Thirty-first Annual Report

of the

MONTREAL NEUROLOGICAL INSTITUTE

and

MONTREAL NEUROLOGICAL HOSPITAL

and the

DEPARTMENT OF NEUROLOGY AND NEUROSURGERY

of

McGILL UNIVERSITY

1965-66

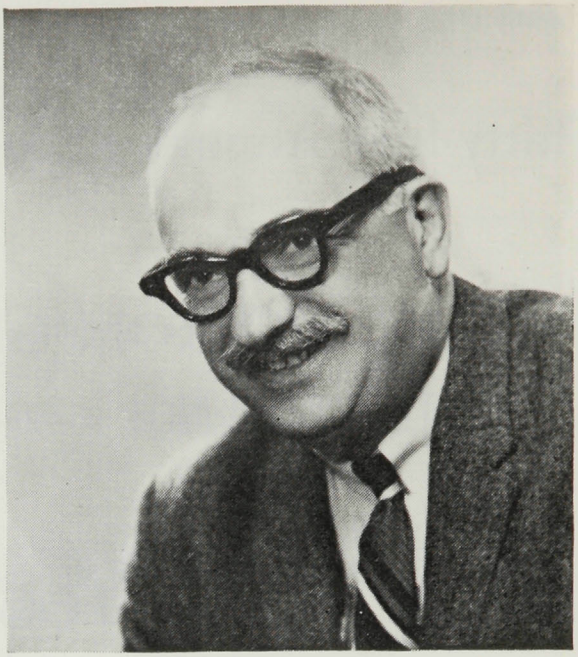

Photo by Garcia

REUBEN RABINOVITCH, B.A., M.D., M.Sc.
1908 - 1965

Reuben Rabinovitch died suddenly on September 16, 1965. It was a serious blow to the Institute. Rab contributed so much in his inimitable way.

Rab was born on November 29, 1908, in La Macaza, Co. Labelle, Québec, in a log cabin, attended Montreal High School and in 1934 earned a Bachelor of Arts degree at New York University. In June 1940 he obtained the doctorate in Medicine from the University of Paris.

He chose to stay in Paris during the war and worked with the French underground and was instrumental in saving the lives of many injured airmen who had parachuted into German-held territory. He was captured by the Germans and interned for two years. In 1946 he was awarded the United States Medal of Freedom with Silver Palm in recognition of his courageous service. Dr. Jacques Lebeau of l'Hôpital de la Pitié wrote of Rab "sa conduite pendant la guerre mérite tous les éloges".

In September 1945, he came to the Institute to work as a Fellow in Neuropathology under the supervision of Dr. William Cone, studying intervertebral disc disease and subsequently certain aspects of muscle pathology. With the passage of time he became fully occupied with the practice of neurology and its many obligations.

In 1949 he was appointed senior neurologist at the Jewish General Hospital in addition to his appointments as Associate Neurologist at the Montreal Neurological Hospital and Associate Professor of Neurology, McGill University. He served for two years as President of the Canadian Association of Neurologists.

He loved the Neurological Institute and served it well. He also gave his patients the most remarkable care and attention, and they were devoted to him. He was a special friend to the nurses.

Rab will be missed by all.

CONTENTS

MONTREAL NEUROLOGICAL INSTITUTE & HOSPITAL

REPORT OF THE DIRECTOR

DR. THEODORE RASMUSSEN

The month of May each year brings with it the opportunity and the obligation to reflect and to report on last year's record, the clinical record of the Hospital and the teaching and research record of the Institute. Separate as to legal and financial structure, these two closely integrated and inseparable institutions are one as regards dedication "to the relief of sickness and pain and to the study of Neurology", as carved in stone on the outside of the building.

The reports of the individual departments and laboratories provide a brief glimpse of some of the high spots of another year of maximal utilization, and then some, of our physical plant and our present personnel. Among the hospitalization statistics in Dr. Robb's report you will note the year's bed-occupancy rate of 91.5%. Only once in the past 10 years has this annual rate fallen below 90%, a figure well above the 85% recommended as the maximum for efficient operation of an active-treatment hospital. During the past year, the monthly bed-occupancy rate has only twice fallen to the vicinity of this ideal figure of 85%, and in four of these months, the figure rose to above 96%. Despite this pressure, our waiting list has been kept within manageable limits during most of the year by dint of much hard and efficient work, much of it overtime, by both the technical and professional staffs.

Modern hospitals, and especially teaching hospitals, are expensive institutions and we have the obligation to utilize our facilities with maximum efficiency. To that end, much time has been spent during the past 2 years in studying many aspects of the operation of our physical plant. Last summer the architectural firm of Bolton, Ellwood and Aimers was engaged to implement plans resulting from this study. Those members of the staff who have laboured throughout the year on the plans to utilize our basement space more effectively, and to find room for the addition of an electron microscopic unit to the Laboratory of Neuropathology, will be particularly interested to hear that the architects' final plans are now nearing completion, and are expected to go out for tender by the end of this month. The contracts for the installation of the new elevator in the vacant shaft in the McConnell Wing have been signed, and the work here should be under way early next month.

The renovation of the basement will provide for a modest expansion in space for the Laboratory of Electroencephalography and Clinical Neurophysiology when it moves into its new location in the present maids' quarters, and will also provide for a much more efficient layout that will facilitate both the clinical and the research activities in this department. The Electronics Shop will also get a little more space when it moves across the corridor from its present site. The janitor's apartment on the corridor to the Pathological Institute will be converted into an office suite for Dr. Milner's Psychology Department. The nurses' locker room and the orderlies' locker room and lounge facilities will be enlarged and improved. The space now occupied by

the EEG Department will house the housekeeping and personnel departments, hospital stores and supplies, as well as new locker and restroom facilities for the maids.

The new electron microscopic unit, to be added to the 6th floor above the X-ray film storage area, will provide a much-needed and long-awaited addition to the Institute's research potential in several fields. As knowledge of the fine structure of the nervous system increases, the activities in this unit will certainly result in important contributions to the clinical field as well, as time goes on. We acknowledge with gratitude the award of a major equipment grant from the Medical Research Council of Canada, that will provide for the purchase of the electron microscope. We also acknowledge our thanks for the renewal of the Institute's M.R.C. Block Term Grant of $75,000 per year, for the coming two years, for the partial support of the research program in some of the Institute's research laboratories.

We mourn the untimely and unexpected death last fall of Dr. Reuben Rabinovitch. He had made a sizeable niche for himself in Canadian Neurology, on the National as well as on the Provincial and local scene. Although the ranks close up and the work goes on, his many friends and even more numerous patients miss his zestful and kindly presence, and remember him with affection. A tangible memorial will shortly appear in the Fellows' Library, to mark a generous donation by two close friends of Rab's, Mr. and Mrs. Sydney Caplan. The income from this Reuben Rabinovitch Memorial Fund will permit a much needed expansion in the Library's continuing acquisition of new books and monographs.

Several other Staff items, in addition to those already mentioned, should be reported. Dr. Pierre Gloor becomes Chief, instead of Acting Chief, of the Laboratory of Experimental Neurophysiology, in addition to his post of Director of the EEG Department. Dr. Agapito Lorenzo has been appointed Assistant Electroencephalographer and Clinical Neurophysiologist, to bring additional strength to the EEG Department and to re-activate electromyography.

The year brought changes in the Department of Anaesthesia. Dr. John McGrath, Assistant Anaesthetist, resigned last summer to return to Newfoundland. Dr. Sever Kovachev of the University of Novi Sad, Yugoslavia, and Dr. Albert Pace-Floridia, originally from Malta, were appointed Assistant Anaesthetists. Dr. Feindel and Dr. Graham doubtless consider this a normal rate of exchange, two non-Maritimers for one Maritimer!

A highlight of our year, and a highlight of the 98th Annual Meeting of the Canadian Medical Association held in Halifax last June, was the presentation by the Association of the F.N.G. Starr Award to Dr. Penfield. This award, described as the "V.C. of Canadian Medicine" and last presented in 1957, was established to honour these rare colleagues whose achievements are "so outstanding as to serve as an inspiration and a challenge to the medical profession of Canada" a most suitable description of Dr. Penfield's career, medical and non-medical.

The Institute lost a good friend and a staunch supporter last summer with the death of Mrs. I. W. Killam, whose husband established our Laboratory for Research in Chronic Neurological Diseases in 1948 with a gift of $50,000. Mrs. Killam has supported this work since then with periodic generous gifts, and now her will indicates the Institute is to receive a substantial bequest for general endowment and for the establishment of Scholarships for advanced studies.

When we shift our gaze forward, we find ourselves facing problems that are a combination of those facing other teaching hospitals, and some of those that are of acute concern to the universities of the Province.

Changes now taking place in the pattern of medical care and practice will sharply increase the responsibilities of the Province's medical schools and teaching hospitals in three distinct yet related areas: First, in the training of physicians and paramedical personnel to handle the increased demand for medical services that lie ahead; second, in providing advanced and specialized care for patients with complicated problems that require the collaboration between clinical and basic medical scientists, to be found only in a medical school environment; and third, in carrying out the research programs essential to translate advances in basic scientific knowledge into better understanding in the clinical sphere.

A continuing influx of able young men and women into the health field is a prime essential, if the challenge in these three areas is to be met. It is thus crucial that all aspects of medical and paramedical fields provide attractive careers, so that the health field will continue to entice its fair share of top-notchers into the fold. It must be clearly realized, at all levels of public and governmental planning and discussion, that policies which tend to depreciate the health field quickly and inevitably lead to a progressive decline in quality of medical care for the entire community.

The second and third areas, concerning the special problems of patient-care, and the investigative programs upon which improvement in medical care ultimately depends, require expansion in both hospital and laboratory facilities, assurance of long-range financial support and increased autonomy of the teaching hospitals in meeting changing needs that don't always coincide with yearly budgetary deadlines, or fit neatly into the Q.H.I.S. accounting categories.

The expansion and the rising costs in our research program continue to outstrip the increase in our endowment income. In 1950, $\frac{2}{5}$ of the Institute's total scientific and departmental budget of $100,000 came from endowment income, $\frac{2}{5}$ from the Federal Consolidated Grant and $\frac{1}{5}$ from yearly project-research grants. In 1960, $\frac{1}{3}$ of the total budget, which had now quadrupled in amount, was provided by temporary grants. Today the Institute's total teaching and research budget is approximately $650,000, and over half of it is provided for by the so-called "soft money" of temporary grants.

Even though permanent endowment of medical research is apparently incompatible with Federal and Provincial governmental policies, new patterns should be sought for that will provide longer range and more stable financial support from governmental funds. The Medical Research Council Associateship program is a valuable step in this direction. Other related programs with the flexibility necessary to promote clinically-oriented research are urgently needed.

Support from the public, with which the Institute has been singularly blessed in the past, is of continuing and increasing importance if this symbiotic twin of Institute and Hospital is to meet the challenge of the exponentially widening frontiers beckoning for investigation of the natural world's most complicated, most interesting and most mysterious entity, the human nervous system.

MONTREAL NEUROLOGICAL HOSPITAL

BOARD OF MANAGEMENT

S. M. FINLAYSON, *President**
B.Sc. (McGILL) ELECTRICAL ENGINEERING

A. D. P. HEENEY, Q.C., *Vice-President*
M.A. (MANITOBA & OXON.) B.C.L., LL.D.

HON. HARTLAND DE M. MOLSON, O.B.E.
D.Sc. COM. (MONTRÉAL)

H. GREVILLE SMITH, C.B.E.
B.A. (OXON.)

WILDER PENFIELD, O.M.
LITT. B. (PRINCETON), B.Sc. (OXON.), M.D. (JOHN HOPKINS),
HONORARY D.Sc., LL.D., AND D.C.L., F.R.C.S., F.R.C.P., F.R.S.

H. ROCKE ROBERTSON *†
B.Sc., M.D., C.M., D.C.L. (BISHOP'S), F.R.C.S. (EDIN.), F.R.C.S.(C), F.A.C.S.
PRINCIPAL AND VICE-CHANCELLOR, McGILL UNIVERSITY

RONALD CHRISTIE *†
M.D., M.Sc., D.Sc. (Lond.), Sc.D. (Dublin), F.R.C.P., F.A.C.P., F.R.C.P. (C).
DEAN, FACULTY OF MEDICINE, McGILL UNIVERSITY

THEODORE RASMUSSEN, *Director* *†
B.S., M.B., M.D., M.S. (MINN.), F.R.C.S. (C).
DIRECTOR, MONTREAL NEUROLOGICAL INSTITUTE

PRESTON ROBB, *Deputy Director & Secretary* *
B.Sc., M.Sc., M.D., C.M. (McGILL)
REPRESENTATIVE OF THE MEDICAL BOARD

* Member of Executive Committee
† Ex-officio Members

MONTREAL NEUROLOGICAL HOSPITAL

CLINICAL STAFF

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

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

Consultant in Neurophysiology
HERBERT JASPER, Ph.D., D.ÈS SCI. (Paris), M.D., C.M.

Consultant in Neurochemistry
K.A.C. ELLIOTT, M.Sc., Ph.D., Sc.D., F.R.S.C.

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., M.Sc., (Cantab.)
REUBEN RABINOVITCH, B.A., M.D., M.Sc. *

Assistant Neurologists
FREDERICK ANDERMANN, B.Sc., M.D.
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., F.R.C.P., Ph.D., MARKLE SCHOLAR

Neurosurgeon-in-Chief
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.

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

Associate Neurosurgeon
CHARLES BRANCH, B.A., M.D., M.Sc., F.A.C.S.

Assistant Neurosurgeons
HENRY GARRETSON, B.S., M.D.
PHANOR PEROT, B.S., M.D., Ph.D., F.A.C.S.

Radiologist
DONALD MCRAE, M.D.

* Deceased Sept. 16, 1965

Associate Radiologist
ROMÉO ETHIER, B.A., M.D.

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

Associate Electroencephalographer and Clinical Neurophysiologist
ROGER J. BROUGHTON, M.D., C.M.

Assistant Electroencephalographers
FREDERICK ANDERMANN
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 Anaesthetists
G. FREDERICK BRINDLE, B.A., M.D., C.M., F.R.C.P. (C)
ANIBAL GALINDO, M.D.

Assistant Anaesthetists
SEVER KOVACHEV, M.D.
ALBERT PACE-FLORIDIA, B.Pharm., M.D.

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

Associate Neurochemist
HANNA PAPPIUS, M.Sc., Ph.D.

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

Assistant Neuropathologist
STIRLING H. CARPENTER, A.B., M.D.

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

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

Clinical Psychologist
CLARA STRAUSS, B.A., M.A.

CONSULTING AND ADJUNCT CLINICAL STAFF

Consulting Pathologist.....GARDNER C. MCMILLAN, M.D., C.M., M.Sc., Ph.D.

Consulting Psychiatrists.....ROBERT CLEGHORN, M.D., D.Sc., R.C.P.S. (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	DONALD BAXTER, M.D., C.M., M.Sc., F.R.C.P. (C) 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 Bacteriologist	R. W. REED, M.A., M.D., C.M.
Consulting Radiologists	ROBERT G. FRASER, M.D., F.R.C.P. (C) JEAN L. LEGER, M.D.
Adjunct Radiologist	NORMAN M. BROWN, B.A., M.D., C.M.
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 Psychologists	JOHN NASH, B.Sc., Ph.D. M. SAM RABINOVITCH, Ph.D.

MONTREAL NEUROLOGICAL INSTITUTE AND McGILL UNIVERSITY TEACHING STAFF

A. Department of Neurology and Neurosurgery, Faculty of Medicine.

Chairman of Department and Professor of Neurology and Neurosurgery	THEODORE RASMUSSEN
Professor, Neurology	FRANCIS MCNAUGHTON
Associate Professors, Neurology	DONALD BAXTER DONALD LLOYD-SMITH PRESTON ROBB
Assistant Professors, Neurology	J. B. R. COSGROVE IRVING HELLER REUBEN RABINOVITCH * ALLAN SHERWIN WILLIAM TATLOW
Lecturers, Neurology	FREDERICK ANDERMANN MORRISON FINLAYSON BERNARD GRAHAM
Demonstrators, Neurology	GASTONE CELESIA GEORGE GIANNAKAKIS KEITH SEAMANS
Cone Professor of Neurosurgery	WILLIAM FEINDEL
Associate Professors, Neurosurgery	GILLES BERTRAND JOHN BLUNDELL JOSEPH STRATFORD
Assistant Professors, Neurosurgery	CHARLES BRANCH HAROLD ELLIOTT HENRY GARRETSON PHANOR PEROT
Demonstrators, Neurosurgery	ROBERT HANSEBOUT MARIO SCULCO BRYCE WEIR
Associate Professor, Clinical Neurophysiology	PIERRE GLOOR
Assistant Professor, Clinical Neurophysiology	ROGER BROUGHTON
Lecturer, Clinical Neurophysiology	ISRAEL LIBMAN
Associate Professor, Neurochemistry	LEONHARD WOLFE
Assistant Professor, Neurochemistry	HANNA PAPPIUS
Associate Professor, Neurological Radiology	DONALD MCRAE
Assistant Professor, Neurological Radiology	ROMÉO ETHIER
Professor and Chairman, Department of Anaesthesia, McGill	RICHARD GILBERT
Associate Professor of Anaesthesia, McGill	G. F. BRINDLE

* Deceased Sept. 16, 1965

Assistant Professors of Anaesthesia, McGill.....ANIBAL GALINDO
SEVER KOVACHEV

Associate Professor, Neuropathology.....GORDON MATHIESON

Assistant Professor, Neuropathology.....STIRLING CARPENTER

Demonstrators, Neuropathology.....DANIEL COWAN
FRANCIS LEBLANC

Associate Professor, Clinical Psychology.....BRENDA MILNER

Lecturer, Neuroanatomy.....ALLAN MORTON

Demonstrator, Electroencephalography.....LEWIS HENDERSON

B. Representatives of Department of Neurology and Neurosurgery on the Faculty of Graduate Studies and Research.

Professors.....WILLIAM FEINDEL
THEODORE RASMUSSEN

Associate Professors.....PIERRE GLOOR

.....LEONHARD WOLFE

EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL HOSPITAL

President.....S. M. FINLAYSON
Vice-President.....A. D. P. HEENEY
Director.....THEODORE RASMUSSEN
Deputy Director and Secretary.....PRESTON ROBB
Financial Administrator and Treasurer.....CHARLES NOEL
Registrar.....BERNARD GRAHAM
Assistant Registrar.....DANICA VENECEK

EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL INSTITUTE

Director.....THEODORE RASMUSSEN
Assistant Director (Undergraduate).....FRANCIS MCNAUGHTON
Assistant Director (Graduate).....PIERRE GLOOR
Executive Secretary.....MISS ANNE DAWSON

RESIDENT STAFF — JULY 1965 JUNE 1966

Senior Neurosurgical Resident.....BRYCE WEIR, M.D. (McGill)
Neurological Services
Teaching Fellows:.....GEORGE GIANNAKAKIS, M.D. (Univ. of Athens)
ROBERT HANSEBOUT, M.D., M.Sc., (Univ. of Western Ont.) *
KEITH SEAMANS, M.D. (New Brunswick) *

Residents
NICOLAS BUENDIA, M.D. (Bogota, Colombia)
NORMAN LUSH, M.D. (Newfoundland)*
ROBERT NELSON, M.D. (Dalhousie)
NAUNIHAL SINGH, M.D. (Judore, India)
GIRDHARILAL TAORI, M.D. (Vellore, India)
FELIPE VALLE, M.D. (Mexico) *

* Six months on this service

Top Row: Drs. J. Murphy, G. Singh, F. LeBlanc, M. Spen ce, N. Buendia, G. Giannakakis, A. Espina, A. Lorenzo, D. Guzman, M. Lechter, C. Pace-Asciak, J. Dreifuss, K. Meier-Ewert.
2nd from Top: Drs. C. St. Pierre, G. Carbonin, E. Sharpe, A. Pace-Floridia, G. Dagenais, D. Derry, T. Shomori, G. Celesia, E. Meier-Ewert, A. Bengzon, G. Mathews, A. Roberge, J. Reed, N. Singh.
3rd from Top: Drs. D. Melançon, A. Galindo, A. Haque, L. Laberge, R. Ethier, M. Ebe, L. Yamamoto, M. Heuff, N. Lush, C. Vera, F. Andermann, J. Gilbert, G. Taori, S. Duchow.
4th from Top: Drs. I. Heller, R. Broughton, S. Carpenter, H. Garretson, Hanna Pappius, Brenda Milner, B. Graham, D. Lloyd-Smith, G. Mathieson, A. Morton, Mr. L. Taylor, Dr. A. Sherwin, Mrs. Clara Strauss, Dr. A. Young.
2nd row from Front: Drs. W. Feindel, P. Gloor, L. Wolfe, R. Gilbert, P. Robb, J. Turner, W. Penfield, R. Sperry, T. Rasmussen, R. Robertson, F. McNaughton, Miss B. Camer on, Miss C. Griffin, Drs. B. Cosgrove, Sumedha Pathak.
Front Row: Drs. K. Seamans, F. Valle, Z. Sayeed, M. Sculco, R. Hansebout, A. Eisen, J. Davis, S. Ambhanwong, C. Needham, P. Grisham.

Assistant Residents

PHILIP GRISHAM, M.D. (Seattle)
MORTIMER LECHTER, M.D. (Montreal) *
KULDIP K. SACHDEV, M.D. (Punjab, India) *
ZAHEER A. SAYEED, M.D. (Madras, India)

R. V. H. Rotators

M. BARZA
J. CURTIS
M. B. GOLDSTEIN
C. LEJTENYI
E. MARLISS
P. MCLEOD
R. PERRY
A. TINMOUTH
J. TOURANGEAU
R. WADDELL
H. WATANABE
W. WEINSTEIN

M. G. H. Rotators

C. ABBOTT-SMITH
J. ALEXANDER
L. DUFRESNE
J. LOCHEAD
H. HADDAD
D. MCLEAN
D. RONCARI
A. SCHLOSSBERG

Neurosurgical Services

Residents

ROBERT HANSEBOUT, M.D., M.Sc., (Univ. of Western Ont.) *
MARIO SCULCO, M.D. (Boston Univ.) *
ANDREW WONG, M.D. (Queen's Univ.)
GIORGIO CARBONIN, M.D. (Padua Univ.) M.G.H. Resident *
MANOUCHER GUERAMY, M.D. (Iran) M.C.H. * and M.G.H. * Resident
WM. MCCANN, M.D. (Georgetown Univ.) M.C.H. Resident *

Assistant Residents

SURAPONG AMBHANWONG, M.D. (Thailand) *
JEROME DAVIS, M.D. (New York)
MARIUS HEUFF, M.D. Utrecht, Holland) *
FRANCIS LEBLANC, M.D., Ph.D. (Ottawa Univ.) *
WM. MCCANN, M.D. (Georgetown Univ.) *
GEORGE MATHEWS, M.D. (Madras, India)
CHARLES NEEDHAM, M.D. (Albany Med. Coll.) *
ANDRÉ ROBERGE, M.D. (Laval Univ.)
ROEL ROMERO, M.D. (Philippines) *

THE WOMEN'S AUXILIARY OF THE ROYAL VICTORIA HOSPITAL

President ..... MRS. J. W. DUNCAN
Chairman, M.N.I. Coffee Shop ..... MRS. JAMES MORTON

NURSING STAFF

Director of Nursing ..... MISS BERTHA I. CAMERON, R.N.
Assistant Director of Nursing ..... MISS IRENE MACMILLAN, B.A., R.N.
Administrative Assistant ..... MRS. ELEANOR CARMAN, R.N.
Supervisor Dressing Rooms ..... MISS ANNIE JOHNSON, R.N.
Assistant Director of Education ..... MISS JEAN MACMILLAN, B.N., R.N.
Clinical Coordinator ..... MISS CAROLINE ROBERTSON, B.N., R.N.
Clinical Instructor ..... MISS HELENA KRYK, B.N., R.N.
Supervisor Auxiliary Nursing ..... MISS ANNE CARNEY, B.N., R.N.
Night Supervisor ..... MISS ELISABETH BARROWMAN, R.N.
Assistant Night Supervisors ..... MISS JANE HENRY, R.N.
MISS LILLIAN MCAULEY, R.N.
MISS MARILYN MANCHEN, R.N.
Operating Room Supervisor and Instructor ..... MISS PATRICIA MURRAY, B.N., R.N.

HEAD NURSES

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

Top row: M. Everett, L. Dalicandro, C. Dixon, M. Pinto, M. Booth, B. Burnett, C. Blair.
Second row: L. Gorman, B. Petrin, D. MacKinnon, E. Clarke, L. Fletcher, B. Holmes, S. LaPorte, P. Loeck.
Third row: N. Ledgister, C. McKenzie, D. McInnis, K. Ho, V. Moroz, N. McGuire, S. Wang, J. Carscadden.
Fourth row: U. Steiner, G. Kumarapeli, J. Mallory, A. Cameron, R. Tang, S. Prausri, D. MacDonald, A. Ham, M. Cavanaugh, H. Kryk.
Fifth row: C. Robertson, P. Murray, E. Carman, A. Johnson, E. Barrowman, B. Cameron, R. Parkes, J. MacMillan, A. Carney.
Front row: K. Devadason, J. Galvin, L. Dagenais, J. Henry, N. Pendon.

GRADUATE STUDIES AND RESEARCH

DR. PIERRE GLOOR

The concepts and tools of today's basic science are those of tomorrow's clinical medicine. This is why in addition to hospitals and basic science research laboratories, there is a need for medical institutes, which can build bridges between basic sciences and clinical medicine. It has been the privilege of this Institute to be one of those bridges between the clinical and basic neurological sciences. With scientific knowledge and skills expanding at a vertiginously fast rate, such bridges are more than ever necessary. For recently a trend in fundamental medical research has become apparent, which fills me, and probably many of my colleagues, with some misgivings. I am referring to the fact that increasingly fundamental research of crucial importance for the future development of medicine is no longer performed by scientists, who, by their upbringing are also physicians, but more and more by non-medically trained basic research workers. This development has been inevitable and though it has borne many welcome fruits, I submit that we ought to ensure that it be complemented by a vigorous growth of research activities, just as fundamental in technique and outlook, conducted by investigators who had medical training, and thus had some experience on the frontline of medicine, on the bedside and in the operating room. For our Institute to train and recruit this type of medical investigator, clinically wise and scientifically experienced, should be one of our foremost concerns.

Have we in the year that just elapsed done justice to this task? It is not for me to attempt to give an unbiased answer to this question. I shall leave this to others, who, less involved in our daily tasks, may be better qualified to judge how well we have discharged our duties in this respect. I shall instead restrict myself to a brief survey of our research activities, a review which for obvious reasons of limitations in time, will have to be sketchy and necessarily incomplete.

Several laboratories, as well as the clinical services, have been engaged in various research activities. As is fitting for a medical institution, the subjects which arrested the researchers' attention, ranged widely, from the immediately practical to the purely scientific. In the clinical field, the problems of the proper diagnosis and treatment of the epilepsies and various movement disorders have continued to absorb the interest of many workers, too numerous to enumerate individually. Various techniques have been used, which involved the skills derived from many disciplines: Neurosurgery, Neurophysiology, Pharmacology, Psychology, and Neurochemistry. Thus, on the one hand, the technique of investigating the activity of single nerve cells in the depth of the human brain in a conscious and awake patient, and on the other, that of temporary pharmacological inactivation of the major part of an entire cerebral hemisphere in a conscious human subject, have continued to be tools, which were rewarding in their yield of immediate benefit to our patients, as well as in providing new insights into the intimate workings of the human brain in health and in disease. One of the most exciting new findings obtained through these investigations has been the demonstration that in some individuals speech function is represented in both cerebral hemispheres.

The introduction of computer techniques into the analysis of the activity of the central nervous system is widely recognized as one of the most significant steps towards the elucidation of many important problems of brain physiology and its disturbance in disease. Many questions which eluded the more traditional approach to these problems can now be attacked with such techniques. During the past year computer techniques have been applied both in the clinical and in the animal research laboratories to great advantage. Thus, in the EEG Laboratory, Dr. R. Broughton and his collaborators have made great strides in our understanding of some of the underlying physiological mechanisms of stimulus-sensitive myoclonus in various forms of epilepsies. In the Neurophysiology Laboratories we have used computer analysis for answering a different kind of problem, concerned with the study of the response pattern of single hypothalamic cells to stimuli originating in various limbic structures of the forebrain. It is hoped that these investigations will in the near future lead to the study of cerebral mechanisms involved in the regulation of endocrine glands. Other studies carried out in the Neurophysiology Laboratories dealt with the alterations of cortical activity produced by the pharmacological inactivation of the sodium and potassium pump mechanism.

The Neurochemistry Laboratory, under the dynamic leadership of Dr. Leonhard Wolfe has continued its research on the biochemistry of cerebral lipids, especially gangliosides and prostaglandins. Here too, the scope of work has ranged from problems of purely basic biochemical import to that of the study of brain lipids in specific neurological diseases. The Neurochemistry Department has been fortunate that Dr. K. A. C. Elliott, in spite of the heavy workload falling upon his shoulders as the Chairman of the Department of Biochemistry of McGill University, has been able to come back once a week to his old homeground, to hold a weekly session of what he so delightfully calls a "Neurocheminar". We are proud to report that Dr. Wolfe, at the invitation of the Italian Research Council, was able to spend part of last summer working at the Physiological Institute of the University of Bologna, where with one of our former Fellows, Dr. F. Coceani, he continued his investigations on prostaglandins. The Neurochemistry Department has not only been productive of new findings and papers, but has also produced a new Assistant Professor for the Department of Medicine at the Montreal General Hospital. Our best wishes accompany Dr. M. Spence, who is going to take up this post in the near future, after having earned, with brilliant success, the degree of Doctor of Philosophy in the Department of Biochemistry.

Dr. H. Pappius has continued her investigations of the mechanism of brain oedema.

Dr. A. Sherwin, in the Laboratory for Research in Chronic Neurological Diseases, has applied very successfully the technique of enzyme analysis to the investigation of various brain tumours.

In the Cone Laboratories of Neurosurgical Research, Dr. Feindel, Dr. Yamamoto and Dr. Garretson, have continued to apply radioisotope techniques to the investigation of brain lesions and cerebral circulation. A promising technique of quantitative arteriography during neurosurgical procedures has been developed.

Dr. O. Hommes, whose return to his native Holland we all regret, has carried out interesting neurohistological studies with Dr. A. Morton, demonstrating that after hypophysectomy in man the infundibular nucleus does not undergo degeneration.

Dr. B. Milner and her collaborators in the Psychology Department have continued their investigation of human brain function along many lines. Quantitative studies of sensory discrimination and the analysis of motor function in patients with various cortical lesions, and in those undergoing stereotaxic surgery for Parkinson's disease have been among the new fields that were explored.

In the Anaesthesia Department under Dr. R. Gilbert's direction research has been oriented towards the understanding of various problems of blood circulation. Dr. A. Galindo has demonstrated the existence of pressure receptors in the spinal cord. Studies on liver blood flow under various normal and abnormal conditions have also been carried out.

All of us who have worked in the research laboratories have in many ways experienced the same problems as those in the clinical services, namely a growing awareness that this Institute is bursting at the seams and that additional space may well be required in the years to come. If this necessity comes upon us, let us remember that limitation in size may even be more important for maintaining quality of work and the psychological atmosphere conducive to it, than a too generous expansion of physical plant. In this respect let me quote from the late Alan Gregg's memorable address given in this very room, when the McConnell wing was inaugurated. He said "By the very self-imposed circumscription of its size and ambit, an institute can provide an extraordinary aid to human effort and satisfaction — the chance to be intimate with excellence." And then he continued: "If that intimacy be sacrificed, whether because of increased size or excessive busyness, then the members of any institute can look at each other in justifiable dismay." It is this essential intimacy that has been the hallmark of our Institute and let it remain our most cherished possession.

NEUROLOGY

Dr. Francis L. McNaughton

It is my sad duty to report the death on September 16, 1965 of a senior member of the Neurological Staff, colleague and friend Reuben Rabinovitch. We all miss "Rab" in a hundred ways. Dr. Rasmussen will have more to say in his report.

Saddened by this loss, we have tried to fill the gap left in our ranks. Dr. Andermann has assumed the full duties of a staff member, while still carrying all his responsibilities in Pediatric Neurology at the Montreal Children's Hospital. In the Department of Neurology of the Jewish General Hospital

two important appointments have been announced, and should be noted here. Dr. Irving Heller has been appointed to the position of Senior Neurologist. He will hold this appointment in addition to his post at the Institute. Dr. Israel Libman becomes Neurologist-in-Chief, and we are pleased to welcome him also as a Consulting Neurologist on the staff of the Montreal Neurological Hospital.

The clinical activities of the Department of Neurology may be summarized by stating that we have carried about the same patient load as in recent years, and have maintained a high standard of medical care for our patients, thanks to the skill and devotion of the resident and nursing staff, not forgetting the contribution made by the medical aides and orderlies and the many laboratory technicians who work with our patients. Living, as we do, in an imperfect world, it is a reassuring experience to work in a hospital where so much good will and cooperation abounds.

There has been no change in the organization of our outpatient clinics in the Royal Victoria Hospital. We feel that this aspect of our service still leaves much to be desired, and with the development of Medicare legislation, we hope to see, before long, the establishment of broader and more adequate services for ambulatory patients, and also better home and hospital services for the chronically ill.

I would like to speak briefly of our special role with regard to epilepsy. We are particularly pleased with Dr. Robb's appointment as member of a special Advisory Committee which is to report to the Surgeon-General of the United States on research and treatment needs in the field of epilepsy. We hope that similar initiative with regard to the Canadian scene will come from Ottawa. This Institute, under the direction of Dr. Penfield and Dr. Rasmussen has made a particular contribution to the understanding and management of epilepsy and we must extend our efforts if we are to continue giving leadership in treatment training and research in this field. To carry the responsibility adequately will require improvement, reorganization, and expansion of our teaching staff and clinical services in the near future. We are grateful for the support we have received for some years from Federal-Provincial grants for rehabilitation but we will need greater support for an expanded program.

It is just a year since a second Teaching Fellowship in Neurology was established and we have been more than pleased with the results. Dr. George Giannakakis has devoted himself to third year teaching in the Institute, and has done a splendid job, and at the same time has been developing his special interest in neuro-ophthalmology. The second Teaching Fellowship has been shared in two six-month periods by Dr. Hansebout and Dr. Seamans, who have helped to reorganize fourth year neurological teaching in the medical department of the Royal Victoria Hospital, while acting as full-time junior consultants. This plan has worked out very satisfactorily and has opened up new and interesting pathways for collaboration between our two departments. Dr. Allan Sherwin has been responsible for the teaching schedule and staff teaching duties in the third and fourth years.

We are happy to know that Dr. Baxter and Dr. Stratford will soon be moving into their new department at the Montreal General Hospital and look forward to even closer collaboration in teaching and research activities between the Institute and the "General". Their growing department continues to add new strength to Neurology and Neurosurgery at McGill. We also look forward to a closer relationship with Dr. Libman and his colleagues at the Jewish General Hospital.

Several months ago, Dr. Penfield, speaking in this amphitheatre, paid tribute to the memory of one of the great figures of British neurology of this century, Sir Gordon Holmes, who died in December 1965, in his ninetieth year.

This Institute has a special association with Gordon Holmes. Dr. Penfield chose him as one of the principal speakers at the foundation ceremonies in 1934, and many of you will have read the address he gave on that occasion. While looking through the Institute Visitors' Book a few days ago, I was delighted to find that he was also the first person to sign the book when it was opened at page one on September the twenty-fourth, 1934. I would like to think that his position at the top of a long list of distinguished guests on that occasion still has special symbolic meaning for us.

Gordon Holmes will long be remembered for his many classical contributions to neurology. He will also be remembered as a great clinical teacher. Dr. Penfield and many more of us can bear witness to this. His emphasis was always on thorough history taking and examination at the bedside followed by correlation with the anatomy and pathology of the nervous system. One must admit that, like many others of his generation he showed little appreciation or understanding of the role which the emotions play in the causation of disease, but I am sure his pupils will forgive him many times over!

Holmes worked at a time when medical research had little financial support, and most of his own research had to be done in his spare time while still earning his living as a practicing physician. As pointed out by his obituary writer in "The Times" he belonged with Jackson, Ferrier, Bastian, Gowers and Horsley and was "perhaps the last of this remarkable group of men; all inexhaustible, forceful and immensely able who created the prestige of British neurology out of their own intellectual resources".

Times have changed. Opportunities for training in clinical neurology and in the neurological sciences have grown greatly since Holmes' active years, particularly in North America, and there has been an increasing tendency to emphasize the laboratory sciences at the expense of skill in clinical training and the care of sick people. This has become a lively concern of neurological teachers everywhere and will be the topic of a National Conference of American and Canadian Neurological Scientists, to be held later this year, under the sponsorship of the two major American Neurological societies, and the National Institute of Neurological Diseases and Blindness. How can one achieve a satisfactory balance between research and high clinical competence? This is also our own concern, as we continue to review our own plans for undergraduate and graduate teaching of Neurology and Neurosurgery at McGill.

Holmes used to say "A laboratory man should be like a well-trained dog, always at your heel'. That day is past. In clinical institutes such as this, the clinic and the laboratory work together in just partnership but I think we will all continue to agree with Gordon Holmes' basic teaching that the patient must remain, always, at the centre of things.

NEUROSURGERY

DR. WILLIAM FEINDEL

Occasionally, it may do no harm to take a slightly detached look at ourselves in historical perspective. Recently, Mr. Charles Hodge, our hard-working photographer, retrieved some pictures from the old files which seem to indicate that there was a time, some thirty years ago, when this Annual Meeting appears to have been a much more casual affair.

The first photograph, taken in the early summer of 1932, shows the preparation of the land on which the Institute was yet to be built. It appears from this as though there was some sort of a small meeting being held in the open air under the trees, in the best Hippocratic style. Everyone else went on pretty much with their own business. The only steam that was let off came, appropriately enough, from the big shovel excavating for the Amphitheatre where we are now sitting. Parking was no problem, and with this item absent from the agenda, we can imagine that the meetings of the Clinical Committee, if any were needed in those days, must have been quite brief.

But, of course, we could not expect this pastoral scene to last. Indeed, as shown in the second photograph, long before the ground was cleared we see the now too familiar sight of cars parked up and down both sides of University Street, patients and visitors already crowding up the hill, the blur of a speeding ambulance bringing in an emergency, and even in evidence the neurosurgical or anaesthetic sports-car.

Now we find ourselves, a third of a century later, at this large meeting attended by the staff and our many friends and faced with the familiar and annually recurring problems of this active hospital and research Institute — too many patients, not enough staff, too little time, everyone too busy, burgeoning laboratories, shortage of space, equipment which needs replacing and modernizing, too little money to do this quickly enough, the daily irritations of inadequate parking, governments' accountants breathing over one shoulder and union representatives over the other. In dealing with all these, one must take the point of view that the belief in the possibility of a solution usually makes a solution possible.

And these difficulties and deficits in time, space and money are more than off-set by the fun of teaching medical and post-graduate students, the refreshing excitement of laboratory research and the great satisfaction which we as


2

clinicians derive from seeing and treating patients. An indication of what I mean is given by brief reference to two patients who had major operations during the past year for benign brain tumours. One woman, an expert skier, reported back for follow-up with the only complaint that she was still not quite satisfied with the way she was able to ski down the Kandahar run at Mont Tremblant. Dr. Rasmussen and the other enthusiastic skiers in this audience will, I think, recognize this as a reasonably stringent test for a post-operative recovery period, or for that matter at any other time. Another patient reported that since operation he was not dancing as well: he did well on the fox-trot but his wife complained about his waltzing, though he finally did admit that she was four years younger, being 67 to his 71 years of age!

The neurosurgical services continued to have the usual annual increase during 1965 with the number of operating procedures up again to a total of 1,245. Since in last year's report I examined the implications of this increasing load on the various departments, I will do no more than say again that it is an obvious index of the hard work and devotion of the entire Institute staff. The neurosurgical residents, Doctors Weir, Sculco and Hansebout, and their able assistants, managed this heavy time-table effectively. Dr. Weir is to be particularly commended for the excellence of the weekly Monday morning clinical presentations.

In regard to post-operative infections, there were three blemishes on our escutcheon, one minor and two major complications. We can only hope that these represent beauty marks to heighten the appreciation of the otherwise remarkably fine record established over the years on the basis of the operating room techniques originally set up by Dr. Cone. In regard to surgical mortality, out of 716 operations there were 14 deaths which occurred within the first seven days after operation, that is, less than 2%. Analysis of these by Dr. Gilbert as well as by review of the clinical and pathological features show that all these fatalities occurred in patients with severe head injuries, with aneurysmal brain haemorrhage, or with certain types of brain tumours.

Members of the nursing staff have been most helpful to us in analyzing and revising many of the Ward procedures. A committee chaired by Dr. Brindle is now examining the possibility of setting up an Intensive Care Unit. A number of phases and areas of neurosurgical activities now merit a fresh look to decide if facilities or patterns require revision to keep our standard up to the mark. The field of neurosurgery in general continues to move forward with many technical and therapeutic improvements; those which seem valid and useful must be incorporated into our present well-established program.

Detailed activities of the members of the neurosurgical staff can only be taken up briefly. They took part in undergraduate and post-graduate teaching activities and in the research seminars and conferences. As I mentioned last year, every neurosurgeon on the staff is engaged in some investigative project and some of us in a number of major research projects in addition to our teaching and clinical commitments.

We congratulate Dr. Henry Garretson who officially joined the staff with the rank of Assistant Professor and received his Diploma from the American

Board of Neurological Surgery. Congratulations are also due to Dr. Falah Maroun, Dr. Gur Sharan Singh and Dr. Andrew Wong who obtained their Fellowships in Neurosurgery from the Royal College of Physicians and Surgeons of Canada.

Dr. Branch and Dr. Perot are attending this week the meeting of a new group of university neurosurgeons who held their first session last year at the Institute. We wish this new society all success and hope they will return again to visit us.

Dr. Gilles Bertrand was Acting-President of the Montreal Neurological Society and a busy Secretary-Treasurer of the Association of Neurosurgeons of the Province of Quebec during a period when many discussions and much committee work were going on in regard to the first stages of Medicare.

Dr. Elvidge was past President of the Canadian Neurological Society and paid an official visit to the Cape Kennedy space centre. He continues his work on the wards and also his production of excellent reports summarizing his experiences especially in the field of brain tumour surgery.

In March, Dr. Rasmussen was Visiting Professor of Neurosurgery at the University of Rochester and delivered a lecture in honour of the late Dr. van Wagenen. He was succeeded this spring as Wilder Penfield Lecturer at the American University in Beirut, Lebanon, by Dr. Kristian Kristiansen of Oslo, a distinguished former Fellow of this Institute.

It was my good fortune to be able to attend last year an excellent International Symposium on the Cerebral Circulation at the University of Lund, which was initiated by Dr. David Ingvar one of our former Fellows. I also had a very pleasant stay recently in March with Dr. Lloyd Stevenson, our former Dean of Medicine at McGill, at Yale University where I was invited to give the Samuel Harvey Lecture in the History of Surgery.

Some of the neurosurgical staff attended the International Congress held last August in Copenhagen, enjoying the very efficiently managed meetings as well as the warm hospitality organized by the Danish Neurosurgeons. Members of the neurosurgical staff also served in a number of official capacities in many societies which are too numerous to index here. Dr. Penfield tops the list for presidencies, continuing in that office for the Association of Canadian Clubs and for the Vanier Institute of the Family which now appears to be substantially launched. He and Mrs. Penfield are off on a jaunt to Europe, including Oxford and Copenhagen, where the Danish Epilepsy Association will confer on him the St. Valentine's Prize in recognition of his many valuable contributions to the study of epilepsy. He will also receive the first Otfrid Foerster Medal from the German Neurosurgical Society.

This brief record may seem to involve an excessive amount of looking backward. But I hope you will consider this, as we might do in Nova Scotia, like the posture of a man rowing a boat — although we appear to be looking in reverse, we are, in fact, all the time moving forward.

HOSPITALIZATION

Dr. Preston Robb

It is my privilege to report to you today on the activities, accomplishments and hopes of the Montreal Neurological Hospital. The clinical services have continued to operate beyond capacity. All services related to patient care, directly or indirectly, have been working to the point where there is a danger that quality may suffer at the expense of quantity.

In 1965 there were 2,308 admissions and 45,109 patient days. The number of patient days increased by 846 from the 1964 figure, and the level of occupancy rose to 91.5%. When one considers that 2 North was closed for three months during the summer to allow holidays for the nurses, one can appreciate what a high rate of occupancy actually exists. During the four months from February through May the average occupancy was 96.1%. The average stay per patient was 19.3 days, a decrease of 0.2 days. There were 105 deaths and an autopsy rate of 84.8%.

In the outpatient clinics of the Royal Victoria Hospital there were 5,079 patient visits, made up of 4,214 in neurology and 865 in neurosurgery.

Hospital operating expenditures rose approximately 10.4% to $2,525,850. This figure includes $1,701,742 for salaries, an increase of 16.9% over 1964. Capital expenditure for equipment was $109,872; $35,870 more than in 1964. The net shareable cost per patient day during 1965 was $48.63. The Quebec Hospital Insurance Service reimbursed our expenditure during the year at a rate of $43.90 per patient day. Although this left a gap of $4.73 per patient day, the improvement over previous years was substantial.

During 1965 a final settlement for 1963 was received. This settlement left an amount of $11,453 outstanding for that year. An interim settlement for the year 1964, amounting to $168,000 was also received, leaving a balance of $52,284 outstanding for 1964. Our claim for reimbursement of shareable expenditure for 1965 amounting to $177,278 was forwarded last week to the Service.

We have heard through the newspaper and the Minister of Health, Mr. Eric Kierans, that the Q.H.I.S. is going to make final settlements for 1964 in the next few weeks, and for 1965 before the end of this year. If this proves to be so, Mr. Kierans is to be congratulated. We then hope that the Q.H.I.S. will move on to the next step where realistic budgets will be accepted and monthly payments made to hospitals by the Q.H.I.S. In this way it will no longer be necessary for hospitals to borrow from the bank and to be continually paying the banks large sums in interest.

The Hospital deficit for 1965 was $136,552; $42,123 less than for 1964. The accumulated deficit at December 31, 1965 was $493,691. To date the Province has not given any indication that we will receive assistance in retiring the portion of our deficit accumulated before 1961.

Building Maintenance

Under the guidance of Mr. York, our most able building superintendent, an active program of renovation and repair has been carried on. We hope that you have noticed the improved illumination in the corridors, the changes in the nursing stations on 2nd and 3rd South, how the stair wells have been brightened, the improvements in the typing pool and the waiting rooms. There is now a plan of co-ordinating the overall interior decor of the hospital with the aim of maintaining a warm friendly atmosphere, and at the same time allowing for efficient service.

Hospital Records

The processing and storing of hospital records continue to challenge the ingenuity of our staff. The first problem is to translate and type the nocturnal mutterings of the resident staff as they dictate histories and discharge summaries. The second is to complete the records after discharge and finally to find storage space. It is now our policy to keep one discharge summary for each patient in the Registrar's Office and from this make photostatic copies as needed. The cutting down on storage of extra discharge summaries has temporarily solved a space problem, but in a year or two we shall have to find more room. I would pay tribute to all those working in the pool for their devotion to a thankless but most essential service.

NURSING DEPARTMENT

MISS BERTHA I. CAMERON

The past year has proved to be a most challenging one to the Department of Nursing at the Montreal Neurological Hospital.

The prevailing spirit of unrest within modern society has had a noticeable effect upon all our varied activities. This year has witnessed the organization of a "Union" made up of members of the auxiliary staff and service employees of the hospital.

The high turn-over of general staff nurses continues. Out of the allocated number of 55 general staff nurses January 1st, 1965, 23 of the original number remained on staff as of December 30th 1965. In other words, while the number remains fairly constant, the degree of experience varies greatly from month to month. It is apparent that the consequent instability creates a pressing problem in matters of orientation and supervision in order to maintain our desired high standard of patient care over the entire twenty-four hour period of a 7 day week.

Progress is continuing in the area of education with special emphasis on the further development of our In-Service Program. Two successful "workshops" were held. The response of the nursing staff and the generous participation of guest speakers was most encouraging to us all. We are pleased to report that about the same number of applicants is now being accepted for

each post-graduate class. The course is of 6 months' duration. There were 38 students in two successful post-graduate classes during the year and they came from 9 different countries. 16 remained on staff. It is very important for us to have nurses on our staff who have had this course because it naturally makes for a more knowledgeable and understanding staff to carry out the desired nursing care. It has been our pleasure to have received during this year our first students from Japan as well as our first students sponsored by the National Institutes of Health from Bethesda, Maryland. The undergraduate student program has been revised in accordance with the latest trend in the field of education.

I would like to take this opportunity of expressing my appreciation to all members of the nursing staff whose loyalty is a source of encouragement and support.

On behalf of the entire hospital staff, I feel that honourable mention should be made at this time of those members of the nursing staff who have been with us for fifteen years and more. The part they have played and are playing is invaluable. Their reliability, experience and devotion to duty is most commendable. An M.N.H. party was held to honour these staff members (16 nurses and 3 nursing assistants) and suitable presentations were made to commemorate the occasion.

May I also express my thanks to all members of the medical staff and to each Department of the Institute and Hospital for their continued interest throughout the past year.

In closing, on behalf of the Department of Nursing, may I pay a special tribute to the late Dr. Reuben Rabinovitch whose spirit of understanding is sorely missed and will ever be remembered.

SOCIAL SERVICE

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

Social Workers:

Mrs. Hilda Feiner, B.A., Dip. S.W.
Mrs. Irena Liebich, B.A., M.S.W.
Miss Kathleen Macdonald, B.A., B.S.W.
Miss Noella Vaillancourt, B.A., M.S.W.

Social Service Assistant:

Miss Yolanda Sabetta, B.A.

An annual report is a review of accomplishments and difficulties of the past year and an expression of hopes for the coming year.

At the core of social service departments are professional social workers. However, experience has shown that there are tasks which may be delegated to an assistant. For nearly two years Miss Yolanda Sabetta has helped us prove the value of such a position here. Our best wishes go with her now as she leaves to enter a school of social work.

In the area of education, we are pleased to report affiliation with two graduate schools of social work. The University of Ottawa for the first time placed a student here under the supervision of Miss Kathleen Macdonald, and for the third year, we have enjoyed a student unit from McGill, under Miss Mary MacLean.

During the past year, the majority of referrals to our department again came from the medical staff. Total referrals were twice as frequent from out-patient as from in-patient services and twice as frequent from Neurology as from Neurosurgery. This can be accounted for in part by the large number of seizure and multiple sclerosis patients, seen mainly in the clinics.

Perhaps one of the distinguishing features of the social worker's approach is that she views, and must view, the patient as a member of a family and of a community. If she forgets this, her contribution to the patient group and to the hospital staff is reduced.

I would like to share with you a few case examples (presented here in capsule form):

Mary A. is a hyper-active six-year old with seizures complicated by mental retardation. In one sense the ideal plan was care at home, but the pressures on the mother, with four other children, were driving her to the breaking point. The social worker helped to reduce the mother's sense of guilt (the child had been struck by a car when unattended), and to arrange a practical compromise for Mary — during the week to board at a special school and each weekend to return home.

Eight-year old Anna B. had somewhat similar problems, but she came from another province, so help for her and her family was arranged through correspondence and telephone communication with the Children's Aid Society in her area.

Mr. C., a twenty-six year old European immigrant with a pretty wife and two small children, was discharged from Neurosurgery with a poor prognosis. For eight months the social worker's contribution was two-fold: (1) mobilization of community resources and (2) continuous support — to him, reassurance that his family would be looked after, and to her, encouragement, recognition of her difficult role and help in step-by-step, realistic planning.

Mr. D. — Marital and family discord have compounded the problems for multiple sclerosis patient Mr. D., still under 40 and for more than a decade relinquishing one after another of his normal activities. The social worker through regular interviews with him and with his wife regarding their interpersonal conflicts has helped him to find a useful place in his family and to involve himself in new and more varied activities, in short to be more independent.

55-year old Mr. E., a quadriplegic, cared for at home for 15 years by his wife with the help of home equipment and VON visits, needed temporary placement during his wife's hospitalization for surgery. Of the four applic-

ations made, one was useless because of the long waiting list, two were refused because the patient was "too sick" and the fourth finally admitted him after a one month waiting period.

We continue up the chronological age-scale into the nineties, with example after example of lack of resources for the chronically ill. Since this lack has been reflected in the annual reports of our department for more than twenty years, there seem to be few words left to convey the magnitude of the problem today. Institutional beds and resources for home care, often the preferred alternative, are not available. We are told at hospital after hospital for patient after patient that the classification of chronic care prohibits admission, as the only patients accepted are for convalescence or for rehabilitation, and then with a time limit of two or three months. Social workers have sent distress letters to Quebec, but more voices are needed.

For the future, we can only plan and hope. We hope for assistants to whom appropriate tasks may be delegated; we hope for continued and even closer collaboration with the medical and nursing staffs, and with volunteer groups in RVH and in the community for friendly visiting of shut-in patients of whom we have so many, and for help with other projects. We are grateful to the RVH Women's Auxiliary and other groups and individuals for their generous donations to the Clinical Relief funds and we hope to continue to provide financially for such patient needs as medication, wheelchairs, etc. And finally, we hope that the community at large, including the government, will make a breakthrough in provision of facilities for the chronically ill.

To all who have contributed tangibly and intangibly to the work of our department, a sincere thank you.

ANAESTHESIA

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

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

Associate Anaesthetists ..... G. F. BRINDLE, B.A., M.D., C.M., F.R.C.P. (C)
ANIBAL GALINDO, M.D.

Assistant Anaesthetists ..... S. KOVACHEV, M.D. (Yugoslavia) (on sabbatical leave from University of Noviesad, Yugoslavia)
A. PACE-FLORIDIA, M.D., F.R.C.P. (C)

Residents:

B. J. ALLEN, M.D. (Univ. of Lond.) *
R. ASSERAF, M.D. (Univ. of Paris) *
JOHN J. EMMETT, M.D. (Australia)
M. GERTEL, M.D. (McGill)
GUY LEFEBVRE, M.D. (Univ. of Montreal) *
ANDRÉE PINEAULT, M.D. (Univ. of Montreal)*
PIERRE ROUSSEAU, M.D. (Univ. of Montreal)*
L. WISEMAN, M.D. (Dalhousie Univ.)*

* Six months on this service

Staff Changes

Dr. David Shephard replaced Dr. Schofer and stayed until September when he went to the Montreal Children's Hospital. He is now on the staff of Dalhousie University. Dr. Sever Kovachev replaced Dr. Shephard. Dr. Albert Pace-Floridia replaced Dr. J. J. McGrath who in July returned to the staff of the hospital in his home town, St. John's, Newfoundland.

Other Appointments

Dr. G. Fred Brindle has been appointed Associate Professor, Department of Anaesthesia at McGill University. He remains Secretary of the Quebec Division of the Canadian Anaesthetists' Society. This year, this has been more than ever a time consuming appointment. He is also in charge of the Medical Affairs of the St. Jovite Race Track.

Dr. R. G. B. Gilbert is the anaesthesia representative of the World Association of Neurological Commissions. He has also been elected to the Executive of the Academy of Anesthesiology.

From September 1st, 1965, Dr. A. Galindo joined the Wellcome Department of Anaesthesia Research, working for his Ph.D. under Dr. K. Krnjevic. He spends two days a week in the clinical department of the Montreal Neurological Institute and Hospital.

Clinical

Techniques of anaesthesia are unchanged from last year. A closer study of the arterial pCO_2 levels during hyperventilation has been made. Greater use has been made of the Gardner head rest.

There have been a total of 1,058 anaesthetics given and 12 cases have been studied by regional techniques for pain problems.

Clinical and pathological review of 14 patients who died within 7 days or less of surgery did not indicate that there were any deaths attributable directly to anaesthesia. All these patients had serious intracranial lesions, including 6 with severe brain or spinal injuries, 4 with brain tumors, and 4 with aneurysmal haemorrhage.

Care and monitoring of respiratory cases could be performed better with an intensive care area. It is difficult to watch every detail when such cases are all over the hospital. Many determinations of plasma and urine osmolarity and blood volume have been made which are of great help in the postoperative period.

The laboratory has been very active during the year and we are all most appreciative of the work Mrs. Sharpe has performed.

Teaching

Dr. Gilbert is responsible for the undergraduate programme while all in the department participate in the postgraduate programme organized by Dr. Gilbert. Dr. Brindle is responsible for the teaching of anatomy to the postgraduate students. All participate in the nurses' teaching programme. Drs. Brindle, Galindo and Gilbert participated in the Annual Refresher Course.

Dr. Brindle has been instrumental in organizing equipment for use on the wards, with Miss Johnson and Miss MacMillan.

Research

Dr. Galindo and Dr. Brindle have now completed studies on hepatic blood flow in relation to anaesthesia and surgery, these have been published in the Canadian Anaesthetists' Society Journal. Clinical studies concerning ventilation are carried out in most operative cases. Dr. Galindo is now studying the effects of anaesthetic drugs on the brain with a multiple microelectrode technique. We are grateful for an anonymous donation to facilitate our studies, to Dr. Lloyd MacLean for his support, and to the Institute for such support as it has been able to find for us.

RADIOLOGY

Radiologist ..... DONALD MCRAE, M.D.

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

Residents:

PIERRE ARCHAMBAULT, M.D. (Univ. of Montreal)*
M. GOLDENBERG, M.D. (McGill)*
A. W. HAQUE, M.D. (East Pakistan)*
D. MELANÇON, M.D. (Univ. of Montreal)*
C. ST. PIERRE, M.D. (Laval)*
DAVID SWALES, M.D. (McGill)*

Chief Technician ..... JOAN BROADLEY, R.T.

* Six months on this service

In 1965, 11,263 radiological examinations were carried out, an increase of 585 over 1964, making 1965 our busiest year. Tribute must be paid to the excellent staff in the X-ray Department for handling this great number of patients and handling them so well. Some 600 of these were emergency examinations, done at night or over the weekend, which were especially difficult and time-consuming. Only technicians with unusual skill, patience and devotion are willing to undertake this type of examination. Why do they do it? Because they have pride in being part of a skilled, conscientious medical team. It is difficult to compensate them adequately for this trying work.

In the last annual report, I pointed out certain analogies between an expanding workload in a hospital and in industry. I drew attention to inadequacies of space, equipment and personnel due to the lag in supplying the need for it. This year, I wish to comment on the conflict between the demands of government health schemes, hospitals and some medical faculties on the university way of life.

Doctors pride themselves on taking care of patients thoughtfully and carefully. Government health plans may mention high quality health services. But the systems that are established encourage a mediocre quality of health care. Some even produce a low quality service. Doctors know that overworked, under-paid doctors with no opportunity to update their knowledge and with no medical supervision are apt to give mediocre or poor medical service. In teaching hospitals, where there is medical monitoring, health care is apt to be of good quality, even though the doctors carrying it out are over-

worked and under-paid. When the work is not done in teaching hospitals, there is little or no monitoring or supervision and the quality is usually of lower degree.

The Montreal Neurological Institute and Hospital is a University Hospital. Traditionally a university is a place where people devote much time to thought. In the faculty of Arts and Science teaching loads are light compared to Medicine and it is accepted that a teacher or research worker must devote part of each day to thought, part to reading and writing, and part to teaching and research. Nights and weekends are usually free. In Medicine, clinical teachers devote a half or more of each day to the care of hospitalized patients, most of this being done with groups of undergraduate or post-graduate students, that is, as teaching. They spend the rest of the day at clinical work, either in hospital or in their private offices. Reading and writing are done at night or on weekends in competition with the demands of family and friends and at a time when the mind is perhaps fatigued. When does the clinical teacher in Medicine get time to think? I cannot answer that question but I know that most of them do not get enough time for thought.

In 1965 we were ably assisted by an enthusiastic group of residents led by Dr. Pierre Archambault. Dr. Archambault served with us for one year while Drs. Brattman, Goldenberg, Swales and Vessa served for six-month periods.

About 250 ultra-sonic examinations of the brain were carried out in 1965, many patients having had more than one examination. Their greatest field of usefulness is to see if the posterior part of the third ventricle is in the midline of the brain, an important point when an expanding lesion of the upper portion of the brain is suspected. Additional information, also of importance in clinical neurology, on the size of the lateral and third ventricles can be given with accuracy. In an occasional partient, a pathological lesion can be picked up directly.

During July and August, 1965 an ultra-sonic tomograph constructed by Dr. David Makow of the Applied Physics Division, National Research Council was given clinical trials at this Institute. Many brain structures were identified in normal patients and certain abnormalities shown in patients with expanding or contracting lesions of the brain.

During the year Dr. McRae was guest lecturer to the Los Angeles Radiological Society, the Toronto Radiological Society and also at Queens' University. He was elected President of The American Society of Neuroradiology. Dr. Roméo Etheir was guest lecturer at Laval University.

Monday afternoon seminars in neuroradiology were given during September, October, November and December. The regular Monday morning colloquia in neuroradiology continued with the valuable assistance of Dr. Ethier. Twelve lectures entitled "Principles of Radiology" were given to the second year medical students. Three lecture-demonstrations were given during the neuro-anatomy course also to the second year medical students.

I wish to give special thanks to the nurses and to the orderlies for their cheerful cooperation during the past year. Their help in maintaining a smooth steady flow of patients in and out of our Department was invaluable.

NEUROCHEMISTRY

Consultant	K. A. C. Elliott, M.Sc. (S. Africa), Ph.D., Sc.D. (Cantab.) F.R.S.C.
Neurochemist and Medical Research Council Associate	Leonhard S. Wolfe, M.Sc. (N.Z.), Ph.D. (Cantab.), M.D.
Associate Neurochemist	Hanna M. Pappius, M.Sc., Ph.D.
Assistant Neurochemist, Clinical	Irving H. Heller, M.Sc., Ph.D., M.D., C.M.
Post-doctoral Fellow	Cecil Pace-Asciak, B.Sc., Ph.D. (McGill)
Fellows:	David M. Derry, M.D. (U.B.C.) Matthew W. Spence, M.D. (Alta.) Medical Research Council Fellow.

Clinical Laboratories

The total number of procedures performed in the 7th Floor Neurochemistry laboratory on spinal fluid, blood and urine during 1965 was 14,769 (13,159). Figures for 1964 are given in parentheses. While determinations of CSF protein and colloidal gold were actually less than last year, the total increase is due to analyses of blood for CO_2, chlorides, BUN, sodium and potassium. This represents an increased utilization of the autoanalyzer. In addition, 5811 (3198) liters of irrigation solution were prepared for the operating rooms. This represents a return to former levels of use. The clinical services were provided with 215 (217) liters of Nupercaine solution.

The work of the 3rd Floor Ward laboratory has increased over last year. Separate blood determinations rose to 22,409 (15,690) and 5256 (5375) complete urinalyses were done. In addition, 3896 (3633) samples of blood were drawn for biochemical analysis at the RVH and 10,300 specimens for our 7th floor laboratory and the Provincial laboratories.

We have been fortunate in maintaining a reliable staff despite the acute shortage of technicians.

The 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

(a) Studies on brain gangliosides.

Good progress has been made in a continuing study of this important group of complex, acidic, neuronal glycolipids. Dr. M. W. Spence has isolated membrane elements from new-born rat brain which are enriched in gangliosides. These membranes contain 7-8 per cent ganglioside together with phospholipids, cholesterol, protein, a very small amount of neutral glycolipids and considerable amounts of cations such as sodium, potassium, calcium and magnesium. It is unlikely that these membrane structures are derived from synaptic vesicles. Electron microscope pictures revealed undifferentiated curved

membranes and vesicular structures which could have been derived from dendritic membrane fragments, synaptosome ghosts or fragmented endoplasmic reticulum. During this work an interesting phenomenon was observed, namely, that the ability to extract gangliosides from brain tissue is dependent on a critical amount of monovalent cations such as sodium and potassium. This research is yielding new information on the interactions of proteins, lipids and cations in neuronal membranes.

Dr. D. M. Derry has developed microchemical techniques for the estimation of the ganglioside content in serial cryostat sections through various brain regions and applied these to Lorente de No's area CA2 of the hippocampus and the folia of the cerebellum. The results clearly indicate that gangliosides are not uniformly distributed throughout the grey matter but occur in local concentrations which appear to reflect the degree of dendritic branching and concentration of synaptic endings on the pyramidal, granular or Purkinje cell bodies and dendrites. In cooperation with Dr. F. Andermann and Dr. Fawcett, Dr. Derry has identified a new form of cerebromacular degeneration in an infant which differs chemically from Tay-Sachs' disease in the type of ganglioside accumulating in the neurones.

In all these studies we have been helped greatly by the efficient technical assistance of Mrs. A. Kurnicki.

(b) Studies on prostaglandins in brain.

Prostaglandins are a group of structurally related dihydroxyketo-and trihydroxy C_{20} unsaturated fatty acids formed biosynthetically from essential fatty acids by the addition of molecular oxygen. It is now clear that prostaglandins, particularly the trihydroxy acids are widely distributed in body tissues. These lipids contract intestinal smooth muscle in exceedingly small amounts, lower blood pressure and are antagonistic to the action of noradrenalin.

Previously in this laboratory, Dr. Coceani with Dr. Wolfe identified a prostaglandin-like principle in perfusates of the cat cerebellum *in vivo* and showed that prostaglandins are present in brain, particularly in grey matter. Their function in brain in unknown. With Dr. Coceani, now at the Institute of Human Physiology, University of Bologna, Italy, we have studied the site of action of prostaglandins in intestinal smooth muscle. Drugs that inhibited sympathetic fibers or receptors potentiated the action of prostaglandins whereas drugs that stimulated sympathetic fibers were inhibitory. A most striking finding was that the presence of oxygen was absolutely necessary to initiate prostaglandin but not acetylcholine contractions. Depolarization of smooth muscle progressively increased sensitivity of the muscle to prostaglandins. A hypothesis was proposed in which prostaglandins are taken up by smooth muscle and in the presence of oxygen converted by a cytochrome dependent oxidation to an unstable 'active form' which initiates contraction by the release of bound calcium or the facilitation of calcium influx.

With Dr. Cecil Pace-Asciak, a Medical Research Council post-doctoral chemist who joined us in the fall of 1965, we have started studies on the biosynthesis of prostaglandins in brain from isotopically labelled essential fatty

acids. Methods are being developed for their quantitative measurement using the technique of gas-liquid chromatography.

(c) Studies on cerebrospinal fluid.

Dr. I. Heller is working part-time in the laboratory on a regular basis, assisting in a research project concerned with the determination of steroids, steroid esters, free fatty acids and complex lipid fatty acids in the cerebrospinal fluid from patients. He is collecting the specimens and is performing the chemical separation of the samples. The final fractions are then analysed quantitatively by gas-liquid chromatography. Together with Dr. Mortimer Lechter, he will be starting a clinical analysis of the neurological complications of diabetes mellitus. It is planned that CSF samples from these patients will be included in the chemical studies of cerebrospinal fluid.

(d) Studies of cerebral oedema.

Dr. Pappius with the able assistance of Mrs. H. Szylinger continued the long range investigation of problems relating to cerebral oedema and blood-brain-barrier phenomena.

Studies are in progress designed to clarify the nature of the generalized changes affecting ionic distribution in brain tissues which result from trauma, or its consequence, oedema. No difference in the ability to accumulate potassium and extrude sodium *in vitro* could be demonstrated between normal cerebral cortex and tissue from traumatized (freezing lesion) brain. Activity of ion-specific adenosine triphosphatase systems in normal and traumatized brain are now being examined.

Efforts to produce experimental anoxic oedema were unsuccessful. Cats subjected to periods of hypoxia with and without severe hypercapnea developed symptoms of neurological damage but the dry weight and electrolyte content of their brain tissues remained invariably within normal limits.

The collaborative study with Drs. Dossetor and Oh of the Renal Unit of the Royal Victoria Hospital on the effects of hemodialysis on cerebral tissue water and electrolyte content and on CSF pressure was concluded. The findings that osmotic imbalance between the plasma and the central nervous system affects invariably CSF pressure while swelling of cerebral tissues occurs only occasionally were substantiated.

Dr. K. A. C. Elliott continues to encourage and help all of us in many ways. The weekly 'neurocheminars' with Dr. Elliott are most enjoyable and informative occasions.

Dr. Pappius was invited to participate in the Workshop on Brain Edema in Vienna in September 1965 and she also attended the Vth International Congress of Neuropathology in Zurich at the end of August.

Dr. L. S. Wolfe spent six weeks as a visiting scientist of the Italian Medical Research Council at the Institute of Human Physiology, Bologna, Italy, completing research work started with Dr. F. Coceani. Dr. M. W. Spence has been appointed Assistant Professor of Experimental Medicine, McGill University and will be leaving in the spring of 1966 to take up this appointment at the Montreal General Hospital. Dr. D. M. Derry has been awarded a Medical Research Council fellowship.

ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

Consultant ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M.

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

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

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

Fellows:

ALFREDO BENGZON, M.D. (Philippines)
GASTONE CELESIA, M.D., M.Sc., (Genoa, Italy) M.R.C. Fellow
JEAN AIME CHABOT, M.D., (Laval Univ.)*
FERNAND DUPLANTIS, M.D. (Univ. of Montreal)*
DANIEL A. GUZMAN, M.D., (McGill)
KAZUO KINOSHITA, M.D., (Kyushu, Japan)*
SALUSTIANO LINS, M.D., (Recife, Brazil)*
JOHN THOMAS MURPHY, M.D. (Columbia Univ.), U.S.P.H.S. Fellow*
AHMED SATOGLU, M.D., (Izmir, Turkey)*
KEITH B. SEAMANS, M.D. (Dalhousie Univ.)*
TOSHIKIYO SHOHMORI, M.D., Ph.D., (Okayama, Japan)*

Research Fellow ..... KARL-HEINZ MEIER-EWERT, M.D., (Düsseldorf, Germany) D.A.A.D. Fellow

Visiting Scientist ..... MITURU EBE, M.D., (Tokyo, Japan)

Chief Technician ..... LEWIS HENDERSON

* In the Laboratory for 6 months or less.

In 1965, 3696 examinations were carried out by our Laboratory, of which 63 were electrocorticograms, taken in the operating room during the surgical treatment of focal epilepsies. This does not include a number of examinations performed for research purposes only. Out of the total of 3696 scalp recordings, 1859 were examinations carried out on patients, hospitalized at the Montreal Neurological Hospital, 670 records were taken on patients hospitalized at the R.V.H., whereas the remaining 1104 examinations were carried out on out-patients referred from the clinics, other hospitals or private offices. The group of patients referred from the Royal Victoria Hospital has shown the most rapid rate of increase over the past few years. The requests for out-patient EEG examinations have become more and more numerous and now exceed the number our Laboratory is capable of handling with the present facilities and personnel. The waiting time for an out-patient appointment has therefore become uncomfortably long and unfortunately imposes unavoidable hardships both on patients and referring physicians. It is obvious that new facilities are needed to take care of this ever increasing workload. Our Laboratory is not large enough, either from the point of view of space or personnel to be able to absorb a further increase in its present turnover of examinations.

During the past year the new computer facilities of our Laboratory, acquired late during 1964, have been put to good use. Dr. Roger Broughton in conjunction with Drs. K. Meier-Ewert, M. Ebe and G. Celesia, have used these techniques to study various forms of sensory evoked responses in man, recording them both from the scalp and from the exposed cortex in the operating room. These studies have provided valuable new information con-

cerning the mechanism of stimulus-sensitive myoclonus and the cortical projection of the somato-sensory system in man. These techniques have now been sufficiently developed to make their introduction as diagnostic aids feasible.

Another research interest pursued by this Laboratory during the past year has been the elucidation of the cause of cerebral seizures, sometimes amounting to fatal status epilepticus, which were observed in a number of patients who underwent open-heart surgery with cardiac bypass in the Royal Victoria Hospital. Dr. K. Seamans spent much effort in unravelling the factors causing seizures in these patients. In collaboration with a team of the Cardiac Surgery Department of the Royal Victoria Hospital, he has analyzed some of the relevant factors in a series of experiments carried out on dogs and has been able to pinpoint the mechanism responsible for these seizures.

The studies on the use of intracarotid Sodium Amytal and Metrazol injections in epileptic patients have been continued and the technique of this procedure has been further refined. An attempt is now being made to test the usefulness of this procedure in patients with bilateral temporal epileptiform abnormalities occurring independently on the right and left side.

Our Laboratory was well represented at last year's International EEG Congress in Vienna and at the Second Advanced Course in Electroencephalography in Salzburg, which preceded the main Congress. We had the opportunity there to report on our experience and procedures used in the EEG diagnosis of seizures in adult patients.

As usual, the Fellows who spent some time in our Laboratory were a mixed international group, who have come to us from many countries in Europe, Asia, South America and this continent. We had the pleasure to have among us, as a visiting scientist, Dr. M. Ebe from Japan, whose previous experience in the study of visually evoked potentials was of very great assistance to our research program.

Teaching in EEG and related fields both for Fellows and Technicians, has been conducted in the form of informal seminars, conferences and lectures, thus supplementing the on-the-job instruction that goes on in our laboratory at all times.

In concluding, we wish to thank the Fellows, the Technicians and all of the Laboratory personnel for their dedication and hard work.

EXPERIMENTAL NEUROPHYSIOLOGY

Consultant ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M.

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

Fellows:

JEAN-JACQUES DREIFUSS, M.D. (Geneva, Switzerland) Canada Council Fellow

ALAIN GODIN, M.D., (Univ. of Montreal), M.R.C. Fellow*

ANTHONY GORMAN, Ph.D. (Rochester, N.Y.) U.S.P.H.S. Fellow

AGAPITO LORENZO, M.D. (Philippines)

JOHN T. MURPHY, M.D., (Columbia University, New York) U.S.P.H.S. Fellow*

TOSHIKIYO SHOHMORI, M.D., Ph.D., (Okayama, Japan)

ROY STEINBERG, M.D. (New York), U.S.P.H.S. Fellow*

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

Chief Electronic Technician ..... MR. EDDIE PUODZIUNAS

* Six months on this service

Most of the investigations conducted during the past year in the Laboratory of Experimental Neurophysiology have grown out of research interests which have been pursued in this Institute for many years. One of these has been concerned with the mechanism of interaction between limbic structures of the temporal lobe, especially the amygdala, and the hypothalamus. In the past year Drs. Jean-Jacques Dreifuss and John T. Murphy have taken up this problem anew by recording the activity of single hypothalamic cells with extracellular microelectrodes and by analyzing the data with digital computer techniques. New insights have been gained into the complex mechanisms whereby limbic structures activate or inhibit cells in various subdivisions of the hypothalamus.

This Laboratory has also, for many years, shown a special interest in the analysis of the electrophysiology of the cerebral cortex, especially with regard to the mechanism of epileptic seizures. The possibility that the sodium-potassium-pump mechanism may be impaired during seizure states has prompted us to follow up this lead by applying a pharmacological method to the analysis of cortical activity. Drs. A. Lorenzo and T. Shohmori have therefore used topical cortical application of Ouabaine, a cardiac glycoside known to paralyze the sodium-potassium-pump mechanism, in order to study the alteration of cortical electrical activity, resulting from a progressive inactivation of this pump mechanism.

In the course of 1965 some research projects mentioned in last year's report have come to conclusion and reached the stage of publication. Thus, Dr. Roy Steinberg completed his studies on retinal activity and has published his findings in the Journal of Neurophysiology. Dr. Anthony Gorman wound up his experiments on the action of polarizing currents upon the cortical neurons. Dr. Alain Godin completed his studies on the effect of motor cortex efferents upon cells in the V.L. nucleus of the thalamus.

One of the greatest needs of our Laboratory at the present time is the acquisition of some modern equipment, to supplement some of the older, more

traditional recording apparatus with which we are well endowed. The greatest need is for a computerized magnetic tape recording system, that would allow on-line analysis of the activity of single nerve cells, and it is hoped the necessary funds will be found to make this acquisition possible within the near future.

As in the past, the Neurophysiology Laboratory has been used by other departments for the conduction of animal experiments. Thus, the Neurochemistry and the Radioisotope Laboratories, the Department of Anaesthesia and the Neuropathology Department have made use of our facilities. A total of 262 experimental procedures were carried out in 1965. It is therefore fitting to express our gratitude to Miss Mary Roach and her assistants, who have borne the brunt of the daily chores and who kept the work in the Laboratories running smoothly and efficiently. We also wish to express our apppreciation to our Electronic Technicians, Mr. Eddie Puodziunas and Mr. Réal Archambault, who have done a first-rate job in keeping our recording equipment up to date and in good functioning order. Our Consulting Electronic Engineer, Mr. Ralph Jell, has also given us much valuable advice, for which we are very grateful.

NEUROPATHOLOGY

Neuropathologist ..... GORDON MATHIESON, M.B., Ch.B., M.Sc.
Assistant Neuropathologist ..... STIRLING CARPENTER, A.B., M.D.

Fellows:

NICOLAS BUENDIA, M.D. (Colombia)**
GIORGIO CARBONIN, M.D. (Italy)*
G. TH. A. M. BOTS, M.D. (Holland)**
DANIEL COWAN, M.D. (McGill)*
AMADO ESPINA, M.D. (Venezuela)*
DANILO GUZMAN, M.D. (McGill)*
FRANCIS LEBLANC, M.D. (Ottawa Univ.)*
MORTIMER LECHTER, M.D. (Queen's Univ.)*
CHARLES NEEDHAM, M.D. (Albany Univ.)**
JOHN REED, M.D. (Duke Univ.)*
JEAN-LOUIS RIBADEAU-DUMAS, M.D. (Paris)*
ARTHUR SCHWARTZ, M.D. (part time)
GUR SHARAN SINGH, M.D. (Punjab, India)

Chief Technicians:

BARBARA NUTTALL, B.A., ART
JOHN GILBERT, RT

* Six months on this service
** Three months on this service

The year under review has been one of change and development and has brought with it the seeds of further growth. First and foremost, we report the welcome arrival of Dr. Stirling Carpenter who joins the department as attending neuropathologist. Dr. Carpenter, who was previously a Fellow in this department, has since had extensive experience in clinical neurology and subsequently in neuropathology at the Armed Forces Institute of Pathology and in California. He brings with him skills in ultrastructural investigation which will play a key role in the future development of the department.

Along with the increase in staff goes an extension of our physical facilities in the form of a projected suite of rooms which will house the electron microscope along with the associated space for preparation, ultra-thin

sectioning and a darkroom for processing electron micrographs. This, together with space for one further Fellow and office accommodation for Dr. Carpenter, will be an extension of approximately 1000 square feet on the 6th floor above the X-ray film storage room. Detailed plans for this have been completed, and we expect the work to commence within a few weeks.

We are indebted to the Medical Research Council of Canada for a capital equipment grant of $38,837.00 towards the cost of the electron microscope.

While waiting for our own laboratory to be built, Dr. Carpenter has been able to work in the electron microscope laboratory of the Pathological Institute through the courtesy of Dr. Huntingdon Sheldon. A number of specimens of cerebral biopsies have been embedded. A study of one of these, a case of spongy degeneration of the central nervous system, is in progress and initial observations on this will be reported at the June meeting of the Canadian Neurological Society. In addition, an investigation is being initiated into experimental Purkinje cell degeneration in guinea pigs secondary to intrathecal injection of eosinophil leukocytes.

In the tissue culture laboratory, Dr. Arthur Schwartz continues his studies on mitotic activity in glial tumors using cultures in Leighton tubes and labelling with tritiated thymidine.

Dr. Gilles Bertrand has relinquished his position with respect to surgical neuropathology. We thank him for his help over the past years and trust that his accumulated experience will be available to us in consultation in the future.

Meanwhile there is a continuous "background activity" of autopsy and surgical neuropathology from which selected cases are subject to detailed study and presentation at our Thursday afternoon neuropathology conference. During the calendar year of 1965, a total of 86 patients dying in the Institute were the subject of autopsy study. This represents 81.9% of the total deaths in the Institute. In addition, 54 studies were made of material from outside the Institute, mainly brains of patients dying in the Royal Victoria Hospital.

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 ..... HENRY GARRETSON, B.S., M.D. (Harvard). MARIUS HEUFF, M.D. (Utrecht, Holland).

Consulting Physicist ..... CHRISTOPHER HASLAM, B.Sc., M.Eng., Eng.

Chief Technician ..... JANE HARRIS, B.Sc.

1. *Brain Scanning and Cerebral Circulation Laboratory.*

The work of this clinical laboratory increased during 1965, with 1,369 scans on 630 patients as compared to 1,137 scans on 518 patients in 1964.

More than twice as many patients were examined during this past year as compared to 1963 though with no increase in either equipment or space. About one quarter of the patients were referred from outside hospitals, including the Royal Victoria, Hotel Dieu, Royal Edward, Queen Elizabeth, Queen Mary Veterans, Jewish General and St. Mary's Hospitals. In addition, 144 radioisotopic cerebral circulation studies were completed, some 30 of these being special intracarotid catheter studies made in the operating theatre using the new combined radioisotopic-dye technique for cortical angiography.

Obviously this increase of work has only been effected by close scheduling of patients and much effort by the entire laboratory staff, with many scans completed and reported in overtime hours and maintenance of electronic equipment often carried out during week-ends.

Though the newly developed cerebral circulation studies have now been found to be valuable for the investigation of patients with cerebral vascular disorders, for example, in differentiating between tumours and ischemic lesions, their application has been seriously limited because of the shortage of space. Only one clinical scanning room is available and this has been almost entirely taken up with the great increase in the number of patients referred for examination. This means that the circulation studies which require a different set of equipment and readjustment of electronic circuits can only occasionally be fitted in during the busy time-table. A second clinical isotope laboratory is sorely needed with extension of facilities and addition of equipment.

The present brain scanning apparatus built in 1959 has been almost replaced in stages over the past five years and has done good mileage. It will shortly need complete replacing with a new type of scanning equipment which, like X-ray equipment, is initially expensive and requires costly upkeep.

While a number of new radioisotopic tracers such as Technectium^{99m} became available recently for brain scanning, the results of other laboratories which we have so far scrutinized have indicated no advantages at present over the use of Mercury^{197} which has continued to prove very satisfactory in detecting almost 90% of brain tumours. Macro-aggregates of radioiodinated albumin have also been used elsewhere by intracarotid injection to provide microemboli which become trapped temporarily in the capillary bed of the cerebral circulation and by external scanning can thereby show up variations in the vascularity of the brain. But because of the risks attendant upon the use of this material and because of the fact that both brain scanning for the detection of tumours, or for the demonstration of cerebral infarcts has, if anything, been inferior as compared to the standard methods, we have not considered the use of this particulate matter justifiable.

As noted above more patients have been referred from outside hospitals and also from the medical and surgical Wards of the Royal Victoria Hospital. This is due partly to the active interests of the Neurological Teaching Fellows and partly to increasing recognition of brain scanning as a useful screening technique in patients suspected of having intracranial disorders. Nevertheless,

this additional patient load has severely taxed our facilities and personnel. The professional, technical and clerical staff are to be commended for managing this busy year.

2. *The Cone Laboratory for Neurosurgical Research.*

While we seem to have reached something of a plateau in regard to space, equipment and finances, this is not true of new ideas, research projects, or the number of unsolved problems, and the research program has continued to be active during 1965.

The technique of quantitative cortical angiography to study the circulation of the brain during its exposure at operation has continued to be developed and refined and has provided much practical and interesting information on regional cerebral blood flow. Studies on twenty patients were completed and analyzed both from their practical value, for example, as an aid in the surgery in angiomas and aneurysms, and in regard to the new knowledge of the blood supply to the brain in man. The rapid photographic sequence method developed by Mr. Hodge has been further improved and has yielded elegant anatomical displays of the surface vessels of the human brain. Reports were presented at the International Congress for Neurological Surgery in Copenhagen and at an International Symposium on Human Capillary Circulation at the University of West Indies in Jamaica.

We are grateful to a generous anonymous donor for a grant which made possible the purchase of special photograph equipment by which this new serial technique can be achieved and by which funds are also available to permit colour-plate publication of selected examples. Additional grants were received from the Medical Research Council of Canada, the National Cancer Institute as well as continuing funds from the Cone Memorial Endowment.

Studies in the cat and monkey brain on the dynamics of cerebral vascular occlusion monitored by radioisotopic tracers and Coomassie Blue dye were begun by Dr. Yamamoto and Dr. Heuff with the help of Miss Jane Harris. The pathological anatomy of these experimental brains after micropaque injection of the blood vessels are being examined by X-ray microscopy by Dr. Richard Saunders and his team at Dalhousie University, Halifax. Dr. Garretson continued his Doctorate Thesis on the glioma transplants studied by radioactive thymidine for analysis of the tumour mitotic cycle. With Dr. Yamamoto and the technical staff Dr. Garretson also began a series of studies on patients with occult hydrocephalus and memory disturbances exploiting the Xenon circulation technique, with CSF pressure recording combined with cerebral biopsy.

Toward the end of the academic year a substantial beginning was made on the application of Sodium Fluorescein as a new intravascular tracer to display the microcirculation of the brain. These studies have so far provided excellent display of the anatomical features of the cerebral vascular bed and have given additional information which can be incorporated into the previous radioisotopic and dye studies. This multiple approach using angiography of

the microcirculation by radioactive tracers and coloured dyes and followed by experimental studies collaborating with Dr. Saunders' group in the use of the X-ray microscopic technique has given an opportunity to investigate systematically a number of basic problems of the cerebral circulation both in the laboratory and under conditions of the operating theatre.

During the year the complex equipment in both laboratories has been kept in excellent condition by Mr. George Lootus who has also devised new equipment both for experimental and clinical use. Mr. Christopher Haslam returned to McGill to continue his Doctoral research but continued as a Consulting Physicist in 1965. Dr. Yamamoto has kept up his liaison appointment as Visiting Scientist to the Brookhaven National Laboratory. We are pleased to welcome Miss Jane Harris, B.Sc., who joined us as a Senior Radioisotopic Technician.

Dr. Marius Heuff continued his work with electromagnetic flow meters and reviewed a series of patients with brain tumours to evaluate brain scanning as a method of follow-up examination.

The needs of these two laboratories in the near future include:

(1) A second clinical radioisotope laboratory.

(2) Additional electronic and radioisotopic equipment for external circulation studies.

(3) A separate radioisotopic equipment unit for operating room studies which will obviate the trundling of heavy equipment from various parts of the Institute to the operating room.

(4) Replacement of the present brain scanner which is now becoming worn out.

(5) Expansion of the laboratory research program into the animal experimental field which will require additional technical staff.

LABORATORY FOR RESEARCH IN CHRONIC NEUROLOGICAL DISEASES

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

Research Associate ..... Allan Sherwin, B.Sc., M.D., C.M., Ph.D., F.R.C.P., Markle Scholar

Research Assistant ..... Dr. Morven McIlquham, B.A., M.D., C.M.

"True science suppresses nothing but goes on searching, and is undisturbed in looking straight at things that it does not yet understand" — Claude Bernard.

This dictum of the great French clinical investigator has continued to guide us during the past year and we have persisted in the search for more information which will lead us to a better understanding of the many problems presented to us by chronic neurological diseases.

Dr. Sherwin has developed excellent laboratory facilities and is to be congratulated on the quality of the work which he is supervising. During the past year he has completed a long-term study on chronic allergic neuropathy. This represents the first long-term study in the rabbit and the first demonstration to produce a long lasting neuropathy by immunological methods. In addition, he has completed an extensive study of antigens in hypertonic saline extracts of bovine sciatic nerves and similarly prepared extracts of bovine spinal cord. Results are in general agreement with our previous comparison of optic and sciatic nerves in the human. He has also carried out a study of the value of the determination of lactodehydrogenase isoenzyme distribution in brain tumours. This was done with the cooperation of the neurosurgical pathology department in a double blind study and it was found that abnormal isozyme patterns are found in virtually all malignant gliomas, being more marked in glioblastomas as well as in cerebral metastases. In epilepsy no difference in isozyme pattern was found between spiking and non-spiking tissues nor between different areas of the cerebral cortex excised. Developmental work has also been done on the fluorometric assay of lactodehydrogenase total enzyme activity and isoenzyme fractions. It is hoped that this will be of great value in controlling future studies of these isoenzymes in central nervous tissue. In cooperation with Dr. El-Haili from the department of urology of the Royal Victoria Hospital he has also participated in a study of the clinical value of lactodehydrogenase isoenzymes in cancer of the prostate.

Clinical studies have continued on the problems of Multiple Sclerosis. This year we have welcomed Dr. Morven McIlquham as Research Assistant. She has assisted in the Multiple Sclerosis clinic at the Royal Victoria Hospital and is collaborating with the computer centre at McGill in a natural history study of Multiple Sclerosis. It is foreseen that the data obtained from the study of patients' histories can be compared with other centres and will be used as a control group for long-term studies of therapeutic agents.

Dr. Melvill Jones from the department of physiology has guided us in the development of direct current electrical recording of eye movements and has supplied us with an optokinetic stimulator to study internuclear ophthalmoplegia in patients with Multiple Sclerosis. This technique promises to be of value in the early diagnosis of some cases of Multiple Sclerosis and subclinical ocular palsies.

We have been particularly pleased to be associated with Dr. Pattee and Dr. Murphy from the Clinical Investigation Unit at Queen Mary's Veterans' Hospital. They have kindly carried out cortisol determinations in the cerebral spinal fluid of neurological disorders and are collaborating in physiological studies of permeability of cortisol into cerebrospinal fluid from the blood under varying conditions in the human patient. Preliminary results suggest that the technique will have importance in the investigation of cortisone

therapy in neurological diseases as well as in the problems of cerebral edema. In the past year the laboratory has also supplied the clinical services of the hospital with electrophoretic protein determinations of blood in cerebral spinal fluid. Eight hundred and six separate determinations were carried out last year.

No modern scientific laboratory can run without technicians. We would like to record here our appreciation of the careful, conscientious, and imaginative work carried out during the past year by Mrs. E. Mehlhose, Mr. R. Laviolette, and Mr. L. Hunt.

PSYCHOLOGY

Neuropsychologist and Medical Research Council Associate	BRENDA MILNER, Ph.D.
Assistant Neuropsychologist	LAUGHLIN B. TAYLOR, B.Ed., M.Sc.
Research Associates	ANTHONY W. H. BUFFERY, Ph.D. (Cantab.) ETIENNE PERRET, Ph.D. (Neuchâtel)
Research and Clinical Assistants	ALICE DAVID, L.Ps. (Paris) RUTH RADBILL, M.A.

The main research programme of this department continues to be the study of the selective effects of focal brain lesions on different aspects of perception and memory in man. Patients undergoing brain operations of varying locus and extent for the relief of epilepsy are examined before and after operation and, wherever possible, in long-term follow-up study. Such work has a two-fold purpose: to increase our understanding of human brain function, and gradually to provide additional diagnostic guides for the assessment of patients with focal epilepsy.

This year the careful, quantitative studies of sensory discrimination initiated by Dr. Suzanne Corkin have been further developed by Mr. L. B. Taylor, with the addition of new tests. As in the past, we are indebted to the nursing department and to the technical staff of the institute for aid in the standardization of our ever-growing number of research tests.

Dr. Etienne Perret has just completed a two-year study of motor function in patients with different cortical excisions and also in Dr. Gilles Bertrand's series of patients undergoing stereotaxic surgery for Parkinson's disease. Dr. Perret will be returning to Zurich shortly, to set up a Neuropsychology Laboratory in Professor Krayenbühl's department. We wish him every success in this new venture.

Dr. Anthony Buffery has carried out a preliminary study of short-term memory, using a delayed matching technique adapted from work with lower primates. Dr. Buffery has now returned to take up a research appointment at Cambridge University, but his work here will be continued by Mme. Alice David.

In collaboration with Dr. Branch and Dr. Rasmussen, we have continued to study speech representation and memory by the Wada technique of intracarotid injection of Sodium Amytal. The results for 212 consecutively studied cases indicate some measure of bilateral speech representation in about 15 per cent of the left-handed or ambidextrous patients in this series.

The auditory functions of the temporal lobe continue to excite our interest. This year, Mrs. Linda Swisher, a graduate student in Dr. D. G. Doehring's department, has been making a precise, systematic study of intensity discrimination before and after unilateral temporal lobectomy, which should provide a valuable complement to the studies of more complex auditory discrimination carried out previously by Dr. Doreen Kimura, Dr. Donald Shankweiler and Mr. L. B. Taylor. We welcome this inter-departmental collaboration.

During the past year Dr. Corkin, Dr. Kimura, and Dr. Shankweiler have all been frequent visitors, continuing to participate actively in our on going research and bringing us new ideas and new tests. We hope that they will continue to visit us during the coming year.

NEUROANATOMY

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

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.

Visiting Research Fellow in Neuroanatomy ..... OTTO R. HOMMES, M.D. (Amsterdam), Ph.D. (Utrecht).

The undergraduate and graduate teaching activities have been carried on, as in previous years. We were fortunate in having Dr. Walle Nauta of the Department of Psychology, Massachusetts Institute of Technology as Visiting Neuroanatomist for a series of Lecture-Demonstrations during the winter months, which were very well attended.

Dr. Hommes completed a quantitative study of the infundibular nucleus in man following hypophysectomy. He also completed a series of experimental studies of the development of neuroglia, in association with Professor Leblond of the Department of Anatomy, McGill. Dr. Hommes has returned to the University of Nijmegen, Holland.

Dr. Morton is continuing his researches on the human hypothalamus following hypophysectomy.

DEPARTMENT OF NEUROPHOTOGRAPHY

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

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

The past year has been a very active one for this department, making and supplying visual aids to all departments of the hospital and institute.

Over one thousand charts and graphs were completed. Two movies with magnetic sound tracks are well on their way to completion. Thousands of feet of 16 mm. movie film in our files could be edited to make about fifteen short teaching films. It is hoped that before long more of this film will be edited.

During this past year, over 95% of the slides were made in 35 mm. size. We have copied for some departments all of the old 3-¼ x 4 inch slides on to 35 mm. size, and hope to discontinue soon this larger size of slide.

In new developments, we have again continued the special project involving rapid sequence photography during cerebral circulation studies in the operating room with Dr. Feindel and the research staff of the Cone Laboratory. Four colour pictures a second are exposed during intracarotid injections of Coomassie Blue dye and this documentation of blood flow in the vessels on the surface of the brain has provided a new means of anatomical study. We have also had some promising results photographing intracarotid fluorescein injections into the cerebral vessels using for this a technique which we developed a few years ago for fluorescent photomicrography. The development of this work is being continued.

Michael Smith, who left this department to begin a photographic section in the Department of Physiology of the University of Montreal, has been replaced by Edward Rupnick.

At the annual meeting of the Biological Photographic Association in Philadelphia during the year, Mr. Hodge was one of the first few to pass the qualification and receive a certificate as a Registered Biological Photographer.

TUMOUR REGISTRY

DR. ARTHUR R. ELVIDGE

During 1965 the records of 249 patients have been processed by the Tumour Registry. This represents somewhat more than 10 percent of the total admissions to the Montreal Neurological Hospital. The number of verified tumours was 126. In the course of treatment 100 operations for removal of tumour were performed which represents some 14 percent of the major surgery in the Montreal Neurological Hospital. Roentgenotherapy was employed, either in addition to, or without major surgery, in 69 patients. Clinic visits amounted to 143 patients, a substantial increase over 1964.

As frequently stated, the purpose of the Tumour Registry is to record the follow-up data of patients treated at the Montreal Neurological Hospital for suspected and verified tumour involving the nervous system. This information is obtained from Outdoor Clinics, private offices, referring doctors and, when necessary, from the Department of Demography of the Province of Quebec, or of the particular Province concerned. Clinic patients are encouraged to return for follow-up examination, are reminded of their treatment schedules and are aided in certain problems by the Department of Social Service. This is of value to the patient and to the supervising doctor. The records serve as source material for research in tumour growth, and evaluation of results under different forms of treatment.

The industrious secretary of the Tumour Registry is Mrs. G. Guthro, who is sincerely thanked for conscientious and efficient service. Dr. M. Heuff carried on the duties of Fellow of the Tumor Registry during this year. The Registry of the Montreal Neurological Hospital is a branch of the Central Tumour Registry of the Royal Victoria Hospital, which is under the supervision of Dr. E. J. Tabah. Returns are made via the Central Tumour Registry to the Tumour Registry of the Province of Quebec which was established in 1961, and which has published annual reports since 1962. These will be a valuable source of basic knowledge in regard to general tumour statistics among the total population. Cooperation with the Tumour Registry of the Province of Quebec is much appreciated.

Dr. O. Solis, last year's Tumour Registry Fellow, completed a systematic clinical follow-up and histological study of a large series of so-called unclassified gliomas with an attempt at reclassification and evaluation of therapy, a portion of which is being prepared for publication. From some of this material he made a special study of hyperchromatic nuclei in relation to survival, in the process of writing a thesis for the M.Sc. degree, in which he was successful. Dr. Heuff hopes to correlate evidence shown by brain scanning techniques with radioactive isotopes for the presence of tumour at various stages of growth and re-growth, in the Neuro-isotope laboratory, in association with Dr. Feindel and Dr. Yamamoto. Dr. B. Barone is completing an extensive review of the ependymomas. He was associated in the publication of "The Long Term Postoperative Survival in Two Cases of Glioblastoma Multiforme". Dr. E. Berger has completed a survey of 140 metastatic tumours which occurred in the years 1950-63 inclusive. An analysis of those prior to 1950 is already on record. All cases of tumour have been followed since 1950. Most occurring before that date have been investigated in connection with various research projects.

The long term follow up of tumours with histological control is of considerable basic importance and on the practical side the optional treatment for a particular variety of tumour can eventually be recommended. A few points to illustrate may be of interest.

It seems now certain that an astrocytoma of the piloid variety will not recur if completely removed with or without the addition of x-ray therapy. The astrocytoma diffusum may have a survival of several years with only a

partial removal and x-ray treatment. The longest survival (deceased) recorded to date is 18½ years. On the other hand one patient has been known to have survived 9 years without removal or x-ray therapy.

The medulloblastomas fare about as well on the average with biopsy and roentgenotherapy as with radical removal and roentgenotherapy. X-ray therapy combined with radical removal has doubled the average length of survival of glioblastoma multiforme. X-ray therapy with removal has also doubled the average survival in the case of the unclassified gliomas. Interesting and important exceptions occur as in the patient who had no recurrence over 24 years, of a glioblastoma with radical removal but without the benefit of x-ray therapy. The reasons for the phenomena observed in follow-up are continuously under study.

FELLOWS' LIBRARY

DR. DONALD L. MCRAE

In the past year there were 1,176 loans of books and journals to our staff, 95 loans to McGill University, University of Montreal, other Universities and Hospitals and Pharmaceutical Companies. There were 99 loans requested for our staff from other libraries.

Though the Fellows' Library remains small, the special holdings in Neurology and related sciences are used not only by the fellows and staff but also by some 100 or more "Regular Users" in other departments of the nearby hospitals and medical school.

Of 158 current journals, 64 are purchased from budget and 94 are received as gifts or exchanges. Shortage of space allows for less than half of these to be kept as long-term holdings. During 1965, 80 books were purchased and 71 received as gifts. Six Doctorate or Master theses were filed in the Library by the post-graduate students in the Institute. Two new journals, Experimental Brain Research and the Current Catalogue of the National Library of Medicine, were subscribed.

The 75 linear feet of new bookshelves added to the Library during the year have already been filled. The problems of insufficient space and insufficient funds for essential new books continue to plague us. Since the problem of space and the problem of increased acquisition are related, no partial solution seems possible.

Miss Sandra Duchow, our Librarian, in addition to numerous reference services, has compiled a holdings list of journals, catalogued the Cone Collection and prepared a report on the history of the Library and its resources. The committee wishes to express its gratitude to Miss Duchow for her splendid work. The committee also is most grateful to the members of the Hospital and Institute and other friends of the Library who have donated books, monographs and journals as a mark of their continuing interest and support.

MONTREAL NEUROLOGICAL SOCIETY

President	DR. CLAUDE GAUTHIER*
Vice-President	DR. GILLES BERTRAND
Secretary-Treasurer	DR. PHANOR PEROT

Twenty-three meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held from October 13th, 1965 to May 18th, 1966.

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

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

DR. JAMES L. MCGAUGH, Associate Professor and Chairman, Department of Psychobiology, University of California: "Time-Dependent Processes in Memory Storage."

DR. KENNETH CASEY, Research Associate, Department of Psychology, McGill University: "Nociceptive Mechanisms in the Thalamus of the Awake Squirrel Monkey."

DR. R. L. DE C. H. SAUNDERS, Professor of Anatomy, Dalhousie University: "X-Ray Microscopy of the Human Cerebral Micro-Circulation."

DR. JOHN STOBO PRICHARD, Hospital for Sick Children, Toronto, Ont.: "A Neurologist in Thailand."

DR. JACOB CHANDY, Professor of Neurology & Neurosurgery, Dean of Medical School, Christian Medical College, Vellore, S. India: "Surgery of Tubercular Diseases of the Nervous System."

DR. HENRI HECAEN, Médecin des Hôpitaux Psychiatriques, Paris, France: "Les Agraphies."

DR. GIAN FRANCO ROSSI, Clinica Neurochirurgica de l'Universita di Genova: "Experimental Analysis of Cerebral Dominance in Man."

DR. JOHN R. GRAHAM, Headache Research Foundation, The Faulkner Hospital, Boston, Mass.: "Treatment of Migraine."

DR. EBEN ALEXANDER, Jr., Professor of Neurosurgery, Bowman Gray School of Medicine, Winston-Salem, N.C.: "Cervical Spine Fractures."

DR. OTTO R. HOMMES, Department of Anatomy, McGill University and Department of Neuroanatomy, M.N.I.: "Mitosis of Glia Cells."

DR. JACQUES SUSSET, Department of Urology, Royal Victoria Hospital: "Recent Advances in Neurogenic Vesical Dysfunction."

DR. MARC COLONNIER, Department of Physiology, University of Montreal: "The Structural Design of the Neo-Cortex."

DR. HENRY DE F. WEBSTER, Mass. General Hospital, Boston, Mass.: "The Ultrastructure and Physiology of Anoxia and Hypoglycemia in Nervous Tissue."

* Members of the Society were deeply saddened by the untimely death of our president, Dr. Claude Gauthier on Jan. 3, 1966.

DR. JAMES A. F. STEVENSON, Professor of Physiology, University of Western Ontario Medical School: "Signals and Systems for Feeding."

DR. DAVID HUBEL, Department of Neurophysiology, Harvard University: "The Visual Cortex and Perception."

DR. M. G. YASARGIL, Professor of Neurosurgery, University of Zurich, Zurich, Switzerland: "The Rôle of the Lenticulostriate Arteries in Cerebral Vascular Occlusive Diseases."

DR. ROGER SPERRY, Division of Biology, California Institute of Technology: Annual Hughlings Jackson Lecture of the M.N.I. — "Mental Unity and Surgical Disconnection of the Cerebral Hemispheres."

FELLOWS' SOCIETY

President.....DR. DANILO GUZMAN
Vice-President.....DR. KEITH SEAMANS
Secretary-Treasurer.....DR. FRANK LEBLANC

During the year 1965-1966, the Fellows' Society again had a successful academic and social year. The academic activities included addresses by several distinguished speakers. These were — Dr. M. G. Yasargil, Zurich, Switzerland; Dr. John Bates, London, England; Dr. John Stobo Prichard, Toronto, Canada; Dr. Henri Hecaen, Paris, France; Dr. Gian Franco Rossi, Genova, Italy; Dr. John R. Graham, Boston, U.S.A.; Dr. Eben Alexander, Winston-Salem, U.S.A.; and Dr. James A. F. Stevenson, London, Ontario. The traditional Christmas and winter parties were once again held and greatly enjoyed by all.

To close the academic year, the Tenth Annual Fellows' Society Lecture will take place on June 17th, 1966. Dr. Robert H. Pudenz will speak on "Experiences in the Treatment of Trigeminal Neuralgia". This will be followed by the banquet, where Drs. R. Nelson, M. Lechter and P. Grisham will assume the offices of President, Vice-President and Secretary-Treasurer respectively.

CLINICAL APPOINTMENTS AND FELLOWSHIPS*

Appointments to the Resident Staff in Neurology or Neurosurgery are made for January 1st or July 1st. An internship in an approved hospital is required.

The posts of 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.

* 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 Director's office and provide names of reference.

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

Appointments for periods of research and training in the laboratories are made by the Director for the Chief of the laboratory in question. A limited number of research stipends are available for these laboratory appointments.

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

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

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

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. See McGill booklet "Faculty of Medicine".

GRADUATE

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

NEUROANATOMY

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

601. Graduate seminars in coordination with Course 611.

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

603. Advanced Neuroanatomy for selected group; times to be arranged.
Professor McNaughton and Staff

NEUROPHYSIOLOGY

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

611. Weekly seminars and demonstrations 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 Gloor and Wolfe

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

Staff and Visiting Lecturers

630. SEIZURE MECHANISM AND CEREBRAL LOCALISATION: Clinical Electroencephalographic and Roentgenographic Conference.
M.N.I. 1 hour weekly (9 months). Tuesdays, 4:00 — 5:00 p.m.

Professors Rasmussen, Gloor, McRae, and Milner

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

Professor Wolfe

NEUROPATHOLOGY

650. Six months laboratory work in Neuropathology.

Professors Mathieson and Carpenter

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

Professors Mathieson and Carpenter

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

ELECTROENCEPHALOGRAPHY

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

671. Seminar in Electroencephalography (including clinical EEG Conferences) Fridays 4:30 — 6:00 p.m., October and November, January and February.

Professors Gloor, Lloyd-Smith and Broughton

MONTREAL NEUROLOGICAL INSTITUTE

PUBLICATIONS

1965-66

BERTRAND, G., BLUNDELL, J. and MUSELLA, R. Electrical Exploration of the Internal Capsule and Neighbouring Structures during Stereotaxic Procedures. *Journal of Neurosurgery*, v. 22, 1965, pp. 333-343.

BRINDLE, G. F., GILBERT, R. G. B., and MCGRATH, J. J. Cardiovascular and Respiratory Observations during Cerebral Angiography. *Anesthesia and Analgesia; Current Researches*, v. 44, 1965, pp. 565-575.

COCEANI, F. and WOLFE, L. S. Prostaglandins in Brain and the Release of Prostaglandin-like Compounds from the Cat Cerebellar Cortex. *Canadian Journal of Physiology and Pharmacology*, v. 43, 1965, pp. 445-450.

CORKIN, S. Tactually-guided Maze Learning in Man: Effects of Unilateral Cortical Excisions and Bilateral Hippocampal Lesions. *Neuropsychologia*, v. 3, 1965, pp. 339-351.

COSGROVE, J. B. R. and AGIUS, P. Studies in Multiple Sclerosis. I. Normal Values for Paper Electrophoresis of Serum and Cerebrospinal Fluid Proteins; Description of the Method with Special Reference to a Practical Concentration Technique for Cerebrospinal Fluid Protein. *Neurology*, v. 15, 1965, pp. 1155-1160.

COSGROVE, J. B. R. and AGIUS, P. Studies in Multiple Sclerosis. II. Comparison of the Beta-gamma Globulin Ratio, Gamma Globulin Elevation, and First-zone Colloidal Gold Curve in the Cerebrospinal Fluid. *Neurology*, v. 16, 1966, pp. 197-204.

EISEN, A. H., KARPATI, G., LASZLO, T., ANDERMANN, F., ROBB, J. P. and BACAL, H. L. Immunologic Deficiency in Ataxia Telangiectasia. *New England Journal of Medicine*, v. 272, 1965, pp. 18-22.

ELLIOTT, K. A. C. My Colleague Q. *Canadian Journal of Biochemistry and Physiology*, v. 43, 1965, pp. vii-ix.

ELVIDGE, A. R. Treatment of Obstructive Lesions of the Aqueduct of Sylvius and the Fourth Ventricle by Interventriculostomy. *Journal of Neurosurgery*, v. 24, 1966, pp. 11-23.

ELVIDGE, A. R. and BARONE, B. M. Long-term Postoperative Survival in Two Cases of Glioblastoma Multiforme. *Journal of Neurosurgery*, v. 22, 1965, pp. 382-386.

FEINDEL, W. The McGill Tercentenary Edition of The Anatomy of the Brain and Nerves by Doctor Thomas Willis. *McGill Medical Journal*, v. 34, 1965, pp. 151-156.

FEINDEL, W. Memory and Speech Function in the Temporal Lobe in Man, in *Brain Function. Vol. II; RNA and Brain Function; Memory and Learning*, M.A.B. Brazier, ed. University of California, Los Angeles Forum Medical Science No. 2, University of California Press, Los Angeles, 1964, pp. 277-298.

FEINDEL, W. Phrenology in Medicine. Lancet, v. 1, 1965, p. 322.

FEINDEL, W. ed. Tercentenary Edition of *The Anatomy of the Brain and Nerves* by Thomas Willis, Montreal, McGill University Press, 1965, 2 vols.

FEINDEL, W., GARRETSON, M. and YAMAMOTO, Y. L. Blood Flow Studies in the Pial and Cortical Circulation in Man Using Intracarotid Radioactive Tracers. *In Third International Congress of Neurological Surgery, Copenhagen*, August, 1965. Excerpta Medica Foundation, 1965, p. 104 (Abstract).

FEINDEL, W., GARRETSON, H., YAMAMOTO, Y. L., HASLAM, C. and HEUFF, M. Analysi of the Blood Flow Pattern in the Pial and Cortical Circulation in Man. *Acta Neurologica Scandinavica* (Kobenhavn), Supp. 14, 1965, pp. 187-189.

FEINDEL, W., GARRETSON, H., YAMAMOTO, Y. L., PEROT, P. and RUMIN, N. Blood Flow Patterns in the Cerebral Vessels and Cortex in Man Studied by Intracaroti Injection of Radioisotopes and Coomassie Blue Dye. *Journal of Neurosurgery* v. 23, 1965, pp. 12-22.

FEINDEL, W. and PEROT, P. Brain Injury from Civilian and Industrial Missiles, i *Accident Surgery*, H. F. Moseley, ed. New York, Appleton-Century-Crofts, 1965 v. 3, Chap. 5, pp. 45-58.

FEINDEL, W. and PEROT, P. Red Cerebral Veins. A Report on Arteriovenous Shunts i Tumors and Cerebral Scars. *Journal of Neurosurgery*, v. 22, 1965, pp. 315-325.

GALINDO, A. Hepatic Circulation and Hepatic Function During Anaesthesia and Surgery. *Canadian Anaesthetists' Society Journal*, v. 12, 1965, pp. 262-274.

GALINDO, A. Hepatic Circulation and Hepatic Function During Anaesthesia and Surgery. (II. The Effect of Various Anaesthetic Agents). *Canadian Anaesthetists' Society Journal*, v. 12, 1965, pp. 337-348.

GALINDO, A., MACLEAN, L. D., GILBERT, R. G. B., BRINDLE, G. F. Hepatic Circulation and Hepatic Function During Anaesthesia and Surgery. (III. Chloroform-induced Liver Injury.) *Canadian Anaesthetists' Society Journal*, v. 12, 1965, pp. 443-449.

GILBERT, R. G. B. Operative Posture and Circulation. *Laval Medical*, v. 36, 1965, pp. 578-582.

GLOOR, P. Contributions of the EEG Towards Diagnosis in Adults with Seizures, in *Second Advanced Course in Electroencephalography*. M. A. B. Brazier, O. Magnus and H. Petsche, eds. Salzburg, Verlag Wiener Medizinische Akademie, 1965, pp. 59-80.

GLOOR, P., GARRETSON, H. and RASMUSSEN, T. Further Studies on the Effects of Intracarotid Amobarbital and Metrazal Injections Upon Epileptiform Discharges in Man. *Proceedings of the 6th International Congress of Electroencephalography and Clinical Neurophysiology*. Vienna, September 1965, pp. 45-47.

HANSEBOUT, R. R. and BERTRAND, G. Intraspinal Teratoma Simulating Protruded Intervertebral Disc. *Journal of Neurosurgery*, v. 22, 1965, pp. 374-379.

JACOB, J. C., GLOOR, P., ELWAN, O. H., DOSSETOR, J. B. and PATERAS, V. R. Electroencephalographic Changes in Chronic Renal Failure. *Neurology*, v. 15, 1965, pp. 419-429.

JASPER, H. and STEFANIS, C. Intracellular Oscillatory Rhythms in Pyramidal Tract Neurones in the Cat. *Electroencephalography and Clinical Neurophysiology*, v. 18, 1965, pp. 541-553.

KARPATI, G., EISEN, A. H., ANDERMANN, F., BACAL, H. L. and ROBB, P. Ataxia telangiectasia. Further Observations and Report of Eight Cases. *American Journa of Diseases of Children*, v. 110, 1965, pp. 51-63.

MCNAUGHTON, F. L. and LLOYD-SMITH, D. Drugs for Major Epileptic Seizures. *Canadia Medical Association Journal*, v. 93, 1965, pp. 607-608.

MCRAE, D. L. The Cervical Spine and Neurologic Disease. *The Radiological Clinics o North America*, v. 4, 1966, pp. 145-158.

MCRAE, D. L. Habenular Calcification as an Aid in the Diagnosis of Intracranial Lesions *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine* v. 94, 1965, pp. 541-546.

MILNER, B. Visually-guided Maze Learning in Man; Effects of Bilateral Hippocampal Bilateral Frontal, and Unilateral Cerebral Lesions. *Neuropsychologia*, v. 3, 1965 pp. 317-338.

MUSELLA, R. Effects of Bilateral External Carotid Artery Ligation on Cerebral Circulation in the Rabbit. I. Arteriographic Aspects. *Archivio di Scienze Biologiche* (Bologna), v. 49, 1965, pp. 1-18.

MUSELLA, R. Effects of Bilateral External Carotid Artery Ligation on Cerebral Circulation in the Rabbitt. II. Hemodynamic Aspects. *Archivio di Scienze Biologiche* (Bologna), v. 49, 1965, pp. 19-40.

MUSELLA, R. Effects of Bilateral External Carotid Artery Ligation on Cerebral Circulation in the Rabbit. III. Influence on Collateral Circulation in the Brain. *Archivio di Scienze Biologiche* (Bologna), v. 49, 1965, pp. 41-53.

PAPPIUS, H. M. The Distribution of Water in Brain Tissues Swollen *in vitro* and *in vivo*, in *Progress in Brain Research*, E.D.P. De Robertis, and R. Carrea, eds. *Biology of Neuroglia*, Amsterdam, Elsevier, 1965, v. 15, pp. 135-154.

PAPPIUS, H. M. and DAYES, L. A. Hypertonic Urea — Its Effects on the Distribution of Water and Electrolytes in Normal and Edematous Brain Tissues. *Archives of Neurology*, v. 13, 1965, pp. 395-402.

PAPPIUS, H. M., DAYES, L. A. and DOSSETOR, J. B. Cerebral Swelling Associated with Rapid Hemodialysis of Uremic Dogs. *Journal of Neuropathology and Experimental Neurology* (Abstract), v. 24, 1965, p. 147.

PENFIELD, W. Speech, Perception and the Uncommitted Cortex, in *Study Week on Brain and Conscious Experience, September 28 — October 3, 1964*. Vatican City, Pontificia Academia Scientiarum, 1965, pp. 319-347.

PENFIELD, W. Conditioning the Uncommitted Cortex for Language Learning. *Brain*, v. 88, 1965, pp. 787-798.

PENFIELD, W. Science Knows no Boundaries. *Science*, v. 147, 1965, pp. 909-910.

PEROT, P. and MUSELLA, R. Observations on the Pathogenesis and Surgical Treatment of Syringomyelia. *Neurochirurgia*, v. 8, 1965, pp. 90-97.

RASMUSSEN, T. Horizons in Neurosurgery, in *Horizons in Neurological Education and Research*. Springfield, Illinois, Charles Thomas, 1965, pp. 72-81.

RASMUSSEN, T. and GLOOR, P. Temporal Lobe and Centrencephalic Epilepsy. *Electroencephalography and Clinical Neurophysiology*, v. 18, 1965, p. 205 (Abstract).

ROBB, P. Epilepsy and its Medical Treatment. *Canadian Nurse*, v. 61, 1965, pp. 171-173.

SAUNDERS, R. L. DE C. H., FEINDEL, W. H. and CARVALHO, V. R. X-ray Microscopy of the Blood Vessels of the Human Brain. *Medical and Biological Illustration*, v. 15, 1965, pp. 108-122, and v. 15, 1965, pp. 234-246.

SHEPHARD, D. A. E. Harvey Cushing and Anaesthesia. *Canadian Anaesthetists' Society Journal*, v. 12, 1965, pp. 431-442.

SHERWIN, A. L., KARPATI, G. and LAVIOLETTE, R. The Blood-cerebrospinal Fluid Barrier to Antibodies in Experimental Allergic Encephalomyelitis and Neuritis. *Revue Canadienne de Biologie*, v. 24, 1965, pp. 277-283.

STEFANIS, C. and JASPER, H. Strychnine Reversal of Inhibitory Potentials in Pyramidal Tract Neurones. *International Journal of Neuropharmacology*, v. 4, 1965, pp. 125-138.

STEINBERG, R. H. Alterations of Averaged Photic Evoked Potentials in Cat Visual Cortex During Repetitive Stimulation. *Electroencephalography and Clinical Neurophysiology*, v. 18, 1965, pp. 378-391.

WEIR, B. The Morphology of the Spike-wave Complex. *Electroencephalography and Clinical Neurophysiology*, v. 19, 1965, pp. 284-290.

WOLFE, L. S. Nervous Tissue, in *Hawk's Physiological Chemistry*, B. L. Oser, ed. New York, McGraw-Hill, 1965, pp. 233-247. (14th ed.)

WOLFE, L. S., COCEANI, F. and SPENCE, M. W. Prostaglandins in Brain. *Proceedings of the 8th International Congress of Neurology, Vienna, September, 1965*, v. 4, pp. 159-164.

MONTREAL NEUROLOGICAL HOSPITAL

BALANCE SHEET AS AT DECEMBER 31, 1965

ASSETS and DEFICIT

GENERAL FUND		
Cash		$ 1,093
Accounts receivable — less provision for doubtful accounts		142,683
Inventories of supplies — at the lower of cost or replacement cost		20,896
		164,672
Deficit (note 1)		493,691
		658,363
PLANT FUND		
Cash		40,574
Buildings — at cost (note 2)		2,825,588
Equipment — at cost	$1,563,079	
Accumulated depreciation	874,745	688,334
		3,554,496
		4,212,859

LIABILITIES and CAPITAL

GENERAL FUND		
Accrued salaries		49,371
Due to the Royal Institution for the Advancement of Learning		
Current Account		164,672
Advances to cover deficit		444,320
		658,363
PLANT FUND		
Due to Quebec Hospital Insurance Service		207
Due to the Royal Institution for the Advancement of Learning		23,372
		23,579
Capital		3,530,917
		3,554,496
		$4,212,859

AUDITORS' REPORT

May 6, 1966

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

We have examined the balance sheet of Montreal Neurological Hospital as at December 31, 1965 and the statements of operations and deficit for the year ended on that date and have obtained all the information and explanations we have required. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion, and according to the best of our information and the explanations given to us and as shown by the books of the hospital, the accompanying balance sheet and statements of operations and deficit, when read in conjunction with the notes thereto, are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the hospital as at December 31, 1965 and the results of its operations for the year ended on that date in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

McDonald, Currie & Co.
Chartered Accountants

MONTREAL NEUROLOGICAL HOSPITAL

STATEMENT OF DEFICIT
FOR THE YEAR ENDED DECEMBER 31, 1965

	Shareable $	Non-Shareable $	Total $
BALANCE — BEGINNING OF YEAR	349,364	301,319	650,683
Adjustment of prior years' deficit	—	(7,917)	(7,917)
Reclassification of certain 1963 expenses on advice of the Minister of Health (net)	(11,453)	11,453	—
Amounts received from the Quebec Hospital Insurance Service			
1963 final payment	(117,627)	—	(117,627)
1964 interim payment	(168,000)	—	(168,000)
	52,284	304,855	357,139
Net operating deficit (surplus) for the year	176,729	(40,177)	136,552
BALANCE — END OF YEAR (note 1)	229,013	264,678	493,691

STATEMENT OF OPERATIONS
FOR THE YEAR ENDED DECEMBER 31, 1965

	Shareable $	Non-Shareable $	Total $
OPERATING EXPENDITURE			
Salaries and wages	1,701,742	—	1,701,742
Medical and surgical supplies and drugs	136,464	—	136,464
Depreciation on equipment	97,692	—	97,692
Sundry supplies, services and expenses	583,739	6,213	589,952
	2,519,637	6,213	2,525,850
OPERATING REVENUE			
Hospital Insurance Service			
In-Patients (note 1)	1,331,764	—	1,331,764
Equipment depreciation fund payments	97,692	—	97,692
In-patients, other	656,289	49,677	705,966
Out-patients	79,227	—	79,227
Grants —			
Province of Quebec	90,000	—	90,000
City of Montreal	67,500	—	67,500
Sundry revenue	20,436	(3,287)	17,149
	2,342,908	46,390	2,389,298
NET OPERATING DEFICIT (SURPLUS) FOR THE YEAR (note 1)	176,729	(40,177)	136,552

Note 1. SHAREABLE DEFICIT — Interim payments under the Quebec Hospital Insurance Act are based on the budget for 1965 approved by the Provincial Department of Health and are subject to adjustment following a review of actual expenditures by the Minister of Health as provided for in the Act. Accordingly the hospital is appealing to the Minister of Health for recovery of the 1965 shareable deficit of $176,729 and the unpaid balance of the 1964 shareable deficit amounting to $52,284. Recoveries in respect of these amounts will be reflected in the statements of deficit of future years.

Note 2. BUILDINGS — The hospital has not provided for depreciation of its buildings which do not qualify for depreciation allowances under the Quebec Hospital Insurance Act.

MONTREAL NEUROLOGICAL INSTITUTE

RESEARCH AND TEACHING EXPENDITURE SUMMARY FOR THE YEAR ENDING DECEMBER 31, 1965

from Major MNI Endowment Funds	$209,860.00
from MNI Special Funds	127,950.00
from General University Funds	9,200.00
from Medical Research Council Block Term Grant	75,000.00
from Various Annual Research and Fellowship Grants	176,007.00
TOTAL EXPENDITURE	$598,017.00

ENDOWMENTS

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

FELLOWSHIP ENDOWMENTS

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

RECURRING ANNUAL GRANTS

1947 — Medical Research Council Block Term Grant

GRANTS FOR SPECIAL PROJECTS

Federal-Provincial Health Grants — Dr. McNaughton
— Dr. Rasmussen

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

U.S. Public Health Grants — Dr. Milner

National Cancer Institute of Canada Grants — Dr. Garretson

John and Mary Markle Foundation Fellowship — Dr. Sherwin

Medical Research Council of Canada Grants — Dr. Sherwin
— Dr. Wolfe

Medical Research Council of Canada Associateships — Dr. Milner
— Dr. Wolfe

Medical Research Council Major Equipment Grant — Dr. Mathieson

DONATIONS TO SPECIAL FUNDS — 1965-66

ANAESTHESIA RESEARCH FUND:	
Anonymous	$15,000.00
BORDEN COMPANY FOUNDATION FELLOWSHIP FUND:	
BRAIN RESEARCH FUND:	
Mr. A. Murray Vaughan	500.00
Mrs. A. Murray Vaughan	500.00
Mrs. Howard Pillow	3,000.00
CANCER CLINICAL RELIEF FUND:	
Cancer Aid League	3,000.00
WILLIAM CONE MEMORIAL RESEARCH FUND:	
Anonymous	5,000.00
In Memory of the Late Dr. Reuben Rabinovitch	690.00
Mr. John Langdon	450.00
Mr. and Mrs. J. C. Conrad in Memory of Mr. John Conrad	60.00
The Harold Crabtree Foundation	1,000.00
Dr. David Berger	25.00
Col. K. B. Jenckes	75.00
Drs. Feindel and Garretson	190.00
Mrs. Alice Russel	5.00
COSGROVE RESEARCH FUND:	
Anonymous	200.00
Mrs. Treva Troutman	50.00
Mr. Peter Grauer	50.00
DICK EPILEPSY FUND:	
GORDON LIBRARY FUND:	
HARVEY CUSHING CLINICAL RELIEF FUND:	
Miss L. Sandler	25.00
Mr. J. Clare Wilcox	100.00
Mr. Maurice Gabes	10.00
Miss Mary Dey	25.00
Women's Auxiliary of the Royal Victoria Hospital	1,500.00
HOSPITAL EQUIPMENT FUND:	
Women's Auxiliary of the Royal Victoria Hospital	500.00
MADISON WALTER MEMORIAL FUND:	
MARY MASSABKY FOUNDATION RESEARCH FUND:	
A. G. Massabky	213.00
MISCELLANEOUS SPECIAL FUNDS:	
Miss Suzanne Cohen in Memory of the Late Mr. G. Cohen	30.00
Mrs. B. Sandiford	38.00
In Memory of the Late Mr. Malcolm Beaton	148.00
In Memory of the Late Mr. John W. Robinson	180.70
M.N.I. NEUROSURGICAL RESEARCH FUND:	
M.N.I. STAFF LOAN FUND:	
MULTIPLE SCLEROSIS CLINICAL RELIEF FUND:	
Montreal Society for Multiple Sclerosis	100.00
Multiple Sclerosis Golf League	300.00
Montreal Assoc. for Multiple Sclerosis	500.00
In His Name Society	25.00

MULTIPLE SCLEROSIS RESEARCH FUND:

MCNAUGHTON NEUROANATOMY RESEARCH FUND:

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

NEUROLOGICAL RESEARCH FUND:

Estate of the Late Mrs. J. W. Watson	25,000.00
Mr. Sander Johnson	15.00
Mr. Joe Rubins	1,000.00
J. W. McConnell Foundation	3,000.00
Mrs. Kathleen Laing	9,000.00
Mr. Louis Reitman	300.00
Mr. Imre Cholnoky	100.00
Mrs. Robert Austrian	100.00

NEUROPHYSIOLOGY RESEARCH FUND:

NEURORADIOLOGY RESEARCH AND TEACHING FUND:

Dr. Giacomo Vessa	500.00

NURSING FUNDS:

EILEEN C. FLANAGAN NURSING BURSARY FUND:

Anonymous	40.00
Mrs. Beatrice Hampson	50.00
Mr. B. Usheroff	50.00
M.N.I. Graduate Nurses' Society	35.00

M.N.I. NURSING EDUCATION FUND:

Mrs. Beverley Coons	100.00
Mrs. Sam Reitman	300.00

OAKLAWN FOUNDATION FELLOWSHIP FUND:

Oaklawn Foundation	2,000.00

PENFIELD RESEARCH FUND:

REUBEN RABINOVITCH MEMORIAL RESEARCH FUND OF THE CANCER RESEARCH SOCIETY:

Cancer Research Society	8,000.00

LEWIS REFORD FELLOWS FUND:

ROBINS RESEARCH FUND FOR VASCULAR DISEASES:

WOMEN'S AUXILIARY FUND:

STATISTICS
CLASSIFICATION OF DISEASES

Nervous System Generally:

Multiple Sclerosis	127	
Motor Neurone Disease	17	
Miscellaneous	2	
		146

Meninges:

Meningocele & Myelomeningocele	3	
Acute Purulent Meningitis	10	
Headache	64	
Vertigo	5	
Subdural Haematoma	21	
Intracerebral Haematoma	9	
Epidural Haematoma	8	
Subdural Hygroma	1	
Subarachnoid Haemorrhage	27	
Intracerebral Haemorrhage	9	
C.S.F. Rhinorrhea	6	
Miscellaneous	4	
		167

Brain:

Congenital Anomalies	15	
Hydrocephalus	17	
Abscess	8	
Syncope	4	
Contusion, Laceration, Traumatic Encephalopathy	75	
Concussion	170	
Epilepsy	344	
Migraine	37	
Parkinsonism	44	
Thrombosis, Encephalopathy due to Arteriosclerosis	195	
Cysts	6	
Intracranial Aneurysm	19	
Encephalitis	16	
Gunshot Wound	3	
Narcolepsy	4	
Amnesia	2	
Miscellaneous	8	
		978

Tumours:

Gliomas	27
Perineurial Fibroblastoma	2
Meningeal Fibroblastoma	15
Craniopharyngioma	7
Angioma	2
Glioblastoma Multiforme	20
Metastatic Carcinoma	40
Astrocytoma	27
Medulloblastoma	4
Ependymoma 4th Ventricle	2
Neurofibroma	4
Stenosis Aqueduct of Sylvius	2
Chromophobe Adenoma Pituitary	18

Sacral Radiculopathy due to Metastases	4
Cholesteatoma	4
Oligodendroglioma	4
Bronchogenic Carcinoma	7
Sarcoma	6
Tuberose Sclerosis	2
Brain Tumours — Miscellaneous	17
	214

Spinal Cord:

Contusion of Spinal Cord	4
Compression of the Spinal Cord	6
Degeneration of Spinal Cord	2
Guillain-Barré Syndrome	6
Myelopathy	9
Syringomyelia	5
Diastematomyelia	3
Cervical Spondylosis	12
Transverse Myelitis	5
Hydromyelia	2
Miscellaneous	4
	58

Cranial & Peripheral Nerves:

Optic Neuritis	6
Trigeminal Neuralgia	40
Meniere's Syndrome	14
Compression Ulnar Nerve	2
Other Neuralgias	10
Neuropathy	14
Carpal Tunnel Syndrome	2
Bell's Palsy	7
Palsy — Cranial Nerves	11
Miscellaneous	15
	121

Muscles:

Myasthenia Gravis	10
Muscular Atrophy	7
Polymyositis	3
Spasmodic Torticollis	14
Miscellaneous	9
	43

Mental Diseases:

Mental Retardation	23
Depression	16
Anxiety State	13
Conversion Hysteria	16
Alzheimer's Disease	12
Schizophrenia	2
Psychoneurosis	2
Personality Change	3
Miscellaneous	2
	89

Other Systems:

Protrusion Disc — Lumbar	236	
— Cervical	23	
Fracture and/or Dislocation of Vertebral Column	57	
Fracture Skull	65	
Pain in Back	30	
Pain — Miscellaneous	31	
Traumatic Lesions & Infections	31	
Hyperthyroidism	5	
Arthritis	7	
Diabetes Mellitus	9	
Miscellaneous	15	
		509

Craniotomy or Craniectomy:

and Biopsy	11
and Decompression	6
and Drainage of Abscess	2
and Drainage of Subdural Haematoma	9
and Drainage of Intracerebral Haematoma	8
and Drainage of Extradural Haematoma	6
and Elevation of Depressed Skull Fracture	15
and Excision of Epileptogenic Focus (Lobectomy)	45
and Excision, Clipping or Wrapping of Aneurysm	16
and Exploration	11
and Hemispherectomy	2
and Hypophysectomy for Endocrine Control	4
and Hypophysectomy for Pituitary or Intra-Sellar Tumour	11
and Incision, Drainage or Removal of Cyst	3
and Plastic Repair of Dura (C.S.F. Rhinorrhea or Fistula)	8
and Plastic Repair of Skull Defect (Plate, Bone or Plastic)	13
and Removal of Adhesions	1
and Removal of Arteriovenous Malformation	4
and Removal of Cerebral Tumour	62
and Removal of Posterior Fossa Tumour	13
and Removal of Tumour of Skull	1
and Trigeminal Massage or Decompression	1
and Trigeminal Rhizotomy	12
and Ventriculocisternostomy (Torkildsen's)	5
	26

Trepanation:

and Aspiration of Cyst	1
and Biopsy	2
and Drainage of Subdural Space	9
and Exploration	2
and Ventricular Puncture	1
and Ventriculography	11
and Leucotomy	1
	27

Shunt Procedure:

Lumbar Subarachnoid-Peritoneal	1
Ventricular-Caval	17
Ventricular-Peritoneal	3
	2

Stereotaxic Procedure:

and Placement of Electrodes for Aneurysm	5
and Ventriculography	29
and Second Stage (Thalamotomy)	25
	5

Laminectomy or Laminotomy:

and Anterolateral Cordotomy — Cervical	1
and Anterolateral Cordotomy — Thoracic	8
and Biopsy	2
and Decompression or Exploration of Spinal Cord for Spondylosis (Dentate Ligament Section)	10
and Decompression or Exploration of Spinal Cord (Trauma)	3
and Decompression or Exploration of Spinal Cord (Tumour or Vascular Malformation)	8
and Discoidectomy — Lumbosacral	105

and Discoidectomy — Cervical	9	
and Incision and Drainage of Intra-Medullary Cyst (Syringomyelia)	1	
and Removal of Adhesions	2	
and Removal of Tumour — Intra-Medullary	1	
and Removal of Tumour — Extra-Medullary, Intradural	3	
and Rhizotomy	13	
and Spinal Fusion with Bone Graft — Autogenous or Bone Bank	52	
and Spinal Fusion with Wire or Plate	3	
and Spinal Fusion — Cervical-Occipital	4	
Discoidectomy — Anterior Approach — Cervical	5	
Plastic Repair of Spina Bifida	2	
		232
Nerve Explorations:		
and Anastomosis or Suture	1	
and Avulsion or Section	12	
and Excision of Neuroma	1	
and Neurolysis, Transplantation or Decompression	4	
		18
Artery Exploration:		
and Endarterectomy (Patch-Graft)	3	
and Progressive Occlusion (Selverstone Clamp)	3	
and Temporary Occlusion	3	
		9
Wound Re-Opening:		
and Drainage of Infection	1	
and Evacuation of Haematoma	8	
and Exploration	10	
and Further Removal of Brain Tissue	3	
and Further Removal of Epileptogenic Focus	1	
and Removal of Bone Flap, Tantalum Plate or Wire Mesh	4	
and Repacking	3	
and Resuturing	6	
		36
Miscellaneous:		
Suture of Laceration or Wound	12	
Tracheotomy	12	
Miscellaneous	31	
		55
Radiological Procedures:		
Cerebral Angiography — Percutaneous, (Carotid, Vertebral or Subclavian)	372	
Cerebral Angiography — Catheterization (Brachial, Femoral or Carotid)	92	
Pneumograms under Anaesthesia	55	
		519
TOTAL		1,245

CAUSES OF DEATH

Head Injury (concussion, contusion, haematomata, etc.)	29
Cerebrovascular Disease (thrombosis, infarction haemorrhage)	27
Intracranial Aneurysm (haemorrhage and haematomata due to aneurysm)	10
Carcinoma (generalized)	14
Intracranial Tumour, Metastatic	7
Intracranial Tumour, Primary	8
Multiple Injuries	2
Other Systems	6
Miscellaneous Neurological Diseases	2
TOTAL	105