Twenty-Eighth Annual Report

of the

MONTREAL NEUROLOGICAL INSTITUTE

and the

DEPARTMENT OF NEUROLOGY AND NEUROSURGERY

McGILL UNIVERSITY

1962-63

Dr. Robb has reported on the financial and budgetary problems that continue to hamper the smooth and efficient running of the hospital. I must emphasize once again that the cost in money of maintaining hospitalization standards at the highest practicable level is cheap in comparison to the cost in loss of life, disability and suffering, as well as in money, that will inevitably result if these standards should fall as a result of inadequate financial support or unwise fiscal policies.

The daily allowance per patient day assigned to us by the Quebec Hospital Insurance Plan continues to be unrealistically low and the resulting monthly deficit has once again built up alarmingly during the year. We are therefore again in urgent need of a supplemental grant under Regulation 17 of the Hospital Insurance Act to cover the deficit of $310,873 by which our 1962 hospital expenditures exceeded our Hospitalization Plan payments, as well as the $34,158 deficit still remaining unpaid from 1961.

No progress has yet been made by the Province to aid in retiring our cumulative indebtedness built up over the years as a result of inadequate remuneration for the hospitalization costs of the indigent patients of the City and the Province, and a large red figure on the McGill books of just under a half million dollars continues to concern us and McGill.

Despite these complaints, which have recurred with monotonous regularity in annual reports from many of the hospitals of the Province these past two years, on overall balance I think all will agree that the Provincial Hospitalization Plan has been a boon to the citizens of Quebec, and the Government can be congratulated, with some reservations, on its management to date. We pledge our continued cooperation and best efforts to operate the hospital with the maximum efficiency and economy consistent with our standards of maintenance and improvement of patient care.

We can point with pride to the fact that our average patient stay in 1962, 18.0 days, was the fourth lowest figure recorded in the 9 years since the opening of the McConnell Wing. This provides ample evidence that our professional staff, our patients and their relatives have done their full share in assuring efficient utilization of our hospital facilities. This figure could be lowered still further if adequate facilities were available in the Province for the care of chronically ill and disabled patients who, despite the energetic and devoted efforts of Miss Griffin's Social Service staff to arrange for transfer to a suitable chronic hospital or nursing home, all too often must be kept here weeks or months after the active neurological or neurosurgical treatment is completed. Prompt development of more and better facilities for convalescent and for chronically ill or disabled patients should have a high priority in the overall health plans for this Province.

This year brought scientific recognition and honors to many of our staff and these will be listed as usual in McGill's Calendar. Special mention should be made of several, however. Dr. Penfield was awarded honorary LL.D. degrees by the University of Vermont and the University of Melbourne, Australia, and an honorary D.Sc. degree by McMaster University. Dr. Penfield also was awarded the Gold Medal in Therapeutics of the

Worshipful Society of Apothecaries of London, England and was elected to membership in the Chinese Medical Association following his lecture tour in the People's Republic of China. We also extend our congratulations to Dr. Feindel, William Cone Professor of Neurosurgery, who will receive an honorary D.Sc. degree from Acadia University in Nova Scotia next week. Dr. K. A. C. Elliott was elected Fellow of the Royal Society of Canada and will begin a sabbatical year this summer by serving as the first Norman Bethune Exchange Professor from McGill University to the Chinese Medical College in Peking. Dr. Preston Robb has been asked by the National Institute of Health in Washington, D.C., to make a survey of research programs being carried out in the field of epilepsy throughout the United States and Canada, and will take a sabbatical year beginning in the summer to make this study. We were all greatly pleased with Dr. Joseph Stratford's return last Fall as Associate Professor of Neurosurgery to take charge of the neurosurgical service and teaching responsibilities at the Montreal General Hospital.

The scientific record of the year is written in the lists of papers published or presented at meetings and in projects currently underway. Time will in due course pass judgement on the ultimate value of this work. Our task is to carry on the work of the present and to plan the work of the future. This continues to be hampered by our need to rely on short-term project grants for a steadily increasing proportion of our research budget.

We report with gratitude the recent action of the Medical Research Council of Canada in replacing our Consolidated Grant of $60,000 per year by a Block Term Grant of $75,000 annually for the next three years. This increase, which was considerably less than was requested however, falls short of replacing a 5-year grant that came to an end last year. The need for increased endowment for the scientific program continues to grow more acute as costs continue their inexorable upward course. The old saying that "what goes up must come down" does not seem to apply to very many of the financial aspects of modern medical education and research!

The research laboratory and office space that seemed so ample when the McConnell Wing was opened, a few months less than 10 years ago, have become progressively more cramped and crowded as new research opportunities and techniques have literally forced themselves upon us. The research horizons in the neurological sciences are expanding in a geometrical rather than arithmetical progression and this is mirrored by the urgency of the need for an increase in our endowment funds. Exploration of the inner space of the nervous system has today comparable potential of discovery with that of the outer space around us and the potential benefit to mankind of the former is far in excess of the relative financial values currently assigned to each by governmental expenditures.

For the future, scientific quest toward the horizons and unremitting efforts toward the alleviation of neurological disease and disability will continue to be, as they have in the past, our guiding stars.

CLINICAL STAFF

Director

THEODORE RASMUSSEN, B.S., M.B., M.D., M.S., F.R.C.S. (C)

Honorary Neurosurgeon and Guggenheim Fellow

WILDER PENFIELD, O.M., C.M.G., M.D., D.Sc., F.R.C.S. (C), Hon. F.R.C.S. (Eng.) F.R.S.C., F.R.S. (Lond.), Hon. F.R.C.P. (Eng.)

Neurologist-in-Chief

FRANCIS MCNAUGHTON, B.A., M.Sc., M.D., C.M., F.R.C.P. (C)

Neurologists

PRESTON ROBB, B.Sc., M.Sc., M.D., C.M.
DONALD LLOYD-SMITH, B.Sc., M.D., C.M., F.R.C.P. (C)

Associate Neurologists

J. B. R. COSGROVE, M.D., M.Sc.
REUBEN RABINOVITCH, B.A., M.D., M.Sc.

Assistant Neurologists

BERNARD GRAHAM, B.A., B.Sc., M.D., C.M.
IRVING HELLER, M.D., C.M., M.Sc., Ph.D.
ALLAN SHERWIN, B.Sc., M.D., C.M. MARKLE SCHOLAR

Neurosurgeon-in-Chief

ARTHUR R. ELVIDGE, M.D., C.M., M.Sc., Ph.D., D.C.L., (Bishop's), F.R.C.S. (C)

Neurosurgeons

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

Associate Neurosurgeon

CHARLES BRANCH, B.A., M.D., M.Sc.

Assistant Neurosurgeon

PHANOR PEROT, M.D., Ph.D.

Radiologist

DONALD MCRAE, M.D.

Associate Radiologist

ROMÉO ETHIER, B.A., M.D.

Neurophysiologist and Consultant in Electroencephalography

HERBERT JASPER, Ph.D., D.ès Sci. (Paris), M.D., C.M.

Electroencephalographer

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

Assistant Electroencephalographer

DONALD LLOYD-SMITH

Anaesthetist

RICHARD G. B. GILBERT, M.B., B.S., F.R.C.P. (C), D.A., R.C.S. & R.C.P., F.F.A.R.C.S., F.A.C.A.

Associate Anaesthetist
G. Frederick Brindle, B.A., M.D., C.M., F.R.C.P. (C)

Assistant Anaesthetists
J. J. McGrath, B.Sc., M.B., B.Ch., B.A.O.
Mary Morris, M.D., C.M.

Neurochemist and Donner Fellow
K. A. C. Elliott, M.Sc., Ph.D., Sc.D., F.R.S.C.

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

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

Neuropathologist
Gordon Mathieson, M.B., Ch.B., M.Sc.

Clinical Research Psychologist
Brenda Milner, B.A., M.A., Ph.D.

Assistant Psychologist
Laughlin Taylor, B.Sc., B.Ed., M.Sc.

Clinical Psychologist
Mrs. Clara Strauss, M.Sc.

CONSULTING AND ADJUNCT CLINICAL STAFF

Consulting Pathologist.....Gardner C. McMillan, M.D., C.M., M.Sc., Ph.D.

Consulting Psychiatrists.....D. Ewen Cameron, M.D., F.R.C.P. (C)
Miguel Prados, M.D.

Consulting Neurologists.....Roma Amyot, B.A., M.D.
Sylvio Caron, M.D., F.R.C.P. (C)
Guy Courtois, M.D.
Jean-Léon Desrochers, M.D.
Jean Saucier, B.A., M.D.,
Norman Viner, B.A., M.D., C.M.
Arthur Young, M.D., C.M., F.R.C.P. (C)

Adjunct Neurologists.....Frederick Andermann, M.D.
David Howell, M.B., B.S., M.R.C.P.
William Tatlow, M.D., M.R.C.P., F.R.C.P. (C)
Danica Venecek, M.D.

Consulting Neurosurgeons.....Claude Bertrand, B.A., M.D., F.R.C.S. (C)
Jean Sirois, B.A., M.D.

Adjunct Neurosurgeons.....John Blundell, M.A., M.D., M.R.C.P. M.R.C.P. (Lond.), F.R.C.S. (Eng.)
Harold Elliott, B.Sc., M.D., C.M.,
Joseph Stratford, M.D., C.M., M.Sc., F.R.C.S. (C)

Consulting Anaesthetist	HAROLD R. GRIFFITH, M.M., B.A., M.D., C.M., F.A.C.A., F.I.C.A., F.F.A.R.C.S. (Eng.), F.R.C.P. (C)
Consulting Research Anaesthetist	J. G. ROBSON, M.B., B.Ch., F.F.A.R.C.S. (Eng.).
Consulting Bacteriologist	R. W. REED, M.A., M.D., C.M.
Consulting Radiologist	CARLETON PEIRCE, A.B., M.Sc., M.D., F.A.C.P.
Adjunct Radiologists	NORMAN M. BROWN, B.A., M.D., C.M. ROBERT FRASER, M.D., F.R.C.P. (C) JEAN L. LEGER, M.D.
Consulting Radiation Therapist	JEAN BOUCHARD, M.D., D.M.R.E. (Cantab.)
Consulting Executive Director	J. GILBERT TURNER, M.D., C.M., M.Sc., F.A.C.H.A.
Consulting Psychologist	M. SAM RABINOVITCH, Ph.D.

TEACHING STAFF

A. *Department of Neurology and Neurosurgery, McGill University Faculty of Medicine*

Chairman of Department and Professor of Neurology and Neurosurgery	THEODORE RASMUSSEN
Professor of Neurology	FRANCIS MCNAUGHTON
Associate Professors	DONALD LLOYD-SMITH
	PRESTON ROBB
Assistant Professors of Neurology	J. B. R. COSGROVE
	DAVID HOWELL
	REUBEN RABINOVITCH
	WILLIAM TATLOW
Lecturers in Neurology	BERNARD GRAHAM
	IRVING HELLER
	ALLAN SHERWIN
Demonstrators in Neurology	MORRISON FINLAYSON
	ROBERT JORDAN
	IRWIN LEWIS
	ROBERT MCPHEDRAN
Cone Professor of Neurosurgery	WILLIAM FEINDEL
Associate Professors of Neurosurgery	GILLES BERTRAND
	ARTHUR ELVIDGE
	JOSEPH STRATFORD
Assistant Professors of Neurosurgery	JOHN BLUNDELL
	CHARLES BRANCH
Lecturer in Neurosurgery	PHANOR PEROT
Demonstrators in Neurosurgery	MILAN FELT
	HENRY GARRETSON
	MANOUCHER GUERAMY
	ROSARIO MUSELLA
Professor of Experimental Neurology	HERBERT JASPER
Professor of Biochemistry	K. A. C. ELLIOTT
Associate Professor of Experimental Neurology	PIERRE GLOOR
Assistant Professor of Experimental Neurology	LEONHARD S. WOLFE
Lecturer in Experimental Neurology	HANNA PAPPIUS
Associate Professor of Neurological Radiology	DONALD MCCRAE
Lecturer in Neurological Radiology	ROMÉO ETHIER
Associate Professor of Anaesthesiology	RICHARD GILBERT
Assistant Professor of Anaesthesiology	G. F. BRINDLE
Demonstrator in Anaesthesiology	J. J. MCGRATH
Assistant Professor of Neuropathology	GORDON MATHIESON
Demonstrators in Neuropathology	ROBERT HANSEBOUT
	ANDREW WONG
Demonstrator in Neuroanatomy	ALLAN MORTON
Assistant Professor of Clinical Psychology	BRENDA MILNER
Demonstrator in Electroencephalography	LEWIS HENDERSON

B. *Department of Neurology and Neurosurgery, McGill University Faculty of Graduate Studies and Research*

Professors	HERBERT JASPER (Chairman)
	K. A. C. ELLIOTT (Biochemistry)
	WILLIAM FEINDEL
	FRANCIS MCNAUGHTON
	THEODORE RASMUSSEN

Associate Professors ..... GILLES BERTRAND
ARTHUR ELVIDGE
RICHARD GILBERT (Anaesthesia)
PIERRE GLOOR
DONALD LLOYD-SMITH
DONALD MCRAE
PRESTON ROBB
JOSEPH STRATFORD

Assistant Professors ..... JOHN BLUNDELL
J. B. R. COSGROVE
HAROLD ELLIOTT
DAVID HOWELL
GORDON MATHIESON
BRENDA MILNER
REUBEN RABINOVITCH
WILLIAM TATLOW

EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL INSTITUTE

Director ..... THEODORE RASMUSSEN
Director of Hospitalization ..... PRESTON ROBB
Assistant Director (Scientific) ..... FRANCIS MCNAUGHTON
Registrar ..... BERNARD GRAHAM
Assistant Registrar ..... DANICA VENECEK
Business Manager ..... CHARLES NOEL
Executive Secretary ..... MISS ANNE DAWSON

RESIDENT STAFF — JULY 1962-1963

Senior Neurosurgical Resident..... HENRY GARRETSON, M.D. (Arizona)
Senior Neurological Residents..... IRWIN LEWIS, M.D. (Montreal)
ROBERT JORDAN, M.D. (Montreal)

Neurological Services

Visiting Fellow ..... SUMARGO SASTRODIWIRJO, M.D. (Djakarta, Indonesia)
Teaching Fellows ..... ROBERT MCPHEDRAN, M.D. (Toronto)
CHONG-BUN YAP, M.D. (Manila, Philippines)
Residents ..... PATRICE DROUIN, M.D. (Montreal)
MORRISON FINLAYSON, M.D. (Alberta)
MANOUCHER GUERAMY, M.D. (Shiraz, Iran)*
NICOLA KATF, M.D. (Cairo, Egypt)*

Assistant Residents

D. BHATHAL, M.D. (India)*
G. CELESIA, M.D. (Italy)
E. DEBBANÉ, M.D. (Beirut)*
A. EISEN, M.D. (Leeds, England)*
N. KATF, M.D. (Egypt)*
M. SCULCO, M.D. (Boston, Mass.)*

R. V. H. Rotators

M. BOISVERT, M.D.
H. DIXON, M.D.
E. FALLEN, M.D.
M. LIPA, M.D.
B. MYERS, M.D.
D. RIMOIN, M.D.
N. RODGER, M.D.
M. ROSENFELD, M.D.
J. SAIKI, M.D.
D. SCHIFF, M.D.

M. G. H. Rotators

A. CARRÉ, M.D.
P. DUTTA, M.D.
J. HANAWAY, M.D.
D. HAWKINS, M.D.
J. MACDOUGALL, M.D.
V. WHITEHEAD, M.D.

Bottom Row: Drs. A. Wong; M. Sculco; B. Barone; D. Bhathal; H. Garretson; M. Gueramy; M. Felt; G. Celesia; E. Debbané; A. Eisen; L. Dayes; M. Hueff.
Second Row: Drs. P. Robb; J. G. Turner; Miss L. Hall; Dr. W. Penfield; Lord Brain; Dr. T. Rasmussen; Principal Rocke Robertson; Drs. F. McNaughton; H. Jasper, W. Feindel; K. A. C. Elliott; Miss C. Griffin; Drs. A. Elvidge; P. da Silva.
Third Row: Drs. R. Rabinovitch; R. Gilbert; G. Bertrand; L. Wolfe; D. McRae; Hanna Pappius; D. Lloyd-Smith; C. Branch; B. Cosgrove; Mr. L. B. Taylor; Drs. N. Katf; G. Mathieson; I. Heller; F. Andermann; Mr. K. Reid; Dr. A. Young.
Fourth Row: Drs. J. J. McGrath; R. Jordan; I. J. Lewis; J. Stratford; P. Perot; R. Ethier; P. Gloor; R. Vazirnia; D. G. Hawkins.
Fifth Row: Drs. R. Steinberg; P-g Sie; M. St. Hilaire; Josefina del-Mundo; B. Weir; R. MacPherson; T. Bacie; D. Shankweiler; F. Coceani; B. Graham; C. B. Yap; L. Yamamota; R. Hansebout.
Sixth Row: Drs. R. Kahn; J. A. Lowden; Mr. R. Lovell; Drs. S. Matsuoka; O. Kalabay; H. Silfvenius; F. Maroun, M. Musella; R. Herndon; D. Pollen; P. Drouin; A. Sherwin; S. Crisostomo.

Neurosurgical Services

Residents ..... MILAN FELT, M.D. (Utah)*
MANOUCHER GUERAMY, M.D. (Shiraz, Iran)*
ROSARIO MUSELLA, M.D. (Naples, Italy)*
JEWELL OSTERHOLM, M.D. (Missouri)*

Assistant Residents

B. BARONE, M.D. (Chicago)*
L. DAYES, M.D. (Jamaica)
M. FELT, M.D. (Utah)*
M. HEUFF, M.D. (Holland)
F. MAROUN, M.D. (Lebanon)*
D. POLLEN, M.D. (Boston)*
M. SCULCO, M.D. (Boston)*
O. SOLIS, M.D. (Mexico)
A. WONG, M.D. (Hong Kong)*

Assistant in Stereotaxy ..... ROSARIO MUSELLA, M.D. (Naples, Italy)*

*Six months on this service.

NURSING STAFF

Director of Nursing ..... MISS BERTHA CAMERON, R.N.
Assistant Director of Nursing ..... MISS LOUISE HALL, B.N., R.N.
Administrative Assistant ..... MRS. ELEANOR CARMEN, N.S.
Supervisor Dressing Rooms ..... MISS ANNIE JOHNSON, R.N.
Educational Director ..... MISS IRENE MCMILLAN, B.A., R.N.
Clinical Instructor ..... MRS. MAUREEN M. MCINTOSH, R.N.
Night Supervisor ..... MRS. ELIZABETH BARROWMAN, R.N.
Assistant Night Supervisors ..... MISS LILLIAN MCAULEY, R.N.
MISS MARILYN MANCHEN, R.N.
Operating Room Supervisor ..... MISS PHOEBE STANLEY, R.N.

HEAD NURSES

MISS M. AGNEW, R.N.
MISS HUGUETTE BELANGER, R.N.
MISS ALICE CAMERON, R.N.
MISS MARY CAVANAUGH, R.N.
MISS AUDREY KIMBERLEY, R.N.
MISS DELTA MACDONALD, R.N.
MISS URSULA STEINER, R.N.

Bottom Row: L. Munoz; N. Siddons-Gray; A. Kimberley; D. MacDonald; P. Wolff; D. Wood; L. Dagenais; P. Gutierrez.
Second Row: J. Harrison; J. Mallory; M. McIntosh; I. MacMillan; L. Hall (Assistant Director of Nursing); A. Johnson; E. Carman; L. Gorman; P. Stanley; K. Devadason.
Third Row: H. Belanger; L. Hoshino; P. Rattray; E. Griffith; L. Fletcher; O. Hirst; U. Steiner; V. Percy; K. Farrell; E. Mitchell; C. Vickery; N. Isaacs.
Fourth Row: M. Everett; J. Dales; D. Serres; L. Friesen; P. Robertson; F. McCormack; D. Baker; P. Hill; N. Cairns; B. Holmes; C. Levesque.

GRADUATE STUDIES AND RESEARCH

DR. HERBERT H. JASPER

I take pleasure in submitting a summary report of graduate studies and research during the past year. This is to cover the work of 11 different laboratories of the Institute, 7 of which are primarily occupied with basic scientific work, each with a clinical laboratory section, and 4 which are principally clinical laboratories with a minor interest in basic research. Details will be found in the published reports of individual laboratories.

In the Donner Laboratory of Neurochemistry there are two full time and two part time senior research chemists working with four research fellows, three studying for advanced degrees in the Biochemistry Department of McGill University. Major research projects include, mechanisms and treatment of brain swelling and oedema, brain gangliosides (important glycolipid constituents of nerve membranes), the role of thiamine in nerve metabolism, and further work on the metabolism and functional significance of amino acids in brain. This is an extremely productive team. The excellence of their work is receiving wide recognition. Close liaison with the Department of Biochemistry at McGill is maintained by Dr. Elliott, and with the clinical neurological services by Dr. Heller.

There is a second laboratory of neurochemistry concerned with clinical and experimental studies of degenerative diseases of the nervous system, such as multiple sclerosis. In this laboratory there are also two full time senior scientists, and one part time director who is also active in the clinical neurological service. Of particular importance are their studies of immunological reactions of the nervous system in relation to certain forms of encephalomyelitis, peripheral neuritis, and other progressive degenerative diseases of the nervous system. For example, Dr. MacPherson has discovered and isolated a new globulin fraction in the spinal fluid of patients with multiple sclerosis, not contained in blood serum, though present in the spinal fluid of patients with certain other diseases of the CNS as well. We regret to say that Dr. MacPherson will be leaving this team at the end of this year for she has done a great deal of splendid and important work in a most difficult field of investigation. Dr. Sherwin will be carrying on with similar studies, which have already yielded striking results in experimental animals, producing specific antigens for the central as opposed to the peripheral nervous system in rabbits, with simulation of certain human diseases in these animals.

In the neurophysiology laboratories there have been 12 fellows working on a variety of experimental problems during the past year, including a major project on the neurophysiological mechanisms of learning, supported by the National Science Foundation of the United States. Studies have been continued on brain stem cortical interrelationships and the functional anatomy and chemistry of the centrencephalic system, with particular

reference to regulation of states of consciousness and petit mal epilepsy, and with respect to mechanisms of habituation and reinforcement in learning.

Intensive work has continued with intracellular microelectrode studies of pyramidal motor neurones, mechanisms of epileptic discharge in the hippocampus, the spread of seizures in the cerebral cortex, and relationships between extrapyramidal and pyramidal motor systems in experimental animals, and in patients before and after their treatment by stereotaxic surgery. Microelectrode studies of single cell discharge in basal ganglia and thalamus are also being carried out in man in collaboration with Dr. Bertrand in the attempt to provide a better guide to their rational surgical treatment.

There is no full time research neurophysiologist in this Department. The work is supervised by two part time staff who are also responsible for clinical laboratories of electroencephalography and electromyography.

In neuropathology there have been seven fellows working under the direction of one full time neuropathologist, and one neurosurgeon, both of whom find their time largely occupied with clinical and teaching responsibilities. With the assistance of Dr. Sheldon and the electron microscope belonging to the neighbouring Institute of Pathology, work has begun on the effect of anoxia on the fine structure of the cerebellar cortex. Important studies of the enzyme histochemistry of glial tumors has also been completed by Dr. Gluscz who, unfortunately has since returned to Poland. The full research potential of these laboratories, especially with the rapid development of powerful new techniques of investigation in this field, can be realized only if it is possible to obtain more senior staff with specialized training.

The Cone Laboratory of Neurosurgical Research under Dr. Feindel has been tooling up with a most impressive array of electronic equipment for the application of radio-isotopes to studies of cerebral circulation, and the effects of various forms of radiation on the brain. One full time research associate, one fellow and a part time research assistant, with a consulting physicist from McGill provide the professional staff for this work.

The Department of Psychology, under the direction of Dr. Brenda Milner has been very active, providing a most valuable clinical service, as well as carrying on important research on speech, perception, learning and memory in patients with focal cerebral seizures, using the nursing staff for control subjects. Dr. Milner has two full time research associates and a Ph.D. student working with her. We are pleased to report that Miss Lilli Prisko has completed successfully her work for a Ph.D. degree under her direction this year.

The Department of Neuroanatomy, under Dr. McNaughton and his part time assistants, has been doing a splendid job with undergraduate and graduate teaching. Research has been limited by the lack of adequate staff, laboratory space and equipment.

Under the broad heading of Graduate Studies and Research should be included clinical research being carried out in laboratories of radiology,

neurochemistry, neuroanaesthesiology, electroencephalography and electromyography, and the new neuro-isotope laboratory, as well as the careful and systematic studies of patients in both neurosurgical and neurological services, all of which form a major part of the graduate study and research activities of this Institute. Graduate seminars and weekly research and clinical conferences continue to provide useful forums for discussion, and particularly to help staff and fellows keep in touch with what is going on in other departments — an increasingly difficult task.

During the past year there have been over 60 post-doctoral fellows engaged in graduate studies and research. Over one half of these, about 35, have been engaged in research or training in one of the various laboratories, while the reminder have been working on clinical services. With only about 5 full time senior research staff it is obvious that most of the work is done by the fellows, together with a splendid staff of highly trained technicians who contribute in large measure, not only to actual work done, but also to the teaching of fellows in the use of complicated apparatus and techniques.

A member of President Kennedy's Science Advisory Committee has drawn attention to the need for more full time men in the basic neurological sciences. He drew attention to the fact that we have passed the days of the successful Sunday afternoon scientist; it is now a full time job requiring extraordinary competence and the cooperation of the most advanced techniques and mathematical theory of the physical sciences. It is obvious that the full research potentialities of the Institute can be realized only with the addition of carefully selected full time research staff in several departments. With a careful re-assessment of the use of existing research funds, together with increased support which has been provided by the Canadian Medical Research Council, there is still need for more financial resources of a permanent character if the Institute is to continue to keep abreast of current developments in the neurological sciences, and to profit by the occasional opportunities to break through into new territory.

NEUROLOGY

DR. FRANCIS MCNAUGHTON

"Whatever the year brings, he brings nothing new." Thus sang the poet. This may be a bad beginning for an Annual Report, but it serves to remind us, that in a Neurological Institute, like most other institutions, life — fortunately — goes on with a certain uniformity from one year to another.

According to Dr. Robb's figures for 1962, the Department of Neurology shared the admissions almost equally with our neurosurgical colleagues, and our total admissions have not varied greatly from other recent years. It has been a busy year for both the Ward services, and the Outpatient Clinics in the Royal Victoria Hospital. The volume of new and old patients in the Clinics has not changed greatly in numbers. The large Seizure Clinic carries on smoothly with the aid of our Rehabilitation Grant — and with excellent cooperation from all Staff Members. Miss Griffin will report on a Social Study of Epilepsy under the supervision of Miss Paulson, in our Clinic.

I would like to speak briefly of the increasing teaching responsibility of the Neurological Department. Each and every member of our staff, visiting and resident, takes some part in the undergraduate teaching of 3rd and 4th years. The greatest responsibility falls on the shoulders of the Teaching Fellows and I wish to commend Dr. McPhedran and Dr. Yap, who, I feel, have improved very considerably our plan of teaching. We share the integrated course on the "C.N.S." in the second year with the Departments of Anatomy and Physiology at McGill. This is an introduction to the basic neurological sciences and clinical neurology, which has been in successful operation for some years. We are pleased that the Curriculum Committee of the Medical Faculty favours an extension of our plan to other areas of teaching, and I would like to think the study of the nervous system with its integrating and unifying concepts might be used to draw all undergraduate teaching more closely together.

Our graduate teaching is supported in part, as in past years, by a training grant from the National Institutes of Health at Bethesda and we are most grateful for the confidence which our fellow North Americans have shown in our Institute. While training stipends have been available in the past for U.S. citizens only, this opportunity has now been extended to include persons of Canadian or other nationality who show promise as independent investigators. There is need to expand our facilities for graduate teaching, and I hope that in the near future there will be clinical expansion at the Montreal General Hospital and the Queen Mary Veterans Hospital.

I should make note of several staff changes. I regret that Dr. Peter Thomas who joined our Department last January found it necessary to return to London after 6 months. Dr. David Howell, who has been a member of the Department for 10 years, and on the staff of the Montreal General Hospital, is returning to Britain with his family in July. He has

contributed to our activities in a great many ways and we shall miss him very much. Dr. Robb is taking a year's leave of absence to join the Staff of the National Institutes of Health at Bethesda. Fortunately for us, this is a temporary period of shore leave, and I expect to see him "on board" again at the next annual meeting, ready to give his report.

I should also draw your attention to the fact that 3 of our staff members are now combining the practice of neurology with an active program of investigative work in the laboratories. Dr. Cosgrove has a number of projects in progress in the Multiple Sclerosis Lab; Dr. Sherwin is pursuing extensive studies on Immunology and the C.N.S., while Dr. Heller is expanding his neurochemical studies of peripheral nerve. It is a difficult feat to combine the smooth Dr. Jekyll of clinical practice with the shaggy Mr. Hyde of the research laboratory — but we hope that a reasonable balance can be maintained.

I must record our thanks to the Residents of the past year, to whom we owe so much — Dr. Drouin, Dr. Finlayson, Dr. Jordan, Dr. Katf and Dr. Lewis as well as their able assistant residents. Our teaching efforts only repay in part our debt to them.

There have been a number of enjoyable and profitable visits from neurological colleagues, who have come here to lecture, teach or observe, and I wish to record their names: Dr. John Game and Dr. William Burke of Australia, Dr. Skulstad from Oslo, Professor Paul Castaigne and Professor François L'Hermitte from the Salpêtrière, Paris, Dr. Richard Richter from the University of Chicago, Dr. James Carson of Sheffield and Dr. Ritchie Russell of Oxford. Today we are particularly honoured by the visit of the Hughlings Jackson Lecturer, Lord Brain, with Lady Brain, and are looking forward to the Ward Rounds and Conferences which have been arranged for the next two days.

In last year's report by the Neurosurgeon, Dr. Arthur Elvidge referred by name to an impressive number of young neurosurgeons who have trained here and who are now spread around the Globe in positions of great influence. In looking over the list, I am pleased to find that almost without exception, these young men spent a considerable period of their training in the Department of Neurology. I would like to think that the benign influence of their neurological training has helped to make them both wise and good, always prepared to follow the well-known aphorism of Lord Moynihan, that "the chief function of Surgery is to prevent surgery." Neurology has had its share in the training of young neurologists, too, and I am proud that we are training promising young people, not only for our own fair country and for the United States, but for distant countries as well. Dr. Sumargo, who has spent the past year with us as Fellow under the Colombo Plan, returns shortly to his position at the University of Jakarta, Indonesia, and all too soon, our good friends, J. C. Jacob and Diwan Bhathal will be setting out for India.

Whenever I review the work of the Clinical Department I become acutely aware of our dependence on all the other departments, in our daily

work. We cannot stand alone. I think of how much we lean on Donald McRae, on Herbert Jasper and Peter Gloor, on Gordon Mathieson, on Miss Griffin and the Social Service Department, and on Miss Cameron and her nurses. More than any others, we lean on the strong shoulders of our neurosurgical brothers, and my colleagues and I wish to express our particular gratitude to every member of the neurosurgical staff. I believe that one of the unique values of the Montreal Neurological Institute as a training centre is this warm relationship which has always been maintained within our group, and particularly between the neurologists and neurosurgeons.

As I see it, the special function of the Department of Neurology — apart from providing the best possible care to the patients entrusted to it — is to teach the young people who come here for clinical training how to sift the conflicting facts obtained at the bedside and in the laboratory, and to make judgments in diagnosis and treatment which will be wise and compassionate. I believe that this is a worthwhile contribution to the work of the Institute.

NEUROSURGERY

Dr. Arthur R. Elvidge

During the year 1962 the Neurosurgical Department has been exceedingly busy. Altogether 1163 operative procedures were undertaken, a moderate increase over the high incidence attained in 1960 and 1961. The total number of procedures actually carried out in the operating rooms was 705, which included 258 craniotomies, 99 for brain tumour and 37 specifically for epilepsy. Another group of 69 were concerned with the major cranial surgery required in the treatment of severe head trauma. This figure, of course, represents a small percentage of all the accident cases treated. There were 224 spinal operations including 142 discoidectomies. In addition 365 angiograms were performed and 45 aortograms, the latter undertaken by the radiologists. The post-operative infection rate was 0.3 percent.

During the year, 1205 patients were admitted directly to the Neurosurgical Department, to which may be added 126 transferrals from our neurological colleagues, making a total of 1331 patients treated, a figure again similar to the peak levels of 1960 and 1961.

Our staff has enjoyed the fullest co-operation with departments in the Royal Victoria Hospital. With the arrival of Dr. Lloyd MacLean, Surgeon-in-Chief of the Royal Victoria Hospital, further interest has been engendered in the surgical treatment of extra cranial vascular disease. We are grateful for help received from members of the team of vascular surgery, and from the orthopedic, plastic and thoracic surgeons, who have collaborated over the years and through the Accident Service.

We have always been fortunate to have expert radiologists at the Neurological Institute. During the past 4 years they have initiated in our hospital the procedure of femoral catheterization so that the main extracranial vessels to the head, in addition to the intracranial, may be completely visualized, which has also added to better understanding and treatment of certain vascular problems.

Our anaesthesiologists are considered, by us at least, to be the finest in the country and we are proud of their achievements in increasing the safety of our operations. Our ward nurses have been complimented by both doctors and patients and they have frequently made possible the impossible. Our operating room nurses are highly trained under the expert guidance of our operating supervisor, Miss P. Stanley.

Our Neurosurgical Residents, in 1962, have come from many parts of the United States, from Mexico, Italy, Hong Kong, Lebanon, Holland, Jamaica, Turkey, Belgium, India, Egypt. They may rotate through one or more of the three Neurosurgical Services. Others, who eventually will do neurosurgery, pass through laboratories to broaden their scientific training. Many have left to organize their own services, in different areas, and others to become associated with clinics elsewhere, and to take University appointments. Many have been heard from during the year both privately and through the Fellows' Society. A casual glance through a list of our present and former Neurosurgical Fellows shows that they hale from at least 43 different countries, and in the larger such as India, there are several representatives. Nearly every state in the United States has one or more Fellows, who has spent some time, if they have not spent all their neurosurgical training, at the Neurological Institute. There are some natives who have remained in Canada and a few have joined their ranks, and nearly all provinces have been invaded. We are happy to see our former Resident and Fellow from Saskatoon, Dr. Joseph Stratford, well installed as Neurosurgeon-in-Chief at the Montreal General Hospital. Our best wishes go to him.

Our staff have kept in touch with the rest of the world through travel, lectures and meetings. Our Honourary Neurosurgeon and Founder Dr. Penfield, in a world tour of neurosurgical clinics which have received their impetus from the Chief, visited many of the hospitals and universities, and was invited as a guest of the Chinese Medical Association to lecture and tour in China, and I am sure this will have a soothing effect on East-West relations. Our director, Dr. Rasmussen, has recently visited Japan, at the invitation of the Japanese Medical Congress, where he spoke at the University of Osaka. We are glad that he and his wife have made a safe journey. Dr. Feindel has just returned from a medical conference in Sweden. The Institute, through its staff, residents and, perhaps, more especially the nurses, and others, has been a cementing influence, no doubt, in world affairs far beyond belief.

The members of the Neurosurgical Staff have participated in the research being carried on in the Institute. The disorders of involuntary movement and related physiological phenomena are being investigated through

stereotaxic methods by Dr. Gilles Bertrand. The many problems concerned with the physiology and the treatment of epilepsy continue to be investigated by Dr. Rasmussen and staff, including studies in speech and cerebral dominance with Dr. Branch and psychologist, Dr. Brenda Milner. The assessment of the value of hypophysectomy in the treatment of hormone dependent growths and problems concerned with diabetes mellitus and early acromegaly continues to be investigated by Dr. Rasmussen in association with Dr. John Beck; the application of chemotherapy in the treatment of malignant brain tumours in association with Dr. Branch and Dr. Hansebout, and the use of cortisone in cerebral edema with Dr. Branch. Other problems in the study of cancer and microelectrode unit recording and electrographic studies have been continued by Dr. Perot and Dr. Garretson. The life history of tumour formation continues to be studied and certain aspects of vascular disease, hydrocephalus and other problems. Brain scanning for intracranial localization, introduced by Dr. Feindel, has been very useful clinically for diagnosis and many physiological problems will arise in the course of the application of this facility. Many of our resident staff have been able to take part in clinical and laboratory investigations.

On behalf of the Neurosurgical Service I should like to congratulate McGill University on the appointment of the former Surgeon-in-Chief of the Montreal General Hospital, Professor Rocke Robertson, to the Principalship and the Vice-Chancellorship of McGill University. On behalf of the Department of Neurosurgery I should like to thank all those who have contributed toward the continued growth of this department.

HOSPITAL SERVICES

DR. PRESTON ROBB

Each year a report is made to you, Mr. Principal and the general public, on the activities and problems of the hospital. Last year, 1962, was an active one. There were 2,450 patients admitted, an increase of four over the previous year. There were 1,215 admitted to Neurology and 1,205 to Neurosurgery. There were 44,662 hospital days, an average daily occupancy of 90.6% and the average length of stay was 18 days. It is a tribute to the hard work of the members of staff, that the length of stay has fallen from 19.35 in 1961 and is well within the lifetime average of the Institute. There are usually 25 patients who have been in a month or longer. If suitable convalescent care could be found for the chronic long stay patient, the turnover would be much more rapid. There were 120 deaths, and an autopsy rate of 75.8%. There were 1,163 operations — an increase of 87 over the previous year. During the year there was a fall-off in patients in the children's ward, attributable mainly to the fact that The Montreal Children's Hospital now operate an excellent neurosurgical service. They receive and care for most of the traumatic cases that formerly came to the Institute. There is little further comment that I can make on these statistics. We have had a busy year and as usual, filled with pressures, long waiting lists, and the usual run of headaches.

The Outpatient Clinics continue to be held in the Royal Victoria Hospital, and are manned by our staff members and residents. In the Neurology Clinics there were 575 new patients, 3,854 revisits, with a total of 4,429. In the Neurosurgery Clinics there were 200 new patients seen, 791 revisits and a total of 991, making a grand total for all clinics of 5,420.

As we do not operate an out-patient department we have avoided the difficulties of the emergency service program as set up by the Quebec Hospital Insurance Service. However one cannot run a hospital in which standard ward care is free, without thinking of the need for a parallel free diagnostic service. Let us take the simple problem of the young child who develops epilepsy. He can be admitted and have a complete investigation and it costs the family nothing, or he can have it done on an out-patient basis,

X-rays of the skull	$15.00
Electroencephalogram	30.00
Psychometric	30.00
TOTAL:	$75.00

With this he does not have the x-ray of the chest, or any blood tests. $75.00 is a large part of a working man's income, and with a chronic illness like epilepsy, the father will be faced with the continuing cost of medication, repeated EEG's and professional fees. Although it is nice to have emergency treatment paid for, the real need is to help with the diagnosis and treatment of long term illnesses.

Nursing

The report of the Nursing Department outlined their activities for the year, particularly the very successful post-graduate class. They omitted to comment on the high calibre of nursing in the Institute and how grateful we, the members of staff are, for the care they give our patients. Also reference was not made to the imminent departure of Miss Louise Hall. She has accepted the post of Assistant Director of Nursing in charge of Nursing Research at the Hospital for Sick Children in Toronto. Miss Hall first came to us as a post-graduate student in 1949. She left for 6 years and for the past 7 years has been here in the teaching department, undertaking further studies at McGill, while she worked on a part time basis and now as Assistant Director of Nursing. We wish her every success and hope that it will not be too long before she is back with us.

Records

Under the guidance of Dr. Graham, Dr. Venecek, and Mrs. von Nida the records continue to work their way to the record room. We are particularly grateful to the staff of the typing pool who have pulled together so well during the recent illness of Mrs. von Nida. The activities of the Registrar's Office are many and varied, as many a bewildered houseman or visitor will testify.

Building Maintenance

The regular work of maintaining the Institute has continued without any drastic changes. Pipes continue to burst and the ceiling of the front entrance peels off regularly. Having a resident painter has greatly improved the appearance of the hospital. A program has been started to replace some of the flooring in the original wing. We are looking forward to the new flower beds to improve the outside appearance. Parking continues to be a serious problem. The only answer, I can see is to have the athletics department of McGill open up the field at the north east end of the stadium.

Finance

You need hardly be told that the cost of hospitalization has gone up. Increased wages, larger staff to make up for the shorter work week, and the complexities of modern medicine are the main contributing causes. In 1961, it cost $1,794,143 to operate the hospital side of the Institute. In 1962 the cost was $1,988,046, an increase of $193,903 or roughly 10%.

The QHIS requires that 40% of the occupancy be standard ward patients. In 1962, 63% of our patients were standard, 24% were semi-private, and 13% private. There was a 5% increase in standard ward patients in 1962 over 1961. This means that we get a relatively small amount of money from the differential paid by private and semi-private patients.

In 1962, 71% of the patients were paid for by the QHIS, 4% were paid for by the Workmen's Compensation Board and 25% were non residents. This leads us to the daily rate. We are paid or are allowed to charge $29.55 per patient per day. When one adjusts for income from other sources, the actual cost per patient per day in 1962 was roughly $42.80. This means that on all patients from outside the Province or who are Workmen's Compensation cases are being subsidized by the Province of Quebec to an amount of $12.00 a day. It has been repeatedly pointed out to the Quebec Hospital Insurance Service that they are losing a great deal of money by reason of the unrealistic and low daily rate.

A final settlement for 1961 has not yet been reached. We still owe $34,158 for that year. The auditors statement for 1962 has just been completed and Quebec owes us $310,873. This makes a total of $345,031 — a truly impressive figure.

Realizing the tremendous problems confronting the QHIS it is my hope that we may soon come to an agreement with them, receive payments for the outstanding debt for 1961 and 1962 and at the same time establish a more realistic daily rate.

Surely in Quebec they are asking the question — "Is there no end to the increasing cost of the QHIS." The answer for the present is that it is not in sight. In the meantime, it is expected that they will keep their end of the bargain and in the words of Bill 2, together we shall and I quote "insure, insofar as is possible, the development and maintenance of a high standard of hospital services, and reasonable and proper utilization of hospital services in all hospitals of the Province."

NURSING DEPARTMENT

MISS BERTHA I. CAMERON

The Nursing Department of the Montreal Neurological Institute experienced a very interesting and stimulating year. The response of each member of the Nursing Staff to the challenge which is presented by the nursing care required by the individual patient has been most gratifying. There has been renewed interest apparent in the advantage being taken of the opportunities for learning in the field of clinical experience. The Library facilities have been extended, the attendance at open lectures has been encouraged and steps are being taken to further enrich the "In-Service" program.

One of our major projects during the past year has been the revision of the Nursing Manual. Already certain sections are in circulation and more are being compiled. Our thanks to all those who assisted in any way with this undertaking.

Certificates were presented to 36 Post Graduate nurses, who came from many countries near and far to take our Courses of six months in Neurological and Neurosurgical Nursing and Operating Room Techniques. It is gratifying to say that many of these nurses, because of their continued interest in this field, have remained on staff to gain further knowledge and experience.

The "Eileen C. Flanagan Prize" which is awarded to the most outstanding student in each Post Graduate Class was awarded to Miss Nessa M. Coyle and to Miss C. Joan Hill.

We had 129 undergraduate students from the Royal Victoria School of Nursing, 4 from the McGill Basic Course in nursing and 21 Post Graduate nurses for "Field" experience in Teaching and Supervision.

Miss Helen Kehoe was awarded the prize given by the Montreal Neurological Institute to the Royal Victoria student showing aptitude and interest in neurological and neurosurgical nursing while affiliating here.

Assistance to staff members for further study has been made possible through bursaries provided by individuals and by the government.

We are privileged to thank Mr. Louis Liebman, who on behalf of himself and members of St. Georges' Lodge No. 10, donated One Thousand Dollars to be used as a Nursing Bursary. This donation has been divided equally and awarded to Miss Patricia Murray and Miss Helen Kryk. We would also like to thank Mrs. Samuel Reitman for the nursing bursary donated in memory of Dr. William V. Cone which was awarded to Miss Caroline Robertson. These nurses, all former staff members, are pursuing Graduate Courses at the School for Graduate Nurses, McGill University and will, I'm happy to say, be re-joining the staff upon completion of their studies.

We are also grateful to Dr. Arthur Elvidge for his donation of a ursing Bursary which is to be awarded this autumn.

The Eileen C. Flanagan Scholarship Fund has grown to the approximate mount of $2,500. It is our hope that this amount will continue to increase) that one day in the not too distant future, our goal will be reached nd this fund can be used as a scholarship.

The Graduate Nurses' Society has continued to grow and to broaden s sphere of interests, under the capable and enthusiastic leadership of the resident, Miss Patsy L. Robertson.

The residences which are available for a limited number of nurses ave been greatly appreciated. The "Corner House" (3661 University St.) as been re-decorated and improved kitchen facilities made available.

I would like to pay a personal tribute to *all* Members of the Nursing ersonnel (nurses, nursing assistants and orderlies) and in particular to ie Head Nurses and all Supervisors both day and night for their loyalty. : is due in large measure to the watchful vigilance and constancy of care ver the whole twenty-four hour period that the standard of patient care hich we aim to give is made possible.

We thank the members of the Medical Staff for their unfailing interest nd support and the many hospital departments for their co-operation.

SOCIAL SERVICE

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

ocial Workers:

RS. Sally Gold, B.A., M.S.W.
Mrs. Lilliane Poteet, B.A., M.S.W.
ISS Kathleen Macdonald, B.A., B.S.W.
Miss Noella Vaillancourt, B.A., M.S.W.
ISS Irene Paulson, B.A., M.S.W.

During the past year, as a member of the Health Committee of the orporation of Professional Social Workers of the Province of Quebec, I articipated in the preparation of a statement on the functions of social rvice departments in hospitals, which has been distributed to the Quebec ospital Association and to other inquirers. We began with a brief uotation:

> "It is necessary for the physician to provide not only needed treatment, but to provide for the sick man himself, and for those beside him, and to provide for his outside affairs."
>
> The author, of course, was Hippocrates, 5th Century, B.C.

I shall continue by reading a paragraph from the statement we epared:

"The main function of a Social Service Department is to provide, in close collaboration with the medical team, the professional help needed by patients whose personal or social problems are related to their illness, recovery or preservation of health. This is provided through individual interviews and/or group sessions. The social worker helps to assess the problem and the resources within the patient, his family and the community and helps to mobilize these resources effectively."

This year, I would like to emphasize the role of the community as a partner in the medical care team, with hospital social workers frequently serving, on behalf of the patients, as a liaison or link between the inside (the hospital) and the outside (the community).

What is the community? and what has it done? It is a variety of governmental and private (voluntary) health, welfare and social agencies; it is schools — both regular and special, employment agencies, employers, leisure-time centres, churches and other religious groups; it is rehabilitation centres, nursing homes and other homes and institutions to which our patients of all ages are discharged; it is even the relatives and friends of patients and in a sense the patients themselves. It is also the schools of social work, and the RVH Volunteers and others whose contributions of time and service have been invaluable (over 600 hours); and it is the Women's Auxiliary of RVH and other community groups such as cancer and multiple sclerosis associations who have been so generous in their donations of funds.

The community is represented by all these and more. Without their cooperation and assistance, I shudder to think of the resulting curtailment of needed services for a large proportion of nearly one thousand patients known to our department during the year, some briefly, others requiring long contacts and/or mobilization of a multitude of resources.

This is a two-way process, as the word "liaison" implies. We must be aware of community needs and share in seeking to develop facilities, programmes and staff to meet these needs. So, in conjunction with the Montreal Children's Hospital, two series of lectures (one in French and one in English) were arranged for parents of seizure patients. We have had social work students for fieldwork training — three from McGill for direct supervision and one from the University of Montreal for experience in social group work through leading the weekly discussion meetings of the French-speaking Young Adult Seizure Patients. We have also served on committees in the community, including those of the Health and Older Persons Sections of the Montreal Council of Social Agencies, and the committee of Heads of Social Service Departments of French and English hospitals, and we have attended meetings in this country and in the U.S. with the common theme — community development.

Many have felt that one of the community needs here is an Epilepsy Information Centre. For the community to accept and support this, it must understand something about the seizure patient population and its needs. To collect data of this nature, a study was planned over a year ago. We can now report that the medical and social sections of the first 500

questionnaires of this study were completed by the end of October and have been prepared for analysis at the McGill Computing Centre. Within the next three months we hope to have the results available. In the meantime, work is continuing on the second 500 questionnaires. It should be mentioned that there has been 100% cooperation from the patients in this study.

For in-patients, one of the greatest community problems plaguing social workers in hospitals here today is the shortage of and confusion about beds for patients who, upon discharge, need care outside their own homes. This has been a problem of varying intensity through the years, but has been accentuated since the advent of the Quebec Hospitalization Insurance, at least in part by the increased number of patients needing such care and because three categories of patients (those requiring rehabilitation, convalescence or chronic care) are covered financially by the insurance. Also whether as cause or effect or both, attitudes have changed — there is less resistance to the idea of nursing homes and institutions particularly by relatives, placement is becoming more socially acceptable in all groups, and facilities *are improving.* However, the number and quality of such services, especially for the chronically ill, have not kept pace with the spiralling demand and further concerted community effort will be necessary.

To all whom I have mentioned directly or indirectly, in our department, in the hospital and outside the hospital, go grateful thanks for helping to make the work of the social service department possible.

ANAESTHESIA

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

Associate Anaesthetist.....G. F. BRINDLE, B.A., M.D., C.M. F.R.C.P. (C).

Assistant Anaesthetists.....J. J. MCGRATH, B.Sc., M.B., B.C., B.A.O.
MARY MORRIS, M.D., C.M.

Resident Staff

SYED MOHAMMED ALI, M.D. (Pakistan)*
JOHN ATKINSON, M.D. (Queen's)*
HUGH BROWN, M.D. (McGill)*
JUAN ESCUDERO, M.D. (Salamanca, Spain)*
PETER GURRIN, M.D. (London, England), M.B., B.S. (McGill)*
HILDA PEDERSEN, M.D. (Scotland)*
JAVIER SAGARMINAGA, M.D. (Madrid)*
REZA VAZIRNIA, M.D. (Teheran, Iran)*

*Six months on this service.

For the first time in the history of the Institute the number of anaesthetics given exceeded the 1000 mark. This is chiefly due to the increased number of procedures done in the x-ray department that require an anaesthetic. All anaesthetics were given by one of the staff anaesthetists, either alone or with a resident.

The technique of hyperventilation has given demonstrable proof of its advantages. There were 466 patients who had this type of regime. Many of the patients were monitored with reference to blood gases on pH, this being used as a clinical tool, rather than a research one as in previous years. Apart from special cases of an investigative nature, explosive agents are no longer used in the Institute. Analysis of cases terminating fatally showed no evidence that they were directly due to anaesthesia.

Changes in the staff this year include the appointment of Dr. Mary Morris, who joined us following her year as a Research Fellow. Lack of ancillary staff has in the past year led to an unnecessary load of work, which we have been prepared to do during an emergency, but cannot undertake indefinitely.

Dr. Brindle has taken a keen interest in diagnostic and therapeutic nerve block procedures. He has also carried on a research program initiating a number of clinical studies. In this respect, we miss the presence of Dr. Millar.

The teaching program of the department continues to be active ranging from nurses, oxygen technicians through medical students and graduate students training in anaesthesia.

RADIOLOGY

Radiologist ..... DONALD MCRAE, M.D.
Associate Radiologist ..... ROMÉO ETHIER, M.D.

Residents

JOSEPH KISS, M.D. (Hungary)
CLARA LASZLO, M.D. (Hungary)
RODERICK MACPHERSON, M.D. (Manitoba)
REGINALD SMITH, B.Sc., M.D., C.M. (McGill)

In 1962, we carried out 9,999 examinations, the greatest number we have ever performed in a single year. There were 631 angiograms and aortograms, 46 arterial catheterizations, 544 encephalograms, 99 ventriculograms, as well as 429 myelograms and discograms. Thirty-five of these examinations were carried out in the operating room, 30 of which were stereotaxic procedures. These complex and time-consuming procedures number 1,779 in all. They represent only 18% of the total, yet they take from one-third to one-half of our time, of the technician's time, and the same proportion of x-ray machine time and x-ray supplies. We have arrived at the point of saturation and now must seriously consider ways and means to increase the size of the department and to increase the staff and equipment.

There has been another type of increase in demand on the department. Ten years ago, there were one neurological and two neurosurgical services. Now there are three of each. The number of internes and residents in neurology and neurosurgery has doubled. This has doubled the demand for film consultation and is forcing us to reorganize the department so that space and time can be set aside for uninterrupted clinical work.

Spokesmen for government and private insurance schemes, some lay people and even some hospital superintendents, speak out against the increase in number of medical procedures, particularly diagnostic procedures, as if such increase was unnecessary and as if such increase was "bad". There has been a steady increase in the number of medical procedures carried out in this department ever since its first year of operation. The growth curve is not entirely smooth but the introduction of the Quebec Hospital Insurance Service produced only a minor peak on the graph. People foresee better afterwards. It is easy to say that a certain diagnostic procedure was unnecessary after it was carried out and failed to produce information of value. Such retrospective criticism is unjustified in most cases. If we knew beforehand which procedure would give the diagnosis, we would usually know the diagnosis. I do not approve of an unlimited number of diagnostic procedures but point out that the necessity of a diagnostic procedure in a patient's management can be judged best by the patient's physician and the other doctors concerned in the procedure at the time the patient is under study. The value of diagnostic procedures is being continually increased and the morbidity and mortality from them being reduced. New procedures are continually being introduced which do not replace but are supplementary to previous standard diagnostic procedures. For these reasons, I look forward to a continued steady increase in the amount of work in this department.

In 1962, four young radiologists from the Diploma Course in Radiology of McGill University completed training periods of six months in Neuroradiology in this department; Drs. Clara Laszlo, J. Kiss, O. Semchishen and T. Connor. Dr. J. Racine, from Notre Dame Hospital, also studied for six months in the department. For many years, we have offered short periods of training to young doctors in training in Radiology. Recently, an American Society of Neuroradiology was formed. It requires a minimum of one year, and preferably two years, of neuroradiological training in the course of the general radiological training. We are planning to offer such training to one radiologist each year, preferably a man who has an appointment waiting for him at the end of his training period.

The seminars and colloquia in Neuroradiology for the Faculty of Graduate Studies and Research were given as in previous years. The introductory course in general radiology for second year McGill students was again given by Dr. Ethier and myself.

NEUROCHEMISTRY

Neurochemist and Donner Fellow.....K. A. C. Elliott, M.Sc., Ph.D., Sc.D., F.R.S.C.

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

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

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

Visiting Scientist.....Rashid Tariq Khan, B.Sc. (Hons.), M.Sc. (Hons. Sch.) (Panjab)

Fellows:

R. A. Lovell, M.S. (Indiana), Pre-doctoral Research Fellowship, U.S.P.H.S. Ph.D. (McGill)

J. A. Lowden, M.D. (Toronto) Queen Elizabeth II Fellow

The work in the 7th floor clinical neurochemistry laboratory in 1962 increased slightly over the previous year. (Figures for 1961 are in parentheses). This year 9683 (8300) separate procedures were done on spinal fluid, blood and urine obtained from patients. In addition 6114 (5600) litres of irrigation solution were prepared for the operating room and 203 (200) litres of nupercaine solution for the clinical services.

The work of the 3rd floor ward laboratory has continued the steady increase that has occurred over the past few years. The number of separate determinations done on blood samples was 17,308 (16,000) and the number of complete urinalyses was 5240 (5000). Our technicians also draw all the blood samples for analyses done in our 7th floor laboratory, in the Provincial Laboratories and in the Royal Victoria Hospital.

A continued increase in the number of blood samples sent to the RVH for biochemical analyses — 4694 (3600) — as well as the steady increase in our own work has led to a decision to purchase a Technicon Automatic Analyzer for the 7th floor laboratory. Starting this summer we will be able to increase both the volume and range of our work without further increase in staff. In particular we will perform those analyses which are most commonly requested from the Royal Victoria Hospital.

The clinical neurochemistry and ward laboratories are administered by Dr. I. H. Heller and technical supervision is provided by Dr. Hanna M. Pappius.

Donner Laboratory of Experimental Neurochemistry

As in any productive department the members of the staff and the students in this laboratory have a hard time keeping up with themselves. The drive to research has to compete with outside demands for talks and reviews and with increasing involvement in teaching and in committee work at home. These non-research activities are a consequence of productiveness in research and provide stimulus for research. The stimulus of working in this laboratory is heightened by the continued wide diversity of research fields, all within the general field of experimental neurology, that are pursued by the various members of the staff and by our contacts, in seminars and teaching, with the many other types of work in progress in the Institute.

Dr. Leonhard Wolfe and Dr. Alexander Lowden with the technical assistance of Miss Ania Morawska have continued studies on brain gangliosides. Gangliosides are complex anionic glycolipids present in neuronal membrane structures. These substances contain sphingosine, fatty acids, glucose, galactose, N-acetyl galactosamine and the acidic sugar N-acetyl neuraminic acid (NANA). A new, chromatographically homogenous, ganglioside has been isolated from human brain; it contains three neuraminic acids in the molecule and has been named trisialoganglioside. Examination of gangliosides purified from cerebral cortex tissue obtained from patients either at operation or autopsy has indicated significantly reduced NANA contents in the brains of those patients in which cerebral asphyxia could have occurred. Studies with cats subjected to periods of asphyxia have indicated that carbon dioxide accumulation is probably the more important factor, rather than simple oxygen lack, in the loss of NANA from gangliosides. The altered gangliosides contained reduced amounts of the trisialoganglioside. During the isolation of trisialoganglioside from brain it was observed that a pink substance was associated with the ganglioside. Preliminary work suggests that the material is a porphyrin-like substance and contains vitamin B_{12}.

Dr. Hanna Pappius is actively carrying on the interest of the laboratory in brain swelling. She has been investigating, *in vivo,* the process of development of cerebral edema following insult. When a standard lesion on the cerebral cortex of a cat is produced by freezing, a change in the permeability of the brain, as measured by uptake of thiocyanate from the circulation, develops in local regions surrounding the area of the lesion. This occurs in cerebral cortex within three hours and well before edema, as measured by the increase in water content of the tissue, has developed in the white matter. With the help of Dr. L. Dayes, Dr. Pappius has studied the mechanism by which urea administration reduces intracranial pressure. Urea administration, as used to control brain swelling, shrinks the brains of normal cats, as judged by a decrease in its water content. This shrinkage, which was more pronounced in white than in grey matter and lasts for 3 to 4 hours, seems to be due to osmotic action of urea. No rebound increase in water content of brain could be demonstrated. Urea administration had no effect on the water content of edematous tissue while the normal brain in the same animals was significantly shrunken. It is concluded that reduction of intracranial pressure by urea is due to shrinkage of normal parts of the brain and not to reduction of edema. In collaboration with Dr. J. B. Dossetor of the Royal Victoria Hospital the manner in which blood dialysis by the artificial kidney occasionally provokes symptoms of increased intracranial pressure was investigated. It was found that in uremic dogs subjected to dialysis a brain-blood urea gradient develops which could account by osmotic action for transient edema which is occasionally encountered during dialysis. Edema, when it developed several hours after dialysis, could not be explained by osmotic effects and appeared to be accentuated, but not necessarily caused, by previous trauma.

Dr. Irving Heller and Mr. Sigurd Hesse are continuing their studies on the role of thiamine in nerve metabolism. They have found that all the thiamine in rat sciatic nerve is in the form of thiamine pyrophosphate. Incubation of nerves in a calcium-free medium results in a release of some of the thiamine uncombined with phosphate. This liberated portion is found in the medium associated with the alpha-one protein band on electrophoretic analysis. Present studies are related to the effect of calcium and electrical pulses on the liberation of free thiamine from nerve.

Mr. Richard Lovell showed last year that a rapid post mortem increase occurs in the *gamma*-aminobutyric acid (GABA) content of brain and this can be avoided by freezing the brain in liquid air at the moment of death. He has now shown that the changes in the levels of GABA previously found in the brain after treating animals with various drugs and other agents are still apparent if the brain is frozen *in situ*. But the well-known apparent decrease in the GABA content of the brains of rats treated with convulsant doses of thiosemicarbazide is not found in quick frozen brain and evidently occurs only post mortem. This has important implications concerning the physiology of GABA and the roles of the bound and free forms. Preliminary studies by Dr. Bilodeau have indicated that some of the bound GABA is in "nerve ending particles".

Mr. Rashid Tariq Khan is continuing the study of the nature of bound and free GABA. Some of the binding is shown to be very labile; its stability has a sharp pH optimum and it is affected by cold and by metabolic conditions.

Dr. Wolfe is to be Chairman of the section on Lipid Metabolism at the First Pan-American Congress of Neurology to be held in Lima, Peru, in August 1963. Dr. Lowden has been awarded a Helen Hay Whitney Foundation Fellowship. Mr. Lovell has submitted a thesis for the Ph.D. degree and will shortly leave to complete his theology studies prior to ordination to the priesthood and assignment to the teaching staff of Loyola University, Chicago. NEUROCHEMISTRY, Second Edition (Edited by K. A. C. Elliott, I. H. Page, and J. H. Quastel) has now been published and copies can be found in many libraries and personal collections.

ELECTROENCEPHALOGRAPHY & ELECTROMYOGRAPHY

Electroencephalographer ..... PIERRE GLOOR, M.D., Ph.D.
Consultant in Electroencephalography ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M.
Assistant Electroencephalographer ..... DONALD LLOYD-SMITH, B.Sc., M.D., C.M., F.R.C.P. (C)
Consultant in Electromyography ..... PETER K. THOMAS, M.D., B.Sc. (Anatomy)*

Electroencephalographic Fellows:

TADEUSZ BACIA, M.D. (Warsaw, Poland) Rockefeller Fellow*
DIWAN BHATHAL, M.D. (India)*
FLAVIO COCEANI, M.D. (Bologna, Italy)*
OSAMAH ELWAN, M.D. (Cairo, Egypt)*
ORHAN KALABAY, M.D. (Istanbul, Turkey)
FALAH MAROON, M.D. (Lebanon)*
LILY PRISKO, B.Sc., Ph.D. (McGill)
JEAN-MARC ST. HILAIRE, M.D. (St. Georges de Beauce, Que.)*
HERBERT SILFVENIUS, M.D. (Helsinki, Finland via Lund, Sweden)
CHONG-BUN YAP, M.D. (Manila, Philippines & Louisville, Ky.)*

Electromyography Fellows:

SHIGEAKI MATSUOKA, M.D., (Kumamoto, Japan)
COSTAS STEFANIS, M.D. (Athens, Greece) Muscular Dystrophy Assn. Fellow

*Six months on this service.

In 1962, a total of 3,374 electroencephalograms and 335 electromyograms were carried out in the laboratory of electroencephalography and electromyography. The total number of electroencephalograms is close to last year's figure, actually showing a slight decrease, whereas the number of electromyograms has again increased substantially, testifying to the rapid growth of this sub-department. Even though the number of electroencephalograms showed a slight decrease, the work load carried by the department was not diminished because of the large number of specialized procedures that have been performed among which we wish to mention especially intracarotid Sodium Amytal and Metrazol tests which have proved to be valuable adjuncts in analyzing difficult diagnostic problems in epilepsy. Of the total of 3,374 EEG examinations, 1805 were carried out on patients hospitalized at the Montreal Neurological Institute. This represents a slight increase over last year's figure. Among the remaining patients, 432 were referred from the Royal Victoria Hospital and 1,137 from the out-patient department, from private offices or from other hospitals. As was to be expected, most examinations, namely 1,300, were carried out on patients suffering from or suspected to be affected by epilepsy in its various forms. Patients with head injuries and suffering from brain tumors also made up a large proportion of our patient population.

The number of operating room electrocorticograms, 46, was lower in 1962 than the year before.

Fellows in training in our laboratory have again come from near and far: Dr. F. Poirier from Hull, Quebec, Dr. J. C. Jacob from India, Dr. N. Giard from Ste. Hyacinthe, Quebec, Dr. G. Karpati from Hungary (via Nova Scotia), Dr. H. D. Garretson from Arizona, U.S.A., Dr. C. B. Yap from China (via Kentucky, U.S.A.), Dr. J.-M. St. Hilaire from the Beauce, Quebec, Dr. H. Silfvenius from Finland, Dr. F. Coceani from Italy, Dr. D. S. Bhathal from India, Dr. C. Stefanis (electromyography) from Greece and Dr. S. Matsuoka (electromyography) from Japan.

The training of Fellows and technicians has again received close attention. The on-the-job practical training in the laboratory was to a large part carried out under the expert guidance of our head technician, Mr. Lewis Henderson. A series of lectures and seminars were given and we are pleased to gratefully acknowledge the contribution made to these teaching sessions by electroencephalographers attached to other Montreal hospitals. A number of regularly held EEG-pathological conferences, where instructive cases were presented by our Fellows-in-training, have also helped to contribute to this teaching programme.

We are sorry that Dr. Peter K. Thomas who had recently joined our department as consultant electromyographer left us again to return to England. We would like to thank him here for the stimulus he has provided to the work of our EMG laboratory.

The following research projects were carried out, or are still in progress:

(1) EEG investigations on patients with diffuse encephalopathies. (Drs. O. Kalabay, N. Giard, and P. Gloor).

(2) A study of evoked potentials in man with a transient response averager. (Dr. H. Jasper and K. Reid).

(3) Long-term EEG follow-up studies in children who sustained various forms of brain damage at the time of birth. (Drs. P. Gloor in conjunction with Dr. P. Fitzhardinge and Dr. G. H. Nickerson, Department of Paediatrics, Royal Victoria Hospital).

(4) Studies of the H-reflex with electromyographic techniques in patients suffering from extra-pyramidal motor disease and undergoing stereotaxic surgery. (Dr. C. Stefanis).

NEUROPHYSIOLOGY

Neurophysiologist ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M.
Assistant Neurophysiologist ..... PIERRE GLOOR, M.D., Ph.D.

Fellows:

FLAVIO COCEANI, M.D. (Bologna, Italy)*
ANTHONY GORMAN, M.D. (Rochester, N.Y.)
LUIS MARCO, M.D. (Valencia, Spain)
DANIEL POLLEN, M.D. (Boston)*
FOSTER REDDING, M.D. (Philadelphia) U.S.P.H. Fellow
KENNETH REID, M.Sc. (Montreal) Research Associate
PEK GIOK SIE, M.D., (Djakarta, Indonesia) Colombo Plan Fellow*
ROY STEINBERG, M.D. (New York)
BRYCE WEIR, M.D. (Montreal)

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

*Six months on this service.

Dr. Jasper returned to active work in this Department during the summer, refreshed from his sabbatical leave in Paris. His visits to leading neurophysiology laboratories in many countries were most stimulating, but served mainly to reinforce his faith in the unusual opportunities provided at the Institute for both basic and clinical neurophysiology, especially working as a team with clinicians and colleagues in other laboratories.

Neurophysiological mechanisms of learning has continued to be a major project being carried out with the support of the National Science Foundation of the United States. Precise tape recorders and computers are being used to record and process data obtained with electrodes implanted in many parts of the brain in animals to study the changes that take place during learning, and the effects of subcortical structures upon cortical functions. In particular, Dr. Redding has been studying the effect of hippocampal stimulation upon visual and auditory systems, and Dr. Marco has been investigating the effect of stimulation of the caudate nucleus upon the pyramidal motor system. Microelectrode studies of the activity of single cells in the brain of the monkey during conditioning are being continued. Mr. Reid, a computer physicist, has been assisting with the technical aspects of these studies as well as working on mathematical computer models of theoretical nerve networks capable of duplicating certain aspects of the learning process. His assistance in setting up computers and developing advanced electronic designs has been most important in the progress of this project. Dr. Steinberg has begun experiments on mechanisms of habituation using the "split brain" preparation of Sperry. Dr. Gorman, who has just joined the "learning" team from the Center for Brain Research of the University of Rochester, is setting up for carefully controlled studies of the effects of D.C. polarization on single unit activity in isolated cortex in relation to sustained patterns of response induced by repetitive electrical stimulation.

Drs. Perot, Pollen and Weir have continued their analysis of the neurophysiological mechanisms of the wave and spike formation in petit mal epilepsy using a variety of electrophysiological and pharmacological techniques, showing the manner in which specific structures of the mid-brain, thalamus and cortex participate in generating this important electrographic picture of epilepsy. Dr. Sie of Jakarta has joined this project, to collaborate with the neurochemistry department in an analysis of chemical aspects of this problem.

Drs. Stefanis and Matsuoka have completed an important series of studies of inhibitory and excitatory mechanisms of pyramidal cells of the motor cortex in the cat, using intra-cellular microelectrodes. They have also obtained some interesting results studying electrically recorded spinal reflexes in patients before and after stereotaxic surgery being carried out by Dr. Gilles Bertrand.

With Dr. Bertrand we have perfected a method for the microelectrode study of unit discharges in subcortical structures in man during stereotaxic operations, which promises to yield results of scientific interest as well as of practical value in operations for the treatment of extrapyramidal motor disorders, and perhaps in certain kinds of epilepsy.

Dr. Gloor has been busy writing up his extensive studies of mechanisms of epileptic discharge in the hippocampus, and has begun another series of experiments with Drs. Coceani and Libman on the conduction and spread of experimentally induced epileptic discharge in animals as effected by intra-arterial injection of sodium amytal.

As usual, Miss Roach and her assistants have been occupied not only assisting with experiments in neurophysiology, but with numerous experiments in neurochemistry, neuroimmunology, neuropathology, and experimental neurosurgery using the facilities of these laboratories. It has been a busy and productive year, and the coming year promises to be even more so as some of the new techniques being developed come into full use. This includes telemetering broadcasts of single cell activity in the brain of freely moving animals, electronic averaging devices for the study of evoked electrical responses from the human brain, as well as from experimental animals, and increased use of special purpose computers for processing electrophysiological data of all kinds.

We are pleased to acknowledge the important participation of Mr. Eddy Puodziunas and Mr. George Lootus, of the neuroelectronics department, in the daily work of these and other laboratories of the Institute where we are becoming more and more dependent upon the proper functioning of complicated electronic apparatus and electrical equipment.

NEUROPATHOLOGY

Neuropathologist ..... GORDON MATHIESON, M.B., Ch.B., M.Sc.
Assistant Neuropathologist ..... GILLES BERTRAND, B.A., M.D., M.Sc.
Research Associate ..... ANDRZEJ GLUSZCZ, M.D. (Lodz, Poland)
Rockefeller Fellow

Fellows:

SANTIAGO CRISOSTOMO, M.D. (Philippines)
PATRICE DROUIN, M.D. (Quebec)
ROBERT HANSEBOUT, M.D. (London, Ont.)
ROBERT HERNDON, M.D. (Detroit)
JOSEFINA DEL-MUNDO VALLARTA, M.D. (Philippines)
JEAN-MARC ST. HILAIRE, M.D. (Quebec)*
ANDREW WONG, M.D. (Hong Kong)

*Six months on this service.

The work of a department such as this is an interlocking mosaic of activities generated by hospital responsibilities, graduate and undergraduate teaching, and experimental investigation. Although the boundaries of the individual elements are not, in practice, clearly defined, it is customary in this review of our work to report them separately.

During the calendar year 1962, a total of 484 surgical specimens were examined. This work was shared by Dr. Lloyd Dayes and Dr. Andrew Wong, and has now been taken over by Dr. Robert Hansebout. Dr. Gilles Bertrand supervises this phase of the department's responsibilities.

Of the 120 patients dying in the Institute during the period January to December 1962, postmortem examination was carried out on 91 cases, an autopsy rate of 75.8%. The rate in 1961 was 82.7%. Brains from 377 cases dying in the Royal Victoria Hospital and autopsied in the Pathological Institute were studied in more or less detail. Neuropathological studies were conducted on a further 84 cases from local hospitals including Verdun

Protestant Hospital, Jewish Hospital of Hope and Grace Dart Hospital. Some 18 cases were referred from elsewhere for special study and opinion during the year. This considerable work load was shared by a number of Fellows spending six months or a year in the laboratory; they were Drs. del-Mundo, Hansebout, Herndon, Polizos and Spence.

An introductory course on the histopathology of the nervous system started a few years ago has gradually grown and this year was attended by ten Fellows. With the increasing amount and complexity of knowledge of the nervous system, it is becoming less possible for Fellows to take an active part in all the disciplines represented in the Institute and short didactic courses of this sort are likely to become increasingly necessary. The same problems of selection and compression are present in even greater degree in the undergraduate course in neuropathology given by Dr. Mathieson under the aegis of the Department of Pathology.

No department of neuropathology can function without a skilled and industrious technical staff and here we are fortunate. During the current year Dr. Herndon has been conducting a weekly class in microscopic anatomy and functional histology to increase the general biological background of our technicians. With the progressive diversification of neuropathology this will become increasingly important. The technical staff have also prepared anatomical control sections in large numbers for experimenters in neurophysiology, as this is presently the sole histological laboratory in the Institute.

The first phase of the study of the fine structure of the cerebellar cortex being carried out by Dr. Herndon is scheduled for publication in the July issue of The Journal of Cell Biology and further stages of the work are in active preparation for publication. Dr. Andrzej Gluszcz's work on enzyme histochemistry of glial tumours has been submitted to Acta Neuropathologica; Dr. Gluszcz has now returned to Poland. Dr. Robert Hansebout in association with Dr. Branch is studying the effect of anticancer agents, given by arterial infusion, on the monkey brain.

On surveying the activities of the department in perspective, it is increasingly clear that the hospital load, teaching, and presentation of material at clinico-pathological conferences occupy so much time and energy of the staff that the development of experimental work, especially with elaborate techniques, is seriously hampered. The need for reinforcement of the department, especially at a relatively senior level, is clear and indeed urgent. An augmented staff would not only enable us to study our present material to better advantage but allow a systematic application of new and rapidly developing techniques to neurological material.

NEUROANATOMY

Neuroanatomist ..... FRANCIS L. MCNAUGHTON, B.A., M.Sc., M.D., C.M.

Teaching Assistants:

JOHN BLUNDELL, M.A., M.D. M.R.C.P. (Lond.), F.R.C.S. (Eng.)

ALLAN MORTON, M.D., C.M., M.Sc.

During the autumn months of 1962, a new series of Review Lecture-Demonstrations was given for the Fellows, with the assistance of members of other departments in the Institute.

A major function of this Department each year has been the teaching of Neuroanatomy to the Undergraduates of the Second Year, as part of the "C.N.S." course. While there has been no major change in the plan of this Course, we feel that the teaching material and the organization have been improved. Laboratory sessions were in charge of Dr. Allan Morton, while Dr. John Blundell gave the lectures. The following assisted as class demonstrators: Drs. Del Mundo, Hansebout, Marco, Prisko, Redding, Steinberg and Weir.

The Annual Neuroanatomical Lecture was given this year by Professor Alf Brodal of the University of Oslo, who has made outstanding contributions to our knowledge of the organization of the brain stem and cerebellum. He spoke to a large audience on the subject of "The Vestibular Nuclei and Their Connections."

We are still hoping for an expansion of this Department in the near future, to meet the research and teaching needs of the Institute.

NEURO-ISOTOPE LABORATORY

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

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

Research Assistants.....ROBERT STOLK, Delft, Holland.
JOAN ZANELLI, M.S.R.

Consulting Physicist.....NICHOLAS RUMIN, B.Eng., M.Sc.

1. *Brain Scanning Laboratory*

Since the introduction of the Mark III model of the Contour Brain Scanner in 1960, more than 1000 brain scans have been completed. In 1962, 711 were made, a three-fold increase over 1961. Since this is the only brain scanning device in use in the Montreal area, requests have been received and filled whenever possible for scanning of patients from other hospitals. During the latter part of 1962 the peak patient load was often reached. The clinical diagnostic value of the scanning technique for brain tumours and other intracranial lesions has been firmly established. The procedure, which depends upon the intravenous injection of a tracer dose of radioactive

material and its pickup and concentration in a brain tumour or brain haemorrhage, provides a simple, safe and painless method for screening patients with various intracranial lesions. The actual scan takes half an hour during which time the patient lies comfortably on a stretcher.

Assessment of the first 500 scans carried out here at the Institute have shown that the method detects more than 80% of brain tumours. In certain instances operation has been carried out only on the basis of the localization provided by the scan. In most patients, however, the surgeon has obtained further information by pneumoencephalogram or angiogram.

The method has also proved useful for follow-up studies on patients with brain tumours either in detection of recurrence of the tumour or in evaluating X-ray or operative treatment. Early studies also suggest that scanning can be of value in following the course of the brain "stroke".

Technical developments in this field have continued to be rapid and during the past year a new radioisotope, Mercury 203 tagged onto a diuretic drug, has made it possible to carry out scans three hours after injection as compared to 24 hours after injection of the more commonly used radioactive iodine tagged onto albumin (RISA).

The clinical evaluation of this new compound compared with radioactive iodine has been completed and was reported at the Canadian Neurological Society Meeting in June, 1962. It is now planned to evaluate another radioisotope, Mercury ^{197} which has physical properties of considerable advantage.

2. *The Cone Laboratory for Neurosurgical Research.*

The research activities of this department have been made possible by the Cone Memorial Research Fund supplemented by smaller grants from the National Cancer Institute and the National Research Council for specific projects.

The main studies have been concerned with the application of radioactive isotopes for investigating the cerebral circulation and the radiation effects on brain tissue.

The early studies started in collaboration with Dr. Richard Rovit have been continued with Dr. Henry Garretson and Dr. Lucas Yamamoto, with expert help in technical design of the radioactive detection apparatus from Mr. Nicholas Rumin and Mr. Robert Stolk.

The apparatus for circulation studies consists of multiple gamma ray detectors, four of which can be placed over the head, and one over the heart. Additional miniature probe detectors can be used for monitoring the radioactive tracer over the large vessels of the neck.

The studies have been carried out on patients who are receiving an intravenous injection of radioactive isotope preparatory to brain scanning. The circulation time of the blood flowing through the heart and brain can be determined.

One project involves the study of patients who have suffered from strokes. We have demonstrated a slowing of the blood flow through the region of the brain which has been partly deprived of circulation because of narrowing or occlusion of the cerebral blood vessels. A correlation of these results with the angiographic display of the cervical and cerebral blood vessels is in progress.

A second circulation project has been the study of blood flow through brain tumours or abnormal blood vessel formations in the brain from direct application of miniature detection probes to the surface of the brain during operation.

The use of these new multidetector devices which give a measurement of cerebral circulation with little risk or discomfort to the patient will be applied to the evaluation of results of surgical treatment of vascular lesions of the brain. Great interest has recently been shown in the surgical removal of clots or atherosclerotic plaques from the large vessels of the neck which supply the brain but at the present time no convenient method is available for assessing the benefit of this procedure and the radioisotope techniques will undoubtedly fill this important gap.

Dr. Yamamoto completed a study, in collaboration with his colleagues at the Brookhaven National Laboratory, where he continues to be a visiting scientist, of the radiation effects on brain tissue. He reported these findings at an International Symposium at Laval University.

With Dr. Cosgrove and his staff the distribution and elimination of radioisotopes from blood and cerebral spinal fluid is being studied with particular reference to patients with meningitis and multiple sclerosis. It is hoped that this will lead to further understanding of the dynamics of cerebral spinal fluid changes in certain neurological disorders.

During 1962 an additional new project was started in cooperation with Professor Richard Saunders of Dalhousie Medical School and his staff. This is the application of the X-ray projection microscope, and the apparatus that Dr. Saunders is now using is one of only three in existence. Using injection of radio-opaque materials into the blood vessels of the brain Dr. Saunders has found it possible to obtain greatly enlarged X-ray photographs illustrating the venous and arterial patterns about which there is still a surprising lack of information. A cooperative plan of research has been drawn up between our two departments and considerable material has already been collected for study.

Other circulation studies carried out during the year included a review of various types of intracranial lesions with which are associated red veins, a phenomenon first noted by Dr. Penfield some thirty years ago but which still remains unexplained. Both the anatomical studies with Dr. Saunders and the radioactive circulation techniques will be applied to this intriguing problem.

Mr. Nicholas Rumin continued during the past year as a consulting physicist, returning to the department of Electrical Engineering to complete his doctoral thesis. We look forward to the continuation of this link between the Neurological Institute and the Department of Engineering at McGill. Mr. Rumin and Mr. Stolk have made it possible to carry out new developments in detection and recording apparatus. The continuing cooperation and interest of Dr. Donald McRae and the help of Dr. Lloyd Stephens-Newsham of the Department of Radiology of the Royal Victoria Hospital are acknowledged.

NEUROPHOTOGRAPHY

Supervisor.....GILLES BERTRAND, B.A., M.D., M.Sc.
Photographer.....CHARLES HODGE, F.B.P.A.
Assistant Photographers.....JEAN GARNEAU
MICHAEL SMITH
Illustration Technician.....MRS. S. KALABAY

This Department has completed another successful year in supplying audio-visual aids to the Institute.

The chart-making section of the Department has had a very busy year, and made a total of 826 charts or an average of just under 70 charts per month. Considering that this is a new service supplied to the Institute, it has been well received. We regret that Mrs. Suzanne Kalabay, who has so ably taken charge of this section of the department for the last year and a half, will be leaving us in June of 1963. Mrs. Kalabay will be returning to her home in Turkey.

Although a start has been made on a neurosurgical sound movie, there are still many thousands of feet of unused exposed film in our files. This material if edited could be made into five or six short teaching films.

During the past year we have made more 35 mm. slides than the larger 3¼ x 4 size. It is felt that some thought should be made in regard to eliminating the larger size of slide for use in this Institute. The 35 mm. screen image quality can be just as good, with today's noticeably improved 35 mm. black-and-white and color films, plus the better optical systems of the 35 mm. projectors. Some of the international meetings request that only smaller slides be used.

This year the department added a few new panels to the museum and we have material for several more on hand.

Mr. Jean Garneau, who was on this staff for almost three years, has left to take a position with the University of Montreal. We wish him every success. Mr. Michael Smith has replaced Mr. Garneau.

Mr. Hodge attended the Annual Meeting of the Biological Photographic Association held in San Francisco this year, and spent four days at the Photography Department of the University of Saskatchewan.

PSYCHOLOGY

Clinical Research Psychologist ..... BRENDA MILNER, B.A., M.A., Ph.D.

Research Associates ..... DOREEN KIMURA, Ph.D. (McGill) until Sept.
DONALD SHANKWEILER, A.B., (Oberlin), M.A., Ph.D. (Univ. Iowa), Post-doctoral Fellow, (Cambridge)

Research Assistant ..... LAUGHLIN B. TAYLOR, B.Sc., B.Ed. (Alberta), M.Sc. (McGill)

Graduate Student in Psychology ..... MRS. SUZANNE H. CORKIN, B.A. (Smith Coll.), M.Sc. Appl. (McGill)

The main programme of this department has continued to be the study of perception, learning and memory in patients with focal cerebral seizures, who are tested extensively before and after unilateral cortical excisions and in long-term follow-up. This work has a dual aspect: first, the application of tests of proven diagnostic usefulness to aid in the localization of areas of cerebral dysfunction; secondly, the development of new methods to throw further light on human temporal and frontal-lobe function and on the problem of cerebral dominance. We are much indebted to the groups of graduate and undergraduate nurses who have so generously acted as volunteer subjects in this research programme.

This year, the work of the section has been greatly strengthened by the appointment of Mr. Laughlin Taylor as a full-time Research Assistant. Mr. Taylor has borne the brunt of the clinical programme with considerable patience and skill, carrying out standard testing of intelligence and memory and also assisting in the development and application of a number of new tests. Mr. Taylor is continuing his research with Dr. Peter Gloor on the electroencephalographic correlates of reading disability in children, and is also working with Dr. Bertrand on the assessment of patients with Parkinson's disease who are being considered for stereotaxic operation.

We were sorry to lose Dr. Doreen Kimura, who will attempt to establish a research and clinical unit in Professor Krayenbühl's department in Zürich. In her place we welcome Dr. Donald Shankweiler, who comes to us as a Research Associate after two years of post-doctoral work with Professor Zangwill at Cambridge. He will work on auditory and visual perception in relation to cerebral dominance. Research on somaesthesis is also being intensively carried out by Mrs. Suzanne Corkin, a Ph.D. student in the Department of Psychology.

Work with Dr. Rasmussen and Dr. Branch on the application of the intracarotid amytal test to the study of speech and memory continues, and this technique is proving to be an increasingly valuable clinical and research tool.

TUMOUR REGISTRY

DR. ARTHUR R. ELVIDGE

During 1962 the records of 249 patients were processed through the Tumour Registry and of these 136 were of verified tumours. The reason for a lower overall figure this year is largely due to stricter criteria in the selection of cases for record; only pathologically verified, or cases with very firm clinical criteria, were accepted. The number of operative procedures carried out in the investigation and treatment of these patients was 156. Roentgen therapy with or without surgery was employed in the treatment of 57 patients. In addition patients made 114 visits to the outdoor clinics. The remainder were followed in the private offices and by letter from the Tumour Registry.

The efficient secretary of the Tumour Registry is Miss Yvonne Leichti. Fellows attached to the Tumour Registry during the year were Dr. Henry Garretson and Dr. Rosario Musella. The Registry is a branch of the Royal Victoria Hospital Tumour Registry, at present under the direction of Dr. Tabah. Cooperation with the newly created Tumour Registry of the Province of Quebec has already been established.

The purpose of the Tumour Registry is to catalogue and record the follow-up status of patients suffering from suspected and verified tumours involving the nervous system. Follow-up data is obtained through the outdoor clinics, privated offices, referring doctors and the Department of Demography, Ottawa. Liaison has been established with the recently created Quebec Tumour Registry. Clinic patients are advised to return for treatment and are helped in social problems by the Social Service Department. This is valuable for both patient and doctor. The records serve as source material for research in tumour growth under various types of treatment.

Dr. Garretson has collaborated in the publication of a paper on glossopharyngeal nerve neuralgia associated with cerebral syncope and cardiac arrest. He has been successful in transplanting glial tumours in rabbits. Dr. Musella has made a study of a case of superior vermis subarachnoid cyst with Parkinson like syndrome. Dr. Barone, former Fellow, is interested in the long term follow-up of glioblastoma multiforme. Analysis of temporal lobe epilepsy in astrocytoma, by former Fellow Dr. Gonzales, has now been published. The analysis, by Dr. Berger, former Fellow, of the medulloblastomas and the sarcomas of the cerebellum has now been published. Dr. Berger will complete the work on the tumours of childhood and is reviewing the problem of carcinoma metastasis in the Central Nervous System. Dr. Gueramy has made a study of the oligodendroglial tumours. A monograph on Third Ventricle Tumours has been published by Dr. Mikropoulos in the Greek language, in Greece in 1962.

FELLOWS' LIBRARY

DR. PIERRE GLOOR

The past year has been one of stock-taking and reorganization of our library collection, tasks which have been conscientiously and efficiently carried out by our librarian, Mrs. A. Melzak. Because of its importance, the journal collection has received first attention. A careful evaluation of the reading habits and research needs of the Staff and Fellows of the Institute has been performed and has led to the retrieval from the Medical Library and from the M.N.I. basement of journals of sufficient demand to justify making room for them on the already crowded shelves of the Fellows Library.

Much work has been done in reclassifying and recataloguing our collection. Many books up to now were classified or catalogued in a way which made it very difficult to find them, either on the shelves or in the catalogue, a situation which often made impossible knowing whether a particular subject matter was covered by a book available in our library. This has been much improved and the new books are classified and catalogued according to up-to-date standards. Consequently new books are easily accessible though the situation with regard to the book collection as a whole still leaves much to be desired. The only remedy to this situation is a systematic examination of all items, reclassifying and recataloguing them wherever necessary. This is a long-term project undertaken by our librarian which is time-consuming and exacting and for which she deserves much credit.

The limitations of the financial means at our disposal have been a continuous source of concern and anxiety to the Library Committee and its Chairman. The situation has become more alarming by the fact that 1962 was the last year during which we received free exchange subscriptions through the courtesy of the EEG Journal. Furthermore the devaluation of the Canadian dollar has raised subscription fees and prices of books by an average of 7%. Even before these cost-raising factors came into play the funds at our disposal allowed us in 1962 to acquire only 41% of the books given top priority for purchase by the Library Committee. For the same reason, some desirable new subscriptions to journals could not be entered.

We are therefore all the more grateful for the gifts of books and subscriptions we have received from Drs. Penfield, Rasmussen, Jasper, McNaughton, Feindel, Mathieson, McRae, Rabinovitch, Milner, Keith, Roth, Sie, Mosely and Gloor, as well as from the McGill Medical Library and from the Department of Neurosurgery. These donations are gratefully acknowledge since they are at the present time the only method at our disposal to make up for the unavoidable deficiencies in our purchasing policy.

Before concluding this report, I wish to give some statistical data concerning the overall Library activity. Registered borrowers number 130. The average daily attendance was about 27, the highest number in one day

58, the lowest number on any day 7. Weekly circulation figures average about 20 books and 30 journals. Books and journals borrowed from other libraries through inter-library loans amounted to 139 items. Of these, 114 were received from miscellaneous McGill Libraries.

The Library receives 82 journals of which 57 are paid subscriptions and 25 are gifts. As a consequence of the review of our subscription policy, 8 subscriptions were discontinued, but 5 new titles were added to our journal list. Six additional periodicals were received as gifts. Eighty-five monographs were acquired during 1962 of which 34 were purchased and 51 received as gifts.

This report would be incomplete without the expression of my sincere gratitude to Mrs. A. Melzak who has made my work as Chairman of the Library Committee much easier than it otherwise could ever be and whose expert help has made the Library a more efficient research tool and source of information for all its users.

MONTREAL NEUROLOGICAL SOCIETY

President ..... DR. W. FEINDEL
Vice-President ..... DR. J. P. CORDEAU
Secretary-Treasurer ..... DR. C. BRANCH

Twenty-eight meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held from October 3rd, 1962 to May 1st, 1963.

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

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

DR. J. LAWRENCE POOL, Director, Service of Neurological Surgery, New York Neurological Institute: "Treatment of Intracranial Aneurysms by Intracranial Surgery."

DR. LEONHARD WOLFE, Associate Neurochemist, Montreal Neurological Institute: "Studies on Brain Gangliosides."

DR. GUY LAMARCHE, Department of Physiology, Université Laval: "Trigeminal Projections in the Reticular Formation of the Brain Stem."

DR. HERBERT JASPER, Neurophysiologist, Montreal Neurological Institute: "Report on the International Brain Research Organization."

DR. DOUGLAS GORDON, West End Hospital for Neurology and Neurosurgery, London, England: "Ultra-Sound as a Diagnostic and Surgical Tool."

DR. GUY OWENS, Chief, Neurosurgery Department, Roswell Park Memorial Institute, Buffalo, New York: "Chemotherapy and Malignant Brain Tumors."

DR. A. B. ROTHBALLER, Associate Professor of Neurological Surgery, Albert Einstein College of Medicine, New York: "Studies in Neuroendocrinology."

DR. DONALD MATSON, Department of Neurosurgery, The Children's Hospital, Boston: "Current Problems in Pediatric Neurosurgery."

PROFESSOR FRANÇOIS L'HERMITTE, l'Hôpital de la Salpêtrière, Paris: "Les Obstructions Bilatérales des Artères carotide et sylvienne."

DR. J. OLSZEWSKI, Department of Pathology, University of Toronto: "Studies of Vascular Permeability in the Hypothalamus and Area Postrema."

DR. JACQUES SUSSET, Department of Urology, Royal Victoria Hospital, Montreal: "The Management of the Neurogenic Bladder."

PROFESSOR PAUL CASTAIGNE, l'Hôpital de la Salpêtrière, Paris: "Ramollissements Médians des Pedoncules Cérébraux."

DR. PIERRE DREYFUS, Department of Neurology, Massachusetts General Hospital: "Deficiency Amblyopia — Recent Pathological and Biochemical Observations."

DR. A. BRODAL, Professor of Anatomy, University of Oslo: "The Vestibular Nuclei."

DR. ALBERT M. UTTLEY, Center for Advanced Study in the Behavioral Sciences, Stanford, California: "The Impact of Computer Engineering on Theoretical Physiology."

DR. RICHARD B. RICHTER, Division of Neurology, University of Chicago Clinics: "La Maladie de Devic, Existe-t-Elle?"

PROFESSOR H. MCILWAIN, Department of Biochemistry, Institute of Psychiatry, The Maudsley Hospital, London, England: "Electrical and Chemical Events in Mammalian Cerebral Tissues *In Vitro*."

PROFESSOR R. W. REED, Chairman, Department of Bacteriology, McGill University: "A Review of Recently Developed Antibiotics."

PROFESSOR EDGAR A. KAHN, Department of Surgery (Neurosurgery), University of Michigan, Ann Arbor: "Brain Scanning as an Adjunct to the Surgical Removal of Brain Tumors."

DR. W. RITCHIE RUSSELL, Department of Neurology, The Radcliffe Infirmary, Oxford: "Some Aspects of Aphasia."

The Annual Dinner of the Society was held on May 7, 1963 at the Montreal Museum of Fine Arts with Lord and Lady Brain as distinguished guests. Lord Brain gave a talk on "Dr. Samuel Johnson and His Doctors."

FELLOWS' SOCIETY

President ..... FOSTER K. REDDING, M.D.
Vice-President ..... ROSARIO MUSELLA, M.D.
Secretary-Treasurer ..... JEAN-MARC ST. HILAIRE, M.D.

The Fellows' Society was addressed by a number of distinguished out-of-town speakers during the past year. Lawrence Pool of New York, Douglas Gordon of Surrey, England, A. B. Rothballer of New York, Guy Owens of Buffalo, Donald Matson of Boston, Paul Castaigne of Paris, Alf Brodal of Oslo, Albert Uttley from England and California, Richard Richter of Chicago, Henry McIlwain of London, Edgar Kahn of Ann Arbor, and Ritchie Russell of Oxford, have all shared some of their knowledge and experience with us.

Movies about the neurosurgical use of urea, emergency tracheotomy and external cardiac massage, were viewed at one meeting.

The 1962 Annual Fellows' Banquet featured Prof. George W. Stavraky of the University of Western Ontario as Sixth Annual Fellows' Lecturer, who talked about "Adaptation after Central Nervous System Damage."

The social season included the Annual Spring Picnic, the Christmas Party at the Fellows' Residence, an illustrated talk by Dr. Wilder Penfield about his experience in the People's Republic of China, an illustrated talk about the Western Auto Trip of Dr. K. A. C. Elliott, and the Annual Winter Ice Skating Party and Hockey Game at which the nurses, once again emerged victorious.

The M.N.I. Fellows' Society Lecture Fund has continued to grow as a result of the generous contributions of the Senior Fellows. It has been transformed into an interest-bearing endowment of three thousand dollars ($3,000.00) this year. This should speed up the growth of the fund, however additional donations from former Senior Fellows will still be needed for another four to six years before the lectureship can be put on a perpetual self-supporting basis.

This year the Fellows' Society affiliated with the Association of English Speaking Internes of Montreal, which is a confederation of all the internes and residents of the English speaking hospitals of the city, and which has close ties with similar groups in the French speaking hospitals of Montreal and Quebec. The association provides a unified voice by which the hopes, wishes, and needs of house staff physicians can be made known.

The season will close with the Annual Fellows' Banquet on June 7, 1963. Dr. G. Milton Shy of the University of Pennsylvania has promised to speak on "Newer Disorders of Muscle."

The new officers taking office at that time will be:

Pres.: Bartolo Barone, M.D.
V. Pres.: Alexander Lowden, M.D.
Secy.-Treas.: Orlando Solis, M.D.

CLINICAL APPOINTMENTS AND FELLOWSHIPS*

Appointments to the Resident Staff in Neurology or Neurosurgery are made for January 1st or July 1st. All candidates are expected to have previous internships in Medicine or Surgery.

The posts of Senior Resident in Neurosurgery, Resident in Neurosurgery and Resident in Neurology are available only to men who have had previous clinical service in the Institute.

Assistant Resident in Neurosurgery — one year's duration — available January 1st and July 1st.

Assistant Resident in Neurology — six to twelve months' duration — available January 1st and July 1st.

Appointments for periods of research and training in one of the laboratories are made by the Director for the Chief of the laboratory in question. Research stipends are available for the following Fellowships:

Senior Fellowship in Neuropathology — six to twelve months' duration — available January 1st and July 1st.

Junior Fellowship in Neuropathology — six to twelve months' duration — available January 1st and July 1st.

Senior Fellowship in Clinical Electroencephalography — six to twelve months' duration — available January 1st and July 1st.

Fellowship in Neuroanatomy — six to twelve months' duration — available January 1st and July 1st.

The Diploma in Neurosurgery, McGill University, requires at least four years of study, including periods of investigative work and neurology.

The Diploma in Neurology, McGill University, requires at least four years of study, including periods of investigative work, neurosurgery and psychiatry.

Applicants for clinical services are preferred who have a speaking knowledge of the French language.

* Graduate physicians or surgeons who wish to be enrolled in clinical or scientific work as something more than an observer must fill out application forms obtainable from the Directors' office and provide names of reference.

COURSES OF INSTRUCTION

UNDERGRADUATE

The Department of Neurology and Neurosurgery cooperates intimately with the Departments of Medicine, Surgery, Pathology, and Radiology in their undergraduate teaching. Thus the teaching of neurology, neurosurgery, neuropathology, and neurological radiology is carried out as part of the regular course planned by the Chairman of each of the above departments.

GRADUATE

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

NEUROANATOMY

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

601. Additional graduate seminars will be held co-ordinated with Course 611.

602. Graduate students are expected to act as demonstrators and to pass the same examination which is given in undergraduate course 2A, but with higher standing.

Professor McNaughton

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

Professor McNaughton

NEUROPHYSIOLOGY

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

611. Weekly seminars and demonstrations co-ordinated with Course 2A (4 months, beginning in December). Mondays, 4:30 to 6:00 P.M.)

612. Under exceptional circumstances, a paper on a neurophysiological subject may be written by special arrangement as a substitute for 610.

Professors Jasper, Elliott, and Gloor

620. COLLOQUIUM IN CLINICAL NEUROLOGY: 1 hour weekly, clinics and lectures, Wednesdays, 5:00 p.m. M.N.I. (9 months).

Staff and Visiting Lecturers

630. SEIZURE MECHANISMS AND CEREBRAL LOCALIZATION: Clinical Electroencephalographic and Roentgenographic Conference.

M.N.I. 1 hour weekly (9 months). Tuesdays, 4:00 to 5:00 p.m.

Professors Rasmussen, Jasper, McNaughton, and McRae

640. OUTLINE OF NEUROCHEMISTRY: Instruction in Neurochemistry in addition to that provided in course 611 may be obtained by special arrangement.

Professor Elliott

NEUROPATHOLOGY

650. Six months laboratory work in Neuropathology.

Professors Mathieson and Bertrand

651. Conference in Neuropathology, Thursday, 4-5 p.m.

Professors Mathieson and Bertrand

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

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

NEUROLOGICAL RADIOLOGY

660. Lecture demonstrations (3 months beginning in September). Mondays 4:30 to 6:00 p.m.

661. Colloquium, 1 hour weekly (9 months) Mondays, 9:00 a.m.

Professor McRae

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1962-63

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ENDOWMENTS

1934 — Rockefeller Foundation Endowment

1951 — Donner Canadian Foundation Grant

1954 — Lily Griffith McConnell Endowment

1957 — Hobart Anderson Springle Memorial Endowment

1958 — Rupert Bruce Memorial Endowment

1959 — Percy R. Walters Memorial Endowment

1960 — William Cone Memorial Endowment

FELLOWSHIP ENDOWMENTS

1948 — Duggan Fellowship

1950 — Lewis L. Reford Fellowship

1956 — Dr. and Mrs. Charles F. Martin Fellowship

RECURRING ANNUAL GRANTS

1947 — Federal Government Consolidated Grant

GRANTS FOR SPECIAL PROJECTS

Federal-Provincial Health Grant — Dr. McNaughton

" " " " — Dr. Rasmussen

U.S. Public Health Neurological Training Grant — Dr. McNaughton

U.S. National Science Foundation Grant — Dr. Jasper

U.S. Public Health Grant — Dr. Milner

National Cancer Institute of Canada — Dr. Rasmussen

John and Mary Markle Foundation Fellowship — Dr. Sherwin

Medical Research Council of Canada Associateship — Dr. Wolfe

Medical Research Council of Canada Research Grant — Dr. Wolfe

DONATIONS TO SPECIAL FUNDS — 1962-63

ANAESTHESIA RESEARCH FUND:	
CLARENCE BERNSTEIN MEMORIAL RESEARCH FUND:	
BRAIN TUMOUR RESEARCH FUND:	
BORDEN COMPANY FOUNDATION FELLOWSHIP FUND	$ 4,800.00
CANCER CLINICAL RELIEF FUND:	
Cancer Aid League	1,500.00
WILLIAM CONE MEMORIAL RESEARCH FUND:	
Dr. David Berger	25.00
Miss Judith Clark	25.00
The Harold Crabtree Foundation	1,000.00
Mrs. A. D. Crews	200.00
Mrs. Robert Hampson	25.00
Mrs. C. D. Howe	25.00
Mr. K. B. Jenckes	50.00
Mr. John E. Langdon	100.00
Dr. Eleanor Leslie	1,000.00
The Leslie Foundation	3,000.00
Mr. W. E. Levan	25.00
Rev. Albert G. Minda	25.00
Dr. James M. F. McGrath	1,000.00
Mrs. J. F MacLuskie	100.00
The Oaklawn Foundation — for fellowship	1,000.00
Mrs. Howard Pillow	3,000.00
Mrs. Edna J. Roberts	120.00
Mrs. H. Y. Russel	5.00
Mr. Morris Steinberg	25.00
Mr. Murray Vaughan	1,000.00
Mrs. Murray Vaughan	1,000.00
Mr. G. E. Wemp	100.00
Mrs. S. Wolfe	10.00
COSGROVE RESEARCH FUND:	
Anonymous	680.00
DICK EPILEPSY FUND:	
GORDON LIBRARY FUND:	
Mrs. Nan Halsey	500.00
HARVEY CUSHING CLINICAL RELIEF FUND:	
In His Name Society	39.00
Miss Muriel Grimmer	25.00
Miss Lillian Sandler	15.00
Mrs. F. Scott	10.00
Mr. J. Clare Wilcox	100.00
Mrs. Thelma Croft	10.00
Miss Suzanne Cohen	30.00
Miss Evelyn Gabes	10.00
Fellows' Wives Club	12.00
Women's Auxiliary of the Royal Victoria Hospital	2,500.00
HOSPITAL EQUIPMENT FUND:	
Dr. J.P. Robb	100.00
Mr. Bruce Robb	500.00
MARY MASSABKY FOUNDATION RESEARCH FUND:	149.09
M. N. I. NEUROSURGICAL RESEARCH FUND:	
M. N. I. STAFF LOAN FUND:	

MISCELLANEOUS SPECIAL FUNDS:	
R. V. H. Women's Auxiliary for Social Service Fund	150.00
In Memory of the late Mr. J. A. Simpson	5.00
In Memory of the late Mrs. Muriel Chisholm	50.00
In Memory of the late Mr. W. J. Osborne	5.00
In Memory of the late Mr. Madison Walter	200.00
MULTIPLE SCLEROSIS CLINICAL RELIEF FUND:	
Multiple Sclerosis Golf League	575.00
Montreal Association for Multiple Sclerosis	500.00
MULTIPLE SCLEROSIS RESEARCH FUNDS:	
Anonymous	20,000.00
Multiple Sclerosis Society of Canada	23,700.00
MCNAUGHTON NEUROANATOMY RESEARCH FUND:	
Anonymous	500.00
Mr. Joseph Shapiro	100.00
NEUROLOGICAL RESEARCH FUND:	
Estate of the late Miss Nettie C. Lingle	5,000.00
Post-Graduate Board of the Royal Victoria Hospital for purchase of teaching equipment	200.00
EVELYN ROBINS MEMORIAL FUND FOR RESEARCH IN VASCULAR DISEASES:	
NEUROPHYSIOLOGY RESEARCH FUNDS:	
NEURORADIOLOGY RESEARCH AND TEACHING FUND:	
NURSING FUNDS:	
MACDOUGALL NURSING SCHOLARSHIP:	
M. N. I. NURSING EDUCATION FUND:	
Mrs. Sam Reitman in memory of Dr. W. V. Cone	300.00
Dr. A. R. Elvidge	350.00
EILEEN C. FLANAGAN NURSING BURSARY FUND:	
Dr. J. P. Robb in memory of Miss E. Bain	25.00
Miss A. Louise Hall in memory of Miss E. Bain	25.00
Mr. C. Constantinou	75.00
Mrs. Robert Hampson	35.00
Graduate Nurses Society of the M. N. I.	500.00
Miss C. E. Hopkins	3.00
Mr. William Labow	50.00
Anonymous	25.00
OAKLAWN FOUNDATION FELLOWSHIP FUND:	2,000.00
PENFIELD RESEARCH FUND:	
LEWIS REFORD FELLOWS FUND:	
Mr. Ralph Andrews	1,000.00
In memory of the late Dr. George E. Robins	45.00
WOMEN'S AUXILIARY FUND:	
Women's Auxiliary of the Royal Victoria Hospital	350.00

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

Bequests and donations should be made out to the Montreal Neurological Institute, McGill University, and sent to the Director.

STATISTICS
CLASSIFICATION OF DISEASES

Nervous System Generally:

Multiple Sclerosis	105
Motor Neurone Disease	18
Neurosyphilis	3

Meninges:

Meningocele & Myelomeningocele	12
Acute Purulent Meningitis	6
Tuberculous Meningitis	7
Headache	61
Subdural Haematoma	33
Intracerebral Haematoma	10
Epidural Haematoma	21
Extradural Haematoma	8
Subdural Hygroma	4
Subarachnoid Haemorrhage	37
CSF Rhinorrhoea	5
Miscellaneous	10

Brain:

Congenital Anomalies	15
Hydrocephalus	19
Abscess	3
Concussion	193
Contusion, Laceration, Traumatic Encephalopathy	117
Syncope	12
Ischemia	9
Epilepsy	388
Migraine	28
Parkinsonism	24
Vertigo	7
Thrombosis, Encephalopathy due to Arteriosclerosis	148
Haemorrhage	7
Intracranial Aneurysm	30
Encephalitis	16
Gunshot Wound	8
Miscellaneous	10

Tumours:

Gliomas	26
Perineurial Fibroblastoma	9
Meningeal Fibroblastoma	22
Craniopharyngioma	5
Pinealoma	1
Angioma	5
Glioblastoma Multiforme	21
Metastatic Carcinoma — General	19
Meningioma	2
Astrocytoma	24
Medulloblastoma	4
Tumours — Unclassified	20
Chordoma	2
Oligodendroblastoma	1
Haemangioblastoma	3
Secondary Tumours, Brain, Spinal Cord	23

Sarcoma	4
Neurofibroma	3
Stenosis Aqueduct of Sylvius	4
Chromophobe Adenoma Pituitary	15
Granuloma, Eosinophilic	3
Sacral Radiculopathy due Metastases	5
Miscellaneous Tumours — Body Generally	4
Miscellaneous CNS & Skull	1
Bronchogenic Carcinoma	11
Carcinoma of Rectum	2

Spinal Cord:

Compression of the Spinal Cord	15
Transverse Acute Myelitis	1
Guillain-Barre Syndrome	6
Myelopathy	22
Syringomyelia	1
Radiculitis	3
Poliomyelitis	1
Spinal Cord Lesion	8
Diastematomyelia	1
Miscellaneous	4

Cranial and Peripheral Nerves:

Optic Neuritis	6
Trigeminal Neuralgia	46
Bell's Palsy	4
Meniere's Syndrome	16
Traumatic Peripheral Nerve Lesions	8
Compression Ulnar Nerve	6
Other Neuralgias	22
Peripheral Neuropathy	21
Diabetic Neuropathy	12
Ocular Myopathy	4
Carpal Tunnel Syndrome	9
Miscellaneous	4

Muscles:

Myasthenia Gravis	12
Muscular Atrophy	13
Polymyositis	4
Miscellaneous	6

Mental Diseases:

Mental Retardation	14
Depression	13
Anxiety State	19
Conversion Hysteria	25
Psychoneurosis	4
Alzheimer's Disease	4
Schizophrenia	2
Alcoholism	3
Reaction to Barbiturates	5

Other Systems:

Protrusion Disc — Lumbar	222
— Cervical	51
— Thoracic	1

Fracture and/or Dislocation of Vertebral Column	39
Fracture Skull	57
Back Pain	26
Neck Pain	5
Face Pain	5
Traumatic Lesions and Infections — Miscellaneous	24
Miscellaneous	33

CAUSES OF DEATH

Head Injury (concussion, contusion, haematomata, etc.)	18
Gun Shot Wound to Brain	6
Intracranial Haemorrhage and Haematomata	31
Cerebro-vascular Disease (thrombosis, infarction)	20
Brain Tumour	20
Carcinoma (Generalized)	10
Intracranial Aneurysm	2
Meningitis	2
Miscellaneous Neurological Diseases	6
Other Systems	5
TOTAL	120

CLASSIFICATION OF OPERATIONS

Craniotomy: (Osteoplastic, miscellaneous, etc.)

and Biopsy	3
and Decompression	2
and Drainage of Abscess	5
and Drainage of Subdural Haematoma	33
and Drainage of Intracerebral Haematoma	10
and Drainage of Extradural Haematoma	8
and Excision of Epileptogenic Tissue of Brain	37
and Excision of Aneurysm	4
and Exploration	6
and Hypophysectomy	11
and Obliteration of Aneurysm	12
and Obliteration of Cyst (removal)	2
and Plastic Repair of Dura (CSF Leak)	5
and Removal of Adhesions	1
and Removal of Tumour	99
and Rhizotomy or Manipulation of Rootlets	15
and Sinusectomy	1
and Removal of Arteriovenous Malformation	4

Trepanations & Craniocentesis

and Biopsy	3
and Drainage of Haematomas	6
and Ventricular Puncture	1
and Ventriculography	9
and Exploration	4
Stereotaxic Procedures	19
Elevation of Depressed Skull Fracture	26
Plastic Repair of Skull Defect, Bone	3
Suture of Lacerated Wound of Scalp	4
Ventriculocisternostomy (Torkildsen's)	1
Ventriculovenostomy and Ventric-Atrial Shunt	7
Artificial Cranial Suture	1

Laminectomy or Hemilaminectomy

and Anterolateral Cordotomy	7
and Biopsy	1
and Decompression of Spinal Cord	15
and Exploration	5
and Incision and Drainage Intramedullar Cyst	1
and Incision and Drainage of Abscess	1
and Removal of Haematoma	1
and Removal of Adhesions	2
and Removal of Tumor	7
and Rhizotomy	4
and Spinal Fusion, Steel Plates	2
and Spinal Fusion with Bone Craft	36
and Spinal Fusion with No. 18 Wire	1
and Lumbar Discoidectomy	119
and Cervical Discoidectomy	11
and Cervical Discoidectomy — Anterior Approach	1
Cutting Dentate Ligament	10
Removal of Bony Abnormality	1

Sympathectomy

Plastic Repair of Spina Bifidium	1
Plastic Repair of Spina Bifida	2
Nerve Avulsion or Section	12
Ligation of Artery	2
Exploration of Nerve	10
Ligation of Artery with Selverstone Clamp	3
Neurectomy Decompression	3
Nerve Anastomosis	1
Nerve Suture	2
Re-opening of Wound with Evacuation	4
Re-opening of Wound with Exploration	3
Re-opening of Tantalum Plate & Further Removal	6
Re-suturing of Wound	1
Miscellaneous	38
Plaster Cast	17
Cerebral Arteriography — Percutaneous	365
Pneumograms or Myelograms	68
Aortograms	45
Tracheotomy	13
TOTAL	1163