Thirty-second Annual Report

of the

MONTREAL NEUROLOGICAL INSTITUTE

and

MONTREAL NEUROLOGICAL HOSPITAL

and the

DEPARTMENT OF NEUROLOGY AND NEUROSURGERY

of

McGILL UNIVERSITY

1966-1967

CONTENTS

MONTREAL NEUROLOGICAL INSTITUTE AND HOSPITAL

REPORT OF THE DIRECTOR

DR. THEODORE RASMUSSEN

This has been our 32nd year, and all reports give ample evidence that it was indeed an eventful one. The clinical aspects of the following reports are directed to the Board of Management of the Hospital Corporation whereas the reports on teaching and research are directed to the Principal and the Board of Governors of McGill University, but it is only the financial aspects that are actually separate. In all other respects, we are reporting our strivings as a cohesive and integrated unit working toward excellence in patient-care, teaching and research. This report is also made to the community at large, and, in particular, to say thank-you to the many friends, individuals and organizations, whose generous donations have helped both in clinical work and research during the past year.

The distressing events of last summer's strike need no further comment, except to emphasize again our gratitude to our nursing staff and to the other members of the professional and non-professional staffs for their magnificent work in keeping essential services functioning, and to record our thanks to Mr. Finlayson, who as President of the Board of Management provided valuable leadership at crucial stages in the negotiations, both in Montreal and in Quebec.

Centennial projects are in the air everywhere this year, and we, too, have ours. The installation of a fourth elevator in the McConnell wing is completed and provides welcome relief from elevator-traffic congestion. The noisiest project, making noise which is music to our ears, is well under way, renovating most of the basement areas and services, and providing for the addition of the electron microscope suite to the Laboratory of Neuropathology. This work, of necessity, is being done in phases, and completion of the final phase in scheduled for the end of the summer.

Another project is the streamlining of our administration. This was precipitated by Mr. Charles Noel's promotion to the post of Business Manager of McGill, and by the marked increase in administrative man-hours required by the union contract imposed on us by the Quebec Hospital Insurance Service last summer, as well as by the need to relieve Dr. Robb of the heavy load of hospital administration he has carried so well and so willingly for the past 16 years.

Mr. Charles Gurd has been appointed to the newly created position of Administrator. He brings both familiarity with McGill administration and

extensive business experience to a challenging and, we hope, inter new post. Mr. Geoffrey Thomas has been promoted to Comptroller an manage the Business Office, and Mr. Hector Heavysege has been app Director of Personnel. Mr. Noel takes with him, to his new post dow hill, our best wishes and our gratitude and thanks for his efficien devoted work at the helm of the Business Office during the past six ye

The arrival of the initial installments of the Killam Bequest faci the implementation of three of our long-range plans. An important exp of the Laboratory of Neuroanatomy was provided by the appointmer summer of Dr. Jacques Courville, a Montrealer who came to us v background of neurophysiological training at the University of Mc under Dr. Jean-Pierre Cordeau, followed by three years of advanced w neuroanatomy in Oslo under Dr. Alf Brodal, our Neuroanatomical Le of 1963.

The Killam Bequest is also facilitating the establishment of a c and research programme on diseases of muscle, in which Dr. Agapito Lc will handle the electromyographic aspects and Dr. George Karpati the c and histochemical aspects, when he returns to Montreal and joins our N logy staff this summer. With the assistance of Dr. Robb, Dr. Ande and Dr. Baxter, it is hoped that this programme will develop into an imp collaborative effort with the Montreal Children's Hospital and the Mc General Hospital.

Thirdly, the Killam Bequest has enabled us to expand Mr. Ralph valuable part-time work, in some of the electronic aspects of our clinic experimental neurophysiological activities, into a full-time appointme Biomedical Engineer to the Institute and Hospital.

The Scholarship portion of the Killam Bequest becomes function summer, with three appointments now approved by the Trustees.

Twenty-two years ago, Dr. Penfield pried Don McRae out c Canadian Navy to take over the Neuroradiology Department of the Ins Building on the foundations laid by Dr. Penfield and Dr. Arthur Chil has developed a department of world renown, and one which has play increasingly vital rôle in the care of most of the patients that have here for investigation and treatment throughout these years. On Jul Dr. McRae takes over responsibility for the Department of Radiology Sunnybrook University Hospital, recently purchased by the Univers Toronto from the D.V.A. for the sum of $1.00. The University is, of c paying rather more for Don's services, I understand! Our sadness in him is tempered by the honour and recognition this appointment repr

and by the knowledge that the challenges of this new opportunity will provide additional dimensions to his career.

A worthy successor and a popular member of our Radiology staff for six years, Dr. Roméo Ethier, will take over from Dr. McRae, with Dr. Denis Mélançon and Dr. Jean Vézina as his associates. With this skilled, young and energetic triumvirate in charge, we have full confidence that Neuroradiology will continue to advance to new levels of achievement, service and prestige.

We also welcome to the Staff Dr. Andrée Pinault, Assistant Anaesthetist, who replaces Dr. Sever Kovachev who resigned last fall to accept a post south of the border.

Last Thursday's newspapers reported the final staff item to be noted here — Dr. Penfield's selection as the winner of the Royal Bank of Canada's Centennial Award for contribution "to the common good and human welfare of Canada and the world society" — sending a thrill of pride through all of us. This award, made from nominees representing all aspects of Canadian life, is a splendid tribute to the breadth of Dr. Penfield's interests and contributions, and to the continuing productivity of his many-sided career.

As we look ahead to Medicine of the future, in the light of the increasingly rapid expansion of medical knowledge and potentialities, and in the light of the changing patterns of medical practice, Canada's growing population and the increasing need for the medically-sophisticated countries of the world to aid the development of medical services in other countries, it is clear that our teaching hospitals face drastically augmented demands in the immediate future. The Institute is no exception, and the pressure for more space and facilities, for nearly all services and departments, makes it essential for us to seriously consider expanding to the south, in the area between the original building and the Pathological Institute.

The planning of essential facilities such as these, and the establishment of priorities, are our immediate responsibilities, but we must turn to others for help in transforming plans and blueprints into buildings and laboratories. The Government, through its Health Resources Fund and Federal-Provincial Health Grants has money ear-marked for this purpose, but the financial needs of the Province's medical schools and teaching hospitals far outstrip the sums presently available. Both increased governmental support and support from the community are urgently needed, if the Province's medical schools and the medical profession are to have any realistic hope of coping with the community's medical needs of the next decade, without a serious drop in quality of the services provided.

Of even greater importance is the necessity for governmental pol to take more active cognizance of the various special rôles of the teac hospitals in the broad sweep of the nation's health field, and of their sp needs that must be met so that these special responsibilities can be s factorily discharged.

Governmental regulatory policies established through the clauses sections of the Hospital Act, and the charter of the College of Physic and Surgeons of the Province of Quebec, must permit and encourage hos organizational structures of sufficient flexibility to allow each teac hospital to combine its service and educational and research functions, i own most effective and productive way. Forcing the Province's hosp of all types into an unduly restrictive strait jacket of regulations, wit due regard for local administrative freedom in meeting the constantly chan problems that differ widely in various types of hospitals, will inevitably l a deleterious effect on the health services of the community.

Governmental fiscal policies, through the Q.H.I.S., must also contin recognize the special rôles and the special needs of the teaching hospi and the way in which patient-care and educational and research funct must be inextricably combined and intertwined, if the teaching hospitals to make their maximum contribution to the citizens' health needs of present and the future.

Thorny, but vital, political and social problems seem to be the orde the day, even in the no-longer-so-ivory towers of the medical schools teaching hospitals. Yet, fortunately, fascinating and always changing ne logical and neurosurgical clinical problems, and the laboratory lures of unknown, are constantly at our elbows, correcting our perspectives clamouring for attention in the continually widening search for better un standing of the 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.)
IRVING HELLER, M.D., C.M., M.Sc., Ph.D.

Assistant Neurologists
FREDERICK ANDERMANN, B.Sc., M.D.
BERNARD GRAHAM, B.A., B.Sc., M.D., C.M.
GEORGE KARPATI, M.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.

Radiologists
DONALD MCRAE, M.D.*
ROMÉO ETHIER, B.A., M.D. †

* Resigned June 30, 1967
† Appointed July 1, 1967

Associate Radiologist
JEAN VÉZINA, B.A., B.M., M.D.*

Assistant Radiologist
DENIS MÉLANÇON, 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 Electroencephalographer and Clinical Neurophysiologist
AGAPITO LORENZO, M.D.

Assistant Electroencephalographers
FREDERICK ANDERMANN
DONALD LLOYD-SMITH

Biomedical Engineer
RALPH JELL, B.S.

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
ALBERT PACE-FLORIDIA, B.Pharm., M.D.
ANDRÉE PINAULT, 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.

Associate 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
MRS. CLARA STRAUSS, B.A., M.A.

Neuroanatomist
JACQUES COURVILLE, B.A., M.D., M.Sc.

Appointed July 1, 1967

CONSULTING AND ADJUNCT CLINICAL STAFF

Consulting Pathologist	Robert H. More, M.D., M.Sc., F.R.C.P. (C)
Consulting Psychiatrist	Robert Cleghorn, M.D., D.Sc., F.R.C.P. (C)
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. Israel Libman, B.A., M.D., C.M., F.R.C.P. (C) 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	Albert Aguayo, M.D., F.R.C.P. (C) 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. Robert Ford, B.A., M.D., F.R.C.S. (C) 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)
Adjunct Physiologist (Anaesthesia)	Kresimir Krnjevic, B.Sc., M.B., Ch.B., Ph.D.
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. (Cant
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	ALBERT AGUAYO J.B.R. COSGROVE IRVING HELLER ALLAN SHERWIN WILLIAM TATLOW
Lecturers, Neurology	FREDERICK ANDERMANN MORRISON FINLAYSON BERNARD GRAHAM
Demonstrators, Neurology	ANDREW EISEN ROBERT NELSON NAUNIHAL SINGH
Cone Professor of Neurosurgery	WILLIAM FEINDEL
Associate Professors, Neurosurgery	GILLES BERTRAND JOHN BLUNDELL JOSEPH STRATFORD
Assistant Professors, Neurosurgery	CHARLES BRANCH HAROLD ELLIOTT ROBERT FORD HENRY GARRETSON PHANOR PEROT
Demonstrators, Neurosurgery	JEROME DAVIS MARIUS HEUFF FRANCIS LEBLANC
Associate Professor, Clinical Neurophysiology	PIERRE GLOOR
Assistant Professors, Clinical Neurophysiology	ROGER BROUGHTON AGAPITO LORENZO
Lecturer, Clinical Neurophysiology	ISRAEL LIBMAN
Assistant Professor, Neuroelectronics	RALPH JELL
Associate Professor, Neurochemistry	LEONHARD WOLFE
Assistant Professor, Neurochemistry	HANNA PAPPIUS
Associate Professors, Neurological Radiology	DONALD MCRAE* ROMÉO ETHIER †
Assistant Professors, Neurological Radiology	DENIS MÉLANÇON † JEAN VÉZINA †

* Resigned June 30/67.
† Appointed July 1/67

Professor and Chairman, Department of Anaesthesia, McGill ..... RICHARD GILBERT

Associate Professor of Anaesthesia, McGill ..... G.F. BRINDLE

Assistant Professor of Anaesthesia, McGill ..... ANIBAL GALINDO

Associate Professor, Neuropathology ..... GORDON MATHIESON

Assistant Professor, Neuropathology ..... STIRLING CARPENTER

Demonstrators, Neuropathology ..... WILLIAM MCCANN
BRYCE WEIR

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

Lecturer, Neuroanatomy ..... ALLAN MORTON

Demonstrator, Electroencephalography ..... LEWIS HENDERSON

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

Professors ..... WILLIAM FEINDEL
THEODORE RASMUSSSEN

Associate Professors ..... PIERRE GLOOR
LEONHARD WOLFE

EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL HOSPITAL

President ..... S.M. FINLAYSON

Vice-President (to May 15, 1967) ..... A.D.P. HEENEY

Vice-President (from May 15, 1967) ..... H. DE M. MOLSON

Director ..... THEODORE RASMUSSEN

Deputy Director and Secretary (to May 15, 1967) ..... PRESTON ROBB

Financial Administrator and Treasurer (to May 1, 1967) ..... CHARLES NOEL

Administrator (from May 1, 1967) ..... CHARLES GURD

Registrar ..... BERNARD GRAHAM

Assistant Registrar ..... DANICA VENECEK

Controller (from May 1, 1967) ..... GEOFFREY THOMAS

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 1966 - JUNE 1967

Senior Neurosurgical Resident — FRANCIS LEBLANC, M.D. (Univ. of Ottawa)

Neurological Services

Teaching Fellows:

ANDREW EISEN, M.D. (Leeds Univ.)
ROBERT NELSON, M.D. (Dalhousie Univ.)*
KEITH SEAMANS, M.D. (New Brunswick)*

Residents:

NICOLAS BUENDIA, M.D. (Bogota, Colombia)*
KULDIP SACHDEV, M.D. (Punjab, India)
MICHEL DROLET, M.D. (Laval Univ.)
FELIPE VALLE, M.D. (San Luis Potosi, Univ. Mexico)*
PHILIP GRISHAM, M.D. (Seattle)*
JOHN WOODS, M.D. (Dublin, Ireland)*
YVAN-CLAUDE MICHAUD, M.D. (Laval, Univ.)*

Assistant Residents:

JAN BULCKE, M.D. (Louvain, Belgium)*
LESLIE STERN, M.D. (Manitoba Med. School)*
GONZALO CHONG, M.D. (Lima, Peru)*
JOHN WOODS, M.D. (Dublin, Ireland)*
CARL DILA, M.D. (Wayne State Univ. Mich.)*, U.S.P.H. Fellow

R.V.H. Rotators:

J. BELICK, M.D. — R. EVANSON, M.D. — G. ST. ONGE, M.D. — M. SIMARD, M.D.
J.R. BUNCIC, M.D. — T. MURRAY, M.D. — J. ST. LAURENT, M.D. — A. SNIDERMAN, M.D.
J. EMMETT, M.D. — A. RABINOWITCH, M.D. — J.E. SHUMAN, M.D. — G.R. VANLOON, *M.D.*

M.G.H. Rotators:

D. ANDERSON, M.D. — K. PRINDLE, M.D. — H. RABIN, M.D. — L. RENAUD, M.D.
J. AUDET, M.D.

Neurological Research Fellow: — MORTIMER LECHTER, M.D. (Queen's Univ.) Sir Edward Beatty Memorial Scholar

Neurosurgical Services:

Residents:

JEROME DAVIS, M.D. (New York)*
FEDERICO ANGEL, M.D. (Bogota, Colombia) Q.M.V.H. Resident*
ROBERT HANSEBOUT, M.D., M.Sc. (Univ. of Western Ont.)*
GARY ASHBY, M.D. (Univ. of Toronto) M.C.H. Resident*
MARIUS HEUFF, M.D. (Utrecht, Holland)
JEROME DAVIS, M.D. (New York) M.C.H. Resident*
GEORGE MATHEWS, M.D., (Madras, India) M.G.H. Resident*
CHARLES NEEDHAM, M.D. (Albany Med. Coll.) M.G.H. Resident*

Assistant Residents:

SURAPONG AMBHANWONG, M.D. (Thailand)
GARY ASHBY, M.D. (Univ. of Toronto)*
RAUL MARINO, M.D. (San Paulo, Brazil)*
CHARLES NEEDHAM, M.D. (Albany Med. Coll.)*
STEVEN NUTIK, M.D. (McGill)
ANDRÉ ROBERGE, M.D. (Laval Univ.)*
ROEL ROMERO, M.D. (Phillipines)
LESLIE STERN, M.D. (Manitoba Med. School)*
YUKITAKA USHIO, M.D. (Osaka, Japan)*

Neurosurgical Externe: AMADO NEL ESPINA, M.D. (Caracas, Venezuela)*

Stereotactic Research Fellow: ANDREW WONG, M.D. (Queens Univ.)

* 6 months on this service

THE WOMEN'S AUXILIARY OF THE ROYAL VICTORIA HOSPITAL

President ..... MRS. J. W. DUNCAN
Chairman, M.N.I. Coffee Shop Committee ..... MRS. W. M. GARVEN

NURSING STAFF

Director of Nursing ..... MISS BERTHA I. CAMERON, R.N.
Assistant Director of Nursing ..... MISS IRENE MACMILLAN, B.A., R.N.
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 LILLIAN MCAULEY, R.N.
MISS MARILYN MANCHEN, R.N.
MRS. SANDRA PEPPER, 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.

First Row (Bottom): Miss B. Robinson, Miss M. Pinto, Mrs. L. Dagenais, Miss F. Tolentino.
Second Row: Miss A. Carney, Miss A. Johnson, Miss J. MacMillan, Miss B. Cameron, Miss H. Kryk, Mrs. R. Parkes, Miss C. Robertson.
Third Row: Mrs. J. Mallory, Miss A. Cameron, Miss D. MacDonald, Mrs. R. Boyer, Miss G. Marshall, Miss J. Harkness, Miss U. Steiner, Miss J. Parker, Miss L. Arsenault, Mrs. L. Fletcher, Miss M. Agnew.
Fourth Row: Miss V. Moroz, Miss S. Prausri, Miss M. Rono, Miss H. Zatylny, Miss O. Legister, Miss N. Cabasal, Miss L. Dalicandro, Mrs. L. Gorman, Mrs. B. Petrin, Miss H. Degasquet.
Top Row: Mrs. G. Kumarapeh, Miss E. DaSilva, Mrs. S. McIntyre, Miss M. Everett, Miss D. MacKinnon, Miss S. MacKinnon, Mrs. P. Gaskill, Miss Y. Hanaoka.

First Row (Bottom): Drs. R. Marino, S. Nutik, L. Stern, J. Davis, S. Ambhanwong, J. Woods, F. LeBlanc, W. McCann, N. Buendia, A. Eisen, C. Bulke, R. Romero, A. Espina, G. Chong.
Second Row: Drs. D. McRae, L. Wolfe, J. Turner, P. Robb, W. Feindel, Miss B. Cameron, Mr. S.M. Finlayson, Dr. T. Rasmussen, Prof. J. Young, Drs. R. Robertson, W. Penfield, F. McNaughton, A. Elvidge, Miss C. Griffin.
Third Row: Drs. R. Broughton, S. Carpenter, I. Heller, G. Bertrand, H. Garretson, C. Branch, D. Lloyd-Smith, Mrs. C. Strauss, Drs. F. Andermann, Hanna Pappius, P. Gloor, G. Mathieson, B. Graham, J. Cosgrove, Mr. L. Taylor.
Fourth Row: Mr. C. Gurd, Drs. P. Perot, B. Pevehouse, M. Heuff, J. Buncic, L. Yamamoto, A. Sherwin, C. Dila, D. Mélançon, M. Levant, J. Courville, Brenda Milner.
Fifth Row: Dr. D. Anderson, Mr. J. Callaghan, Dr. F. Coceani, Mr. C. Pace-Asciak, Drs. D. Derry, F. Valle, A. Roberge, V. Humpherys, R. Nelson, Miss S. Duchow, Drs. Z. Sayeed, H. Usher.
Sixth Row: Drs. M. Drolet, A. Lorenzo, V. Montpetit, P. Grisham, A. Haque, Y. Michaud, J. Murphy, J. Dreifuss, Mr. D. Skuce, Dr. M. Lechter.

GRADUATE STUDIES AND RESEARCH

DR. PIERRE GLOOR

Research performed in our Institute and Hospital can be classified into three broad categories: (1) Basic research in neurological sciences, (2) Laboratory studies directed towards the elucidation of neurological and neurosurgical problems and (3) research activities of a clinical nature. Although these distinctions are somewhat arbitrary, they usefully define the major avenues along which research activities in this Institute have been pursued in the past year as well as in earlier ones.

Since the more clinically oriented research is covered in reports on the activities of the hospital, I shall emphasize here investigations in the basic neurological sciences.

It is hardly possible for me to review all of these projects within the confines of a brief report, and I am therefore forced to select only a few to highlight the general trend of our research activities. I beg for your indulgence, should you for one reason or the other disagree with the choice of representative samples which I have chosen for this purpose.

Three of our laboratories, neurochemistry, neurophysiology and neuroanatomy, are involved in basic research in the neurological sciences.

In the past year, the Donner Laboratories of Experimental Neurochemistry, under the able leadership of Dr. L. Wolfe and with the assistance of Dr. H. Pappius, again lived up to their reputation as a fountainhead of new and important neurochemical knowledge. Dr. Wolfe's research, in which he was ably assisted by Drs. D. Derry, F. Coceani and C. Pace has concentrated on two classes of lipids, gangliosides and prostaglandins, which both seem to be intimately concerned with synaptic function. They may therefore represent key substances for the mechanism of signal transfer from one nerve cell to another. It is evident that these findings are of great importance for our understanding of some of the most fundamental mechanisms of brain function.

In the Neurophysiology Laboratories we have pursued our long-standing interest in the relationships between the limbic system and the hypothalamus. The precise micro-electrode studies of hypothalamic nerve cells, which have been carried out by Drs. J. J. Dreifuss and J. Murphy, have added new and important information to this field. In addition, much has been learned about the significance of slow electrical events with regard to the timing of discharges of single nerve cells.

Also in the Neurophysiology Laboratories, Drs. A. Lorenzo and T. Shohmori added further support to some of our earlier conclusions which suggested that the genesis and maintenance of seizure discharge may be related to a relative inability of the nerve cell to maintain a normal distribution of sodium ions across its membrane.

All of us who work in the Neurophysiology Laboratories have been greatly stimulated by Mr. D. Skuce, a physicist-mathematician who has joined our group. With his keen interest in the application of computer techniques to the investigation of brain function, the frequent informal discussions and seminars we had with him have become a precious source of information for all of us in an area that is both novel and exciting.

We also welcome back on our fulltime staff Mr. R. Jell, our biomedical engineer, whose contributions will be most valuable, not only for the Neurophysiology Laboratories, but also for the Institute as a whole. We are especially pleased that he will establish liaison with the new Department of Biomedical Engineering at McGill University.

By far the most welcome development in the field of basic neurological research has been the filling by Dr. J. Courville of the long vacant position of neuroanatomist to the Institute. With neuroanatomy back in the fold, we can justly claim that the family of neurological sciences in our Institute is again complete. Dr. Courville has been continuing his precise histological studies on the connections of the cerebellar nuclei, an area of increasing interest both to the neuroanatomist and to the neurophysiologist.

Laboratory research directed towards the study of clinical problems in neurology and neurosurgery has been carried out in the Laboratories of Neurochemistry, the Neuroisotope Laboratories, in Neuropathology, in Neuropsychology, in the Department of Anesthesia, the Laboratory of Chronic Neurological Diseases and in the Laboratories of Electroencephalography and Clinical Neurophysiology. Many of these studies have given us deeper understanding of basic mechanisms underlying some of the problems with which we are faced when the normal functioning of the brain is disturbed by structural or biochemical lesions.

Dr. H. Pappius and Dr. W. McCann for instance have grappled with the always difficult question of explaining the beneficial effects of corticosteroid prophylaxis of what is usually called cerebral oedema.

Drs. W. Feindel, L. Yamamoto, H. Garretson and M. Heuff have continued their studies of cerebral circulation with radioisotope techniques. The problems of circulatory changes in cerebral vascular disease and cerebral tumors and in epilepsy have been investigated. The color motion pictures they have taken in collaboration with Mr. Hodge of the Department of Photography are not only scientifically illuminating, but have aesthetic qualities that would make them fitting exhibits at the Pavilion "Man and His Health" of Expo 67.

In Neuropathology, Dr. S. Carpenter has described interesting and hitherto unknown axonal lesions in motor neurone disease — we are certain that with the help of the new electron microscope to be installed in the Neuropathology Laboratories this summer, he will be able to shed further light on their nature.

Problems of sensory mechanisms and their disturbance in brain lesions have absorbed the interest of researchers both in the Neuropsychology Department and in the Laboratories of Electroencephalography and Clinical Neurophysiology. Thus Dr. B. Milner and her collaborators have continued their quantitative investigations of disturbances of various sensory modalities caused by a variety of brain lesions in man.

Dr. R. Broughton, on the other hand, by studying somato-sensory and visual evoked potentials in man has been notably successful in clarifying some of the functional derangements encountered in stimulus-sensitive myoclonus. He has also provided us with very important normative data on the distribution of somato-sensory evoked potentials on the scalp and the cortex of man. Deviations from normality caused by lesions or functional derangements can now be compared with much greater confidence, thus providing us with an additional important diagnostic tool.

We are very pleased that Dr. Lorenzo after some time spent in Dr. Lambert's electromyography laboratories at the Mayo Clinic has returned to us and is about to start our Electromyography Laboratory again. This will fill a need that has been sorely felt for a long time. His interest in the electrophysiology of muscle and nerve, will give us the opportunity to broaden our research into the field of neuromuscular diseases. We expect that this research aspect will be strengthened still further by Dr. G. Karpati's return to the Institute from the National Institutes of Health where he has familiarized himself with the histochemistry of muscle tissue.

Finally a word should be said about our clinical research activities. Only two shall be mentioned specifically, because they illustrate the new trend clinical research is taking now. Both projects make use of techniques of data analysis provided by the computer centre at McGill University. The first of these is the project undertaken by Dr. M. Lechter under Dr. I. Heller's guidance. It deals with an exhaustive study of neuropathies in a population of diabetics. The second is that carried out by Dr. A. Bengzon, who was assisted by Dr. M. Stephens and Mr. J. Dusseault of the Department of Mathematics at McGill University. This study was concerned with analyzing prognostic factors in the surgical treatment of temporal lobe epileptics. Our collaboration with the mathematicians have been most illuminating in pointing out the complexities one encounters when analyzing problems in which so many variables are involved as in these two studies. There is no doubt, that now that modern data analysis methods are available, no study of this kind should be carried out without making use of the help that general purpose computers can provide.

I wish to conclude this report by thanking all those who have helped in carrying out our research, even though time has not allowed me to name them all individually. Among these I would particularly like to mention the technicians in the various laboratories, in electronics and in photography, as well as Miss Mary Roach, under whose watchful eye most of the animal experimentation has been carried out in our 7th Floor laboratories.

NEUROLOGY

Dr. Francis McNaughton

There have been no important changes in the organization of the neurological services during the past year — and no significant change in the volume of clinical work in the hospital or in the Neurological Outpatient Department of the Royal Victoria Hospital.

Once again, I wish to record our gratitude for the splendid help given by all members of the Attending and Resident Staff in carrying the load of patient care and undergraduate teaching. Special mention should be made of the Teaching Fellows, Drs. Eisen, Nelson, Seamans, and Singh, who have set a high standard for those who will follow them.

Dr. Keith Seamans has now joined the staff of the Saint John General Hospital. I am pleased that Dr. Robert Nelson will be with us for the coming year as an Assistant.

Dr. Naunihal Singh Sachdev returned to New Delhi last November as an Assistant Professor in Neurology at the All-India Institute of Medical Sciences, and will be joined this summer by his wife, Dr. K. K. Singh, after she has completed her residency with us. We look forward to a distinguished career of service in India for this outstanding husband-and-wife team — and wish them every success. The same wishes are extended to another of our Residents, Dr. G. Taori, who will be returning to a teaching post in India after a year in Glasgow with Professor Ian Simpson.

I must mention several others who will be leaving the Institute, after extended periods of training, for new and exciting fields of works — Philip Grisham, Nicolas Buendia and Felipe Valle. Our good wishes for them are mixed with feelings of sadness and perhaps of envy — as they leave us for wider worlds than ours.

It is a pleasure to welcome to the Attending Staff one of our former Fellows, Dr. George Karpati, who returns after two years of productive research on neuromuscular disease with Dr. King Engel at National Institute for Nervous Diseases and Blindness in Bethesda. Dr. Karpati will continue his researches here, with support from the Muscular Dystrophy Association of Canada and will take an active part in clinical work and teaching. We hope that his interest in muscle disease will be linked closely with Dr. Lorenzo's work in electromyography at the Institute, and with Dr. Aguayo at the Montreal General Hospital and Dr. Guzman at the Montreal Children's Hospital, who share this interest.

Recently Dr. Cosgrove was appointed to the Medical Board of the Grace Dart Hospital, and this gives me an opportunity to speak of his good work in developing a close liaison between the two hospitals, during the past 18 months. The Grace Dart Hospital has helped us with convalescent and long-term care of an increasing number of our neurological and neurosurgical patients. At the same time, Dr. Cosgrove, assisted by Drs. Nelson

and Lush, has been making regular rounds at that hospital. While this arrangement has been on a trial basis until now, it seems to be working satisfactorily for both institutions. We hope that it will soon become a well-established pattern.

Dr. Cosgrove will shortly be taking sabbatical leave from his post at the Institute, in order to investigate new techniques in neuro-ophthalmology and otology. We will look forward to his return with fresh approaches, and, we hope, new solutions for some of our most difficult neurological problems.

The research activities of Drs. Cosgrove, Sherwin and Heller will be reported elsewhere.

In last year's report, I referred to the Institute's special role with regard to treatment, training, and research in Epilepsy, and the need for more active planning in this area. Now that Dr. Robb has been relieved of certain administrative duties, he hopes to devote more time to planning and directing clinical research, with particular emphasis on epilepsy. He will correlate activities of the seizure clinic at the Montreal Children's Hospital, which is supervised by Dr. K. Metrakos, with the seizure clinic in the Royal Victoria Hospital, which has now been placed under the supervision of Dr. Fred Andermann. We are pleased that the support of the Federal-Provincial Grants for these special clinics has been increased, in line with our needed expansion.

It is appropriate to refer in this report to the growing strength of the Department of Neurology in the Montreal General Hospital, under Dr. Donald Baxter, which is an important unit within the McGill Department of Neurology and Neurosurgery. With Dr. Tatlow, he shares a splendid new ward with Dr. Stratford of Neurosurgery, and has recently added two members to his Staff, Dr. Finlayson and Dr. Aguayo. Our Residents rotate to the Montreal General Hospital during their senior year, and have found this one of the most valuable parts of their training experience.

The relationship between the Montreal General Hospital Department and the Institute has always been a close, personal one. There is a constant two-way rotation of Residents between the two hospitals, as we receive six Assistant Residents in Medicine each year for training in Neurology. To make this relationship an even closer one, we have set up a coordinating committee on neurological training which will be concerned with the selection and the training plans of candidates in neurology in all the McGill Hospitals, including the Montreal Children's Hospital.

Before closing this report, I wish to say a few words in appreciation of Lord Brain, eminent physician and neurologist, who died in December 1966 at the age of 71. He was a personal friend of many who are here to-day, and through his writings, his influence on neurology and on neurologists has been world wide.

He visited this Institute on a number of memorable occasions as a clinical teacher and lecturer. His last formal visit was in May of 1963, as

Hughlings Jackson Lecturer, when he spoke on "Some Reflections on Brain and Mind" — a topic very close to his heart.

Russell Brain was a man with a remarkable range of talents and achievements. You are all aware of the many ways in which he contributed to the progress of modern neurology, as a consultant and clinical investigator, as teacher, writer and editor. In parallel with his busy neurological life, he had a distinguished career in public life, as chairman of many important government committees, as president of the Royal College of Physicians for two terms, and as president of the British Association for the Advancement of Science, to mention but a few. His approach to problems was always fair-minded and objective, yet he never lost sight of the human values in any situation. With his medical and scientific background, this made him an admirable spokesman for the medical profession on many public issues.

One of his last public services was as chairman of a special commission to investigate all aspects of the health services of Newfoundland — and his final report will remain a landmark in the medical history of that province.

He moved through life in a quiet, dignified and kindly way, and never seemed bothered or hurried by the weight of his responsibilities. He still found time to cultivate a rich garden of private hobbies and friendships.

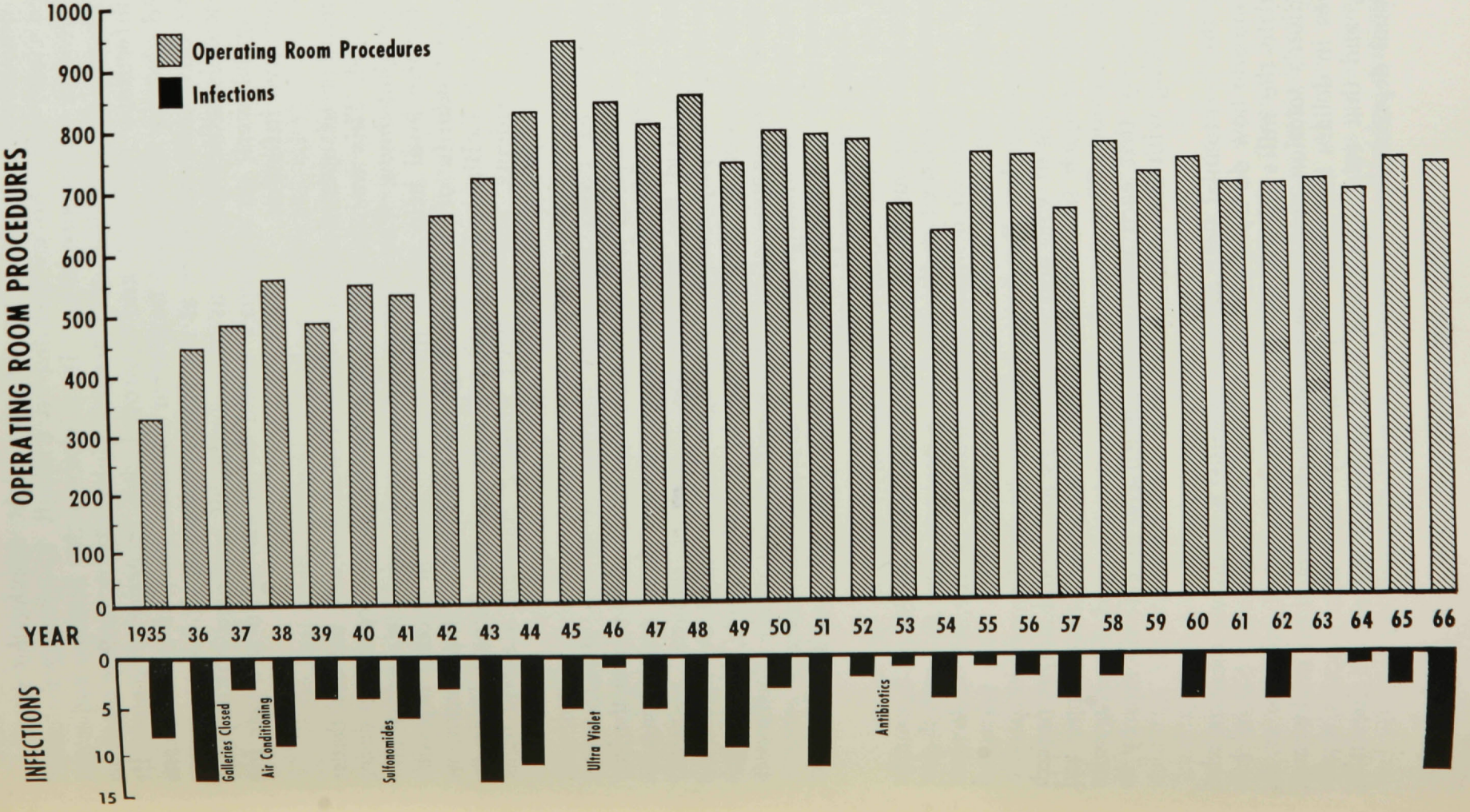
Neurologists around the world may claim Russell Brain, with justifiable pride, as one of their very own, a man who has added a new distinction to neurology. It is fitting on the occasion of our annual meeting to pay tribute to his greatness.

NEUROSURGERY

Dr. William Feindel

When we examine the chart (reproduced here) of all the surgical procedures done at the M.N.I. since 1934, we can see that over the past fifteen years, we have had no more than four post-operative infections in any one year out of some 700 theatre cases. This incidence of less than 0.5% was improved in each of three recent years when there were no infections. In 1966, however, this pattern changed, with five major and six minor complications from an infection out of a total of 716 theatre cases, giving an incidence of just under 1.5%. Fortunately, except for one patient where other serious circumstances existed, all patients recovered satisfactorily. Although an infection rate of 1.5% might well be the envy of some surgical units, neurosurgeons must consider any infection unacceptable. In consequence, we reviewed the problem cases and our operating room procedures with Miss Murray, our Operating Room Supervisor, and in consultation with Dr. Abramovitch of the Department of Bacteriology. Recom-

MONTREAL NEUROLOGICAL HOSPITAL
OPERATIONS 1935 - 66



mended measures were taken. In the past eight months the record has again been clear. All who co-operated so willingly in effecting the control measures deserve our appreciation. In a visit to the Institute earlier this year, Professor Carl Walter of Harvard University, a leading expert on surgical infections, reviewed and approved our program of control. He commented also on the unique long-term documentation of operative cases which have been continued here at the Institute since 1935. I would suggest that a most satisfactory way for us to celebrate this centenary year of Joseph Lister's original work on antisepsis would be to aim again at a year free of post-operative infection.

The number of operations in 1966 increased to 1,301, the total theatre cases being 704. This was despite the decrease in elective operations during the summer shut-down. The neurosurgeons again wish to express their gratitude for the loyal help of all the Institute staff in making it possible to maintain standards of surgical diagnosis and care. In particular, we thank Dr. Frank LeBlanc, Dr. Marius Heuff and Dr. Jerome Davis, the Neurosurgical Residents, and the hard working Assistant Resident teams, for their splendid support.

In this year of Expo '67, some features about the M.N.I. suggest that we might be operating a Neuro-Expo ourselves. Aside from the busy Medi-theatres on the fifth floor and our expensive food and lodging, we have all noticed behind the Institute the "Son[redacted] et Lumiere" — mostly "Son[redacted]" — which happily herald what might well be called Dr. Mathieson's and Dr. Gloor's version of Neuro-Habitat. As a final example, Mr. Hodge's excellent colour photographs of our fluorescein display of the blood vessels of the brain, shown in multi-projection at several of our research seminars, compare favourably in artistic quality and certainly in scientific value with the best of Expo's photographic exhibits.

But in a more serious mood, this centennial year invites us to examine what has been accomplished in the third of a century since this neurological hospital and brain research institute were started. It is true, as Dr. Penfield has often pointed out, that these two organizations have been segregated by budgetary expediencies. But in real life we know they are inseparable. To pursue an analysis of who and what belongs to hospital and/or research institute would be much like discussing the differences between upper and lower motor neurons. The essential point, and a sound Sherringtonian principle, is surely that each part gains immensely in effectiveness by its integrated working with the other.

But in this trentennial year of the Institute, how do we measure what has been done and how do we apply this to what we hope to do? Statisticians could calculate the miles of E.E.G. paper, the acres of X-ray film or the litres of Elliott's solution used. Government agencies would no doubt gauge our activities in dollars and cents — patient day rates, salary scales, equipment costs, and that relentless fiscal term to which we are all inevitably subject, annual depreciation.

Another legitimate measure might be the publications coming from the Institute over the past thirty years, running now to some 900 research papers and a dozen or so scientific monographs. A very substantial index too would be the large number, also about 900, of research and clinical Fellows who have trained here and then gone out to teach and work in universities and hospitals in this province, in Canada and in many other countries. The memory of their contributions while at the Institute and our awareness of their continuing good works provide a bond of comradeship which transcends political and geographic boundaries.

In the final count, however, the most significant achievement is reflected in the patients who are helped, not only by contemporary medical care, but by new techniques and new knowledge of the nervous system developed here in the laboratories, wards, and operating rooms even though some of these may only become therapeutically effective in future years. A letter which came last week from a patient expresses better than I can the unaccountable value of this aspect of the Institute.

"Today, Tuesday, I am celebrating the fifth anniversary of getting a hole in the head. May I delegate you," the patient wrote to Miss Carson, my secretary, "to give a special 'thank you' firstly, to the doctors, to the psychologists, the nursing staff, and the countless people in the hospital who were so kind to me during my stay and every time I have visited since then. Each of you has always given me the impression that you were personally concerned and interested in my improvement. Almost unconsciously, the thought of you kind people has been more helpful than those thousands of pills. My 'thank you' itself will mean nothing. So I am having special prayers offered for you all to make your work in other persons as much a success as you have made for me".

Not all our patients write with such humour and clarity, but a justifiable claim could be made that of all the multiple functions which this Institute serves, the type of care recognized by this patient's expression of gratitude must rank high as the true measure of our work.

In addition to clinical services, teaching and research activities also engaged the time and interest of the neurosurgical staff. Dr. Gilles Bertrand and Dr. Andrew Wong summarized further work with Dr. Jasper on microelectrode recordings from nerve cells deep in the brain during the surgical therapy of Parkinsonism. They reported their findings at several scientific meetings. Dr. Bertrand also summarized the surgical technique of atlantoaxial fixation for dislocations of the upper part of the cervical spine. He continued as Secretary-Treasurer of the Association of Neurosurgeons of the Province of Quebec. Dr. Charles Branch was President of the Osler Reporting Society of McGill and of the recently formed Society of University Neurosurgeons. Dr. Phanor Perot has been examining the problem of subcortical epileptic discharge from the point of view of stereotaxic treatment and with his colleagues has published reports on subdural empyema, and seizures produced by tuberous sclerosis. Dr. Elvidge continued his sum-

maries of the biological behaviour of brain tumours and also visited the Marine and Naval Headquarters in Virginia in association with the Canadian Industrial Preparedness group.

On the second neurosurgical service we have made progress with the new technique of epicerebral angiography, the demonstration of the blood vessels on the surface of the surgically exposed brain by fluorescein dye and special photography. These anatomical findings have then been correlated with measurement of local cerebral blood flow by radio-isotopic techniques. Mr. Charles Hodge our neurophotographer has applied his expertise to this method while the staff of the Cone Laboratory under the supervision of Dr. Yamamoto have been responsible for carrying on the experimental program in the animal laboratory. Experimental findings were then applied in the operating theatre so that we now have for the first time a means for the neurosurgeon to assess changes in cerebral blood flow at the time of operation, both from a quantitative and qualitative point of view. This is permitting us to examine several new dimensions of the cerebral circulation *in vivo* and it promises to give us better understanding of this important field of cerebral vascular problems. Other details of this work will be found in the report from the Cone Laboratory for Neurosurgical Research.

Dr. Henry Garretson continued his work toward his Doctorate thesis which is devoted to a study of brain tumour transplants with the purpose of defining the mitotic cycle using radio-active thymidine. Dr. Rasmussen and Dr. Feindel were delegates to the World Federation of Neurosurgeons in Madrid earlier this spring, where plans were drawn up for the World Congress of Neurosurgeons to be held in New York in 1969.

The neurosurgical staff view with mixed feelings the changes announced to-day in neuro-radiology. We will have a sense of great loss when our friend and colleague Dr. Donald McRae leaves to take up his appointment at the new University Medical Centre in Toronto. His world-wide recognition in this special field has added stature to the Institute. His remarkable talents as a teacher have been enjoyed by the many disciples trained under him in this exacting specialty as well as the resident staff in Neurology and Neurosurgery and not least by the members of the attending staff. His experienced judgment and quality control, so often brought to bear upon our clinical problems, have kept the neurologists and neurosurgeons on their diagnostic toes and have contributed greatly to our management of the increasing number of problem cases referred to the Institute. On the other side of the coin we welcome back Dr. Roméo Ethier, whose radiological opinion we have all learned to respect, and his two very able assistants Dr. Vézina and Dr. Mélançon. All did post-graduate study under Dr. McRae's tutelage. We look forward to continuing the atmosphere of co-operative and friendly competition which we have enjoyed in the past in the Department of Neuroradiology.

Among the neurosurgical residents of the previous year, Dr. Robert Hansebout is in research work now at the University of Ottawa, Dr. Mario Sculco in private practice in Connecticut and Dr. Bryce Weir, who gained

his neurosurgical Fellowship from the Royal College of Physicians and Surgeons of Canada, is at the University of Alberta where he has joined two former M.N.I. Fellows, Dr. Guy Morton and Dr. Tom Speakman. Before leaving for the West, Dr. Weir completed a survey of oligodendrogliomas from our brain tumour registry. Dr. Frank LeBlanc after completing his residency year this summer will continue here as a Medical Research Council Scholar, a senior research award for which we warmly congratulate him.

As neurosurgeons we are indebted to many of the staff, but I wish to acknowledge the help particularly of Miss C. Robertson and her nursing associates in promoting improvements in ward procedures and techniques and to the initiative of Mrs. E. Carman and Miss A. Johnson for their evaluation and acquisition of new equipment such as the intensive care beds and the many forms of disposable equipment for the dressing rooms and wards.

An annual report should, of course, be something more than a look in the rear view mirror. We should be concerned as well about our future programs. It must be emphasized that modern neurosurgery is a sophisticated, demanding field moving rapidly ahead by new techniques, new equipment and new approaches. We are in a position, if we choose, to extend new or better forms of treatment to an ever increasing number of patients with complex and as yet poorly understood neurological disorders. Even since the new wing of the Institute was built in 1953, for example, we have seen the introduction of stereotaxic treatment of Parkinsonism, the widespread use of radio-active isotopes for diagnosis and treatment and many newer biochemical methods for examining features of nervous tissue not before possible.

As I emphasized last year, certain provisions for neurosurgical care in this hospital require updating. We would benefit by a better physical arrangement for intensive care, and with such an area, also, patients with some of the puzzling maladies affecting the nervous system could be more adequately observed and investigated. Moreover, now that enlarged quarters have been provided for Electroencephalography, Psychology, and Neuropathology, other overcrowded laboratories, for example, Neuro-anatomy, Neurochemistry and Neurosurgical Research merit our immediate attention. The Fellows come here from many countries because of the reputation in teaching, research, and clinical practice of this Institute. They also require improved physical arrangements so they can most effectively pursue their training programs and make the most of their time here.

These are only a few of the items which demand our energy and efforts in the immediate future. Dr. Penfield envisaged this Institute not as a purely local undertaking but as one "that could provide a centre of neurological thought which would serve the whole continent". And in our planning for the future, we must recognize that the vantage point from which we now stand has derived from the devoted work and interest of those who have contributed here over the past third of a century. We must be aware that we are thus committed to keep a place in the vanguard of neurology.

HOSPITAL ACTIVITIES

DR. PRESTON ROBB

The year of 1966 has been described as the year of strikes. It was a year of labour problems, spiralling costs, and general unrest. There were 2,229 admission and 42,542 patient days. The strike during the summer caused a decrease in the number of patient days by 2,567 from the 1965 figure and the occupancy level dropped to 86.3%. In spite of this the rate of occupancy continued to be high. From February through to the end of May the average occupancy was 93.3%. The average stay per patient was 18.9 days, a decrease of 0.4 days. 101 deaths were recorded and there was an autopsy rate of 79.2%.

The outpatients clinics of the Royal Victoria Hospital reported a total of 5,522 patient visits, 4,375 in neurology and 1,147 in neurosurgery.

The operating expenditure of the hospital rose by approximately 15.1% to $2,908,075. This figure includes $2,007,524 for salaries representing an increase of 18% compared to 1965. Capital expenditure for equipment in 1966 amounted to $40,749. The net shareable cost per patient day during 1966 was $60.66. The Quebec Hospital Insurance Service reimbursed our expenditure during the year at a rate of $54.40 per patient day. The gap of $6.26 per patient day, was an improvement over previous years.

This year a final settlement for the year 1964 was received, which left an amount of $15,873 to be added to the accumulated deficit. An interim settlement for the year 1965, amounting to $80,462 was also received which leaves an outstanding balance of $96,267. Our claim for reimbursement of shareable expenditure for 1966 amounting to $188,301 was forwarded early this month to the Service, and on May 18th we received $148,150 as an interim payment leaving an unpaid balance of $40,151.

The Hospital deficit for 1966 was $163,205. This is $26,653 more than for the year 1965. The accumulated deficit on December 31, 1966 was $593,086. With receipt of final settlement of $36,411 for 1964, and interim payment of $22,700 for 1965, and $136,000 for 1966, deficit at May 31, 1967 was $385,825.

To date the Province has not given any indication that we will receive assistance in retiring the portion of our deficit accumulated before 1961 and noted at $369,643.

It was in 1945 that I first reported at the Annual Meeting of the M.N.I. Dr. Norman Peterson had died the previous July and I was filling in as "Acting Registrar". Since then, many changes have taken place — and it is with considerable satisfaction that I have watched the Institute contribute to the growth of neurology and neurosurgery across Canada. Today I report to you for the last time as "Deputy Director of Hospitalization".

When the Institute first opened, most of the day-to-day administration was carried out by the R.V.H. This includes such items as admitting, accounting, residences for nurses and house staff, food, maintenance, laundry and other things. Gradually, we began to assume more and more responsibility for the administration of the hospital. At the same time the Institute grew. First, the EEG Department was added. Then the war — and an incredible jam of patients, precipitating the first major changes. The military annex was built, more space was made available for X-ray, a third operating room and social service. The squash court (which at this time housed the "sea sickness machine") gave way to private surgical offices and more space for neurophysiology and neurochemistry. After the war, through the generosity of Mr. J. W. McConnell, the military annex, a temporary wooden structure was removed and the McConnell wing added. This was completed in 1952 and doubled the size of the Institute. I can still hear Colin Russell mumbling "Wilder, we must build an addition".

Since then, although there have been no major physical changes in the building, pressures have built up, and the demand for space increased at all levels. The work load and staff of all departments have gone up. New departments such as psychology and brain scan have been added and old ones expanded.

In 1961 the Q.H.I.S. was started. One could say a great deal about this, for and against. For the indigent, and for the patient who could not afford hospital insurance, the "free" hospitalization has been a great boon. However, administrative problems and costs have gone up. Unsatisfactory budgeting procedures and the lag in prompt payments of actual costs by the government has made the operation of a hospital exceedingly difficult.

The unionization of employees has added a continuing and time-consuming problem to administrators. Last summer, as you all know, the hospital was involved in a strike. I mention this now, not to reopen an old and painful wound, but to pay tribute to those who helped out during this difficult time. As a result of this help we were able to carry on, accepting all emergencies, and operating at over a 50% capacity. When it was over, my main feeling was one of pride in our staff. The MNI has done it again.

There has been a continuing program of redecoration of the hospital. New carpets, curtains, painting, especially in the waiting rooms, have vastly improved the appearance of the Institute. As the budget permits, these improvements will keep on. Special mention should be made to the redecoration of the Fellows' Lounge, which was undertaken by the Women's Auxiliary of the Royal Victoria Hospital.

Last fall it became apparent that a need for a reorganization of our administrative procedures was necessary. With our limited staff we were falling behind in day-to-day problems, and had no time to tackle new ones. The biggest need was to set up a personnel office to handle employee problems and labour relations. Matters came to a head when Mr. Charles Noel, our business manager, was called back to McGill to assume higher

responsibilities. Mr. Noel has gone and we miss him. He served the hospital well during a most trying time. We are grateful for all he did and wish him every success in his new duties. A survey, done by Urwick-Currie, a firm of management consultants, recommended changes aimed at solving our difficulties. This included the appointment of an administrator for the MNI and MNH, a controller and a personnel officer — other changes to follow. The big step was taken and we are happy to welcome as administrator, Mr. Charles Gurd, who comes to us from McGill with a broad experience in business. As administrator he will serve as executive officer to the MNI and MNH and he will be able to devote full time to the many complex problems that arise. We are also happy to report the elevation of Mr. Geoffrey Thomas to the post of controller and to welcome Mr. Hector H. Heavysege as personnel officer. With this team. I feel confident that the administrative affairs of the hospital and Institute will move ahead in an efficient manner. This still leaves an urgent and difficult matter to solve: *Space.*

Last year, I quietly hinted that we must expand. Since then, changes already referred to, are being made in the basement. This will solve some of our problems, but unfortunately leave many unresolved. I could list floor by floor and department by department our many needs. This will be done in a separate report. Suffice it to say that any healthy institute cannot stand still and we are no exception. The hospital must provide more space for social service, brain scan, psychology, X-ray, the coffee shop, the business office, an intensive care unit and so on, *if* it is to maintain its place of prominence and continue to serve the public. More space must be provided not only for patient care, but also for teaching and research. This Institute is not large, but it has done more to provide neurologists and neurosurgeons for Canada than any other teaching unit. There is still a shortage and we must continue and produce. We are presently attempting to define our space needs. Then it is my sincere hope that we can move ahead with a new addition.

It would be hard and unfair to point out those who should be thanked for the support given me over the years. The strike points up the difficulty — everybody pitched in and worked — far beyond the call of duty. So to all, I offer my most sincere thanks.

Finally, ladies and gentlemen, I must step down. Not with a feeling of regret or sadness, but with a feeling of enthusiasm for the future. This hospital will continue to provide the leadership in neurology and neurosurgery that it has in the past.

NURSING DEPARTMENT

Miss Bertha I. Cameron

The past year has been a most active and challenging one for the Department of Nursing.

The responsibilities of the department continue to increase. The pace of nursing increases with the progress of medical science.

We realize the need and our responsibility for continued staff education, and have been actively engaged in orientation programmes, in-service staff education, nursing care committees, work-shops and efforts to up-date all existing information relating to the care of the patient. We are particularly aware of the fact that all personnel members must be informed of any changes. Thus there is need for constant reviews, explanation, communication and supervision on the part of all concerned.

We receive many requests from hospitals and nurses regarding our nursing and our postgraduate course. We have arranged individual programmes for special visitors to our department. These have included Mr. James Geddes, Assistant Educational Officer of the Scottish Board, Royal College of Nursing, Edinburgh, and Miss Marjorie Pirie, Visiting Nurse Lecturer, Medical-Surgical Nursing, University of California, San Francisco Medical Center. Miss Pirie spent a month with us to gain some background information for preparation of Clinical Nurse Specialists. Miss Elizabeth Plummer, Associate Professor of Nursing, New York Medical College, Flower and 5th Avenue Hospital, also spent a month here to gain information to set up a curriculum of Master of Science Degree in neurological and neurosurgical nursing.

Miss Irene MacMillan, Assistant Director of Nursing, was on leave of absence working at McGill University towards a Masters Degree in Nursing. (She will return to the staff on June 1st). Miss MacMillan was ably replaced by Miss Jean MacMillan. Miss Jane Henry, previously supervisor on night duty, is now Assistant Head Nurse on 2 South and has been replaced by Mrs. Sandra Pepper. Under Mrs. Pepper the increase in supervision between 3:30 and 7:30 P.M. has proven to be very worthwhile and of much help and assistance to the various wards. Mrs. Geneen Kumarapeli was appointed Assistant Head Nurse on 2 North replacing Mrs. Ruby Parkes who is now Instructor in the Department of Education in charge of the undergraduate students from the Royal Victoria Hospital.

Our postgraduate program is becoming more widely known throughout the world. Each year more requests are being received from neurological-neurosurgical set-ups needing nurses trained in this specialty. Forty-one postgraduate nurses, under the guidance of Miss Helena Kryk, received certificates during the year. The nurses came from 12 different countries, including two nurses from Malaysia sponsored by the Colombo Plan.

One hundred and twenty-four undergraduate students from the Royal Victoria Hospital affiliated here. Our staff prize for neurological and neurosurgical nursing was awarded to Miss Diane Norman, an R.V.H. student who graduated this month. Students from the McGill School for Graduate Nurses have sought experience in the various clinical areas here during the year.

In May 1951 a donation of $5,000 from Mrs. Hartland B. MacDougall established the MacDougall Nursing Scholarship Fund at the Montreal Neurological Institute in memory of her late husband, Hartland B. Mac-

Dougall. I am very happy to say that this fund can now provide an annual award of $500.

We are privileged to thank Mrs. Samuel Reitman for the Nursing Bursary, donated in memory of Dr. W. V. Cone, which was awarded this year to Miss Irene MacMillan.

I would like to express my gratitude and appreciation to each and every member of the whole nursing "Team" for their continued co-operation, support and loyalty. Without the full participation of *all* members, the maintenance of a high standard of patient care for the entire twenty-four hour period (which is our aim) could not be realized.

May I also take this opportunity to thank the members of the Medical Staff for their help with teaching and for their encouragement and support during the year, as well as all members and friends of the Hospital and Institute for their continued interest and help. We remember, in particular, all those who so ably and generously helped us to carry on during the "Hospital Strike" in July.

SOCIAL SERVICE DEPARTMENT

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.
Mrs. Betty Schon, M.S.W. (Part-time)
Miss Noella Vaillancourt, B.A., M.S.W.

Social Service Assistant: Miss Jane Dryer, B.Sc.

In thinking back over the past year and ahead to the coming year, various thoughts emerge, all emphasizing change and continuity: the department staff, its problems and aspirations, and its roles in relation to this institution and to the community at large.

Again we must bid farewell to a staunch staff member — Mrs. Hilda Feiner to whom so many multi-problem seizure patients have turned repeatedly (sometimes week after week) for help with the myriad of commonplace or complicated situations which they cannot untangle by themselves. Our best wishes go with her.

We are continuing to try to isolate tasks which fall within the total social welfare field but can be delegated to social service assistants. Our present assistant, Miss Jane Dreyer, is helping with the assessment of the position and with day-to-day services to patients. The provincial Department of Education and the schools of social work, recognizing the pertinence of the trend, are sponsoring training courses.

In this teaching centre, our department has continued to provide opportunities for social work field instruction through affiliation with two schools of social work, University of Ottawa with Miss Kathleen Macdonald again supervising a student, and McGill University with its unit of six students under the supervision of Miss Mary MacLean.

During the year, of approximately 1,000 patients referred or carried over from the previous year, there were twice as many out-patients as in-patients, with an interesting contrast between the services. In neurosurgery, two-thirds were in-patients and one-third out-patients, while in neurology just one-fourth were in-patients and three-fourths out-patients. This difference, and the fact that there were twice as many neurology as neurosurgery patients, may be explained by two large diagnostic groups in neurology, epilepsy and multiple sclerosis, with severe related social problems requiring periodic or continuous attention from our department, frequently in collaboration with other community agencies.

Again this year the majority of referrals originated with the medical staff. Among in-patients, about three-quarters were for placements. One staff member said to me: "Please don't talk about placements this year. They'll think that's all we do." Another said: "Be sure to mention that due to lack of placement resources in the community, social workers (and often the doctors with endless filling of forms) have to 'waste' a disproportionate amount of time finding a hospital or home for patients." Both social workers were concerned that we have too little time for the type of work for which we were trained, work which contains more of the elements of rehabilitation and/or prevention and which can sometimes help prevent hospital readmission. With discharge to other institutions a major practical problem, with the City of Montreal recently reporting a waiting list of over 200 beds for convalescence and over 400 for chronic care, and with community home-care just in the planning stages, we must re-state our concern for the inadequacy of resources, particularly for the large number of our long-term chronically ill men and women.

Webster's Dictionary defines "gratitude" as "a feeling of thankful appreciation for favors received". We are especially grateful to the following: 1) to all who during the emergency last summer volunteered their time and selves; 2) to those steady R.V.H. volunteers who have become an inseparable part of the neurology and neurosurgery clinics and upon whom patients and staff alike depend; and 3) to those whose generous financial contributions helped patients to obtain greater benefit from medical care, e.g. taxi transportation for Mr. A., to permit him to be discharged home but to report for daily X-ray therapy for several weeks; for Miss B., paying board to her sister-in-law from a small pension, help with payment for medication; for young paraplegic Mr. C., eager to return to work, the price of a wheel-chair shared equally with the government; for Mrs. D., a wheelchair housewife and mother, the services of a home-aide which, with regular visits from the V.O.N. nurse, enabled her to remain at home with her family. Donors include the R.V.H. Women's Auxiliary, Cancer Aid League, two multiple sclerosis groups, In His Name Society, Rotary and other service clubs. To them and to all with whom we have worked — 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 ..... ALBERT PACE-FLORIDIA, B.Pharm., M.D.
ANDRÉE PINAULT, M.D.

Residents:

J. COUTURE, M.D. (Univ. of Montreal)*
JOAN DIXON, M.D. (Lond. Eng.)*
ROBIN EACOTT, M.D. (Univ. of Queensland, Australia)*
A. GAGNON, M.D. (Univ. of Ottawa)*
A. GOODWIN, M.D. (Queen's Univ.)*
ROLAND MONGEON, M.D. (Univ. of Ottawa)*
KON SEMINIUK, M.D. (Univ. of Alberta)*
B.O. TAYLOR-LEWIS, M.D. (Colombo Plan Fellow from Sierra Leone)*

* Six months on this service.

During 1966 over 1,000 patients received anaesthesia.

There have been no startling changes in technical work, anaesthetic care, or monitoring of patients. More patients have had intra-arterial recording during surgery and the information from this has been classified. The use of Innovar for angiography has been limited because of associated psychological reactions. Fifteen cases were operated upon in the sitting position, using the Gardner pressure suit to maintain blood pressure.

During the first four months of 1966 a study of the average duration of operating time was made. This was found to vary from one and a half hours for a single vessel angiogram to just over ten hours for craniotomies for seizures.

There were three instances of post-operative death occurring within 48 hours. Two of these were patients with severe trauma, and one was a patient seriously ill with metastatic brain tumour.

Dr. Sever Kovachev left on October 19 to join the staff of New York University and has been replaced by Dr. Andrée Pinault.

Dr. G. F. Brindle continues as secretary of the Quebec Division of the Canadian Anaesthetists' Society and consultant physician and secretary of the Montreal Motor Racing Club.

Dr. R.G.B. Gilbert remains in the Executive of the Academy of Anesthesiology.

The Anaesthetic Department was disappointed that no practical plans are yet in view for an intensive care area, although time-consuming discussions on this important matter were frequently held between the anaesthetic staff and the neurosurgical staff during 1966.

Laboratory work in 1966 totalled 1,557 procedures, in addition to numerous emergency biochemical determinations by members of the anaesthetic and neurosurgical staffs.

Members of the staff as usual gave lectures to undergraduates and postgraduate students, as well as to the postgraduate nursing class.

Research activities included a completion of studies on liver blood flow. This will be followed by investigations into the blood flow in the splanchnic vessels under conditions of anaesthesia, surgery, and drug-induced changes.

Dr. Brindle is taking part with Dr. Garretson in the study of C.S.F. circulation and respiration in patients with memory disturbances associated with chronic hydrocephalus.

Dr. Galindo continues his work on his Doctorate thesis in the Department of Anaesthesia research with Dr. K. Krnjevic on the topic of "The Site of Action in the Central Nervous System of Anaesthetics".

NEURORADIOLOGY

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

Assistant Radiologist ..... DENIS MÉLANÇON, B.A., M.D.*

Residents:

WILLIAM BEAMISH, M.D. (Univ. of Alta.)*
A. HAQUE, M.D. (East Pakistan)
NAZIR KAHN, M.D., (Trinidad, West Indies)
DENIS MÉLANÇON, B.A., M.D.*
HARRIETT MCDONALD, M.D. (Univ. W. Ont.)*
M. S. USHER, M.D. (McGill)*

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

* Six months on this service

In 1966, 10,956 radiological examinations were performed as compared to 11,263 examinations in 1965. In addition there were some 300 ultra-sound examinations as compared to 250 in 1965. A number of these patients were paralyzed, unconscious or semi-conscious, or agitated. The large amount of high quality work is a continuing tribute to the skill and devotion of the radiological technicians on our staff. We must also thank the resident staff and the nursing staff for their help.

Dr. A. Haque and Dr. D. Mélançon served for the full year, and Dr. N. Kahn for six months, as residents in radiology. Dr. Roméo Ethier, Associate Radiologist, resigned in June 1966 to become Associate Radiologist at Hôtel-Dieu de Montréal. Associated with the department for some six years, his good work and his keen inquiring mind were missed by all.

As in past years, teaching sessions included weekly seminars in neuroradiology in September, October, November and December; the Monday morning colloquia from September to May; and lecture demonstrations to medical students in radiology and in neuro-anatomy.

One of the problems in our department is to maintain a steady flow of patients for the various radiological examinations. I wish to express special appreciation to the nurses on the floor and the orderlies of this department for their cooperation in making this possible.

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

Visiting Scientist ..... FLAVIO COCEANI, M.D. (Bologna)

Post-doctoral Fellow ..... CECIL PACE-ASCIAK, B.Sc., Ph.D.

Fellows:

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

DAVID M. DERRY, M.D. (Univ. B. Columbia) 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 1966 was 16,869 (14,769). Figures for 1965 are given in parentheses. The increased work in this department should be noted in view of the three week slowdown in hospital admissions in July, 1966. In addition, 5,907 (5,811) litres of irrigation solution were prepared for the operating rooms. The Clinical services were provided with 217 (215) litres of Nupercaine solution.

The 3rd Floor Ward Laboratory continues to operate at about the same level as last year, considering the July hiatus. About 16,040 (22,409) separate blood determinations were performed and 5,367 (5,256) urinalyses were done. In addition, 4,309 (3,896) samples of blood were drawn for biochemical analysis at the R.V.H. and 10,623 (10,300) specimens for our 7th Floor Laboratory and the Provincial Laboratories.

We will soon require another full-time technician for the 7th Floor Laboratory as the number of special tests done on a research basis has increased in recent years (e.g. amino acid screening, sulfatase, etc.) and the present arrangements are not adequate in case of absence of our only technician on the 7th floor.

We welcome the appointment of a full-time Personnel Manager to the Hospital to assist us in our employment 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.

Dr. D. M. Derry has developed still further microchemical techniques for the analysis of chemical constituents in serial cryostat sections through various brain regions. The quantitative distribution of gangliosides has been studied through the laminae of the hippocampus and the cerebellum. Wide differences in ganglioside content even in adjacent sections were found, particularly in the molecular and granular layers. These variations appear to reflect differences in the concentration of synaptic endings on dendrites

and cell bodies. Techniques similar to these of Holger Hydén in Göteborg, Sweden, were developed for the isolation of single neurones from Deiter's nucleus of the brain stem. It was possible to analyze the ganglioside contents of (a) groups of clean neurones, (b) the neuropil rich in nerve terminals immediately adjacent to the neurones, (c) surrounding tissue which contained predominantly glial cells. The highest concentration of gangliosides on the basis of tissue dry-weight occurred in the neuropil containing the nerve terminals. Thus, in support of previous subcellular work, gangliosides are most likely membrane acidic lipids concentrated in terminal synapses. It was found that the recently developed interference-phase optics (Nomarski-Zeiss) was most valuable in the examination of the isolated neurones.

Dr. D. M. Derry with Dr. F. Andermann, Dr. J. S. Fawcett and Dr. Wolfe have identified in two French Canadian siblings a new type of cerebral lipidosis, late infantile systemic lipidosis. The neuronal lipid which accumulates in this degenerative disease was found to be the major monosialoganglioside present in normal brain tissue. This disease represents a genetically determined, clinical, pathological and biochemical entity, which probably includes some of the cases previously described as Tay-Sach's disease with visceral involvement.

Little is known of the way in which gangliosides are synthesized and incorporated into the neuronal membrane during development. Mr. John Callahan is developing the basic chemical methodology necessary before this problem can be investigated in developing brain. The individual ganglioside species have been separated by column chromatography and each one chemically degraded to yield a series of sialic acid containing oligosaccharides. These can be further degraded to give the individual sugars. These methods will enable the incorporation of radioactive labelled simple precursors into gangliosides to be determined during development and will clarify many problems of the synthesis of these lipids.

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

(b) Studies on prostaglandins.

The natural prostaglandins are a new group of tissue hormone-like substances of unique chemical structure which are derived from methylene-interrupted polyunsaturated fatty acids by enzymic endoperoxidation and cyclisation. They are widely distributed in animal tissues and have numerous potent pharmacological actions. They are released spontaneously from a number of tissues including the cerebral cortex and cerebellum. The collaborative work with Dr. Coceani of the Institute of Human Physiology, Bologna, Italy, in which prostaglandin F_{2a} was identified in brain and found to be released from the surface of the cerebellum, has been extended. The spasmogenic action of prostaglandins on intestinal smooth muscle has been shown not to be mediated by an activation of the intrinsic neural network but is due to a direct effect on the smooth muscle membrane. With Dr. Pace-Asciak, the formation and release of prostaglandins from the rat stomach under various conditions of nerve stimulation has been studied. A most interesting finding was that stimulation of cholinergic fibers accelerates

the synthesis and release of prostaglandins from the smooth muscle membrane. The effect of nerve stimulation was blocked by anticholinergic drugs. A hypothesis has been presented in which prostaglandins derived from the oxidation of polyunsaturated fatty acids cleaved from membrane phospholipids act as a link in excitation-contraction coupling in smooth muscles. The results obtained on the innervated stomach preparations will clarify considerably the physiological importance of prostaglandins in the central nervous system.

Studies of Dr. Pace-Asciak and Dr. Wolfe have demonstrated prostaglandin synthesis from isotopically labelled arachidonic acid in cerebral cortex and stomach tissues. Research is now directed towards investigating the relationship between the balance of essential polyunsaturated fatty acids in membrane bound phospholipids and the formation of prostaglandins. The isolation and purification of the enzymes responsible for the synthesis of prostaglandins has started. Such biochemical studies are of fundamental importance to an understanding of the physiological and metabolic function of this intriguing group of hormonal fatty acids.

In these studies, Miss Klara Morawska, a research assistant from Poland, has given excellent help.

(c) Studies of cerebral edema and related problems.

A new technique has been introduced in the study of cerebral edema. Dr. Pappius with Dr. W. P. McCann have been using RISA, injected before a freezing lesion is made, as a tag of edema fluid. Earlier work on changes in water and electrolyte content of edematous tissues did not provide information on the total volume of edema which developed in response to a standard lesion. Changes in total weight of the affected hemisphere were only a gross indication of the extent of edema. In this series of experiments, the uptake of RISA present in the circulation at the time of the lesion proved to be a more sensitive and less variable measure of the total edema fluid. Experiments are in progress to show whether steroid therapy affects the extent of edema in the cat. When RISA is injected 24 hours after a lesion is made, its uptake is greatly diminished, evidence that the permeability characteristics of the tissue are returning to normal. The effect of steroid therapy on this recovery process is being investigated.

Dr. McCann is carrying out an E.E.G. study on the same animals to determine whether the E.E.G. pattern is less abnormal in animals on steroids. That this might be the case was suggested by an incomplete earlier study of Pappius and Gulati. Effect of the freezing lesion and/or edema on the ganglioside content of cerebral tissue is also under investigation.

Dr. Pappius has confirmed her earlier studies on the distribution of inulin and sucrose in cerebral tissues *in vitro* using C^{14} labelled markers in trace amounts, showing again that sucrose, just as thiocyanate, equilibrated with a greater fraction of tissue water than does inulin. *In vivo,* thiocyanate was shown to distribute in about 30% of the non-inulin space, when equilibrium between blood, brain and CSF was approached.

Mrs. H. Szylinger continues to provide very competent technical assistance.

Dr. K. A. C. Elliott continues to stimulate, encourage and help all of us.

Dr. L. S. Wolfe was invited to present the collaborative work done with Dr. Coceani and Dr. C. Pace-Asciak at the 2nd Nobel Symposium at the Karolinska Institute, Stockholm, Sweden, in June, 1966.

Dr. Pappius was invited to participate in a Conference on Brain Barrier Systems which was held in Amsterdam-Baarn in September, 1966.

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)
AMADO NEL ESPINA, M.D. (Venezuela)*
DANIEL A. GUZMAN, M.D. (McGill)
VAL HUMPHERYS, M.D. (Pittsburg)*
NORMAN T. LUSH, M.D. (Newfoundland)*
RAUL MARINO, M.D. (Brazil)*
GEORGE MATHEWS, M.D. (Madras, India)*
ELIZABETH MEIER-EWERT, M.D. (Germany)*
ROBERT F. NELSON, M.D. (Prince Edward, Island)*
SHOZO NAKAZAWA, M.D. (Japan)**
ZAHEER A. SAYEED, M.D. (India)
CRISTIAN VERA, M.D. (Chile)*

Research Fellows:

GASTONE CELESIA, M.D. (Genoa, Italy) M.R.C. Fellow
KARL-HEINZ MEIER-EWERT, M.D. (Germany), D.A.A.D. Fellow

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

Chief Technician ..... LEWIS HENDERSON

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

The total number of EEG examinations carried out in the Laboratories of Electroencephalography and Clinical Neurophysiology in 1966 was 3435. This number is somewhat lower than that of the previous year. This drop is due to a decrease in the number of the examinations during the period of the hospital strike in the summer of 1966. An additional number of investigations carried out for pure research purposes is not included in this figure. Of this total of 3435 examinations, 1720 were carried out on patients hospitalized in the Montreal Neurological Hospital, 684 in patients cared for at the Royal Victoria Hospital, 326 in patients referred from the outpatient clinics, 585 in those referred from private offices and the remaining 120 in patients referred from other hospitals. In addition to these examinations carried out in the laboratory, we recorded in the operating room 63 electrocorticograms from the exposed brain during neurosurgical operations for the treatment of epilepsy.

Although the overall number of recordings has remained fairly stable, this does not adequately reflect the actual demands made upon the laboratory. To some extent the number of recordings had to be kept down artificially for reasons of lack of staff and space. Thus we are unfortunately obliged to set an arbitrary limit on the number of outpatient examinations. This

leads to long waiting lists and to many complaints from referring physicians, who are unable to obtain an appointment in our laboratory for an ambulatory patient within a reasonable delay of time. This is a serious problem which we alone are unable to solve. It emphasizes the necessity of providing additional EEG facilities, which most logically should be incorporated within the ambulatory care services which the Royal Victoria Hospital is planning to set up. These undoubtedly will include our neurological and neurosurgical outpatient clinics. It would therefore be logical that neurological laboratory services, such as EEG and EMG offered to outpatients, should be part and parcel of such a plan. Furthermore in spite of a slight decrease of the overall number of records, the number of patients referred from the Royal Victoria Hospital has continued to increase; thus the trend for a most rapid increase of referrals from the Royal Victoria Hospital, pointed out in last year's report, has continued to be felt.

Dr. M. Ebe, visiting scientist from Tokyo (Japan) and Dr. Karl-Heinz Meier-Ewert from Germany worked together with Dr. R. Broughton in the research section of our laboratory on the computer analysis of evoked potentials in patients suffering from myoclonic epilepsies.

Dr. R. Broughton in addition has carried on with his important studies on human somato-sensory evoked responses, as recorded from the scalp and from the exposed brain at operation.

Dr. A. Bengzon made an analysis of prognostic factors in the surgical treatment of temporal lobe epileptics. Two groups of patients were compared, one in whom temporal lobectomy had been successful in eradicating the seizure tendency, the other in which this treatment had been unsuccessful.

For the above named research activities use was made of the services provided by the McGill Computer Center. We are indebted to Mr. R. Jell, Dr. M. Stephens and Mr. J. Dusseault for their expert help in the statistical and mathematical analysis of the data.

Studies by means of intracarotid injections of sodium amytal and Metrazol in patients with generalized epileptiform EEG abnormalities have been continued. The opportunity has also presented itself on a few occasions to inject these drugs via the vertebral route. Many of the findings obtained in the course of these studies have shed some new light on the pharmacological action of Metrazol which, contrary to common belief, seems to be exerted mainly at the cortical and not at the brain stem level; they have given us some new insight into the mechanism of generalized seizure discharges of the "centrencephalic" type. The important role of the cortex for the elaboration of these discharges has become very evident from these studies.

We had the opportunities of presenting some of the findings of our research activities last September in Marseille at the Second International Institute of Advanced Studies in Human Electroencephalography, organized by Prof. H. Gastaut under the auspices of the World Federation of Neurology and the International League against Epilepsy.

A number of lectures and informal seminars both for Fellows and technicians have contributed to our intramural training program.

In concluding this report it is fitting to record our indebtedness to our technicians who, under the able direction of Mr. Lewis Henderson, have carried out their work ably and with much devotion. We also record with gratitude the technical assistance in electronics received from Mr. R. Jell, Mr. E. Puodziunas and Mr. R. Archambault.

EXPERIMENTAL NEUROPHYSIOLOGY

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

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

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

Fellows:

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

AGAPITO LORENZO, M.D. (Philippines) M.R.C. Fellow

JOHN T. MURPHY, M.D. (Columbia Univ.) U.S.P.H.S. Fellow

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

DOUGLAS SKUCE, B.Sc. (Univ. of Miami)

ANDREW WONG, M.D. (China) M.R.C. Fellow

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

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

Research in neurophysiology has been conducted along several lines. Drs. J. J. Dreifuss and J. Murphy have continued their microelectrode studies of hypothalamic nerve cells and have added important new information to our knowledge of the relationship of limbic structures, especially of the amygdala, to the tuberal portion of the hypothalamus. A dual projection system of the amygdala to this portion of the hypothalamus has been defined anatomically and functionally; one component, the stria terminalis, is inhibitory, the other, the ventral amygdalofugal system, is excitatory with regard to ventromedial hypothalamic nerve cells. Convergence of inputs upon single hypothalamic cells originating from various subdivisions of the amygdala, from the septum and from the midbrain tegmentum have been demonstrated. The study of the interrelationship between the slow electrical events and action potentials of single hypothalamic nerve cells has shown that, here, as in other parts of the brain, the slow events closely approximate the probability function of firing of individual cells.

Drs. A. Lorenzo and T. Shohmori have further continued their studies on the action of ouabaine on the electrical activity of the cerebral cortex. This pharmacological inhibitor of the sodium pump when applied topically leads to a localized depression of neuronal activity. However under certain conditions the inability of the nerve cells to extrude sodium from their interior leads to self-sustained seizure discharge. This confirms previous observations made in part in our own laboratories in earlier years, which had suggested that seizure activity is associated with a certain deficiency in sodium extrusion from the interior of the nerve cell.

Dr. G. Celesia carried out studies on auditory evoked potentials in cats, comparing the findings with those obtained in man in the course of the surgical treatment of epilepsy.

Dr. A. Wong, assisted by Dr. C. Vera, who had returned from Chile to work for some months with us in the EEG-Laboratories, searched for single cells in the cat thalamus which might respond to muscle stretch. This study was complementary to that which he undertook in collaboration with Drs. H. Jasper and G. Bertrand during stereotaxic procedures carried out for the relief of tremor in human parkinsonian patients. Suggestive evidence was obtained that contrary to a commonly held view the thalamus may receive some input from muscle stretch receptors.

We are very pleased that Mr. D. Skuce, a physicist-mathematician, who recently joined our department, has given us much valuable information on computer techniques as applied to the analysis of the activities of the central nervous system. His great knowledge in the computer field has provided a much needed and valuable stimulus to our thinking and we are very pleased that we can look forward to further collaboration with him in this area.

Informal seminars were held at irregular intervals in the department. They were very useful as a medium for a free and uninhibited exchange of ideas and for teaching in a situation where happily everyone was at the same time student and teacher.

We are very happy that Mr. Ralph Jell will join us as a full-time biomedical engineer and we are looking forward with eager anticipation to his personal involvement in some of our research activities. We would like to thank him, Mr. E. Puodziunas and Mr. R. Archambault for the their expert assistance in the technical field.

We are also very much indebted to Miss Mary Roach and to her assistants for looking after the numerous organizational, administrative and housekeeping problems of our Laboratories. As in earlier years she had to lend her services and those of the laboratories not only to the neurophysiologists but to all other members of the Institute, who wished to carry out experiments in animals. The Laboratories of Experimental Neurophysiology have thus, as in the past, contributed to the support of the activities of the Neuroisotope, the Neuroanatomy, the Neuropathology and the Neurochemistry Laboratories of the Institute.

NEUROPATHOLOGY

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

Fellows:

NICOLAS BUENDIA, M.D. (Colombia)*
PHILIP GRISHAM, M.D. (Oklahoma)**
WILLIAM MCCANN, M.D. (New York)
YVAN-CLAUDE MICHAUD, M.D. (Laval Univ.)*
VITAL MONTPETIT, M.D. (Ottawa)
JOHN RICHARDSON, M.D.**
ANDRÉ ROBERGE, M.D. (Laval Univ.)*
ROSEMARY ROSE, M.D.**
ARTHUR SCHWARTZ, M.D. (Montreal)**
G. M. TAORI, M.D. (Vellore, India)*
FELIPE VALLE, M.D. (San Luis Potosi, Mexico)*
BRYCE WEIR, M.D. (Montreal)*

Chief Technicians:

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

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

This report is written to the sounds of drilling and hammering, a symphony of booming construction sound, *fortissimo con amore*, the culmination of two years of patient — and sometimes not so patient — planning. After a number of delays, work is in full swing on the suite of laboratories that will house Dr. Carpenter and the electron microscopic unit. Initially we plan to install a Hitachi HU 11 C instrument along with preparation and processing facilities. Meanwhile the department is concentrated on the north side of the main corridor under rather cramped conditions. We feel this temporary inconvenience a small price to pay for the splendid addition to our facilities and potential.

Dr. Carpenter has been working on certain striking axonal changes occurring in motor neurone disease and hitherto little regarded. We continue to be indebted to Dr. Huntington Sheldon for use of the facilities of his electron microscope laboratory in the Pathological Institute and for the continuing technical help of Miss Nora Shepard.

During 1966, a total of 446 surgical specimens have been examined. Of the 101 deaths occurring in the Montreal Neurological Hospital during this time, autopsy examination has been carried out on 79, an autopsy rate of 78.2%. This is only the second time in the present decade that our autopsy rate has fallen below 80%, suggesting the need to impress upon all concerned the important role which autopsy examination plays in a modern hospital. Neuropathological examination has been made in some 80 additional cases derived mainly from the Royal Victoria Hospital. All these cases have been worked up by the various Fellows in Neuropathology.

A long overdue task, tackled this year, has been a thorough revision of the departmental diagnostic index. The new system, in use since 1 January, 1967, should provide ready access to a long category of neurological diseases.

Another task facing the department is to ensure that the numerous Fellows passing through get an adequate opportunity to examine a wide range of neuropathological diseases. During this past year, we have held a slide seminar two mornings a week, in addition to our routine case review. These seem a useful innovation and we plan to continue them.

The April 1967 issue of the regulations and requirements of Graduate training of the Royal College of Physicians and Surgeons of Canada lists, for the first time, a Fellowship available in Neuropathology. This represents the culmination of a long campaign by the small group of Canadian neuropathologists to establish neuropathology as a recognized specialty. Members of this department have played a considerable role in this campaign. There has been considerable debate recently about the function of graduate examinations and some misgivings about their danger as potential distorters of graduate studies. Nevertheless, until now, neuropathology has been in an anomalous position, with those practising it being virtually without official recognition. We hope that introduction of formal criteria of training and ability can be accomplished without hardship and that recognition of the subject by the Royal College will increase recruitment to this undermanned specialty.

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)

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

Electronic Technician ..... GEORGE LOOTUS

1. *Brain Scanning and Cerebral Circulation Laboratory.*

The work of this Laboratory again increased during 1966, with 1,578 scans on 810 patients as compared with 1,369 scans on 630 patients in 1965. In addition, 85 circulation studies and 28 special examinations of the circulation in the operating theatre were made. Thirty per cent of the patients were referred from the Royal Victoria Hospital and outside hospitals. This increase occurred despite the shut-down of the Laboratory during a part of the summer due to the hospital strike. Opportunity was taken to revise the electronics and detector units of the brain scanner at this time. The scanner, built to the original Saskatoon design, has now completed more than 6,000 scans. Since one of its advantages is the quantitative record of radioactive uptake of brain lesions, these scan records on a variety of intracranial disorders now provide valuable source material for clinical research. Dr. J.P. Murphy, a Fellow in the E.E.G. Laboratory working with Dr. Yamamoto, compared 73 of our verified cases of brain tumour scans with the electroencephalographic findings. He found that in this series of supratentorial tumours, only three per cent displayed negative findings on both brain scan and E.E.G. Glioblastoma multiforme was localized by both methods in all examples. Low grade gliomas which take up little radio-isotope were responsible for most of the negative brain scans but here the E.E.G. was often successful. The converse was true in localization of meningiomas where the brain scan was better than E.E.G.

Because of the increasing demand for scanning and the shortage of space the number of circulation studies was necessarily reduced this year. We are in urgent need of space for developing these useful objective examinations of cerebral blood flow which are now technically possible and add much to our understanding of the very common, though difficult, problem of cerebral vascular disorder.

The many patients referred from the other hospitals indicate the value of brain scanning as a screening diagnostic test. Thus, a patient suspected of subdural haematoma, cerebral vascular insufficiency or metastatic tumours, to name several more common conditions, are referred for brain scanning as an initial examination. If a positive scan is obtained the referring physician is then given information which allows him to make a more logical decision regarding further neurosurgical assessment of the patient.

Dr. Yamamoto completed a study on the comparison of the speed of blood flow through the brain with improved instrumentation. He found transit times were slow or altered in patients with cerebral vascular insufficiency

but more rapid in those with brain tumours. These results provide one means of helping to differentiate between a brain tumour and a cerebral infarct, both of which may give a positive scan.

The demanding work load was completed with remarkable co-operation on the part of the laboratory and clerical staff and they are all to be again commended for their loyalty and support during this busy year.

2. *The Cone Laboratory for Neurosurgical Research.*

This Laboratory is supported by the Cone Research Fund, by generous other donations including especially those from Mrs. Howard Pillow and Mr. and Mrs. Murray Vaughan and from an anonymous donor for the purchase of special photographic equipment. The Laboratory is becoming more crowded. Dr. Yamamoto and Dr. Garretson share a laboratory office which has only twice the floor area of one of our elevators. The main laboratory is now piled up with instruments, equipment, bulky electronic recording gear, an electronic repair shop and two desk areas for research assistants. Lack of space has made it necessary to use the same expensive electronic equipment for different purposes, shunting it to four different areas in the Institute, some times in the same day. Only the devoted co-operation of the laboratory staff has made it possible to tolerate these conditions and at the same time to produce results of high standard.

Last year I noted that we had made an exciting beginning on the use of a new fluorescein technique to examine the surface vessels on the brain. This approach has now given us substantial results and for the first time makes it possible to examine the microcirculation of deeper structures in man. While our own interest has centered on the circulation of the brain, the main features of this technique, particularly the photographic aspects which we have already described, can be adapted to study the surface vessels of the heart, kidney or other organs. We would predict that it will have wide and useful application in the study of blood flow in other tissues and organs.

Our findings on the brain circulation were reported last summer at the International Conference on Microcirculation at Cambridge University, at the Moorfield's Eye Hospital in London and in October at the American Academy of Neurological Surgeons in San Francisco. Mr. Charles Hodge and his able assistant Mr. Edward Rupnick were responsible for the photographic methods while Dr. Yamamoto, Miss Harris and Mr. Lootus have all contributed their skills particularly in the experimental animal work. A continuing active program is underway to apply this method both to the study of basic problems in the circulation in the laboratory and to obtain information on the surface vessels during surgery in patients with brain tumours and epilepsy where it has practical as well as theoretical value. Dr. Yamamoto, Mr. Hodge and Dr. Feindel attended a three-day conference on Blood Flow recently at the University of Glasgow and also visited the radio-isotope and circulation laboratories of Dr. Neils Lassen in Copenhagen. A more recent report on the circulation studies was presented at the European Congress of Neurosurgery in Madrid.

Dr. Marius Heuff compared pre- and post-operative brain scans and later follow-up scans in a series of patients with verified brain tumours.

These useful results are being reported to the Canadian Neurological Congress in Quebec City, in June.

Another interesting development stems from the phenomenon of red cerebral veins which were described by Dr. Penfield some thirty years ago. The presence of these veins has become more widely recognized in a greater variety of cerebral lesions and now seem to represent an index of a breakdown in the regulation of cerebral blood flow under certain abnormal conditions. Without going into further detail, it can be said that this phenomenon occurs in association with many types of brain damage and appears to be a feature of fundamental importance in the pathophysiology of the cerebral circulation. Our present techniques of dye studies, correlated with radio-isotopic quantitative flow curves, provide a means now of examining this interesting problem.

We have continued our fruitful collaboration with Dr. Richard Saunders and Miss Mary Bell and their associates at Dalhousie University, Halifax, where they have been applying the technique of X-ray microscopy for the study of blood vessels of the brain by examining some of the experimental material from our laboratories.

Dr. Garretson and Dr. Yamamoto with the help of Mr. Lootus have continued clinical studies on patients with low grade increase of intracranial pressure by measuring cerebral blood flow, as well as the pressure of cerebral spinal fluid and of arterial and venous blood. They have received the active collaboration of Dr. Fred Brindle from the Department of Anaesthesia in these studies.

Dr. Yamamoto was at the Brookhaven National Laboratory last summer to pursue an evaluation program on a multi-polar detector system tied into a computer which shows promise of being of great value in the measurement of focal changes in cerebral blood flow.

Miss Jane Harris, under Dr. Yamamoto's supervision, completed an excellent study of the field of detection of the mini-probes which we use on the surface of the brain during operation. The findings are of basic importance in our techniques for measuring cerebral blood flow. Miss Harris has decided to leave to go into the teaching profession. We wish her all success and satisfaction in her new career and thank her for her skilful help.

In previous annual reports I outlined the present and future needs of the Neuro-Isotope Laboratories and the Cone Laboratory for Neurosurgical Research. Now that a firm examination of space requirements at the Institute is under way, these needs have been incorporated in a separate report.

The burgeoning load of brain scanning, the increasing help with diagnosis provided by radio-isotopic circulation studies, and the exciting observations on the cerebral blood vessels obtained by our new M.N.I. fluorescein-isotope technique all demand now an improved physical milieu that will at least match that enjoyed by other recognized centres engaged in this challenging field presented by the cerebral circulation and its clinical disorders. And there are some who would argue that the facilities provided here should be indeed among the best.

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. (C) Markle Scholar

Research Assistants ..... Dr. Morven McIlquham, B.A., M.D., C.M.
Dr. Robert F. Nelson, M.D., F.R.C.P. (C)

This year we have again tried to obtain a balance between clinical and laboratory investigation.

Clinical research has included the continuing study of the natural history of Multiple Sclerosis. Dr. McIlquham, in the Multiple Sclerosis Clinic at the Royal Victoria Hospital, has spent many arduous hours in reviewing the case histories of these patients and in coding forms for future computer analysis. She has also studied the effect of intrathecal methyl prednisolone on patients with Multiple Sclerosis.

With the Clinical Investigation Unit at Queen Mary Veterans Hospital, a study has been completed of the adrenal corticoid levels in cerebrospinal fluid of patients with various neurological disorders. We have also investigated the cerebrospinal fluid levels of cortisol in Multiple Sclerosis patients following intramuscular injections of adrenocorticotrophic hormone. Preliminary results suggest much variation in response which may be important in evaluating any standardized regimen of therapy with adrenocorticotrophic hormone.

Doctor Robert Nelson continued his interest in the cytological changes of the cerebrospinal fluid in Multiple Sclerosis. He presented a paper on this subject at the Canadian Neurological Society in Quebec City in June 1967. Mr. Howard Bergman, a medical student, was awarded a summer fellowship by the Medical Faculty to assist Dr. Nelson.

Dr. Sherwin's research was designed to apply immunochemical methods to clinical neurological problems as well as to basic aspects of the structure and function of the central and peripheral nervous systems. In addition, techniques to detect and measure isozymes were developed and applied to the study of brain tumors, epilepsy and stroke syndromes.

Basic studies on nervous system antigens continued with efforts being made to study the differences between normal nervous tissue and brain tumors. Antibodies were prepared which reacted with human gliomas and the antigens characterized. Much additional work will be required in this area. A study entitled "An immunological comparison of the central and peripheral nervous systems" has just been published.

Studies of the isozymes in human brain tumors have been continued with the help of Dr. F. LeBlanc and Dr. W. McCann. A recent finding, which to our knowledge has not been reported, is that significant alterations occur in the sera of patients with malignant gliomas when the lacticdehydrogenase isozyme pattern is determined. These alterations appear to be reversed by therapy. It is expected that these findings may prove to have immediate value in the diagnosis and therapeutic management of patients with brain tumors.

A new fluorometric technique to determine the isozymes of creatine phosphokinase was developed in the laboratory by first-year medical student G. Siber and the distribution of the isozyme in various portions of the nervous system, muscles and other organs determined. Mr. Siber was excused from the routine biochemistry laboratory course (1st yr. Med.) and work on further aspects of this study continued part-time during the academic term.

The level of creatine phosphokinase in the sera and cerebrospinal fluid of patients with stroke syndromes has been determined in a series of patients by Dr. A. Eisen. The results indicate that such studies are of diagnostic and prognostic value and contribute as well to the understanding of cerebral ischemia and infarction.

In addition to the above, Dr. Elhilali of the Royal Victoria Hospital carried out studies on isozymes of lacticdehydrogenase and alkaline and acid phosphatase in carcinoma of the prostate. These were recognized by an award by the American Urological Society and were displayed by the Royal Victoria Hospital at the annual meeting of the American Urological Society in New York in June 1967. More recently Dr. Elhilali has been carrying out immunological studies on isozymes of lacticdehydrogenase in carcinoma of the prostate. The studies developed at the Montreal Neurological Institute were considered of sufficient importance so that a laboratory has been established at the Royal Victoria Hospital to carry on this work in the future.

At the present time work on the study of creatine phosphokinase levels in strokes and lacticdehydrogenase isozymes in tumors are being continued. Dr. Valle has joined the laboratory group part-time, and will spend from July 1st to October 1st studying the localization of creatine phosphokinase enzyme and isozymes in human brain. Dr. Bulcke will come on full time January 1, 1968.

Again we thank the faithful services of Mrs. E. Mehlhose, Mr. Lionel Hunt and Mr. Douglas Smythe without whose technical help much of this work could not have been completed.

NEUROPSYCHOLOGY

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

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

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

Graduate Student and Clinical Assistant ..... PHILIP CORSI, B.A. (Dartmouth)

This year much research effort has gone into the assessment of somatosensory function in patients with focal cortical lesions undergoing unilateral brain operation for the relief of epilepsy. Quantitative testing of sensory discrimination has been combined with the appraisal of performance on more complex learning and problem-solving tasks based on tactual and proprioceptive cues. This work, which provides a needed supplement to our investigations of visual and auditory function, is being carried out by Mr. L.B. Taylor.

We have been fortunate in having the assistance of Mme. Alice David for the detailed examination of our growing number of French-speaking patients. Mme. David has also initiated some research on visual shape and size perception, with the intent of delineating more precisely the changes in complex visual function occurring after posterior cortical excisions.

Mr. Philip Corsi has just completed an M.A. thesis on auditory discrimination in the presence of contralateral noise. His findings on normal adult subjects have a direct application to problems of hemispheric specialization and cerebral dominance. Mr. Corsi is currently devising new tasks for evaluating frontal-lobe function.

We continue to collaborate actively with other laboratories. This spring Dr. John Oxbury and his wife, from Professor Ritchie Russell's group at Oxford University, spent a month here carrying out special auditory tests on patients undergoing temporal lobectomy. We hope that they will visit us again before too long. Our former associates, Dr. Doreen Kimura, Dr. Suzanne Corkin and Dr. Donald Shankweiler also continue to play a significant part in our ongoing research.

As in past years, we have received considerable help from the nursing and technical staff who have served as volunteer subjects in the standardisation of new tests. We are most grateful for this contribution to our research programme.

Last August the International Congress of Psychology took place in Moscow. Dr. Milner was invited to participate in two symposia, one on Frontal-Lobe Function organised by Professor Alexander Luria, and one on Short-Term Memory, organised by Dr. Donald Broadbent of Cambridge University. Dr. Milner also organised a Symposium on Memory Disorders, as part of the International Neuropsychology Conference held in Athens last September. Some new research projects have emerged as a direct result of the interchange of ideas at these meetings.

NEUROANATOMY

Neuroanatomist ..... Francis L. McNaughton, B.A., M.Sc., M.D., C.M., F.R.C.P. (C)

Associate Neuroanatomist ..... Jacques Courville, B.A., M.D., M.Sc.

Teaching Assistant ..... Allan Morton, M.D., C.M., M.Sc.

Fellow ..... Rosalie Alexander, M.D. (Melbourne, Australia)

We are pleased to announce that Dr. Jacques Courville, who joined the staff of the Institute in June 1966 as Associate Neuroanatomist, will now take charge of this department. Dr. Courville is a native Montreal, a graduate of l'Université de Montréal, and recently completed three years of research in neuroanatomy under the direction of Professor Alf Brodal at the University of Oslo. Dr. Courville is continuing his research on the connections of the cerebellum with other parts of the central nervous system. He has taken over the direction of undergraduate and postgraduate teaching in neuroanatomy and will also hold an appointment in Professor Leblond's Department of Anatomy at McGill.

Dr. Allan Morton is completing his quantitative studies of retrograde changes in the nuclei of the human hypothalamus following hypophysectomy. He is also taking an active part in the undergraduate teaching.

The integrated course on the central nervous system for second year medical students is now undergoing a thorough revision in view of the proposed change in the McGill curriculum in 1968.

The Annual Neuroanatomical Lecture was delivered by Professor J. Auer of the University of Ottawa on the subject of "The Reticular Formation of the Thalamus".

NEUROPHOTOGRAPHY

Supervisor ..... Gilles Bertrand, B.A., M.D., M.Sc., F.R.C.S. (C)

Photographer ..... Charles Hodge, R.B.P., F.B.P.A.

Assistant Photographer ..... Edward Rupnik

Technical Assistant ..... Linda Cory

This has been an extremely busy year, with considerable increase in the number of charts and slides, many of which were complicated and time-consuming. In addition, the photographic activities of the department increased on both the clinical and research sides.

The department purchased a new Arriflex 16 mm. motion picture camera this year. Many new films have been started and some are well on their way to completion since the acquisition of this camera. It is hoped that during this next year several teaching films will have been completed.

The department has also been very active with the technique of rapid-sequence photography carried out both in the experimental laboratory and in the operating room for special studies on the brain circulation. This work, done in collaboration with Dr. Feindel and Dr. Yamamoto, has utilized some of the methods previously reported from this department for special development of colour film to demonstrate fluorescence.

Mr. Hodge took part in the presentation of this fluorescein angiographic material at the Conference on Blood Flow at Glasgow University, and was also able to visit medical photographic units in London hospitals in order to review new techniques and discuss mutual photographic problems. This exposure has proved invaluable in speeding up the development of our recent fluorescein methods. We are now able to obtain consistently excellent photographs and movies in colour of the cerebral circulation both in animals and in man. (Reference to other details of this work will be found in the reports of Neurosurgery and the Cone Laboratory for Neurosurgical Research). Mr. Hodge attended the Annual Meeting of the Biological Photographic Association in Lexington, Kentucky, in 1966, and presented a paper entitled 'Photography of the Dynamics of Cerebral Circulation'.

TUMOUR REGISTRY

Dr. Arthur R. Elvidge

The records of 254 patients, with suspected tumour, were processed by the Tumour Registry in 1966. This is a slight increase over 1965, the highest total since 1961, and 11% of total admissions to the Montreal Neurological Hospital. Except for minor annual variations the number of proven tumours has remained fairly constant. Tumour was verified in 93 new cases, to which must be added 28 re-admissions, making a total of 121 verified tumours treated. Operations totalled 96, a figure close to that for the previous 3 years. This means that an operation for tumour was performed every 3½ days, and represents about 13% of major surgery in the Montreal Neurological Hospital. Roentgenotherapy was employed in 65 patients, a fairly constant figure over the last 10 years. There were 171 visits, by tumour patients to the Outdoor Clinics of Neurology and Neurosurgery, a steady increase over the last 5 years.

The principal function of the Tumour Registry is to record the follow-up data of patients treated at the Montreal Neurological Hospital for suspected and verified tumour of the nervous system. The information is gathered from Outdoor Clinics, private offices, referring doctors, and when necessary the Department of Demography of the Province of Quebec, or of the Province concerned. Patients are reminded to return for follow-up examinations and treatment, and many have written letters of appreciation to the secretary, Mrs. Guthro, for the help which they have received and the interest shown. The records serve as source material for evaluation of treatment under different conditions.

The hard working, industrious secretary of the Tumour Registry, Mrs. G. Guthro, is thanked for efficient service during the year. Dr. Wm.

McCann was appointed Fellow of the Tumour Registry, as of February 1967, to succeed Dr. B. Weir, who has been appointed Neurosurgeon in Edmonton.

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 of the Royal Victoria Hospital to the Central Tumour Registry of the Province of Quebec, which was established in 1961 and which has published annual reports for the Province of Quebec since 1962. These will become a valuable source of basic data in regard to tumour statistics.

Apart from the routine of the Registry, certain problems have been undertaken by various members of the staff. Dr. Solis made, in part, an analysis of a sampling of 112 cases of unclassified gliomas, from the years 1950 to 1959 inclusive. It shows that average survival is nearly doubled when major surgery is combined with x-ray therapy. He has also correlated site of growth with function of speech. Dr. M. Heuff has evaluated brain scanning techniques in relation to brain tumour follow-up, in association with Dr. Feindel and Dr. Yamamoto. Dr. B. Barone is analysing the ependymomas. He is now Chief of Neurosurgical Service of the Sixth Naval District, Charleston, South Carolina, and has been appointed assistant Professor of Surgery (neurosurgery) at Georgetown University.

Dr. B. Weir, who took over from Dr. M. Heuff in July 1966, began a study of the oligodendrogliomas which he plans to report at the Canadian Congress of Neurology and Neurosurgery in Quebec city in June. Dr. McCann is studying cases of long-term survival in melanosarcoma of brain. Dr. E. Berger continues his study of 140 metastatic tumours from the years 1950-1960 inclusive.

The tumour follow-up is complete since 1950. Certain earlier cases have also been followed. The long-term follow-up of tumours of the brain, more especially the gliomas, is of fundamental importance regarding the reasons for changes in growth and malignancy. A paper on our material was presented at the Pan-Pacific Surgical Association. The average results, depending on tumour type, are generally more satisfactory when operation is followed by x-ray, but exceptions occur in individual cases. It is clear now that piloid astrocytomas, when complete removal is feasible need never recur whether or not x-ray therapy is employed. The longest follow-ups for surviving cerebral and cerebellar piloid astrocytomas are 38 and 37 years respectively. The longest survival of the diffusum type is 18½ years, with partial removal followed by three courses of x-ray therapy. One patient survived 9 years with neither surgery or x-ray therapy. The longest survival, after surgical removal for a gemistocytic astrocytoma, is 10 years. On the average, duration of survival in glioblastoma multiforme and in intermediate groups, is doubled if x-ray therapy is administered after radical removal. The medulloblastomas, being very radiosensitive, fare as well on the average with biopsy verification and x-ray therapy as with operative removal and x-ray therapy. Survival has run to 24 years with x-ray therapy following surgical removal, and to 12 years after surgical biopsy and x-ray therapy.

FELLOWS' LIBRARY

DR. DONALD L. MCRAE

In the calendar year 1966 there were 1273 loans of books and journals to our staff compared with 1175 last year. Interlibrary loans were 95, the same as last year. Requests for books and photocopies on behalf of the Montreal Neurological Hospital and Montreal Neurological Institute staff amounted to 175 compared to 116 a year ago.

Our major problem continues to be lack of shelf space. The National Science Library in Ottawa accepted some of our bound journals and thus freed some space. Our present annual budget and our allotted space are insufficient to maintain what we would consider a satisfactory neurological library.

In order to carry out certain projects which will expand, improve and make more readily available the complete resources of our present library, a regular assistant is now necessary. Some of these projects are; compiling the library's holdings in special fields and the subsequent purchase of any important works in that field lacking in our library, regular inventory to determine losses in the library and in departmental libraries, cataloguing theses, journals and journal supplements, and completion of a library work manual.

We thank members of the hospital and institute and other friends who have donated books and journals. Our special thanks go to Miss Sandra Duchow who serves not only as librarian but provides invaluable help for the resident staff and research Fellows.

MONTREAL NEUROLOGICAL SOCIETY

President ..... DR. ANDRÉ PARENTEAU
Vice-President ..... DR. IRVING HELLER
Secretary-Treasurer ..... DR. ALLAN SHERWIN

Twenty-five meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held from September 28th, 1966 to May 31st, 1967.

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

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

DR. JACQUES COURVILLE, Department of Anatomy, McGill University and Department of Neuroanatomy, M.N.I.: "The Efferent Projection of the Cerebellar Nuclei."

DR. E. CHARLES KUNKLE, Neurologist, Portland, Maine: "The 'Jumpers' of Maine."

DR. JUAN TAVARAS, Director of Radiology, Washington University: "Intracranial Occlusive Vascular Lesions — Angiographic Aspects."

PROF. JOHN GILLIGHAM, Department of Surgical Neurology, University of Edinburgh: "Ruptured Intracranial Aneurysm — a Long-term Appraisal."

Dr. M. Stephen Mahaley, Jr., Division of Neurosurgery, Duke University: "Localization of Radioantibodies in Human Brain Tumours."

Dr. Pierre Gloor, Department of Neurophysiology, M.N.I.: "Centrencephalic Epilepsy Reconsidered."

Dr. Perry Black, Neurosurgeon, John Hopkins Hospital: "Information Exchange between the Cerebral Hemispheres: Behavioral Studies in the Chimpanzee."

Dr. J. Auer, Professor and Head, Department of Anatomy, University of Ottawa: Annual Neuroanatomy Lecture — "The Reticular Formation of the Thalamus."

Dr. R. Katzman, Professor and Chairman, Department of Neurology, Albert Einstein College of Medicine: "Some Approaches to the Anatomy and Chemistry of Cations in the CNS."

Drs. Claude Bertrand, N. Martinez and Jules Hardy, Department of Neurosurgery, Notre-Dame Hospital: "Certains Aspects of Stereotactic Surgery."

Dr. C. Miller Fisher, Neurologist, Massachusetts General Hospital: "Pathological Changes in Small Cerebral Arteries."

Dr. Vernon Mountcastle, Professor of Physiology, John Hopkins University: "Some Correlations between Psychophysical and Neurophysiological Studies of Sensation."

Dr. Ernst Beutner, Department of Bacteriology and Immunology, State University of New York at Buffalo: "The Relationship between Muscle Autoantibodies and Myasthenia Gravis."

Dr. Carl Walter, Professor of Surgery, Harvard University: "The Infector on the Surgical Team."

Dr. Irwin Kopin, National Institutes of Health, Bethesda, Md.: "Norepinephrine and False Neurochemical Transmitters in Brain."

Dr. Nicholas Gonatas, Department of Neurology, University of Pennsylvania: "Axonic and Synaptic Abnormalities in Neuropsychiatric Disease."

Prof. John Z. Young, Department of Anatomy, University College London: Annual Hughlings Jackson Lecture of the M.N.I. — "Information Storage in the Nervous System."

The Annual Dinner of the Society was held on October 10th, 1966, on board M. S. "Alexandr Pushkin".

FELLOWS' SOCIETY

President ..... Dr. Robert F. Nelson

Vice-President ..... Dr. Mortimer Lechter

Secretary-Treasurer ..... Dr. Philip Grisham

The Fellows' Society is an association of the residents on the clinical services and the fellows in the various research laboratories of the hospital and institute. This year we had a total of 54 members from over 21 different countries.

We started the year with several small social gatherings in the summer months which allowed the new and old fellows to get acquainted.

Early in December our Annual Winter Party was again a great success, with wives and staff nurses joining our festivities. Later in the winter we had an opportunity to help the nurses make their skating party another "best yet" event.

The fellows were very fortunate this year to have the old ninth floor room completely redecorated by the Women's Auxiliary of the R.V.H. This has provided a place where the weary resident on duty can relax for a few minutes and the fellows can have impromptu meetings in pleasant surroundings.

The Fellows' Society Banquet will be held June 16th this year at the new Chateau Champlain. Our guest speaker will be Dr. Arthur A. Ward Jr. from the University of Washington, and his topic will be Pathophysiology of Epilepsy. We look forward to this closing event and anticipate the usual good support.

We would like to point out that financial support for these events comes from the following sources. Interest from the endowment given by the late Dr. Lewis Reford and Mrs. Reford provide financial support for social events. The annual Fellows Lecture is made possible by interest from the Lecture Endowment Fund and by donations from former fellows. This year's interest amounted to $312.00. It is hoped that continued contributions will help us to pursue a more vigorous educational program.

CLINICAL TRAINING OPPORTUNITIES
NEUROLOGY

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

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

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

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

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

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

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

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

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

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

NEUROSURGERY

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

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

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

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

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

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

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

COURSES OF INSTRUCTION

UNDERGRADUATE

The Department of Neurology and Neurosurgery cooperates closely 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.

Professors McNaughton, Courville, and Staff

NEUROPHYSIOLOGY

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

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

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

Professors Gloor and Wolfe

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

Staff and Visiting Lecturers

630. SEIZURE MECHANISM AND CEREBRAL LOCALIZATION: Clinical Electroencephalographic and Roentgenographic Conference.
Alternate Thursdays 4:00 — 5:00 p.m.

Professors Rasmussen, Gloor, Broughton, Ethier, 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, alternate 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 — 6:00 p.m.
Professor Ethier

Electroencephalography and clinical neurophysiology

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, Broughton and Andermann

MONTREAL NEUROLOGICAL INSTITUTE

PUBLICATIONS

1966-67

BERTRAND, G. and JASPER, H.H. Microelectrode Recording of Unit Activity in the Human Thalamus. *Confinia Neurologica*, v. 26, 1965, pp. 205-208.

BERTRAND, G., MUSELLA, R. and BLUNDELL, J. Stimulation during Stereotactic Operations for Dyskinesias. *Journal of Neurosurgery*, v. 24, 1966, pp. 419-423.

BRINDLE, G.F. The Role of the Anaesthesiologist in the Management of Head Injuries, in *Head Injury; Conference Proceedings*, W.F. Caveness and A.E. Walker, ed. Philadelphia, Lippincott, 1966, pp. 158-167.

BROUGHTON, R., MEIER-EWART, K. and EBE, M. Visual and Somatosensory Evoked Potentials of Photo-sensitive Epileptic Subjects during Wakefulness, Sleep and following I.V. Diazepam (Valium). *Electroencephalography and Clinical Neurophysiology*, v. 21, 1966, p. 622.

CELESIA, G.G. and JASPER, H.H. Acetylcholine Released from Cerebral Cortex in Relation to State of Activation. *Neurology*, v. 16, 1966, pp. 1053-1063.

COCEANI, F. and GLOOR, P. The Distribution of the Internal Carotid Circulation in the Brain of the Macaque Monkey (Macaca Mulatta). *Journal of Comparative Neurology*, v. 128, 1966, pp. 419-429.

COCEANI, F., LIBMAN, I. and GLOOR, P. The Effect of Intracarotid Amobarbital Injections upon Experimentally Induced Epileptiform Activity. *Electroencephalography and Clinical Neurophysiology*, v. 20, 1966, pp. 542-558.

COCEANI, F. and WOLFE, L.S. On the Action of Prostaglandin E_1 and Prostaglandins from Brain on the Isolated Rat Stomach. *Canadian Journal of Physiology and Pharmacology*, v. 44, 1966, pp. 933-950.

COCEANI, F. and WOLFE, L.S. Pharmacological Properties of Prostaglandin E_1 and Prostaglandin Extracted from Brain. *Progress in Biochemical Pharmacology*, v. 3, 1967, pp. 129-135.

COURVILLE, J. The Nucleus of the Facial Nerve; the Relation between Cellular Groups and Peripheral Branches of the Nerve. *Brain Research*, v. 1, 1966, pp. 338-354.

COURVILLE, J. Rubrobulbar Fibres to the Facial Nucleus and the Lateral Reticular Nucleus (Nucleus of the Lateral Funiculus). An Experimental Study in the Cat with Silver Impregnation Methods. *Brain Research*, v. 1, 1966, pp. 317-337.

COURVILLE, J. Somatotopical Organization of the Projection from the Nucleus Interpositus Anterior of the Cerebellum to the Red Nucleus. An Experimental Study in the Cat with Silver Impregnation Methods. *Experimental Brain Research*, v. 2, 1966, pp. 191-215.

COURVILLE, J. and BRODAL, A. The Rubro-cerebellar Connections in the Cat. An Experimental Study with Silver Impregnation Methods. *Journal of Comparative Neurology*, v. 126, 1966, pp. 471-486.

DOBELL, A.R.C., WYANT, J.D., SEAMANS, K.B. and GLOOR, P. Penicillin Epilepsy: Studies on the Blood-brain Barrier During Cardiopulmonary Bypass. *Journal of Thoracic Cardiovascular Surgery*, v. 52, 1966, pp. 469-475.

DREIFUSS, J.J., MURPHY, J.T. and GLOOR, P. Response Patterns of Hypothalamic Neurons to Limbic Stimulation. *Proceedings of the Canadian Federation of Biological Societies*, v. 9, 1966, p. 49.

FAWCETT, J.S., ANDERMANN, F., WIGLESWORTH, F.W., and LLOYD-SMITH, D.L. On the Natural History of Late Infantile Cerebromacular Degeneration. *Neurology*, v. 16, Nov. 1966, pp. 1130-1134.

FEINDEL, W., GARRETSON, H. and YAMAMOTO, Y.L. Blood Flow Studies in the Pial and Cortical Circulation in Man Using Intracarotid Radio-active Tracers. *Proceedings of the Third International Congress of Neurological Surgery*, series no. 110, 1965, pp. 603-606.

FEINDEL, W., YAMAMOTO, Y.L. and HODGE, C. Intracarotid Fluorescein Angiography: A New Method for Examination of the Epicerebral Circulation in Man. *Canadian Medical Association Journal*, v. 96, 1967, pp. 1-7.

FEINDEL, W., and YAMAMOTO, Y.L. Luxury-Perfusion Syndrome. *Lancet, i*, 1967, pp. 48-49.

FEINDEL, W., Highlights of Neurosurgery in Canada. *Journal of American Medical* Association, v. 200, 1967, pp. 149-156.

FEINDEL, W., HODGE, C.P., and YAMAMOTO, Y.L. Epicerebral Angiography by Fluorescein During Craniotomy. *Proceedings of the Third International European Congress of Neurosurgery*, series no. 139, 1967, p. 47.

FEINDEL, W., YAMAMOTO, Y.L., and HODGE, C.P. The Human Cerebral Microcirculation studied by Intra-arterial Radio-active Tracers, Coomassie Blue and Fluorescein Dyes, Proc. 4th European Conf. on Microcirculation, Cambridge, 1966, *Bibl. Anat.*, Fasc. 9, 1967, pp. 220-224.

FORD, R.M. and MCRAE, D.L. Echoencephalography. A Standardized Technique for the Measurement of Width of the Third and Lateral Ventricles, in *The Use of Diagnostic Ultrasound in Brain Disorders*, C.C. Grossman, ed. Springfield, Ill., C.C. Thomas, 1966, pp. 117-129.

GALINDO, A., BRINDLE, G.F. and GILBERT, R.G.B. Hepatic Circulation and Hepatic Function during Anaesthesia and Surgery. IV. Halothane Anaesthesia. *Canadian Anaesthetists' Society Journal*, v. 13, 1966, pp. 328-341.

GARRETSON, H., GLOOR, P. and RASMUSSEN, T. Intracarotid Amobarbital and Metrazol Test for the Study of Epileptiform Discharges in Man: A Note on Its Technique. *Electroencephalography and Clinical Neurophysiology*, v. 21, 1966, pp. 607-610.

GARRETSON, H., PEROT, P., YAMAMOTO, Y.L., and FEINDEL, W. Intracarotid Coomassie Blue Dye as an Aid in the Surgery of Intracranial Vascular Lesions. *Journal of Neurosurgery*, v. 26, 1967, pp. 577-583.

GILBERT, R.G.B. Anesthetic Problems in the Management of the Patient Undergoing Surgery of the Central Nervous System, in *Anesthesiology and the Nervous System*, J.B. Dillon and C.M. Ballinger, eds. Salt Lake City, University of Utah Press, 1966, pp. 188-214.

GLOOR, P., HALL, G. and COCEANI, F. Differential Sensitivity of Various Brain Structures to the Epileptogenic Action of Penicillin. *Experimental Neurology*, v. 16, 1966, pp. 333-348.

GORMAN, A.F. Convergence of Fast and Slow Synaptic Systems on Pyramidal Tract Neurons in Motor Cortex Following Surface Stimulation. *Experimental Neurology*, v. 17, 1967, pp. 344-356.

GORMAN, A.F. Differential Patterns of Activation of the Pyramidal System Elicited by Surface Anodal and Cathodal Cortical Stimulation. *Journal of Neurophysiology*, v. 29, 1966, pp. 547-564.

HANSEBOUT, R.R. and COSGROVE, J.B.R. Effects of Intrathecal Phenol in Man. A Histological Study. *Neurology*, v. 16, 1966, pp. 277-282.

JASPER, H.H. Pathophysiological Studies of Brain Mechanisms in Different States of Consciousness, in *Brain and Conscious Experience*, John C. Eccles, ed. New York, Springer-Verlag, 1966, pp. 256-282.

JASPER, H.H. and BERTRAND, G. Recording from Microelectrodes in Stereotactic Surgery for Parkinson's Disease. *Journal of Neurosurgery*, v. 24, 1966, pp. 219-221.

JASPER, H.H. and BERTRAND, G. Thalamic Units Involved in Somatic Sensation and Voluntary and Involuntary Movements in Man, in *The Thalamus*, D.P. Purpura and M.D. Yahr, eds. New York, *Columbia University Press*, 1966, pp. 365-390.

KIMURA, D. Dual Functional Asymmetry of the Brain in Visual Perception. *Neuropsychologia*, v. 4, 1966, pp. 275-285.

MCRAE, D.L. Observations on Craniolacunia. *Acta Radiologica*, v. 5, 1966, pp. 55-64.

McRae, D.L. and Makow, D.M. Horizontal Laminography of the Head with Ultrasound. *Journal of the Canadian Association of Radiologists*, v. 17, 1966, pp. 75-80.

McRae, D.L. and Standen, J. Roentgenologic Findings in Syringomyelia and Hydromyelia. *American Journal of Roentgenology*, v. 98, 1966, pp. 695-703.

Meier-Ewart, K. and Broughton, R. The Photomyoclonic Response of Epileptic and Non-epileptic Subjects during Wakefulness, Sleep and following I.V. Diazepam (Valium). *Electroencephalography and Clinical Neurophysiology*, v. 21, 1966, p. 622.

Milner, B. Amnesia following Operation on the Temporal Lobes, in *Amnesia*, O.L. Zangwill and C.W.M. Whitty, eds. London, Butterworths, 1966, pp. 109-133.

Milner, B. Brain Mechanisms Suggested by Studies of Temporal Lobes, in *Brain Mechanisms underlying Speech and Language*, F.L. Darley, ed. New York, Grune & Stratton, 1967, pp. 122-145.

Milner, B., Branch, C. and Rasmussen, T. Evidence for Bilateral Speech Representation in Some Non-right-handers. *Transactions of the American Neurological Association*, v. 91, 1966, pp. 306-308.

Murphy, J.T., Gloor, P., Yamamoto, Y.L. and Feindel, W. A Comparison of Electroencephalography and Brain Scan in Supratentorial Tumors. *New England Journal of Medicine*, v. 276, 1967, pp. 309-313.

Pappius, H.M., Oh., J.H. and Dosseter, J.B. The Effect of Rapid Hemodialysis on Brain Tissues and Cerebrospinal Fluid of Dogs. *Canadian Journal of Physiology and Pharmacology*, v. 45, 1967, pp. 129-147.

Penfield, W. Epilepsy, the Great Teacher. Acta Neurologica Scandinavica, v. 43, 1967, pp. 1-10.

Penfield, W. Speech, Perception and the Uncommitted Cortex, in *The Brain and Conscious Experience*, J.C. Eccles, ed. New York, Springer-Verlag, 1966.

Perot, P., Ethier, R. and Wong, A. An Arterial Posterior Fossa Extradural Hematoma Demonstrated by Vertebral Angiography. *Journal of Neurosurgery*, v. 26, 1967, pp. 255-260.

Perot, P., Feindel, W. and Lloyd-Smith, D. Hematomyelia as a Complication of Syringomyelia: Gower's Syringal Hemorrhage. *Journal of Neurosurgery*, v. 25, 1966, pp. 447-451.

Perot, P., Weir, B. and Rasmussen, T. Tuberous Sclerosis; Surgical Therapy for Seizures. *Archives of Neurology*, v. 15, 1966, pp. 498-506.

Redding, F. Modification of Sensory Cortical Evoked Potentials by Hippocampal *Stimulation. Electroencephalography and Clinical Neurophysiology*, v. 22, 1967, pp. 74-83.

Shankweiler, D. Effects of Temporal-lobe Damage on Perception of Dichotically Presented Melodies. *Journal of Comparative and Physiological Psychology*, v. 62, 1966, pp. 115-119.

Sherwin, A.L. Chronic Allergic Neuropathy in the Rabbit. *Archives of Neurology*, v. 15, 1966, pp. 289-293.

Sherwin, A.L. and Laviolette, R. An Immunological Comparison of Central and Peripheral Nervous Tissues. *International Archives of Allergy and Applied Immunology*, v. 31, 1967, pp. 152-162.

Steinberg, R.H. Oscillatory Activity in the Optic Tract of Cat and Light Adaptation. *Journal of Neurophysiology*, v. 29, 1966, pp. 139-156.

Strauss, C. Some Psychological Studies with the Blind, Low Vision and Deaf Blind. *Special Education in Canada*, v. 40, 1966, pp. 7-18.

Weir, B. and Sie, P.G. Extracellular Unit Activity in Cat Cortex during the Spike-wave Complex. *Epilepsia*, v. 7, 1966, pp. 30-43.

Wolfe, L.S. et al. The Mechanism of Action of Local Anesthetics [panel discussion] in *World Congress of Anaesthesiology*. 3d. Sao Paulo, Brazil, September, 1964. *Anaesthesiology and Resuscitation. Berlin, Springer*, 1966, pp. 86-137.

MONTREAL NEUROLOGICAL HOSPITAL
BALANCE SHEET AS AT DECEMBER 31, 1966
ASSETS AND DEFICIT

		1966
		$
GENERAL FUND		
ASSETS		
Cash		4,696
Accounts receivable — less provision for doubtful accounts		121,884
Grant receivable — Province of Quebec		90,000
Inventories of supplies — at the lower of cost or replacement cost		27,772
		244,352
DEFICIT (note 1)		593,086
		837,438
PLANT FUND		
ASSETS (note 2)		
Cash		54,097
Amount due from the Royal Institution for the Advancement of Learning		19,251
Equipment — at cost	$1,475,938	
Accumulated depreciation	839,101	636,837
		710,185
		1,547,623

LIABILITIES AND CAPITAL

		1966
		$
GENERAL FUND		
LIABILITIES		
Accrued salaries		13,190
Amounts due to the Royal Institution for the Advancement of Learning —		
Current account		243,312
Advances to cover deficit		580,936
		837,438
PLANT FUND		
LIABILITIES		
Amount due to Quebec Hospital Insurance Service		4,856
Amount due to the Royal Institution for the Advancement of Learning		
		4,856
CAPITAL		705,329
		710,185
		1,547,623

AUDITORS' REPORT

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

April 18, 1967

We have examined the balance sheet of Montreal Neurological Hospital as at December 31, 1966 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, 1966 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

STATEMENT OF DEFICIT
FOR THE YEAR ENDED DECEMBER 31, 1966

	1966		
	Shareable	Non-shareable	Total
	$	$	$
BALANCE — BEGINNING OF YEAR	229,013	264,678	493,691
Adjustment of prior years' deficit		(6,048)	(6,048)
Amounts received from the Quebec Hospital Insurance Service			
1963 final payment			
1964 interim payment			
1965 interim payment	(57,762)		(57,762)
	171,251	258,630	429,881
Net operating deficit (surplus) for the year	192,950	(29,745)	163,205
BALANCE — END OF YEAR (note 1)	364,201	228,885	593,086

STATEMENT OF OPERATIONS
FOR THE YEAR ENDED DECEMBER 31, 1966

	1966		
	Shareable	Non-shareable	Total
	$	$	$
OPERATING EXPENDITURE			
Salaries and wages	2,007,524		2,007,524
Medical and surgical supplies and drugs	173,407		173,407
Depreciation on equipment	92,246		92,246
Sundry supplies, services and expenses	629,032	5,866	634,898
	2,902,209	5,866	2,908,075
OPERATING REVENUE			
Hospital Insurance Service			
In-Patients (note 1)	1,746,696		1,746,696
Equipment depreciation fund payments	92,246		92,246
In-patients, other	609,363	43,943	653,306
Out-patients	83,329		83,329
Grants —			
Province of Quebec	90,000		90,000
City of Montreal	67,500		67,500
Sundry revenue	20,125	(8,332)	11,793
	2,709,259	35,611	2,744,870
NET OPERATING DEFICIT (SURPLUS) FOR THE YEAR (note 1)	192,950	(29,745)	163,205

NOTES TO FINANCIAL STATEMENTS

1. SHAREABLE DEFICIT

Interim payments under the Quebec Hospital Insurance Act are based on the budget for 1966 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 in appealing to the Minister of Health for recovery of the 1966 shareable deficit of $192,950, the unpaid balance of the 1965 shareable deficit amounting to $118,967 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.

2. BUILDINGS

The premises occupied by the hospital are the property of The Royal Institution For The Advancement Of Learning (McGill University).

The hospital's accounts were separated from those of the university in 1963 when the hospital was incorporated. At that time it was anticipated that title to the premises would be transferred to the hospital and the cost was therefore reflected in the hospital's accounts. Since the transfer has not been made the cost has been eliminated from the hospital's accounts.

This adjustment has also been reflected in the comparative figures.

MONTREAL NEUROLOGICAL INSTITUTE

RESEARCH AND TEACHING EXPENDITURE SUMMARY FOR THE YEAR ENDING DECEMBER 31, 1966.

from Major MNI Endowment Funds	$161,660
from MNI Special Funds	162,300
from General University Funds	9,350
from Medical Research Council Block Term Grant	75,000
from Various Annual Research and Fellowship Grants	228,363
TOTAL EXPENDITURE	$636,673

ENDOWMENTS

1934 — Rockfeller 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
John and Mary Markle Foundation Fellowship — Dr. Sherwin
— Dr. Milner
Medical Research Council of Canada Grants — Dr. Sherwin
— Dr. Wolfe
Medical Research Council of Canada Associateships — Dr. Milner
— Dr. Wolfe
Medical Research Council of Canada Major Equipment Grant — Dr. Mathieson
Multiple Sclerosis Society of Canada Research Grant — Dr. Wolfe

DONATIONS TO SPECIAL FUNDS 1966-67

ANAESTHESIA RESEARCH FUND:	
Anonymous	$15,000.00
BRAIN RESEARCH FUND:	
Mr. A. Murray Vaughan	500.00
Mrs. A. Murray Vaughan	500.00
Mrs. Howard Pillow	4,000.00
CANCER CLINICAL RELIEF FUND:	
Cancer Aid League	3,000.00
Canadian Cancer Society	80.00
WILLIAM CONE MEMORIAL RESEARCH FUND:	
Mrs. Edna Roberts (In Memory of Mr. Percy Roberts)	200.00
Miss Betty Yablon (In Memory of Dr. R. Rabinovitch)	25.00
Harold Crabtree Foundation	1,000.00
Mr. John Langdon	600.00
Col. K. B. Jenckes	100.00
Dr. D. Berger	25.00
Mr. and Mrs. J. C. Conrad (In Memory of Mr. John Conrad)	60.00
Mr. Hugh Seybold	50.00
Mr. Gordon Gowling	500.00
COSGROVE RESEARCH FUND:	
Mr. J. D. deLalanne	200.00
Mrs. Treva Troutman	25.00
DICK EPILEPSY FUND:	
Anonymous	1,000.00
GORDON LIBRARY FUND:	
HARVEY CUSHING CLINICAL RELIEF FUND:	
Miss Lillian Sandler	25.00
Miss Hazel Burrell	50.00
In His Name Society	202.00
Christmas Index Fund	25.00
Mr. Maurice Gabes	10.00
Mr. J. Clare Wilcox	100.00
Mrs. Elizabeth deSimini	20.00
Lions Club of Montreal	32.00
Women's Auxiliary of the Royal Victoria Hospital	400.00
HOSPITAL EQUIPMENT FUND:	
Women's Auxiliary of the Royal Victoria Hospital	2,000.00
McConnell Foundation	3,000.00
MARY MASSABKY FOUNDATION RESEARCH FUND:	
Mr. A. G. Massabky	299.38
MISCELLANEOUS SPECIAL FUNDS:	
In Memory of the Late Mr. Andrew Ritchie	10.00
In Memory of the Late Master Bruce Jonathan Wardle	20.00
In Memory of the Late Mr. Arthur Aitkins	50.00
Miss Betty Yellon in Memory of Dr. R. Rabinovitch	25.00
M.N.I. NEUROSURGICAL RESEARCH FUND:	
M.N.I. STAFF LOAN FUND:	
MULTIPLE SCLEROSIS CLINICAL RELIEF FUND:	
Mr. H. W. McMahon	35.00
Multiple Sclerosis Golf League	400.00
Montreal Association for Multiple Sclerosis	500.00
MULTIPLE SCLEROSIS RESEARCH FUND:	
McNAUGHTON NEUROANATOMY RESEARCH FUND:	
Anonymous	500.00
Mrs. Anna Aron	100.00
Miss Rose Griffith	200.00
NEUROLOGICAL RESEARCH FUND:	
Mr. P. A. Lorentzen	25.00

Mrs. Peter Laing	3,000.00
Mr. Howard B. Hoppenheim	50.00
Estate of the Late Mrs. Marguerite Yuile Watson	52,427.25
Mr. Joe Rubin	1,000.00
Mr. Stanley Wolenski	90.00
Mr. Horace Wolfe	1,000.00
NEUROPHYSIOLOGY RESEARCH FUND:	
NEURORADIOLOGY RESEARCH AND TEACHING FUND:	
NURSING FUNDS:	
EILEEN C. FLANAGAN NURSING BURSARY FUND:	
Mr. and Mrs. W. Stoll	10.00
Mrs. Beatrice Hampson	50.00
Mr. B. Usheroff	50.00
M.N.I. Nursing Staff	35.00
M.N.I. NURSING EDUCATION FUND:	
Mrs. Sam Reitman	300.00
OAKLAWN FOUNDATION FELLOWSHIP FUND:	
Oaklawn Foundation	2,000.00
PENFIELD RESEARCH FUND:	
REUBEN RABINOVITCH MEMORIAL FUND OF THE CANCER RESEARCH SOCIETY:	
REUBEN RABINOVITCH MEMORIAL LIBRARY FUND:	
Mr. and Mrs. Sydney Caplan	10,000.00
REUBEN RABINOVITCH MEMORIAL TRIBUTE FUND:	
Mrs. R. Springer	200.00
CANCER RESEARCH SOCIETY:	3,000.00
LEWIS REFORD FELLOWS FUND:	
WOMEN'S AUXILIARY FUND:	
Women's Auxiliary Fund of the Royal Victoria Hospital	600.00

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

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

STATISTICS

CLASSIFICATION OF DISEASES

Nervous System Generally:		
Multiple Sclerosis	118	
Motor Neurone Disease	18	
Meningo-Vascular Lues	2	
Miscellaneous	3	
		141
Meninges:		
Meningocele & Myelomeningocele	2	
Acute Purulent Meningitis	3	
Headache	61	
Vertigo	10	
Subdural Haematoma	30	
Intracerebral Haematoma	10	
Epidural Haematoma	9	
Subdural Hygroma	2	
Subarachnoid Haemorrhage	29	
Intracerebral Haemorrhage	11	

C. S. F. Rhinorrhea	4	
Miscellaneous	6	
		177

Brain:

Congenital Anomalies	10	
Hydrocephalus	13	
Abscess	4	
Syncope	4	
Contusion, Laceration, Traumatic Encephalopathy	63	
Concussion	131	
Epilepsy	353	
Migraine	31	
Parkinsonism	36	
Thrombosis, Encephalopathy due to Arteriosclerosis	193	
Cysts	3	
Intracranial Aneurysm	26	
Encephalitis	7	
Gunshot Wound	5	
Miscellaneous	7	
		886

Tumours:

Gliomas	29	
Meningeal Fibroblastoma	22	
Craniopharyngioma	6	
Angioma	2	
Glioblastoma Multiforme	21	
Metastatic Carcinoma	31	
Astrocytoma	31	
Medulloblastoma	5	
Ependymoma 4th Ventricle	2	
Chromophobe Adenoma Pituitary	23	
Sacral Radiculopathy due to Metastases	3	
Oligodendroglioma	4	
Bronchogenic Carcinoma	5	
Sarcoma	2	
Tuberose Sclerosis	6	
Brain Tumours — Miscellaneous	18	
Malignant Melanoma	3	
Malignant Teratoma	3	
Neurinoma 8th nerve	3	
Pinealoma	2	
		221

Spinal Cord:

Contusion of Spinal Cord	1	
Compression of the Spinal Cord	5	
Guillain-Barre Syndrome	6	
Myelopathy	5	
Syringomyelia	7	
Poliomyelitis	1	
Diastematomyelia	2	
Cervical Spondylosis	15	
Transverse Myelitis	7	
Miscellaneous	9	
		58

Cranial & Peripheral Nerves:

Optic Neuritis	10
Trigeminal Neuralgia	22
Meniere's Syndrome	3
Compression Ulnar Nerve	4
Other Neuralgias	16
Neuropathy	5
Carpal Tunnel Syndrome	8
Bell's Palsy	2
Paresis — Cranial Nerves	27
Miscellaneous	8
	105

Muscles:

Myasthenia Gravis	10
Muscular Atrophy	5
Muscular Dystrophy	10
Polymyositis	4
Myopathy	6
Spasmodic Torticollis	6
Miscellaneous	4
	45

Mental Diseases:

Mental Retardation	22
Depression	21
Anxiety State	38
Conversion Hysteria	13
Alzheimer's Disease	19
Schizophrenia	2
Personality Change	6
Alcoholic Degeneration	7
Miscellaneous	6
	134

Other Systems:

Protrusion Disc — Lumbar	200
— Cervical	19
Fracture and/or Dislocation of Vertebral Column	48
Fracture Skull	90
Pain in back	30
Pain — Miscellaneous	16
Traumatic Lesions & Infections	31
Hyperthyroidism	2
Arthritis	6
Diabetes Mellitus	9
Miscellaneous	13
	464

CLASSIFICATION OF OPERATIONS

Craniotomy or Cranicctomy:

and Biopsy	10
and Decompression	3
and Drainage of Abscess	2

and Drainage of Subdural Haematoma		30
and Drainage of Intracerebral Haematoma		8
and Drainage of Extradural Haematoma		9
and Elevation of Depressed Skull Fracture		17
and Excision of Epileptogenic Focus		54
and Obliteration of Aneurysm		26
and Exploration		2
and Hypophysectomy for Endocrine Control		1
and Hypophysectomy for Pituitary or Intrasellar Tumour		13
and Incision, Drainage or Removal of Cyst		1
and Plastic Repair of Dura (C.S.F. Rhinorrhea or Fistula)		4
and Plastic Repair of Skull Defect (Plate, Bone or Plastic)		10
and Removal of Arteriovenous Malformation		5
and Removal of Cerebral Tumour		59
and Removal of Posterior-Fossa Tumour		14
and Removal of Tumour of Skull		2
and Trigeminal Rhizotomy		10
and Ventriculocisternostomy (Torkildsen's)		6
		286

Trepanation:

and Aspiration of Cyst		1
and Biopsy		2
and Drainage of Subdural Space		5
and Exploration		7
and Ventricular Puncture		1
and Ventriculography		14
and Leucotomy		1
		31

Shunt Procedure:

and Lumbar Subarachnoid — Peritoneal		1
and Ventricular Caval		29
and Ventricular Peritoneal		4
		34

Stereotaxic Procedure:

and Ventriculography		20
and Second Stage		27
		47

Laminectomy and Hemilaminectomy:

and Anterolateral Cordotomy — Cervical	3
and Anterolateral Cordotomy — Thoracic	3
and Biopsy	1
and Decompression or Exploration of Spinal Cord for Spondylosis (Dentate Ligament Section)	7
and Decompression or Exploration of Spinal Cord (Trauma)	2
and Decompression or Exploration of Spinal Cord Tumour or Vascular Malformation	4
and Discoidectomy — Lumbosacral	101
and Discoidectomy — Cervical	8
and Incision and Drainage of Abscess	1
and Incision and Drainage of Intramedullary Cyst (Syringomyelia)	3
and Removal of Tumour — Intramedullary	3
and Removal of Tumour — Extramedullary, Intradural	4
and Removal of Extradural Tumour — Metastatic, Bone tumour, etc.	7
and Rhizotomy	3
and Spinal Fusion with Bone Graft — Autogenous or Bank Bone	52

and Spinal Fusion — Cervical — Occipital	1	
Discoidectomy — Anterior Approach — Cervical	5	
		208
Nerve Explorations:		
and Anastomosis or Suture	1	
and Avulsion or Section	6	
and Excision of Neuroma	2	
and Neurolysis, Transplantation or Decompression	16	
		25
Artery Explorations:		
and Endarterectomy (Patch-Graft)	5	
and Ligation	1	
and Progressive Occlusion (Selverstone Clamp)	1	
and Temporary Occlusion	1	
		8
Wound Re-Opening:		
and Drainage of Infection	2	
and Evacuation of Haematoma	7	
and Exploration	3	
and Further Removal of Brain Tissue	3	
and Further Removal of Epileptogenic Focus	1	
and Removal of Bone Flap, Tantalum Plate or Wire Mesh	3	
and Repacking	4	
and Resuturing	5	
		28
Miscellaneous:		
Diagnostic Spinal Anaesthesia	1	
Miscellaneous	15	
Suture of Laceration or Wound	2	
Tracheotomy	20	
Radiological Procedures:		
Cerebral Angiography — Percutaneous, Carotid, Vertebral or Subclavian Catheterization — Brachial, Femoral or Carotid	530	
Pneumograms under Anaesthesia	66	634
TOTAL		1,301

CAUSES OF DEATH

Intracranial aneurysm (haemorrhage & haematomata due to aneurysm)	26
Head Injury (concussion, contusion, haematomata, etc.)	25
Intracranial tumour, metastatic	15
Cerebrovascular Disease (thrombosis, infarction, haemorrage)	13
Intracranial tumour, primary	4
Carcinoma (generalized)	2
Hydrocephalus	2
Other systems	7
Miscellaneous Neurological Diseases	7
TOTAL	101