dr. Gloor also participated as a lecturer in the EEG Course given in April 1971 at the American Academy of Neurology Meeting in New York City.

We wish to thank our Fellows in training, the technical and secretarial staff of the laboratory for their dedication and good work.

EXPERIMENTAL NEUROPHYSIOLOGY

<i>Consultant</i>	HERBERT JASPER, M.D., C.M., Ph.D., D. ès Sci., F.R.C.S.
<i>Neurophysiologist</i>	PIERRE GLOOR, M.D., Ph.D.
<i>Biomedical Engineer</i>	JOHN IVES, M.Sc.
<i>Computer Systems Engineer</i>	CHRISTOPHER THOMPSON, M.Sc.
<i>Fellows:</i>	
GRAHAM BALL, M.Sc. (Univ. of Manitoba)	STANISLAV PRELEVIC, M.D. (Univ. of Belgrade, Yugoslavia)
McINTYRE BURNHAM, B.A. (Cornell Univ.)	DOUGLAS SKUCE, M.Sc. (Univ. of Miami) Killam Scholar
STEPHEN NUTIK, M.D., M.Sc. (McGill)*	GIANFRANCO TESTA, M.D. (Univ. of Padova, Italy)*
<i>Laboratory Supervisor</i>	MARY ROACH, A.R.R.C., R.N.
<i>Chief Electronic Technician</i>	EDWARD PUODZIUNAS

*Six months on this service.

Research activities in the Laboratory of Experimental Neurophysiology have undergone a certain reorientation during the past year. Three new programs have been instituted. One of these sets out to analyse the relationships between spontaneous slow potentials occurring on the surface of the cortex and unitary action potentials of individual cortical neurons. The ultimate aim of this study is to explore the relationships between these two electrophysiological manifestations of central nervous system activity in the human brain exposed during neurosurgical operations. The work is being carried out in collaboration with Mr. Graham Ball, a Ph.D. student in the department of Neurology and Neurosurgery. Computer programs are being prepared in collaboration with Mr. Christopher Thomson in order to develop adequate statistical methods for demonstrating the correlation between the two sets of electrophysiological events under study. We intend to study not only the normal rhythm of the cortex, but also abnormal slow waves such as delta waves which, from the neurophysiological point of view, have remained virtually unexplored territory.

A second area of study being actively explored by Dr. Stanislav Prelevic and Mr. McIntyre Burnham deals with the analysis of neocortical and hypothalamic inputs to the amygdala. In the past, much work on the descending projections from the amygdala to the diencephalon has been carried

out in this laboratory. Little is known however both electrophysiologically and anatomically about the afferent input to the amygdala. Proper understanding of amygdaloid physiology is not possible without tackling the still relatively unexplored territory of the organization of amygdaloid afferent connections.

Recently Dr. Gianfranco Testa has joined our laboratory and has begun an exploration of the respective roles of higher brainstem structures and cerebral cortex in the genesis or modulation of bilaterally synchronous epileptiform discharges of the spike and wave variety. The experimental model chosen was the generalized spike and wave pattern which can be elicited in the cat by large doses of parenteral penicillin. In the first stage of this study, the effects upon these discharges exerted by intracarotid and intravertebral injections of Amobarbital and Metrazol is being investigated.

Dr. Stephen Nutik has wound up his thorough and exacting studies of posterior hypothalamic neurons related to thermoregulation. He is in the process of writing up the results of three years of research in this area as a Ph.D. thesis. His study has clearly demonstrated the existence of a descending inhibitory pathway from the anterior thermoregulatory area in the preoptic region to the posterior hypothalamus, the region presumably involved in activating thermogenic regulatory mechanisms. He also demonstrated that some cells in this area respond by increasing their firing rate to cooling of the skin. He furthermore documented appropriate convergent effects of skin cooling and preoptic cooling upon these posterior hypothalamic cells.

Mr. Douglas Skuce has continued his studies on artificial intelligence by devising advanced computer programs that the machine can use to recognize and properly classify the kind of signals one might encounter in an EEG record.

The computer laboratory under the direction of Mr. Christopher Thompson has been very busy during the past year. Programs were prepared to assist in a variety of clinical and research projects. Thus a program was prepared which stores stereotaxic maps of the human diencephalon in the frontal, sagittal and horizontal planes. Appropriate maps can be displayed by the computer on a cathode ray oscilloscope screen and can be contracted or expanded to fit the dimensions of the patient's individual anatomy. This is but a first step in the direction of making the computer useful for guiding stereotaxic surgical exploration of the human diencephalon and will be used by Dr. Gilles Bertrand and Dr. André Olivier in the operating room.

Another computer program that has been prepared is designed to assist in the classification of electromyographic data by using a template method. It will be used by Dr. Andrew Eisen in the electromyography laboratory.

Programs for the crosscorrelation of slow wave and unit activity for power spectrum analysis and the crosscorrelation of epileptiform spikes to

be used in the analysis of EEG data and of electrophysiological recordings obtained from the human and animal cortex have also been prepared.

The main problem with which we are faced in the neurophysiological laboratory is lack of adequate space and over-utilization of the present space for multiple purposes, many unconnected with the research programs in neurophysiology. Only two rooms are large enough to qualify as good experimental laboratories; yet these rooms have to be shared with other departments such as the neurochemistry and the neurosurgical laboratories, because they are the only two animal operating rooms in the whole Institute. In order to promote a vigorous and active neurophysiological research program, the appointment of an additional experimental neurophysiologist is greatly needed. Under the present physical strictures, however, this can hardly be contemplated. It was a great disappointment, therefore that our building plans for the new wing had to be shelved for the time being because of a freeze on new hospital construction imposed by the newly elected Provincial Government. We hope the green light for construction of the new wing will soon be given. This would allow us to develop a more active neurophysiological research program conducted in adequately designed modern laboratory space.

In September 1970, an International Symposium in Neurosciences in honor of Dr. Herbert Jasper, was held at Mont Tremblant. More than 200 neuroscientists from all over the World, former students, coworkers and friends of Dr. Jasper, participated in this memorable event. The Symposium was a fitting tribute to the great contributions Dr. Jasper has made to experimental and clinical neurophysiology and an occasion for this many friends to express their admiration and affection for him.

At the conclusion of this report, I wish to thank our laboratory supervisor, Miss Mary Roach, the staff of the Electronics Laboratories, Mr. John Ives, Mr. Edward Puodziunas and Mr. Réal Archambault, and our computer experts, Mr. Christopher Thompson and Mr. Douglas Skuce, for their generous assistance which they have always provided for us.

NEUROPATHOLOGY

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

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

Fellows:

KEIICHI AMANO, M.D. (Univ. of
Tokyo, Japan)*

JUAN BILBAO, M.D. (Univ. of La Plata,
Argentina)*

GONZALO CHONG, M.D. (San Marcos
Univ., Peru)*

PETER FRAGATOS, M.D. (McGill &
Univ. of Ottawa)*

BOGDAN KRYSZTOFIK, M.D. (Univ. of
Poznan, Poland)*

BHIM SEN NANGIA, M.D. (Univ. of
Andhra, India)*

IAN PEDEN, M.D. (Univ. of Edinburgh)*

GUY REMILLARD, M.D. (Univ. of Ottawa)*

ANDREW SEREDA, M.D. (Univ. of Alberta &
Univ. of Iowa)

RAJINDER SIDHU, M.D. (Amritsar Med.
Coll. Punjab, India)

Chief Technicians:

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

JOHN GILBERT, R.T.

*Six months on this service.

In the Department of Neuropathology, training of clinical residents in the elements of histological diagnosis continues, along with the diagnosis of surgical specimens, the examination of spinal fluid cytology, and the investigation of neurological disease at autopsy. Fifty postmortem examinations were performed on patients dying in the M.N.H. The autopsy rate was 73%. Eighty-one other brains of neurological interest were examined. There were 456 surgical specimens.

The second year medical course in pathology, now revised and integrated into a course on the biology of disease, received its coordination this past year under a neuropathological aegis.

Two cases of oligodendroglioma with dissemination in the cerebrospinal fluid are being studied with Drs. Nabwangu and Hansebout.

The Laboratory of Electron Microscopy has been active. Miss Barbara Nuttall sustains the operation with her technical skills. We are grateful for the continued support of the Medical Research Council of Canada and the Muscular Dystrophy Association of Canada. This has supported a second electron microscopic technician, Miss Jo-Ann Bader, so that we can now take advantage of the copious biopsy material that the M.N.H. affords, and at the same time pursue experimental models of disease. During the past year we have studied muscle, nerve and skin from several patients with late infantile and juvenile cerebromacular degeneration. Characteristic storage deposits could be identified in sweat glands, Schwann cells, smooth and skeletal muscle, and compared with the deposits in neurons. As a result of this "dermatologic" approach to neuropathology, these forms of genetic disease can now be diagnosed by electron microscopy of muscle and skin, and the more formidable procedures of biopsying brain or appendix avoided. This project, as well as other studies in progress on human nerve and muscle has been carried out in cooperation with Drs. Karpati and Andermann. The interchange between people working in separate but related fields at the Institute is contributing to the development of new ideas in investigation.

A report of two cases of nemaline myopathy, recently published, touched on the metabolic interrelationship of nerve and muscle. We hope to learn more about this problem from a study, undertaken together with Drs. Karpati and Eisen, on the effects of tenotomy on the soleus muscle of rats. A large number of nerve biopsy specimens have been prepared for electron microscopy. Two of these are being investigated in detail; a case of acute arsenical neuropathy, and an apparently unique case of demyelinating neuropathy in a newborn infant. The characteristic peripheral nerve lesions of Krabbe's disease were displayed as part of a Grand Rounds presentation, now scheduled to appear in *The Canadian Medical Association Journal*. We are grateful to Mrs. R. Fudge for her careful typing and re-typing of many manuscripts. Papers in which this department participated were presented at The American Association of Neuropathologists, The Royal College of Physicians and Surgeons of Canada, The Canadian Neurological Association, and The Canadian Federation of Biological Societies.

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>Cone Research Fellows</i>	SURAPONG AMBHANWONG, M.D. (Bangkok). MORTIMER LECHTER, B.Sc., M.D. (Queens) ROEL ROMERO, M.D. (Philippines)
<i>Medical Research Council Fellow</i>	HIROH KATO, M.D. (Kyoto)
<i>U.S. Public Health Fellow</i>	HENRY LAURELLI, M.D. (Jefferson Med. Coll.)
<i>Research Assistant</i>	ANDREA PHILIPPS, B.Sc. (Loyola)
<i>Senior Brain Scan Technician</i>	HELEN ROJEK, B.Sc., (S.G.W.), RT (NM), Dip. McGill.
<i>Assistant Brain Scan Technician</i>	RONALD MILLER
<i>Electronic Technician</i>	GEORGE LOOTUS

1. *Brain Scanning and Cerebral Circulation Laboratory.*

During 1970, the number of brain scans (4,250) increased by 60% and special radio-isotope cerebral circulation studies (310) more than doubled as compared to the previous year. Because of this there was a strain on the predicted budget, particularly in the cost of radio-active agents. Just under half of the patients were referred by consultants, from outside hospitals, or from the Royal Victoria Hospital.

Some increase in brain scanning and circulation work resulted from the evaluation of the Picker Dynacamera, under the direction of Dr. Yamamoto. Patients in selected series had the standard contour brain scans using Hg¹⁹⁷-Neohydrin which were then compared with a scan using Technetium^{99m} on the dynacamera. A careful analysis of the results in over 200 patients showed that the resolution of the dynacamera was not as fine and the dead time somewhat longer than in the specifications. These factors were reviewed with the Picker X-ray Company representatives who then planned revisions of the equipment to improve the technical quality.

Dr. Lechter, Dr. Laurelli, and Dr. Romero worked in the clinical laboratory as part of their graduate training programme. The technical part of the work was directed by Miss Helen Rojek with the able assistance of Mr. Ronald Miller. Miss Pamela Bottomley organized the increasing load of brain scan and circulation study records. Mr. George Lootus was responsible for keeping the scanning equipment working effectively. There was no significant interruption of service despite the heavy increase in referral of patients for examination.

In addition to routine diagnostic work, several clinical studies have been continued. Dr. Lechter completed a review of patients who had brain scans and circulation studies for the diagnosis and management of occlusive cerebral vascular lesions. Our technique of bilateral external detectors, associated with rapid intravenous injection of the radio-active tracer (an extension of the early Saskatoon method), has proved a simple yet valuable test to compare the circulation transit time over either cerebral hemisphere.

Special scans detecting cerebral spinal fluid leaks have also been useful. Dr. Henry Garretson has completed, for publication, his study of the cerebral spinal fluid pressure in patients with normal pressure hydrocephalus.

Dr. Romero has been analysing the 4-year M.N.I. experience with intrathecal RISA encephalogram (IRE) in the study of communicating hydrocephalus problems. Emphasis is placed on cases of abnormal IRE results especially when major intracranial surgery preceded the suspected hydrocephalus. The question of significance of abnormal IRE is being assessed in the light of results following shunting procedures in these cases. Further pursuit of the question using the dynacamera, is being done in prospective patients where the IRE results are analysed for radio-active counts in the lateral ventricles, sylvian cisterns, etc., and compared to radio-active counts in venous blood at selected intervals.

2. The William Cone Laboratory for Neurosurgical Research.

The work in this laboratory, supported by the Cone Research Fund, by the Pillow-Vaughan Fund, and by annual operating grants from the Medical Research Council of Canada, has been directed toward the following main topics:

(a) Analysis of factors affecting experimental strokes.

This very important problem has continued to be examined in our laboratory by our technique of fluorescein angiography of the brain combined with the multichannel recording of focal cerebral blood flow from the cortex of the dog brain. The equipment designed in conjunction with the Simtec Company, consisting of miniature detectors of lithium drifted silicon which are gamma sensitive, have been effectively used. We refer to these as Montreal monitors. One important study was completed in regard to the effect of arterial carbon dioxide levels. It was shown that the size of the zone of ischemia was reduced with increasing levels of carbon dioxide by virtue of a sometimes dramatic increase in the amount of collateral flow towards the area. Conversely, reducing the level of carbon dioxide in the blood by hyperventilation tended to cause an increase in the area of ischemia and a reduction in the focal cerebral blood flow. The experimental zone of ischemia or "stroke" had been produced by our previous technique of clipping a small surface branch of the middle cerebral artery. This model was proven to be extremely useful since under the experimental conditions it obviates factors, such as increase in intracranial pressure, and deep ischemia in the hemisphere, both of which have been contributory factors in confusing other experimental results where proximal

clipping of the middle cerebral artery has been used in the experimental design. These results clearly are at variance with some of the theoretical views in the literature which advocate hyperventilation as a treatment for strokes.

(b) *The Cerebral Steal Syndrome.*

A further step in the characterization of the cerebral steal syndrome associated with red cerebral veins was made on the basis of an important analysis in the operating room of focal cerebral blood flow changes before and after occluding the arterial supply to a large arteriovenous malformation. Although change in blood flow in the normal brain adjacent to an angioma has been surmised by many neurosurgeons, this example represents the first instance where direct measurement from the surface of the brain of changes in perfusion flow correlated with changes in fluorescein angiographic flow pattern have been reported. The cerebral steal syndrome includes a short circulation time, early uptake on the brain scan, turbulent flow in the red veins and a dramatic conversion of shunt flow to perfusion flow after the arterial obliteration of the feeding vessel. On this basis it is suggested that production of progressive symptoms in these patients such as focal seizures, neurological deficits and memory impairment, may be related to the non-nutritional shunt flow rather than to recurrent haemorrhages.

(c) *Effects of Hypertension on "Strokes".*

Dr. Hiroh Katoh, in addition to taking part in a number of other projects, has been particularly concerned with analysing the effects of blood pressure artificially raised by pressor drugs on the development of ischemic lesions produced by our technique of an arterial branch clipping.

The effect of changes in paCO_2 during induced hypertension were also studied. Our combined Montreal monitor system and fluorescein angiography were used to detect the changes. Following the infusion of metaraminal (0.1 mg/ml), rCBF was increased significantly in the ischemic as well as in the non-ischemic areas. The response of the cerebral blood vessels to change in paCO_2 persisted during induced hypertension in most of the regions examined. These findings do not suggest that hyperventilation is advantageous for patients with cerebrovascular occlusive lesions.

(d) *Experimental Venous Occlusion.*

As almost no information is available in the literature on changes in rCBF after experimental occlusion of cerebral veins, this problem was assigned to Dr. Henry Laurelli as his M.Sc. project. Four groups of dog experiments were carried out. Occlusion over a period up to 4 hours was studied 1) with blood gases and blood pressure at normal ranges 2) with hypercapnia followed by hypocapnia, and 3) in a reverse sequence, and 4) combined with occlusion of a small surface artery. The findings were evaluated by fluorescein angiography of the brain and by measurement of the focal cerebral blood flow by Xenon¹³³ clearance recorded by our Montreal monitor system. A progressive decrease in blood flow (30-50%) over all cortical regions followed the venous occlusion. Focal cerebral blood flow was increased 10-30% by hypercapnia and decreased 25-50% by hypo-

capnia. Progressive subarachnoid haemorrhages, primarily perivenous, were observed in all experiments. Surface veins increased 10-80% in diameter while arterioles in the 50-250 micron range were seen to decrease in diameter by 10-50% of control values. These changes were not consistently altered by changes in blood gases. Fluorescein angiography at various times following the venous occlusion revealed wide-spread anastomotic flow patterns between the venous tributaries and reversal of the direction of flow in major branches of the occluded vein.

(c) *Effect of Prostaglandin on Cerebral Blood Flow in Dogs.*

In this project, carried out in collaboration with Dr. Wolfe, changes in the cerebral hemodynamics were measured following intracarotid infusion of PGE₁ and PGF_{2α}. Similar techniques were used for measurement of rCBF, together with high magnification photography for measurement of cerebral vessel diameters.

Intracarotid PGE₁ (0.05-0 μg/min.) markedly reduced rCBF with vasoconstriction in small epicerebral arteries (< 550 μ diam.). No fluorescein dye was seen on carotid injection. Intracarotid PGF_{2α} (5-25 μg/min.) caused a moderate reduction of rCBF with selective vasoconstriction in small epicerebral arteries (< 200 μ diam.). Scattered filling of fluorescein dye was seen on carotid injection. Collateral flow from the vertebro-basilar system and anastomotic vessels of the ipsilateral external carotid artery after intracarotid PGE₁ was studied. It was shown that PGE₁ completely cut off blood flow through the anastomotic artery from the external carotid to intracranial internal carotid with significant increase of blood flow through the vertebrobasilar system.

Thus, these direct measurements of cerebral hemodynamics show that PGE₁ and PGF_{2α} markedly reduce cerebral blood flow and have powerful vasoconstricting effects on the small arteries as well as on anastomotic branches of the external carotid. These results differ from conclusions derived by White et al from carotid and CSF pressure measurements. They also indicate that caution is necessary in the clinical application of prostaglandins.

(f) *Fluorescein Angiography of the Brain with Videotape and the Operating Microscope.*

After several years' work we have now been able to display the fluorescein angiogram on videotape, so that the surgeon is able to see the vascular details on replay during operation. This guides him in obliterating accurately arteries and veins, observing the microcirculation of the adjacent normal cortex, particularly sensory motor and speech areas, and thus avoiding unnecessary post-operative neurological deficits. This addition to micro-neurosurgical techniques provides a unique means of controlling and evaluating surgical approaches to the blood vessels of the brain which previously could only be surmised from standard X-ray angiography.

(g) *Reports and Meetings.*

(1) Symposium on Recent Research on the Cerebral Microcirculation.

Two papers from our own group and four other reports, all presented at the Canadian Congress of Neurological Sciences in 1969, were edited by Dr. Feindel for publication in the *Journal of Neurosurgery*. These emphasize the functional anatomy of the cerebral microcirculation and summarize results with new techniques including X-ray projection microscopy of the brain and spinal cord, new staining methods for noradrenergic fibres on the cerebral blood vessels and the application experimentally and in the operating room of the fluorescein angiography and the miniature Montreal monitoring devices for measuring cerebral blood flow. Dr. Penfield had been invited to be Chairman and to provide the introductory paper of this symposium: it is of interest that some of his earliest observations on the cerebral blood vessels have been extended by these more recent techniques.

(2) Reports were presented at the IV International Symposium on Cerebral Blood Flow in London, England, in September, where Dr. Feindel chaired the opening session of the scientific programme.

(3) Others were made at the Royal College of Physicians of Canada, at the Annual Meeting in January, 1971. Dr. Feindel also gave invited lectures on the Cerebral Microcirculation in Man to the Congress of Neurological Surgeons in St. Louis, and at a Neurosurgical Post-Graduate Course at the University of California, at San Francisco. The analysis of fluorescein angiography using the television monitor and videotape was first reported at the meeting of the American Academy of Neurological Surgeons in Mexico City, in October, 1970.

(4) Mr. Hodge reported on the photographic aspects of fluorescein angiography at a combined meeting of the Royal Colleges of Surgery, Medicine, and Photography, in May, in London, England, and received at that time, a special medal signifying distinction in this field.

(5) Positron CBF Device.

Dr. Yamamoto reports further progress at the Brookhaven National Laboratory on the 32-detector unit for measuring focal cerebral blood flow. The staff at this laboratory have been most helpful in designing and constructing the new interface to compute our blood flow values into the PDP-12 computer in neurophysiology. This will allow on-line results to be obtained during experiments in the laboratory and with therapeutic surgery in the operating room.

The research and technical staff of the laboratories are to be complimented for their effective and devoted work under crowded conditions.

NEUROLOGICAL RESEARCH

(a) *Section of Immunochemical Research and the Anticonvulsant Drug Laboratory.*

<i>Director</i>	ALLAN L. SHERWIN, M.D., Ph.D., F.R.C.P. (C)
<i>Medical Research Council Fellow</i>	JOHN B. ARMSTRONG, M.D.
<i>Medical Student on Elective</i>	GEORGE W. BOCK, B.Sc. (Chem.)
<i>Summer Medical Student</i>	ARTHUR MARLIN, B.Sc.
<i>Technicians</i>	CHRISTINE SOKOLOWSKI, B.Sc. (Chem.) JACQUELYN LOYND, B.A. RONALD CHUN-TAITE

In the past year the laboratory has combined basic research with efforts to develop practical techniques which could be utilized in community health services. The availability of plasma anticonvulsant drug levels is proving to be a significant aid in the clinical management of patients with epilepsy, permitting the identification of patients receiving inadequate medication, and those with high levels and unsuspected toxicity. Kits containing instructions and supplies were distributed to various hospitals and clinics so that blood samples could be sent to the laboratory. A technician from Hôpital Hôtel Dieu du Sacre-Coeur was trained in the techniques to help set up a similar service in Québec City.

A new rapid assay technique for diphenylhydantoin (a major anti-convulsant drug) was developed by Mr. George Bock and has been adopted by a number of laboratories in other centers. Gas chromatographic techniques have been modified by Miss Sokolowski to permit the simultaneous measurement of a number of anticonvulsant drugs.

Dr. Sherwin and Mrs. Loynd have studied the clinical pharmacology of ethosuximide (Zarontin), one of the main drugs utilized in the treatment of petit mal epilepsy. Nearly 200 patients have been studied — many being children from a special group with absence attacks followed by Dr. J.P. Robb. Patients at the Montreal Children's Hospital Clinics have been studied by Dr. M. Lechter. This is the first large study to evaluate plasma levels in relation to dose and seizure control. The findings will be presented to the Symposium on Pharmacology of Antiepileptic Drugs sponsored by the National Institutes of Health.

Studies on diphenylhydantoin levels carried out on 30 patients at Foyer Savoy with the cooperation of Dr. B. Graham showed that plasma levels and seizure control were unchanged if diphenylhydantoin was given in a single dose.

Dr. John Armstrong succeeded in developing an improved method to isolate and purify the enzyme creatine kinase from rabbit brain. Antibodies were prepared to show that the brain isoenzyme was organ specific. Purified muscle creatine kinase isoenzyme was labelled with radio-iodine and a radio-immunoassay developed. This new approach to the quantitative estimation of enzyme protein will be utilized by Dr. Armstrong to study the factors that regulate the synthesis and activity of this important enzyme in neuromuscular disease.

(b) *Section on Neuromuscular Research*

<i>Director</i>	GEORGE KARPATI, M.D., F.R.C.P. (C)
<i>Summer Student</i>	MR. JACK MILLER, B.Sc.
<i>Technician</i>	MR. R. STANFORD

Study of specific involvement of skeletal muscle and peripheral nerve in degenerative central nervous system diseases continued with promising results. The pathogenesis of experimental nemaline rods and central cores is being investigated by correlative ultrastructural, histochemical and electrophysiological techniques. Mr. Jack Miller, a Muscular Dystrophy Association of Canada summer student, carried out an interesting study on the effect of vincristine upon fragmented sarcoplasmic reticulum from rat muscle. This study was done in cooperation with Dr. J. Clarke. An experimental comparative study of the effects of various vasoactive substances upon skeletal muscle has been initiated. This may provide insight into the pathogenesis of Duchenne dystrophy.

Research activities in general are closely coordinated with those of Drs. Carpenter, Andermann and Eisen.

Papers from this laboratory have been presented at the Canadian Society for Clinical investigation; 35th Annual Meeting of Physicians and Surgeons of Canada; Annual Meeting of the American Association of Neuropathologists; 5th Canadian Congress of Neurological Sciences; 21st Annual Meeting of the Histochemical Society of America. Dr. Karpati was guest lecturer in muscle research at the University of Ottawa.

NEUROPSYCHOLOGY

<i>Neuropsychologist and Medical Research Council Associate</i>	BRENDA MILNER, Ph.D.
<i>Assistant Neuropsychologist</i>	LAUGHLIN B. TAYLOR, B.Ed., M.Sc.
<i>Canada Council Fellow</i>	GIUSEPPE SCOTTI, M.D. (Milan)
<i>Research Associate</i>	VALERIA CAVAZZUTI-ERBA, Ph.D. (Bologna)
<i>Research and Clinical Assistants</i>	ALICE DAVID, L.Ps. (Paris) URSULA STEEB, Dipl.Ps. (Geneva)
<i>Graduate Students and Clinical Assistants</i>	PHILIP CORSI, M.A. MARILYN JONES, B.A. (California)
<i>Summer Students</i>	FRED GENESEE, M.A. DAVID LAWSON, B.A. (Victoria)

Research on human memory continues to occupy a central role in the work of the department. A new departure has been to try to discover how far the use of visual imagery can compensate for the verbal learning difficulties that accompany dominant temporal-lobe lesions. Marilyn Jones is exploring this problem by training such patients to use pictures as an aid in verbal associative learning. Also in the field of memory, Dr. Milner and Mr. Taylor, in collaboration with Dr. Garretson, have been refining their methods for assessing memory change after injection of Sodium Amytal into the internal carotid artery of one side. This technique is proving extremely helpful in screening out patients with bilateral temporal-lobe abnormality who run some risk to memory in a temporal lobectomy that includes the hippocampus.

Our department grows apace. We are happy to welcome back Dr. Valeria Cavazzuti-Erba, who will continue her work on short-term memory in patients with frontal-lobe lesions. Our new Canada Council Fellow, Dr. Giuseppe Scotti, also comes to us from Italy, where he worked in Dr. De Renzi's group, in Milan. Dr. Scotti is analysing, with special tests, the complex perceptual disorders that may result from right posterior cortical lesions.

Throughout the year Mr. Taylor and Mme David have borne the brunt of the clinical testing, but with considerable help from our graduate students. We are pleased to report that our clinical team has now been strengthened by the addition of Miss Ursula Steeb. Miss Steeb comes to us from Geneva, where she worked with Professor Ajuriaguerra and Professor Tissot.

Dr. Milner will spend the coming academic year at Cambridge University, in Professor Zangwill's laboratory. She has been awarded the K. M. Stott prize for medical research, from Newnham College, and has been elected to a Clothworkers' Visiting Fellowship at Girton College for 1971-2.

NEUROANATOMY

<i>Acting Neuroanatomist</i>	FRANCIS McNAUGHTON, M.D.
<i>Teaching Assistant</i>	ALLAN MORTON, M.D., C.M., Ph.D.
<i>Killam Scholar</i>	LUIS APPELTAUER, M.D.
<i>Technician</i>	GIOVANNI GAGGI

We regret the resignation of our Neuroanatomist, Dr. Jacques Courville, in June 1970. He came to the M.N.I. three years ago, following extensive research training with Dr. Alf Brodal in Oslo, and established a Department of Neuroanatomy in the full sense of the term. He has joined the Staff of the University of Montreal and will continue his anatomical researches there, in association with Professor Cordeau, and with responsibility for undergraduate and postgraduate teaching in Neuroanatomy. He has our warmest good wishes.

During the past year, Dr. McNaughton acted as coordinator of the "CNS Course" for Second Year Medical Students, with Dr. Gloor and Dr. Bertrand as associates. They were helped by many other members of the clinical teaching staff. Particular mention should be made of the demonstrators in Neuroanatomy, who contributed very ably to the student teaching — Drs. Ian Peden, Henry Laurelli, Andrew Sereda, Howard Blume, Patrick Murray and Terence Myles.

Dr. Luis Appeltauer is now completing the third year of his Ph.D. study of "The Origin and Connections of the Mammillary Peduncle in the Cat." He also assisted with student teaching and took charge of the student laboratory.

The post of Neuroanatomist has not yet been filled, due to shortage of laboratory space, and lack of suitable candidates.

NEUROPHOTOGRAPHY

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

During the past year there was a great increase in the workload of this department. In addition to the routine services, approximately 14,000, 35 mm rapid sequence photographs of Fluorescein Angiography were taken in the experimental laboratories and in the operating rooms. Fifteen hundred feet of clinical movies were taken during the year.

A meeting was attended in London, England on Cerebral Blood Flow. A paper on Photography of Fluorescein Angiography was presented at the Meeting of Biological Photographic Association in Houston, Texas, as well as at the Institute of Medical and Biological Illustration at Newcastle on Tyne. Mr. Hodge was an invited panelist at the Annual Meeting of the Association of Neurological Surgeons. The subject was "Documenting Neurosurgical Experience".

Mr. Hodge had the honour of being the first Canadian recipient of the medal awarded jointly by the Royal College of Physicians of London, the Royal College of Surgeons of England, the Royal College of Obstetricians & Gynaecologists and the Royal Photographic Society. The inscription reads — "For perfecting the photographic technique of fluorescein angiography for demonstrating the epicerebral circulation during craniotomy, May 1971".

TUMOUR REGISTRY

ARTHUR R. ELVIDGE, M.D.

There has been a moderate increase in the number of cases of neoplasm admitted and recorded by the Tumour Registry during 1970. The figure of 244 includes 102 new cases and 142 readmissions. A total of 119 cases, 91 new and 28 with recurring tumours, were verified by pathological examination.

A total of 94 operations were performed upon 76 new cases and 18 readmissions. This figure represents 7.5% of major surgical operations, in the Montreal Neurological Hospital. The total number treated with roentgenotherapy was 66, which includes 42 new cases and 24 readmissions. Of the new cases treated with roentgenotherapy 29 were treated post-operatively and 13 with radiation only. There were 31 mortalities and autopsy was performed on 16. There were 166 clinic visits.

The Tumour Registry was established in 1950, as a branch of the Central Tumour Registry of the Royal Victoria Hospital, which is under the supervision of Dr. Edward Tabah. Annual monthly returns are made by the Royal Victoria Hospital to the Central Tumour Registry of the Province of Quebec, which was established in 1961, and which has issued annual reports since 1962.

The principal function of the Tumour Registry is to obtain and record follow-up data on patients treated for tumour of the nervous system. The

information is obtained from Outdoor Clinics, private offices, referring doctors and from the Department of Demography of the Province concerned. Patients are reminded to return for follow-up examination and treatment and many are contacted by letter each year. Many have written letters, in appreciation for help, service and interest shown. The records serve as source material for evaluation of treatment under various conditions, and are complete from 1950, though in actual follow-up research studies information goes back to 1928, and thirty-year follow-ups are not unusual.

The secretary of the Tumour Registry is Mrs. Geraldine Guthro, and she is thanked for most efficient and conscientious service. Dr. Dila and Dr. Chong were Fellows of the Tumour Registry during 1970, and have been succeeded by Dr. Tutt.

General follow-up studies of the gliomata have been in progress over the years. The most recent large series to be completed are the ependymomata, with Dr. Barone. Other studies have included the astrocytomata, glioblastomata, medulloblastomata, oligodendrogliomata and the unclassified gliomata.

Longevity can be studied in relation to surgery, roentgenotherapy and chemotherapy, and tumour type and location. An exciting future lies ahead as the structure of the cell unfolds, through chemical knowledge and immunological techniques.

MONTREAL NEUROLOGICAL INSTITUTE AND HOSPITAL LIBRARY

MARINA M. BOSKI, B.A., B.Ls., Librarian

The past year has brought several upheavals in everyday routine of the Montreal Neurological Institute and Hospital Library. First came the decision of the Library Committee, early in the year, to subject the book collection to a thorough weeding, i.e. an examination of every volume to determine whether it merited retention in the collection. It was the first overall weeding since the establishment of the Library and was accomplished between February 6th and the end of May. Library Committee members met on Friday afternoons to do the work. The result was the withdrawal of 369 volumes from the collection, while some 150 volumes were transferred to the Historical Section. In addition, 48 volumes were registered as missing. The weeding was followed by an inventory taken by the Library staff.

Additions this year amounted to 128 volumes, of which 58 were gifts from Staff members and other friends of the Library. Thus, at the end of December, 1970, the number of volumes in the Library was 4,625 of which 1,850 were bound periodicals. We also subscribed to 72 periodicals and received 27 titles of periodicals, bibliographies and abstracts either free of charge from their publishing bodies or through the generosity of Staff members.

Now that the collection has been thoroughly evaluated, it is possible to plan further modernization. The Librarian has been studying the feasibility of a changeover from the present Dewey Decimal Classification to the system used by the U.S. National Library of Medicine and for this purpose travelled last April to The Francis A. Countway Library in Boston to observe the latter scheme in operation. At its last meeting the Library Committee voted to go ahead with the recataloguing and reclassification project. It will take approximately two and a half years to complete and will begin in the early summer of 1971.

Since February 1971 the Library has been serving all the Departments of the MNI-H as the ordering and processing centre for all books they are purchasing. This has also meant our complete separation from the McGill Medical Library as far as cataloguing and ordering are concerned.

Additional periodical racks to hold 24 more journals were installed in the Journal Reading Room and the journal collection expanded into the Main Reading Room.

Towards the end of 1970 the Library commenced to give access to McGill undergraduate and other students in Medicine and related fields. They are permitted to take out certain approved books and to consult periodicals in the Library, but due to limited space they cannot use our facilities for general study purposes.

The Library's most pressing current problem is one of funds. In order to purchase a limited number of new books this year — after paying for periodical subscriptions the cost of which has risen by 10 per cent this past year alone — the Library Committee approved the Librarian's proposal to sell the *Journal of Nervous and Mental Disease*, which is also available at the McGill Medical Library. The funds thus realized will be used to buy some new titles and will serve as a cushion against financial emergencies. However, a long-term solution to the Library's financial problems is imperative if it is to continue functioning adequately as the information centre of the Institute and Hospital.

MONTREAL NEUROLOGICAL SOCIETY

<i>President</i>	DR. RAYMOND LAFONTAINE
<i>Vice-President</i>	DR. GORDON MATHIESON
<i>Secretary-Treasurer</i>	DR. GEORGE KARPATI

The Society officers for the 1971-72 year are: President, Dr. Gordon Mathieson, Vice-President, Dr. Jules Hardy, Secretary-Treasurer, Dr. George Karpati.

This year, meetings were held only once a month from September 30, 1970 to May 5, 1971. The meetings were hosted by the Montreal Neurological Institute, the Montreal General Hospital, St. Justine's Hospital, Jewish General Hospital, the Institut de Recherches Cliniques de Montréal

and the University of Vermont in Burlington, Vermont. Following the meetings, the membership was entertained at brief social periods provided by the host hospitals.

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

DR. CLARENCE F. GIBBS, National Institute of Neurological Diseases and Stroke, Bethesda, Maryland: "Transmissible Subacute Virus Encephalopathies".

DR. NORMAN GESCHWIND, Professor and Chairman, Department of Neurology, Harvard Medical School, Boston, Mass: "The Apraxias".

SIR JOHN C. ECCLES, Department of Neurobiology, State University of New York at Buffalo, N.Y.: "The Role of the Cerebellum in the Control of Movement".

DR. ROSCOE O. BRADY, Assistant Chief, Laboratory of Neurochemistry, National Institute of Neurological Diseases and Stroke, Bethesda, Maryland: "Genetic Mismanagement of Complex Lipid Metabolism".

DR. A.K. OMMAYA, Associate Neurosurgeon, National Institute of Neurological Diseases and Stroke, Bethesda, Maryland: "Experimental Studies on Traumatic Unconsciousness".

DR. GILBERT GLASER, Professor and Chairman, Department of Neurology, Yale University School of Medicine, New Haven Connecticut: "Cerebral Ionic Environment in Epilepsy".

DR. F. LAMBERT, Section on Neurology, Mayo Clinic, Rochester, Minnesota: "The Neuromuscular Transmission in the Myasthenic Syndromes".

DR. MAX REINMUTH, Department of Neurology, University of Miami, School of Medicine, Miami, Florida: "Factors Influencing the Cerebral Circulation".

DR. CLINTON N. WOOLSEY, Professor of Neurophysiology and Director, Laboratory of Neurophysiology, University of Wisconsin: Annual Hughlings Jackson Lecture of the Montreal Neurological Institute. "The Cortical Motor Maps of Monkey and Dog After Section of the Medullary Pyramid".

The Annual Dinner of the Society was held on May 27, 1971 at the Cercle Universitaire, Cité du Havre.

FELLOWS' SOCIETY

<i>President</i>	LEON J. RAVVIN, M.D.
<i>Vice-President</i>	HENRY LAURELLI, M.D.
<i>Secretary-Treasurer</i>	BOGDAN KRYSZTOFIK, M.D.

The Fellow's Society again had a successful academic and social year with emphasis of encouraging intercommunication and cooperation between the Fellow's Society and other departments of the Institute.

Topics taken up in the Neurosurgical Seminars, organized by the Fellows, included Pathology of Head Injuries, Radioisotopes in Neurosurgery, Blood-brain Barrier, Cancer Chemotherapy, Memory, Posterior Fossa Tumours and Cerebral Blood Flow.

The Society held Halloween, Christmas and Valentine's Day parties. We are indebted to the Wives' Club for their help in making these gatherings so successful. The annual skating and hockey party was an exciting event, ending with a tightly contested hockey match.

An Orientation Program to introduce new Fellows to the Institute is presently being planned.

The final event of the year will be the Annual Fellows' Day Lecture and Banquet. The guest speaker will be Dr. Cosimo Ajmone Marsan, Chief of Electroencephalography and Clinical Neurophysiology at the National Institutes of Health, Bethesda, Maryland.

MONTREAL NEUROLOGICAL INSTITUTE WOMEN'S SOCIETY 1970-1971

<i>President</i>	PATTY CHONG
<i>Secretary</i>	JUNE MERCER
<i>Vice-President</i>	SANDY TUTT
<i>Treasurer</i>	MARILYN SEREDA

The M.N.I. Wives' Society have had another busy year.

In July, Mr. and Mrs. Gurd played hosts at their country home to an enjoyable "Welcoming" outing for all the new Fellows and families.

In mid-August we had a party at the R.V.H. pool and in October a "get-acquainted" evening at the home of Mrs. Tutt.

Mrs. Rasmussen hosted the first general meeting in November, when Mrs. Wolfe spoke on "Highlights of Montreal". She outlined the many changes which have taken place, as well as those planned for the development of the City.

December, as always, was a busy month with a big evening — the Fellows' Christmas Party — for which many of the wives worked hard to prepare the delicious food and lovely decorations.

In January, at the home of Mrs. Bertrand, we heard Mrs. Taylor of "Barton-Taylor Modelling School" on fashion, make-up, diet, etc.

In February, the wives' group contributed towards the Fellows Valentine Party and met at Mrs. Appeltauer's, where a film on pollution was shown.

The annual potluck supper, with dishes from many lands, was held in April at the home of Mrs. Sherwin.

In May at our final meeting at the home of Mrs. Robb, we are to be honoured with the presence of Dr. Penfield who will speak to us on the history of the M.N.I.

In addition, the Book Club met about every two months to discuss certain novels, and the Gourmet Club has met in different homes to enjoy entertainment and share gastronomic delights.

The Executive of the Society during the past year would like to extend thanks to all those who contributed in many, varied ways to help make this a full and lively year.

Officers for 71-72 are:

<i>President</i>	ANN MYLES	<i>Treasurer</i>	JENNIFER LAURELLI
<i>Secretary</i>	CAROL MELMED	<i>Vice-President</i>	BETTY BLUME

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 — and the Jewish General 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.

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 and The Montreal Children's 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.

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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. See McGill booklet "Faculty of Graduate Studies and Research".

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.

NEUROSCIENCES SEMINAR

G531-602H This is a course of weekly seminars, given during the academic year, designed to present over a 2-year period a concise, up-to-date review of the basic neurologic disciplines. Mondays, 4:30 — 6:00 p.m.

Professors Gloor, Wolfe, Feindel, Sherwin and other members
of the Departments of Neurology and Neurosurgery,
and related McGill Departments

NEUROPHYSIOLOGY

G531-610A Lectures, together with undergraduate Neurology and Neurosurgery Course 2A "Anatomy and Physiology of the Central Nervous System".

G531-611A Seminars and group discussions in Neurophysiology.
Professor Gloor

NEUROANATOMY

G531-620A Advanced Neuroanatomy for selected group, by special arrangement.

G531-621A Seminars and group discussions correlated with Course G531-602H
Professors McNaughton and Staff

CLINICAL CONFERENCES

G531-630H Colloquium in clinical and basic aspects of the nervous system.
Wednesdays 5:00 — 6:00 p.m. Staff and Visiting Lecturers

G531-631H Seizure and EEG conference — alternate Thursdays 4:30 — 5:30 p.m.

Professors Robb, Andermann, Rasmussen, Gloor, Milner and Ethier

NEUROCHEMISTRY

G531-640H Seminars in Neurochemistry in addition to that provided in Course G531-602H. By special arrangement.

Professors Wolfe and Pappius

NEUROPATHOLOGY

G531-650H Six or twelve months laboratory work in Neuropathology.

G531-651H Conference in Neuropathology, alternate Thursdays, 4:30 — 5:30 p.m.

G531-652A Introduction to Histopathology of the Nervous System, a short basic course for a limited number. By special arrangement.

Professors Mathieson and Carpenter

NEURORADIOLOGY

G531-660H Practical instruction in techniques and interpretation.

G531-661A Lecture demonstrations (3 months in the fall), Mondays 4:30 — 5:30 p.m.

Professors Ethier, Vézina and Melançon

ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

G531-670H Laboratory work in Electroencephalography (minimum 6 months with active participation, seminars and clinical conferences).

Professor Gloor

NEUROPSYCHOLOGY

G531-680H Training and research methods for selected graduate students.

Professors Milner and Taylor

MONTREAL NEUROLOGICAL INSTITUTE

and

MONTREAL NEUROLOGICAL HOSPITAL

Publications

1970-1971

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- ELLIOTT, K. A. C.: Binding and metabolism of gamma-aminobutyric acid and other physiologically active amino acids in the brain. In: *Biogenic Amines as Physiological Regulators*, J. J. Blum, ed. Englewood Cliffs, N. J., Prentice-Hall, Inc. 1970.

- ELLIOTT, K. A. C. (YOSHINO, Y. and ELLIOTT, K. A. C.): Effects of various conditions on the movement of carbon atoms derived from glucose into and out of protein in rat brain. *Canadian Journal of Biochemistry*, v. 48, 1970, pp. 236-243.
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MONTREAL NEUROLOGICAL HOSPITAL
(Incorporated by Private Act under the laws of the Province of Quebec)
BALANCE SHEET AS AT DECEMBER 31, 1970
GENERAL FUND

	1970	1969
ASSETS		
Cash	\$ 12,393	\$ 3,836
Accounts receivable — less provision for doubtful accounts	250,400	220,632
Grant receivable — Government of Quebec	90,000	90,000
Inventory of supplies at cost	72,959	64,883
	<u>\$ 425,752</u>	<u>\$ 379,351</u>

PLANT FUND

ASSETS		
Cash	\$ 241	\$ 241
Due from Quebec Hospital Insurance Service	22,697	50,946
Fixed assets, at cost		
Equipment	\$1,401,519	
Less: Accumulated depreciation	(738,466)	
	<u>\$ 663,053</u>	<u>\$ 632,736</u>
	<u>\$ 685,991</u>	<u>\$ 683,923</u>

LIABILITIES AND CAPITAL
GENERAL FUND

	1970	1969
LIABILITIES		
Accounts payable	\$ 2,397	\$ 1,946
Due to Royal Institution for the Advancement of Learning		
Current account	423,355	377,405
Advances to cover deficit	600,826	622,272
DEFICIT — NOTE	<u>(600,826)</u>	<u>(622,272)</u>
	<u>\$ 425,752</u>	<u>\$ 379,351</u>

PLANT FUND

LIABILITIES		
Due to Royal Institution for the Advancement of Learning	\$ 22,938	\$ 51,187
CAPITAL	<u>663,053</u>	<u>632,736</u>
	<u>\$ 685,991</u>	<u>\$ 683,923</u>

AUDITORS' REPORT

To the Board of Management,
Montreal Neurological Hospital.

We have examined the balance sheet of the Montreal Neurological Hospital as at December 31, 1970 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.

Except that payments to the Hospital under the Hospital Insurance Act are subject to adjustments arising from a subsequent review by the Minister of Health, as described in the Note to the financial statements, in our opinion these financial statements present fairly the financial position of the Hospital as at December 31, 1970 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.

TOUCHE ROSS & CO
Chartered Accountants.

MONTREAL NEUROLOGICAL HOSPITAL
STATEMENT OF GENERAL FUND DEFICIT
FOR THE YEAR ENDED DECEMBER 31, 1970

	1970	1969
BALANCE AT BEGINNING OF THE YEAR	\$ 622,272	\$ 632,778
Deduct: Settlement from Quebec Hospital		
Insurance Service on account of 1966	—	23,505
Insurance Service on account of 1967	—	124,378
Advances from Quebec Hospital Insurance		
Service on account of 1968	57,953	291,229
Service on account of 1969	241,099	—
Adjustment of prior years' deficit	—	1,234
	323,220	192,432
Add: Salary adjustment retroactive to 1968	13,327	134,701
Salary adjustment retroactive to 1969	56,915	—
Adjustment of prior years' deficit	1,896	—
Deficit for the year	205,468	295,139
BALANCE AT END OF THE YEAR (Note)	\$ 600,826	\$ 622,272

STATEMENT OF PLANT FUND CAPITAL
FOR THE YEAR ENDED DECEMBER 31, 1970

	1970	1969
BALANCE AT BEGINNING OF THE YEAR	\$ 632,736	\$ 632,780
Increase in plant capital	117,912	83,322
	750,648	716,102
Less: Depreciation on equipment	87,595	83,366
BALANCE AT END OF THE YEAR	\$ 663,053	\$ 632,736

STATEMENT OF OPERATIONS
FOR THE YEAR ENDED DECEMBER 31, 1970

	1970	1969
INCOME:		
Revenue from Quebec Hospital Insurance Service (Note)	\$2,625,750	\$2,430,062
Revenue from patients	1,341,352	1,015,433
Grants — Government of Quebec	90,000	90,000
Grants — City of Montreal	67,500	67,500
Other income	21,779	11,891
	4,146,381	3,614,886
EXPENSE:		
Salaries and wages	3,244,604	2,861,484
Drugs, medical and surgical supplies	180,275	202,128
Services and supplies	926,970	846,413
	4,351,849	3,910,025
DEFICIT FOR THE YEAR	\$ 205,468	\$ 295,139

MONTREAL NEUROLOGICAL HOSPITAL

NOTE TO THE FINANCIAL STATEMENTS DECEMBER 31, 1970

Revenue under the Hospital Insurance Act is based on the 1970 budget of expenditures and offset income as approved by the Department of Health. The Act provides that the Minister of Health shall review the actual expenditures of the Hospital to determine the amount by which actual expenditures for insured services is greater or less than the interim payments received from the Service in respect of that year. Revenue as shown in the financial statements of the year is subject to adjustments arising from such review and determination. Adjustments of deficits for the years 1968 and 1969 are still under discussion with the Quebec Department of Health and the Hospital is preparing a claim in respect of the year 1970.

MONTREAL NEUROLOGICAL INSTITUTE
RESEARCH AND TEACHING EXPENDITURE SUMMARY
FOR THE YEAR ENDING DECEMBER 31, 1970

M.N.I. — Endowment Funds	\$ 362,214.00
M.N.I. — Special Funds and Donations	337,127.00
General University Funds	21,359.00
Research and Fellowship Grants	408,144.00
TOTAL EXPENDITURE	<u>\$1,128,844.00</u>

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
- 1969 — Sophie M. C. Letang 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

GRANTS FOR SPECIAL PROJECTS

- Federal Provincial Health Grants — Dr. Rasmussen
— Dr. Robb
- U.S. Public Health Neurological Training Grant — Dr. Robb
- Medical Research Council of Canada Grants — Dr. Carpenter
 - Dr. Feindel
 - Dr. Gloor
 - Dr. Hansebout
 - Dr. Milner
 - Dr. Pace-Asciak
 - Dr. Pappius
 - Dr. Sherwin
 - Dr. Wolfe
- Medical Research Council of Canada Associateships — Dr. Milner
— Dr. Wolfe
- Medical Research Council of Canada Scholarship — Dr. Pace-Asciak
- Muscular Dystrophy Association Research Grants — Dr. Carpenter
— Dr. Karpati

DONATIONS TO SPECIAL FUNDS — 1970-71

ANAESTHESIA RESEARCH FUND:

BRAIN RESEARCH FUND:

Mr. A. Murray Vaughan \$ 1,000.00

CANCER CLINICAL RELIEF FUND:

Cancer Aid League 2,000.00

WILLIAM CONE MEMORIAL RESEARCH FUND:

Dr. David Berger 25.00

Mr. Jacques Boulais 100.00

Crabtree Foundation 1,000.00

Mrs. Edith Dawson (In Memory of the Late Miss Gail Budd) 20.00

Earl-Beth Foundation 500.00

Colonel Kennan B. Jenckes 150.00

Mr. John Langdon 500.00

Estate of the Late Mr. William Ewart Le Van 700.00

Oaklawn Foundation 1,000.00

Mrs. H. Y. Russel 5.00

Mr. Hugh G. Seybold 50.00

COSGROVE RESEARCH FUND:

Mr. J. A. de Lalanne 200.00

Quebec Division of the Canadian Physiotherapists Association 15.00

Mrs. G. D. Troutman 50.00

DICK EPILEPSY FUND:

GORDON LIBRARY FUND:

HARVEY CUSHING CLINICAL RELIEF FUND:

Women's Auxiliary of the Royal Victoria Hospital 2,500.00

The Alumnae Association Inc. of the Royal Victoria Hospital 300.00

Mrs. M. Blanchart 5.00

Miss Hazel W. Burrell 50.00

Miss Suzann F. Cohen (In Memory of the Late Mr. George W. Cohen) 5.00

Miss Marjorie Glasspoole 100.00

In His Name Society 70.00

Mrs. Gordon McAlary 15.00

Miss Lillian Sandler 50.00

Mrs. Joseph Shapiro 15.00

HOSPITAL EQUIPMENT FUND:

Mrs. William Stall 10.00

MARY MASSABKY FOUNDATION RESEARCH FUND:

MISCELLANEOUS SPECIAL FUNDS:

In acknowledgment of Mrs. Lloyd-Smith's outstanding contribution to the Westmount Fine Arts Committee 40.00

In Memory of the Late Mr. and Mrs. Harry Bessner 10.00

In Memory of the Late Mrs. Davina Blair 165.00

In Memory of the Late Mrs. L. W. Bond 26.00

In Memory of the Late Mr. Thomas Cairns 40.00

In Memory of the Late Mrs. Peter Dawson 13.00

In Memory of the Late Mr. Donald Goodby 10.00

In Memory of the Late Mr. Douglas E. Hazell 40.00

In Memory of the Late Mr. Larry Hecht 3.00

In Memory of the Late Mrs. Isobel Hendry 304.00

In Memory of the Late Dr. Gerard A. P. Hurley 515.00

In Memory of the Late Mr. Jacob Levitt 3.00

In Memory of the Late Dr. Herman Moret 25.00

In Memory of the Late Mrs. Harold P. Nash 15.00

In Memory of the Late Mr. Michel Plante 10.00

In Memory of the Late Mrs. Sam Reitman	10.00
In Memory of the Late Mrs. Ruth Rubin	579.00
In Memory of the Late Mrs. Smith	10.00
In Memory of the Late Mr. Graham Voelker	15.00
In Memory of the Late Mr. Joseph L. Watters	247.50
In Memory of the Late Mrs. Margretta Witt	503.00
M.N.I. BUILDING FUND:	
Colonel R. S. McLaughlin (1969)	250,000.00
Anonymous (1969)	750,000.00
Mr. Max Bell (Donation in Memory of Chester Bell)	125,000.00
Mr. Howard Webster	50,000.00
M.N.I. NEUROSURGICAL RESEARCH FUND:	
M.N.I. PARKINSON'S DISEASE FUND:	
Mr. L. H. Barrington	131.60
Mr. Gerald Cassidy	35.00
Mrs. Olive Prichard Clark	50.00
Mr. Louis E. Couillard	420.00
Mrs. Berthe Dax	250.00
Mr. Harry Edgehill	150.00
Dr. A. R. Elvidge	116.29
Mrs. Hazel Fraser	39.50
Mrs. Florence Gardner	80.00
Dr. D. Lloyd-Smith	125.00
Dr. F. McNaughton	1,205.86
Mr. Morgan Peel	75.00
Dr. P. Robb	21.00
Mrs. Mildred Roberts	139.40
Mr. Stewart Shepherd	100.00
Mr. M. R. Van Loon	200.00
Mr. L. Waxman	75.00
M.N.I. STAFF LOAN FUND:	
MULTIPLE SCLEROSIS CLINICAL RELIEF FUND:	
In His Name Society	36.00
Montreal Association For Multiple Sclerosis	500.00
Multiple Sclerosis Golf League	600.00
MULTIPLE SCLEROSIS RESEARCH FUND:	
McNAUGHTON NEUROANATOMY RESEARCH FUND:	
FRANCIS McNAUGHTON NEUROLOGICAL RESEARCH FUND:	
Mrs. Rita Breitman	50.00
Mrs. Olive Prichard Clark	200.00
Employees of Reitman's (In Memory of the Late Mrs. Ruth Reitman)	325.00
Dr. and Mrs. Andrew E. Franzoni (In Memory of the Late Mrs. Ruth Reitman)	25.00
Mrs. George W. Perkins	1,000.00
Dr. Preston Robb	580.00
Mrs. M. M. Sheldon	1,000.00
Mr. J. Clare Wilcox	100.00
NEUROLOGICAL RESEARCH FUND:	
Earl-Beth Foundation	500.00
Mr. and Mrs. Joseph Kolodny	1,060.00
Mrs. Peter M. Laing	3,000.00
Mr. N. Latsky	500.00
The J. W. McConnell Foundation	3,000.00
NEUROPHYSIOLOGY RESEARCH FUND:	
NEURORADIOLOGY RESEARCH AND TEACHING FUND:	
NURSING FUNDS:	
EILEEN C. FLANAGAN NURSING BURSARY FUND:	
Graduate Nurses' Society, M.N.H.	342.74
Mrs. R. Hampson	50.00
School for Graduate Nurses, McGill University	50.00

M.N.I. NURSING EDUCATION FUND:	
OAKLAWN FOUNDATION FELLOWSHIP FUND:	
Oaklawn Foundation	2,000.00
PENFIELD AWARD FUND:	
PENFIELD RESEARCH FUND:	
REUBEN RABINOVITCH MEMORIAL FUND:	
REUBEN RABINOVITCH MEMORIAL LIBRARY FUND:	
Professor and Mrs. Maxwell Cohen	50.00
LEWIS REFORD FELLOWS' FUND:	
SHERWIN RESEARCH FUND:	
Mr. A. E. Cummings	35.00
R.V.H. WOMEN'S AUXILIARY FUND:	
Women's Auxiliary of the Royal Victoria Hospital	500.00

Donations to the Montreal Neurological Institute may be made to any of the above funds or for other purposes as specified by the donor. Receipts for such contributions are valid for income tax purposes in Canada. Donations from the United States will also qualify for income tax purposes if cheques are made out to the *Friends of McGill University, Inc.* and sent to the *Secretary, Mrs. Ernest Rossiter, Jr. Box 533, Hempsted, N.Y. 11551*, 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	70	
Motor Neurone Disease	7	
Friedreich's Ataxia	2	
Tuberous Sclerosis	4	
Demyelinating Disease	12	
Miscellaneous	17	112

Meninges:

Meningocele and Myelomeningocele	3	
Acute Purulent Meningitis	8	
Vertigo	12	
Subdural Hygroma	2	
Subdural Haematoma	17	
Subarachnoid Haemorrhage	24	
Intracerebral Haematoma	8	
Intracerebral Haemorrhage	20	
Adhesive Arachnoiditis	4	
Mononucleosis	1	
Poliomyelitis	1	
C.S.F. Rhinorrhea	2	
Miscellaneous	8	110

Brain:

Congenital Anomalies	11	
Hydrocephalus	25	
Abscess	4	
Syncope	10	
Contusion, Laceration, Traumatic Encephalopathy	57	
Concussion	55	
Epilepsy	363	
Arnold-Chiari Deformity	3	
Headache	49	
Migraine	25	
Parkinsonism	78	
Thrombosis, Encephalopathy due to arteriosclerosis	207	
Cysts	6	
Aneurysm	30	
Encephalitis	8	
Amnesia	3	
Miscellaneous	14	948

Tumours:

Meningeal Fibroblastoma	19
Craniopharyngioma	1
Neuroma	6
Gliomas	65
Chromophobe Adenoma Pituitary	10
Sarcoma	3
Metastatic Carcinoma	56
Hodgkin's Disease	4

Brain Tumour Suspected
Hemangioblastoma
Schwannoma 8th Nerve
Myeloma
Angioma
Tumour of Lacrimal Gland
Abdominal Tumour
Pinealoma
Miscellaneous Tumours

Spinal Cord:

Contusion of Spinal Cord
Compression of Spinal Cord
Guillain-Barré Syndrome
Myelopathy
Syringomyelia
Cervical Spondylosis
Radiculopathy
Hydromyelia
Anterior Horn Cell Disease
Diastematomyelia
Paresthesia
Miscellaneous

Cranial & Peripheral Nerves

Optic Neuritis
Trigeminal Neuralgia
Meniere's Syndrome
Compression Ulnar Nerve
Carpal Tunnel Syndrome
Other Neuralgias
Peripheral Neuropathy
Neuritis
Miscellaneous

Muscles:

Myasthenia Gravis
Muscular Dystrophy
Myopathy
Spasmodic Torticollis
Dystonia Musculorum Deformans
Familial Tremor
Meralgia Paresthetica
Miscellaneous

Mental Disease:

Mental Retardation
Depression
Anxiety State
Conversion Hysteria
Alzheimer's Disease
Schizophrenia
Drug Intoxication
Behaviour Disorder

Chronic Alcoholism	3	
Miscellaneous	2	81

Other Systems:

Protrusion Disc — Lumbar	201	
Protrusion Disc — Cervical	37	
Fracture and/or Dislocation Vertebral Column	28	
Fracture Skull	38	
Low Back Pain	29	
Pain Miscellaneous	28	
Traumatic Lesions and Infections	27	
Gunshot Wounds	4	
Rheumatoid Arthritis	6	
Coronary Insufficiency	5	
Hypoglycemia	2	
Osteomyelitis	4	
Miscellaneous	18	427
TOTAL		2199

CLASSIFICATION OF OPERATIONS

Craniotomy and Craniectomy:

and Biopsy	2	
and Decompression	6	
and Drainage of Abscess	3	
and Drainage of Subdural Haematoma	16	
and Drainage of Intracerebral Haematoma	7	
and Drainage of Extradural Haematoma	5	
and Elevation Depressed Skull Fracture	11	
and Excision of Epileptogenic Focus (Lobectomy)	42	
and Excision, Clipping or Wrapping of Aneurysm	29	
and Exploration	1	
and Hypophysectomy for Pituitary or Intracellular Tumour	7	
and Hypophysectomy (Transphenoidal) for Endocrine Control	1	
and Hypophysectomy (Transphenoidal) for Pituitary or Intracellular Tumour	4	
and Incision, Drainage or Removal of Cyst	1	
and Plastic Repair of Dura (CSF, Rhinorrhoea or Fistula)	2	
and Plastic Repair of Skull Defect (Plate, Bone or Plastic)	6	
and Removal of Arteriovenous Malformation	4	
and Removal of Cerebral Tumour	55	
and Removal of Posterior Fossa Tumour	19	
and Removal of Tumour of Skull	3	
and Trigeminal Massage on Decompression	2	
and Trigeminal Rhizotomy	7	
and Ventriculo-Cisternostomy (Torkildsen's)	4	237

Trepanation:

and Biopsy	3	
and Drainage of Subdural Space	15	
and Drainage of Abscess	1	
and Exploration	3	
and Ventricular Puncture	12	
and Ventriculography	9	43

Shunt Procedure:

and Ventricular Caval	29	
and Ventricular Peritoneal	1	30

Stereotaxic Procedure:

and Second Stage	16	16
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Laminectomy and Hemilaminectomy:

Anterolateral Cordotomy — Cervical	2	
Anterolateral Cordotomy — Thoracic	17	
Decompression or Exploration of Spinal Cord for Spondylosis (Dentate Ligament Section)	5	
Decompression or Exploration of Spinal Cord Tumour or Vascular Malformation	5	
Discoidectomy — Lumbar-Sacral	84	
Discoidectomy — Anterior Approach — Lumbar	2	
Discoidectomy — Cervical	5	
Discoidectomy — Anterior Approach — Cervical	14	
Incision and Drainage of Intramedullary Cyst (Syringomyelia)	6	
Removal of Tumor — Intramedullary	3	
Removal of Tumor — Extramedullary, intradural	7	
Removal of Extradural Tumour — Metastatic, Bone, etc.	5	
Rhizotomy	6	
Spinal Fusion with Bone Graft — Autogenous or Bone Bank	50	
Spinal Fusion with Wire or Plate	2	
Spinal Fusion — Cervical occipital	1	
Percutaneous Cordotomy	4	
Incision of Scalp and Application of Tongs for Traction	1	
Plastic Repair of Spina Bifida	2	221

Sympathectomy:

Sympathetic Ganglioneurectomy — Dorsal	1	1
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Nerve Explorations:

Avulsion or Section	13	
Excision of Neuroma	2	
Neurolysis, Transplantation or Decompression	21	36

Artery Exploration:

Endarterectomy (Patch-graft)	18	
Ligation	3	
Progressive Occlusion (Selverstone Clamp)	3	24

Wound Re-Opening:

Drainage of Infection	2	
Evacuation of Haematoma	4	
Exploration	2	
Further Removal of Brain Tissue	1	
Further Removal of Tumour	1	
Resuturing	1	11

Miscellaneous:

Diagnostic Spinal Anaesthesia	4*
Miscellaneous	8
Nerve Blocks	64*
Plaster Casts	1*
Scalenus Anticus Muscle Section	3
Suture of Laceration or Wound	1
Suture of Lacerated Wound of Scalp	1
Tic Injection	4*
Tracheotomy	8
Muscle Biopsy	58
	79
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TOTAL	698

Radiological Procedures under Anaesthesia:

— Cerebral Angiography:	
Percutaneous, Carotid, Vertebral or Subclavian	373
Catheterization — Brachial, Femoral or Carotid	149
— Pneumograms	72
	594
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*Not included in total count.

CAUSES OF DEATH

Intracranial aneurysm (haemorrhage & haematomata due to aneurysm)	21
Other cerebrovascular disease (thrombosis, infarction,, haemorrhage)	12
Head injury (concussion, contusion, haematomata, etc.)	11
Intracranial tumour, primary	10
Intracranial tumour, metastatic	9
Coronary Occlusion	5
Other Systems	1
TOTAL	<hr/>
	69

