# Twenty-Fourth Annual Report

of the

# MONTREAL NEUROLOGICAL INSTITUTE

and the

# DEPARTMENT OF NEUROLOGY AND NEUROSURGERY

McGILL UNIVERSITY
1958-59

# CONTENTS

William V. Cone, M.D.

1897-1959

# REPORT OF THE DIRECTOR

DR. WILDER PENFIELD

It was twenty-eight years ago when a few farsighted citizens of Montreal contributed a quarter of a million dollars to McGill University and the sum was matched by the Rockefeller Foundation. Three years later the Montreal Neurological Institute opened its doors. This was a beautiful building with every facility, but there were only 32 public beds and 15 private beds. Then the war came. A temporary military annex was built to hold more beds. Finally, public demand resulted in the building of the McConnell wing. The beds had now increased to 136. The three research laboratories had become seven. New chiefs took charge of all but one. That was the laboratory of Dr. Cone.

Thus we have watched this small local hospital become a consulting and treatment center for Canada. We have seen this academic project become a school for graduate teaching and research that knows no national boundaries. And thus, Montreal has in it today a clinical institute, a brain institute, for the service of mankind.

If the achievement of a quarter century has justified the original scientific hopes of the Rockefeller Foundation and the University; if it has justified the humanitarian hopes of the Province of Quebec which backed us with money and goodwill and the City of Montreal which did the same — we should give some thought to the future.

You have heard, in crisp succession, the reports of those who have gradually taken over my responsibilities within the Institute. And so, perhaps I may be pardoned if I change the Director's report into an appeal for the consolidation of resources that will render permanent and adequate the scientific work of this Institute. Without financial provision for research, this could become just another hospital. With it, it will surely be a place of special leadership. We need not concern ourselves now about the future support of the hospital beds. Succeeding generations will see to that, as they have done. There is no other way of learning the truth about the brain and the mind of man, no other place than in an institute half laboratory, half hospital.

In the beginning we thought we saw the opportunity to serve mankind through greater knowledge of the nervous system — Professor Archibald, Dean Martin, Dr. Cone and I. Now it is clear how great is that opportunity. Men talk of outer space and the need to explore the moon and the stars. But what is outer space to us? Of course it is true as the psalmist sang so long ago: "The Heavens declare the glory of God and the firmament showeth His handiwork."

But in the brain of man, there is a microcosm that is no less vast than that of the universe. In it, the secrets of God's purpose are written as well as in the stars, secrets of greater import to mankind. Ten million nerve cells are sending and receiving electrical messages along insulated wires within the brain of one man. This vast humming mechanism with potentials flashing this way and that, is coordinated and controlled to make each man's thinking possible — this is the microcosm we have set out to explore.

The brain is the home of man's awareness, the temple of his spirit. It is the organ of human destiny. Leave the stars to move in their ordered courses. Man and his mind is our problem.

Next October when this Institute celebrates its quarter century of life, I hope, perhaps foolishly, to be able to announce that the endowment of research has been greatly increased. Every leading nation of the world should have at least one permanent Institute such as this. Not every nation needs to launch a satellite.

Prime Minister Diefenbaker told me recently that members of the Federal Parliament would never consider permanent endowment of science by capital grants. We must therefore turn to private sources and perhaps to industry. The Federal Government does help us, as Professor Rasmussen has pointed out, by annual consolidated grants through the National Research Council.

At a critical moment six years ago, a certain Montreal citizen and his wife gave us an added endowment which made expansion of laboratory work possible when the new wing was opened in 1953. And an American citizen did likewise in lesser amount. So it was that the work did not flag. It has gone forward with our expansion.

The Montreal Neurological Institute is a key. Those who support it will be using that key to unlock a future for certain discovery, a future in which man will come to greater understanding of man himself and his mind. Fortunately for us this Institute is administered by a University. As the world is organized today, no institution can promise such continuity and permanence of effort as can a University.

It has been said that the M.N.I. is the realization of a dream. Most of the things worth while in the life of today were once someone's insubstantial dream. But the realization of a dream is something more, much more, than the dream or the dreamer. This neurological realization which is so much better than the original dream, is not the building. That becomes obsolescent, is rebuilt. It is not the workers. They come and go and others come. It is something beyond all that, something that may be compared to the spirit of a group of explorers. It is like a flame that is fed by tradition and by past achievement and by the approval of society, a flame that the passage of time will not extinguish.

This is not the time for obituaries nor is it the place for tears. But I must record the death of Dr. William Cone, Neurosurgeon-in-Chief and Neuropathologist of this Institute and Professor of Neurosurgery. He was a dreamer and a worker, a friend, a man of infinite kindness. He had an unshakeable determination to realize perfection in our Art. He was a surgeon excelled by none. He, more than any other, has made this Institute what it is.

In the early morning hours of May 4th, shortly before his 62nd birthday, when his resident assistants thought that he was working in his office preparing his report for this meeting, he dropped over the side of the ship and set off in the pilot's boat, heading for the unknown shore.

We, who remain, will hold this ship to its course, as men will do in years to come, whoever drops over the side. Dr. Cone is still a part of the spirit to which I have just referred, for the spirit of an institution that is well founded has a sort of immortality of its own. It goes on and each of us leaves something that lives on in it. We may weep for ourselves but we should be glad, I suppose, that he could die when he had reached his goals in life and all men could applaud. He lived as he wanted to live, working as few men ever worked, working in kindly service to his fellow men because he loved them.

Many there are who loved him and the things he did and hoped to do. Sir Charles Sherrington, Oxford's great Neurophysiologist, wrote a sonnet on the death of his friend. I cannot do that. The last line of Sherrington's sonnet was this: "Loving is more than living, more than to be beloved."

Patients often gave Dr. Cone money for the purpose of his pet investigations. This pleased him and he spent some of the money, leaving the rest in the care of the University, year by year. He planned to spend it someday on the better researches he dreamed about, someday when he should find the time. He did not find the time.

The Cone Research Fund amounts today to $62,231. When two partially expended grants are added to that, the total amounts to about $70,000. Already, an unsolicited offer of contribution has reached me which will considerably more than double that sum.

If my words should come to the ears of his former patients, I would have them know that this money will create a memorial fund to their doctor. It will be devoted to the search for truth, the research he had in mind. Others may still contribute, if they wish, and we hope they will, in sums large or small, to this permanent William Cone Memorial.

Every man, in every walk of life, should serve some sort of cause. If he gives his life to it, and the cause is good, its movement does not cease. Instead, momentum grows. A body of science may become a cause rather than random enquiry to no good purpose.

Hippocrates, long, long ago, made of the Art of Medicine a great cause for human betterment. He died 2400 years ago, but the movement he started has gone on and the oath his disciples took is still the physician's gospel. These words are found in it: "I will keep pure and holy both my life and my art." But Hippocrates did more than that. He founded natural science. The truth, he said, was only to be discovered by the critical observation of nature. Along that road of science he could go but a little way. None of us goes very far. Modern science calls for the effort of many men in long succession. Success depends on concerted action, long continued. Many should serve this cause — for the goal is truly the betterment of mankind.

# GRADUATE STUDIES AND RESEARCH

DR. HERBERT H. JASPER

Visitors to the Institute from many parts of the world get different impressions of our work, but they all agree on the one outstanding feature which is unique, the close interweaving of devotion to the healing of the sick and the advancement of science. Each stimulates and complements the other. The many unsolved problems of diseases of the nervous system motivate much of our laboratory work, while each patient, thoroughly studied, may teach us much of basic scientific value if our minds are prepared and alert, and if we take time for reflection.

In our weekly research conferences we have a forum for critical review of both laboratory and clinical studies, and for discussion of plans for future work. In graduate seminars there is a more systematic review of the most recent advances in knowledge of the function and structure of the nervous system and its diseases. Clinical, radiological, and pathological conferences and visiting lecturers round out the formal aspects of graduate training while the daily close association between fellows and staff in laboratories and wards provides the most rewarding part.

It is possible to mention only a few of the highlights of the many varied basic and clinical studies being pursued with more or less success during the past year. Outstanding is the work of our neurochemistry department whose consistent and penetrating analysis of the metabolism and action of an inhibitory substance called GABA (Gamma Aminobutyric Acid) is receiving world wide attention as shown by the insatiable demand for reprints and invitations to participate in international meetings and symposia. Physiological studies of this substance have been equally rewarding, adding zest to the continued fruitful collaboration between neurophysiology and neurochemistry. In Nico Van Gelder's doctorate thesis will be found an excellent review of this subject together with a detailed account of his own important contributions to its development.

Next week Dr. Elliott and myself will be winging our way to California to join a distinguished international gathering devoted to studies of inhibition and GABA. We are very proud that Dr. Elliott and his work have also received recognition at home by his appointment as Professor and Head of the Department of Biochemistry at McGill University.

In the neurophysiology and E.E.G. departments the technique of microelectrodes, which makes it possible literally to "listen in" on the firing of single brain cells, has been used in a variety of problems: analysis of the effects of anaesthesia on cortical and subcortical structures, the effect of amygdaloid seizure discharge upon temporal neocortex, cellular and dendritic mechanisms of excitation in the development of seizures in the hippocampus, analysis of cortical and subcortical mechanisms in experimental Parkinson-like tremor in the monkey, and a continuation of our analysis of alterations in brain cell activity during conditioning.

Of particular interest also has been the work of Drs. Stepien, Cordeau and Rasmussen on the effect of restricted lesions in temporal cortex and amygdaloid-

hippocampal complex upon the retention of auditory and visual memory patterns in the monkey, stimulated by the studies of Drs. Penfield and Milner on the importance of these structures for memory in man. I am pleased to report also that Drs. Bertrand and Blundell have finally begun carrying out carefully controlled stereotaxic surgical procedures with most promising results in several patients and, with Drs. Rasmussen, Rovit, Gloor, and Lewis Henderson have begun implanted electrode studies of epileptic patients with ambiguous bilateral electroencephalograms which promise to open a new chapter in the surgical treatment of epilepsy. Introduction of the carotid amytal test for the analysis of mechanisms of bilateral epileptic discharge is also a promising approach.

In neuroanatomy, Dr. Moliner has successfully completed his doctorate thesis on a quantitative study of neuronal and glial elements of the cerebral cortex and Dr. Klingler with Dr. Gloor have made important contributions to our knowledge of the connections between the deeper portions of the temporal lobe and subcortical structures.

Dr. Sinha has completed a Master's thesis on the analysis of hearing loss and disturbances in speech perception in patients with temporal lobe excisions, work done in collaboration with the department of audiology. Typically penetrating psychological analysis of temporal lobe function is being continued by Dr. Milner, not to mention continued contributions to this subject being made by Dr. Penfield and Dr. Rasmussen in their analyses of the rich material brought to us by the many patients being treated for temporal lobe seizures.

We are particularly pleased to be able to welcome to our laboratories Dr. George Smirnov, an old friend and colleague from Moscow, who is engaged in electrophysiological studies of sensory mechanisms of attention and is incidentally a most congenial coworker, devoted as well to the cause of international cooperation in brain research. He was one of the principal organizers for the Soviet Academy of Sciences of the International Colloquium which I had the pleasure of attending in October, out of which has developed an International Brain Research Organization now known as IBRO, working under the auspices of UNESCO.

I must apologize for omitting many equally important researches for lack of time. The publication in June of the long awaited book, "Speech and Brain-Mechanisms" by Penfield and Roberts is an event which cannot go unmentioned, especially if it helps to make it a best seller, not to mention the book on Hippocrates, "The Torch", recently completed by an equally well known author. Many other scientific publications by fellows and staff, and the editing of two scientific journals together with the increasing numbers and quality of men applying for graduate training attest the continued vitality of our Institute in these rapidly changing times.

Even though we may not be able to keep up with the inflated expansion of neurological research south of the border, our vision of the pursuit of science joined with the care of the sick must not be dimmed if we are to maintain the most distinctive feature of our Institute and its position of leadership and close collaboration with colleagues of common interests and objectives throughout the world.

# TEACHING AND THE LABORATORIES

DR. THEODORE RASMUSSEN

The report of this year's teaching activities can be brief, since the pattern of the undergraduate teaching has followed that of past years. The transition to the new Medical School Curriculum has begun, however, and the first year of the second quarter century of the Neurological Institute will see the new plan well under way. In the Curriculum for the Second Year, the combined course on the Nervous System, in which neuroanatomy and neurophysiology are interrelated, will be expanded by a major contribution from the Department of Psychology concerning the function of brain as studied by psychological methods. If the proper synthesis of anatomical, physiological and psychological facts takes place in the medical students' minds, a stouter base will be provided for their clinical neurological studies in the Third and Fourth Years.

The Third Year students will come to the Institute in groups of 7 or 8 for the afternoons of a three-week period. During this block of time, the students will see in action the evolution of diagnostic and therapeutic procedures, which in the past has had to be presented second hand in the form of lectures and clinical demonstrations. The students will also have the opportunity of attending some of the regular Institute conferences and seminars.

During the Fourth Year, we will provide additional neurological instruction during the medical clerkships at the Montreal General and Royal Victoria Hospitals. Some of the details of this new teaching program remain to be worked out, and minor adjustments will need to be made as we become more familiar with the problems of the new routine. We look forward, however, to increased efficiency and effectiveness in our undergraduate teaching program.

The report of the graduate teaching program can also be brief, since it too has continued on the wards, and in the laboratories as in the past. The Fellowship and Resident Staff, numbering 40, is one of the largest, as well as one of the most senior we have had. Ten are from Canada, while the remainder are equally divided between the United States on one hand, and ten other countries stretching around the world from Japan to Chile.

We have enjoyed and profited from the visits of three senior scientists — Dr. Geneviève Arfel, electroencephalographer at the Hôpital Foch in Paris, and first assistant in Dr. Fischgold's Department of Electroencephalography at La Pitié, spent a productive fall and winter in the E.E.G. Laboratory. Dr. Lucjan Stepien, senior associate to our good friend and former Fellow, Dr. Chorobski, and Professor of Neurosurgery in the vigorous and flourishing neurosurgical department of the Medical Academy of Warsaw in Poland, has carried out some interesting and important studies in the Laboratory of Neurophysiology during his 9 months tenure of a Rockefeller Foundation Fellowship in Medical Education and Public Health. We are enjoying also the stimulating presence of Dr. G. D. Smirnov of Moscow, Deputy Director and head of the Laboratories of

Neurophysiology at the Institute of Animal Morphology of the Academy of Sciences of the U.S.S.R., and Deputy Chief Editor of the Journal of the Soviet Academy of Sciences.

The sudden and unexpected death of Dr. Cone, which has saddened us all, is the principal staff change of the year. This, of course, necessitates considerable re-organization in both the neurosurgical services and in the laboratories, and these are now being planned.

Dr. Lamar Roberts left the neurosurgical service early last fall to take charge of the Department of Neurosurgery at the new University of Florida Medical School in Gainesville, Florida, and Miss Joyce Beatty resigned from the Social Service Department to take charge of a smaller, more personal establishment in Washington, D.C.

Dr. Douglas Sproul joined the staff as Associate Roentgenologist, and brings added strength to the Department of Neuroradiology that has won world-wide recognition under Dr. McRae's guidance.

Dr. D. Ewen Cameron and Dr. Miguel Prados have accepted appointments to the Consulting Staff as Consulting Psychiatrists. This brings added strength to the Consulting Staff to whom we turn for advice in their respective special fields, and formalizes an informal relationship that has been of great value for a number of years. This is, in a sense, a return to the fold for Dr. Prados, who joined the Staff of the Institute in 1939, first as Clinical Assistant in Neuropsychiatry, and then for the following 3 years served as Associate Neuropsychiatrist before transferring his affiliation to the Allan Memorial Institute.

Two well deserved promotions have high-lighted this anniversary year — Dr. Francis McNaughton's promotion to Professor of Neurology reflects the increasing prestige of the Department of Neurology as a training center, and Dr. McNaughton's contributions to the Institute and McGill. Dr. K. A. C. Elliott has assumed weighty responsibilities as a result of his promotion to Professor and Chairman of the Department of Biochemistry, while continuing as Director of the Institute's Laboratory of Experimental Neurochemistry. Dr. Elliott thus joins Dr. Gilbert, of the Department of Anaesthesia, as Chairman of a University Department outside the Institute.

A generous Provincial Hospital Equipment Grant again has allowed us to replace some expensive items of hospital equipment that were nearing the end of useful life, and to replace others that were becoming obsolete, although still serviceable. In addition, new equipment to make patient care safer and more efficient has also been provided through this grant. The value of these Hospital Equipment Grants in keeping our physical plant efficient and up to date can hardly be over-emphasized.

Possible retrenchment in the laboratories due to the constantly increasing costs of almost all aspects of our research program has been avoided by a most welcome increase in our Consolidated Grant from the National Research Council of Canada for the coming year. This does not, however, provide adequate financial support for the expansion of the Laboratory of Neuroanatomy into a major

research arm. The recent development of new neuroanatomical techniques is resulting in glimpses of exciting advances in our knowledge of the structure of the nervous system. We need to be working in the forefront of this field, as well as in neurophysiology, neurochemistry and neuropathology, if we are to take full advantage of our opportunities to contribute to better understanding of the nervous system.

The advances of neurological knowledge of the past 25 years provide a strong foundation for the continuing study of man's most intricate physical attribute, his nervous system. No one can prophesy what new knowledge the next 25 years will bring, but we may be certain the continued expansion of our understanding of the nervous system will open up new fields for investigation in geometrical ratio for many quarter centuries to come.

# CLINICAL STAFF

*Director*

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. (London), Hon. F.R.C.P. (Eng.)

*Neurologist-in-Chief*

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

*Neurologist*

PRESTON ROBB, B.Sc., M.Sc., M.D., C.M.

*Associate Neurologist*

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

*Assistant Neurologists*

JAMES B. R. COSGROVE, M.D., M.Sc., M.Sc., (Cantab.)
BERNARD GRAHAM, B.A., B.Sc., M.D., C.M.
IRVING HELLER, M.D., C.M., M.Sc.
DAVID HOWELL, M.B., B.S. (Lond.), M.R.C.P. (Lond.)
REUBEN RABINOVITCH, B.A., M.D., M.Sc.
WILLIAM TATLOW, M.D. (Lond.), M.R.C.P. (Lond.), F.R.C.P.(C)

*Neurosurgeon-in-Chief*

WILLIAM CONE, B.S., M.D., F.R.C.S.(C), F.R.S.C.

*Neurosurgeons*

ARTHUR ELVIDGE, Ph.D., M.D., C.M., F.R.C.S.(C)
WILDER PENFIELD
THEODORE RASMUSSEN, B.S., M.B., M.D., M.S., F.R.C.S.(C)

*Associate Neurosurgeon*

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

*Assistant Neurosurgeons*

JOHN BLUNDELL, M.A., M.D. (Cantab), M.R.C.P. (Lond.), F.R.C.S. (Eng.)
CHARLES BRANCH, B.A., M.D., M.Sc.

*Roentgenologist*

DONALD MCRAE, M.D.

*Associate Roentgenologist*

R. DOUGLAS SPROUL, M.D.

*Electroencephalographer*

HERBERT JASPER, Ph.D., D.èsSci. (Paris), M.D., C.M.

*Associate Electroencephalographer*

PIERRE GLOOR, M.D. (Basle), Ph.D.

*Anaesthetist*

RICHARD GILBERT, M.B., L.R.C.P., B.S. (Lond.), R.R.C.P. (C), M.R.C.S., D.A., R.S.C., F.F.A.R.C.S., F.A.C.A.

*Associate Anaesthetists*

G. FREDERICK BRINDLE, B.A., M.D., C.M.
RONALD MILLAR, M.D., Ch.B. (Edin.), F.F.A.R.C.S., M.Sc.

*Neurochemist and Donner Fellow*
K. A. C. ELLIOTT, M.Sc., Ph.D., Sc.D.

*Associate Neurochemist*
HANNA PAPPIUS, B.Sc., Ph.D.

*Neuropathologist*
GORDON MATHIESON, M.B., Ch.B. (Aberdeen)

*Clinical Psychologist*
BRENDA MILNER, B.A., M.A., (Cantab.), Ph.D.

## CONSULTING AND ADJUNCT CLINICAL STAFF

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|---|---|
| *Consulting Pathologist* | GARDNER C. MCMILLAN, M.D., C.M., M.Sc., Ph.D. |
| *Consulting Psychiatrists* | D. EWEN CAMERON, M.D., F.R.C.P.(C)<br>MIGUEL PRADOS, M.D. |
| *Consulting Neurologists* | ROMA AMYOT, B.A., M.D., (Montréal and Paris)<br>SYLVIO CARON, M.D., F.R.C.P.(C)<br>JEAN-LÉON DESROCHERS, M.D.<br>JEAN SAUCIER, B.A., M.D., (Paris and Montréal)<br>NORMAN VINER, B.A., M.D., C.M.<br>ARTHUR YOUNG, M.D., C.M., F.R.C.P.(C) |
| *Adjunct Neurosurgeons* | CLAUDE BERTRAND, B.A., M.D., F.R.C.S.(C)<br>HAROLD ELLIOTT, B.Sc., M.D., C.M.<br>JEAN SIROIS, B.A., M.D. |
| *Consulting Anaesthetist* | HAROLD R. GRIFFITH, M.M., B.A., M.D., C.M., F.A.C.A., F.I.C.A., F.F.A.R.C.S. (Eng.), F.R.C.P.(C) |
| *Consulting Research Anaesthetist* | J. G. ROBSON, M.B., B.Ch. (Glasgow), F.F.A.R.C.S. (Eng.). |
| *Consulting Bacteriologist* | R. W. REED, M.A., M.D., C.M. |
| *Consulting Roentgenologist* | CARLETON PEIRCE, A.B., M.Sc., M.D., F.A.C.P. |
| *Adjunct Roentgenologists* | NORMAN M. BROWN, B.A., M.D., C.M.<br>ROBERT FRASER, M.D., F.R.C.P.(C)<br>JEAN L. LEGER, M.D. |
| *Consulting Radiation Therapist* | JEAN BOUCHARD, M.D., D.M.R.E. (Cantab.) |

## TEACHING STAFF

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

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|---|---|
| *Chairman of Department* | WILDER PENFIELD |
| *Professor of Neurology and Neurosurgery* | THEODORE RASMUSSEN |
| *Professor of Neurosurgery* | WILLIAM CONE |
| *Professor of Experimental Neurology* | HERBERT JASPER |
| *Professor of Neurology* | FRANCIS MCNAUGHTON |
| *Associate Professor of Experimental Neurology* | K. A. C. ELLIOTT |
| *Associate Professor of Neurological Radiology* | DONALD MCRAE |
| *Assistant Professors of Neurology* | J. B. R. COSGROVE<br>DONALD LLOYD-SMITH<br>PRESTON ROBB<br>W. F. T. TATLOW |
| *Assistant Professors of Neurosurgery* | HAROLD ELLIOTT<br>ARTHUR ELVIDGE |

*Bottom Row*: Drs. I. Libman; P. Black; S. Huestis; D. Bloom; J. A. Aguilar; E. B. Keener; C. L. Branch; P. L. Perot; C. Vera; D. R. Gulati; W. Bryans; Jesse Barber; R. A. Wilson.
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*Third Row*: Drs. R. G. Gilbert; E. Berger; R. D. Sproul; I. Heller; D. Lloyd-Smith; G. Bertrand; B. F. Graham; G. Mathieson; P. Gloor; R. Rabinovitch; J. Cosgrove.
*Fourth Row*: Drs. L. Hsu; Brenda Milner; A. J. Richards; Helen Mahut; J. Jane; G. D. Smirnov; Margaret Rensaa; J. Bidzinski; J. P. Cordeau; L. Stepien; H. Pappius; J. C. Kennady.
*Fifth Row*: Drs. J. Blundell; A. Tarazi; S. Ray; Betty Chester; F. Andermann; Shirley Fyles; K. Reed; A. Hildebrande; Mrs. Clara Strauss; A. Morton; E. Ramon-Moliner.
*Top Row*: Drs. R. Rovit; G. Thompson; E. Bovard; Mr. N. van Gelder; Drs. V. Dave; H. Mavor; F. Cooper; H. Garretson; M. House.

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| *Assistant Professor of Neuropathology* | GORDON MATHIESON |
| *Assistant Professor of Experimental Neurology* | PIERRE GLOOR |
| *Lecturers in Neurology* | BERNARD GRAHAM |
| | IRVING HELLER |
| | DAVID HOWELL |
| | REUBEN RABINOVITCH |
| *Lecturers in Neurosurgery* | JOHN BLUNDELL |
| | CHARLES BRANCH (Reford Fellow) |
| *Lecturer in Experimental Neurology* | HANNA PAPPIUS |
| *Lecturer in Clinical Psychology* | BRENDA MILNER |
| *Demonstrators in Neurology* | FREDERICK ANDERMANN |
| | ALLAN MORTON |
| *Demonstrators in Neurosurgery* | D. R. GULATI |
| | ANTONE TARAZI |
| | GORDON THOMPSON |
| *Demonstrator in Neuropathology* | JOHN JANE |
| *Demonstrator in Electroencephalography* | LEWIS HENDERSON |

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

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|---|---|
| *Professors* | WILLIAM CONE |
| *(Chairman)* | HERBERT JASPER |
| | FRANCIS MCNAUGHTON |
| | THEODORE RASMUSSEN |
| *Associate Professors* | K. A. C. ELLIOTT |
| | DONALD MCRAE |
| *Assistant Professors* | J. B. R. COSGROVE |
| | ARTHUR ELVIDGE |
| | PIERRE GLOOR |
| | GORDON MATHIESON |
| | PRESTON ROBB |

## EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL INSTITUTE

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| *Director* | WILDER PENFIELD |
| *Deputy Director* | THEODORE RASMUSSEN |
| *Assistant Director (Scientific)* | FRANCIS MCNAUGHTON |
| *Assistant Director (Hospitalization)* | PRESTON ROBB |
| *Registrar* | BERNARD GRAHAM |
| *Business Manager* | PETER J. HOGAN |
| *Executive Secretary* | MISS ANNE DAWSON |

## RESIDENT STAFF — JULY 1958 — 1959

*Senior Resident* — ELLIS KEENER, M.D. (Emory)

*Neurosurgical Services*

*Residents* — ANTONIO AGUILAR, M.D. (Colorado); CHARLES BRANCH, M.D. (Vanderbilt)

*Assistant Residents*

P. PEROT, M.D. (Tulane)
C. VERA, M.D. (Chile) Rockefeller Fellow
D. BLOOM, M.D. (Cornell)
P. TANDON§, M.D., M.S. (Lucknow) India
D. R. GULATI, M.B.B.S. (Punjab) Colombo Plan Fellow
W. BRYANS, M.D. (Colorado)
J. BARBER*, M.D. (Howard) N.I.N.B. Trainee

*Neurological Services*

*Assistant to the Staff* ..... ARTHUR HOUSE, M.D. (Dalhousie)

*Teaching Fellows* ..... MARY MORROW, M.D. (McGILL)
GORDON THOMPSON, M.D. (McGill)

*Residents* ..... SHIRLEY FYLES, M.D. (QUEENS)
KENNETH KAPPHAHN, M.D. (Washington)

*Assistant Residents*

B. CHESTER, M.B.B.C. (Cambridge)
I. LIBMAN, M.D. (McGill)
P. BLACK, M.D. (McGill)
J. BARBER*, M.D. (Washington)
D. GONZALES*, M.D. (National Univ., Mexico)
J. LEWIS†
W. S. TOTTEN†
A. D. DAWSON†
A. SHERWIN†
M. WATANABE†
D. HILLSMAN†
T. KINSELLA†
E. MUNRO†
D. SAUNDERS†
A. SARGENT†
T. LEE‡
T. P. BROOME‡
F. INMAN‡
J. RUEDY‡
P. FITZHARDINGE‡
H. WARREN‡

## LABORATORIES AND DEPARTMENTS

### ANAESTHESIA

*Consultant* ..... H. R. GRIFFITH, B.A., M.D., C.M., F.A.C.A., F.I.C.A., F.F.A.R.C. (Eng.) F.R.C.P.(C) — Emeritus Professor of Anaesthesia, McGill

*Consulting Research Professor* ..... J. G. ROBSON, M.B., B.Ch., (Glasgow), F.F.A.R.C.S., Professor of Anaesthesia Research (Wellcome), McGill

*Anaesthetist* ..... RICHARD GILBERT, M.B., L.R.C.P., B.S. (Lond.), R.R.C.P.(C), M.R.C.S., D.A., R.S.C., F.F.A.R.C.S., F.A.C.A.

*Associate Anaesthetist and Research Associate* ..... RONALD MILLAR, M.D., Ch.B. (Edin.), F.F.A.R.C.S., M.Sc.

*Associate Anaesthetist* ..... G. FREDERICK BRINDLE, B.A., M.D., C.M.

*Research Assistant* ..... MARGARET LAIDLAW, B.Sc. (McGill)

*Resident Staff*

F. AKIN, M.D. (McGill)
J. BIDZINSKI, M.D. (Warsaw) (Rockefeller Fellow)
A. HILDEBRANDE, M.D. (McGill)
M. RENSAA, M.D. (Alberta)

*Nurse in Charge of Anaesthetic Rooms* ..... HELEN CALLANDER, R.N.

### ELECTROENCEPHALOGRAPHY AND ELECTROMYOGRAPHY

*Electroencephalographer* ..... HERBERT JASPER, Ph.D., D.ès Sci., M.D., C.M.

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

*Electroencephalographic Fellows*

GENEVIÈVE ARFEL*, M.D. (Univ. of Paris)
EMIL BERGER, M.D. (Vienna)
JOHN GARNER*, M.D. (Stanford)
ARTHUR HOUSE*, M.D. (Dalhousie)
RICHARD ROVIT, M.D. (Jefferson)

*Six months on this service.
†On rotation from Royal Victoria Hospital.
‡On rotation from Montreal General Hospital.
§On rotation to Queen Mary Veterans' Hospital.

*Electromyographic Fellow* ..... S. YAMAMOTO*, M.D. (Kanazawa) Japan
V. SUSSET*, M.D. (Univ. of Paris)
*Chief Technician and Demonstrator* ..... LEWIS HENDERSON

## NEUROCHEMISTRY

### (DONNER LABORATORY AND CLINICAL LABORATORY)

*Neurochemist and Donner Fellow* ..... K. A. C. ELLIOTT, M.Sc., Ph.D., Sc.D.
*Associate Neurochemist* ..... HANNA M. PAPPIUS, M.Sc., Ph.D. (McGill)
*Assistant Clinical Neurochemist* ..... IRVING H. HELLER, M.D., M.Sc.
*Student Assistants* ..... FERNAND BILODEAU, B.Sc.
NICO VAN GELDER, B.S., Ph.D. (McGill)

## NEUROANATOMY AND MEDICAL NEUROPATHOLOGY

*Neuropathologist* ..... GORDON MATHIESON, M.B., Ch.B.
*Fellows*
FREDERICK ANDERMANN*, M.D. (McGill)
FLOYD COOPER*, M.D. (Emory)
VIJAY DAVE, M.B.B.S. (Agra) India
HENRY GARRETSON, M.D. (Harvard)
HUNTINGTON MAVOR, M.D. (Rochester)
ENRIQUE RAMON-MOLINER, M.D. (Madrid) Spain, Can. Nat. Research Council Fellow
ALLAN MORTON, M.D. (McGill)
*Chief Technician* ..... BARBARA NUTTALL

## NEUROPHYSIOLOGY

*Neurophysiologist* ..... HERBERT JASPER, Ph.D., D.ès. Sci., M.D., C.M.
*Visiting Scientist* ..... G. D. SMIRNOV, D.B.S. (Moscow)
*Fellows*
EVERETT BOVARD, Ph.D. (Mich.), U.S.P.H.S. Fellow
JOHN BLUNDELL, M.B.B.C. (London)
JEAN-PIERRE CORDEAU, M.D. (Montreal) N.R.C. Fellow
JOHN JANE, M.D. (Chicago)
JAN GYBELS, M.D. (Louvain) Belgium
HELEN MAHUT, Ph.D. (McGill)
S. N. RAY, L.M.F., M.Sc. (Calcutta)
LUCJAN STEPIEN, M.D. (Warsaw) Rockefeller Fellow
*Electronic Engineers* ..... ROBERT NAGLER
EDWARD POUDZIOUNAS
*Electronic Technician* ..... GUENTHER SAINITZER (Part-time)

## PHOTOGRAPHY

*Supervisor* ..... GILLES BERTRAND, B.A., M.D., M.Sc.
*Photographer* ..... CHARLES HODGE
*Assistant Photographer* ..... VINCENT TAYLOR

## NEUROLOGICAL RADIOLOGY

*Radiologist* ..... DONALD MCRAE, M.D.
*Associate Radiologist* ..... R. DOUGLAS SPROUL, M.D.
*Residents* ..... D. S. DADHICH, M.B.B.S. (Bombay) India
PIERRE PERRAS, M.D. (Montreal)
*Chief Technician and Demonstrator* ..... PAUL POITRAS, R.T.

*Bottom Row:* N. Paton (3S); M. Agnew (3S); V. Storle (2E); M. Jerrett (2E); B. Ball (2E).
*Second Row:* A. Kimberley (3S); A. Cameron (4S); L. Hall; B. Cameron; E. Flanagan; P. Stanley (OR); E. Carman; C. Robertson (2E); B. Fields (4N).
*Third Row:* N. Siddons-Grey (4N); R. Smith (OR); E. Bain (OR); M. Yeoman (OR); M. Cavanaugh (2S); V. Glos (3N).
*Fourth Row:* I. MacMillan (4N); A. Starcevitch (OR); M. Shaw (2N); H. Danaher (2N); B. Campbell (2E); J. Brooker (2S).
*Top Row:* A. McIlveen (4N); R. Boyer (4S); H. Hillelson (4S); B. O'Leary (4N).

## RESEARCH IN MULTIPLE SCLEROSIS

*Chief* ..... James B. R. Cosgrove, M.D., M.Sc.
*Chemist* ..... Pamela Agius, B.Sc.
*Technician* ..... Mrs. Eva Mehlhose

## SURGICAL NEUROPATHOLOGY

*Neuropathologist* ..... William Cone, B.S., M.D., F.R.C.S.(C), F.R.S.C.

*Assistant Neuropathologist* ..... Gilles Bertrand, B.A., M.D., M.Sc.
*Senior Neuropathological Fellow* ..... Antone Tarazi, M.D. (Beirut) Lebanon

*Neuropathological Fellows*

Hector Berezowski*, M.D. (McGill)
Peter Brandt*, M.D. (Buenos Aires)
Floyd Cooper*, M.D. (Emory)
Stuart Huestis*, M.D. (Dalhousie)
John Kennady*, M.D. (Iowa)
Roger Morell*, M.D. (Washington)
Cone Pevehouse*, M.D. (Baylor), U.S.P.H. Fellow

*Chief Technician* ..... John Gilbert

## NURSING STAFF

*Director of Nursing* ..... Miss Eileen C. Flanagan, B.A., R.N.
*Assistant Director of Nursing* ..... Miss Bertha Cameron, R.N.
*Administrative Assistant* ..... Mrs. Eleanor Carmen, R.N.
*Supervisor Dressing Rooms* ..... Miss Annie Johnson, R.N.
*Educational Director* ..... Miss Louise Hall, R.N.
*Clinical Instructor* ..... Mrs. Susan Webster, R.N.
*Night Supervisor* ..... Miss Elizabeth Barrowman, R.N.
*Assistant Night Supervisors* ..... Miss Lillian McAuley, R.N.
Miss Marilyn Manchen, R.N.
*Operating Room Supervisor* ..... Miss Phoebe Stanley, R.N.
*Assistant Operating Room Supervisor* ..... Miss Patricia Murray, R.N.

## HEAD NURSES

Miss Audrey Kimberley, R.N.
Miss Evelyn Adam, R.N.
Miss Barbara Fields, R.N.
Miss Lenore Kane, R.N.
Miss Mary Cavanaugh, R.N.
Miss Alice Cameron, R.N.
Miss Caroline Robertson, R.N.

## SOCIAL SERVICE STAFF

*Director* ..... Miss Joyce Beatty, M.A., M.S.W.
*Acting Director* ..... Miss Kathleen MacDonald, B.A., B.S.W
*Caseworkers* ..... Miss Betty Folliott, B.A., M.S.W.
Mrs. Margaret Puvrez, Diploma in Social Work (U. of M.)
*Junior Caseworkers* ..... Miss Patricia Linck, B.A., M.S.W.
Miss Louise Singer, B.A., M.S.W.

*Six months on this service.

# TEACHING HOSPITALS OF MONTREAL
## BY MEMBERS OF STAFF
## APPOINTMENTS HELD IN
### ROYAL VICTORIA HOSPITAL

| | |
|---|---|
| *Neurologist and Neurosurgeon-in-Chief* | WILLIAM CONE |
| *Neurologist* | FRANCIS L. MCNAUGHTON |
| *Neurosurgeons* | ARTHUR R. ELVIDGE |
| | WILDER PENFIELD |
| | THEODORE RASMUSSEN |
| *Associate Neurologists* | DONALD LLOYD-SMITH |
| | PRESTON ROBB |
| | ARTHUR W. YOUNG |
| *Assistant Neurologist* | REUBEN RABINOVICTH |
| *Clinical Assistants in Neurology* | J. B. R. COSGROVE |
| | B. F. GRAHAM |
| | I. H. HELLER |
| *Clinical Assistant in Neurosurgery* | GILLES BERTRAND |
| *Physician-in-Charge of Electroencephalography and Electromyography* | HERBERT JASPER |
| *Associate Radiologist* | D. L. MCRAE |
| *Associate Anaesthethist* | R. G. B. GILBERT |

### MONTREAL GENERAL HOSPITAL

| | |
|---|---|
| *Neurosurgeon-in-Chief and Director* | H. ELLIOTT |
| *Associate Neurologist* | W. F. T. TATLOW |
| *Assistant Neurologist* | DAVID HOWELL |
| *Consultant in Electroencephalography* | HERBERT JASPER |
| *Consultants in Neurology* | FRANCIS MCNAUGHTON |
| | PRESTON ROBB |
| *Consultants in Neurosurgery* | WILLIAM CONE |
| | ARTHUR ELVIDGE |
| | WILDER PENFIELD |

### MONTREAL CHILDREN'S HOSPITAL

| | |
|---|---|
| *Consultants* | GILLES BERTRAND |
| | W. V. CONE |
| | A. R. ELVIDGE |
| | H. H. JASPER |
| | F. L. MCNAUGHTON |
| | D. L. MCRAE |
| | WILDER PENFIELD |
| | THEODORE RASMUSSEN |
| | A. W. YOUNG |
| *Director — Neurology and Cerebral Palsy Division* | J. P. ROBB |

# REPORT OF THE NEUROLOGIST

DR. FRANCIS MCNAUGHTON

Once again, I am happy to report a year of continuing activity in the Department of Neurology. The number of patients admitted to the two services in 1958 remained essentially unchanged from the admissions in 1957. On the other hand, there was a distinct increase in attendance at our Outpatient Clinics in the Royal Victoria Hospital. The number of new patients rose from 532 in the previous year to 600 in 1958, and the number of revisits increased in all our clinics.

If the work of the Department has been excellent, it is because of the excellence of the workers. On behalf of the so-called "Permanent Staff", I wish to express our thanks to the members of our ever-enlarging House Staff, and particularly the Residents, Dr. Shirley Fyles, Dr. Betty Chester and Dr. Kenneth Kapphahn for the high quality of their work. I want to give honourable mention, also, to the young men and women from the Department of Medicine who circulate through the Institute from the Montreal General and the Royal Victoria Hospitals for part of their training. I should mention also the fine work of the Teaching Fellows, Drs. Mary Morrow and Gordon Thompson. I also want to thank our Staff assistant, Dr. Max House, who shows such a remarkable combination of good humour, good common-sense, and good work.

The Seizure Clinic continues to grow and flourish with the aid of the Federal-Provincial Grant for Rehabilitation. Dr. Sidney Barza has joined the Clinic Staff as Psychiatric Consultant, while Dr. Allan Morton will be with us as part-time assistant after July 1st. Dr. Aguilar has continued the clinical trials of promising anti-epileptic drugs, which began in 1957, and with Dr. Martin prepared a progress report for the recent meeting of the American Academy of Neurology. During the past year, the Clinic Social Workers, Miss Folliott and Mrs. Puvrez, have been experimenting with evening discussion groups of young seizure patients. The results thus far have been both interesting and encouraging.

In last year's report, I referred to Dr. Cosgrove's Multiple Sclerosis Clinic, which has expanded to the point where further professional help and financial backing are needed if this important work is to continue. A solution has not yet been found, but I hope to report progress by next year's Annual Meeting.

Clinical teaching activities have broadened during the year, and we are grateful for the encouragement provided by the renewal of our U.S. Public Health Training Grant in Neurology. The rounds held on Tuesday and Friday mornings throughout the entire year give an opportunity to present and discuss a rich variety of clinical problems, and provide a constant challenge to the young neurologist as well as his senior partners. I would mention also the valuable teaching provided by Dr. McRae (Radiology), Dr. Mathieson (Neuropathology), Dr. Murphy (Neuro-ophthalmology) and Dr. Prados (Psychiatry).

Preston Robb and I feel that there should be more opportunities for clinical research in Neurology and we hope that this will be developed during the coming year. Dr. Lloyd-Smith is now spending part of his time in the E.E.G. department, and this move brings us into closer contact with an important clinical laboratory.

I doubt if many Departments of Neurology are as fortunate as we are at the M.N.I. in the invigorating contact at every level of experience with our neurosurgical brothers-in-arms. This interchange of thought and experience is a most important part of the training of both neurologist and neurosurgeon, which we would not want to diminish, but rather increase. The lack of it is a serious defect in a great many training centers around the world today. For the good of the Neurology and Neurosurgery of the future, I only hope that our experience will be copied elsewhere.

Someone has defined Medicine in very simple terms as the Art and Science of helping people. It will be wise for the younger generation to keep in view this ultimate goal, however fascinating the Art and the Science may seem, as ends in themselves. There is no substitute for personal responsibility and devotion to our patients, as Wilder Penfield and William Cone — each in his own characteristic way — have abundantly demonstrated in this Institute since its foundation in 1934. Unless we can maintain this devotion to the patient and his welfare, all our expensive machinery, our electronic gadgets, our books and our scientific jargon will become as meaningless as the "sounding brass" and the "tinkling cymbal" of which the Apostle Paul once spoke, and will indeed profit us nothing.

## REPORT OF THE NEUROSURGEON*

### Dr. William Cone

The only change in the personnel of the permanent staff of the Department of Neurosurgery has been the resignation of Dr. Lamar Roberts to take charge of Neurosurgery at the University of Florida.

From the clinical standpoint the year has been a busy one; 1419 patients were admitted to the Neurosurgical Service, 23 more than in 1957; 971 operations were done, 105 more than last year. Throughout the year the demands for urgent and emergency treatment were continuous and led to overcrowding. The fear, that because the bed occupancy was almost too high, and patients' safety was being sacrificed, was worrisome. The fear proved groundless, as illustrated by the infections occurring as the result of operation. Out of 971 operations there were 2 infections, a percentage of but 0.2. Last year it was 0.4 per cent.

In Neurosurgery the opportunity for clinical research is great. Precise study of patients pre-operatively, during operation and post-operatively not only provides facts making treatment rational, effective and safe, but provides facts of scientific value for understanding the nervous system. Clinical research has always been an important part of the work in the Department of Neurosurgery. Some of the clinical investigations under way this past year will be mentioned.

*Read by Dr. Arthur Elvidge.

Dr. Penfield has continued with the analysis of speech mechanisms and the book he has written with Dr. Lamar Roberts is to be published shortly. Dr. Penfield has been surveying the results of stimulation of the interpretive cortex. Dr. Rasmussen has been studying the value of the carotid sodium amytal test to determine the lateralization of speech dominance. He has been conducting a follow-up study of epileptic patients who have been treated surgically. He has been analyzing at operation seizure mechanisms by depth stimulation and recording. Dr. Brenda Milner, Psychologist, has been studying the psychological changes associated with frontal lobe lesions and excisions. She has also been investigating the pattern of abilities in left-handed patients with focal cerebral seizures.

Dr. Elvidge has continued the follow-up studies of neoplasms — glioblastoma (with Dr. John Roth); medulloblastoma (with Dr. Emil Berger); acoustic neuroma. He has also been studying the cause of death in cerebral aneurysm and Dr. Joseph Stratford is collaborating with him in this study. Dr. Elvidge continues to study hydrocephalus and has been particularly interested in that type secondary to stenosis of the aqueduct of Sylvius.

Dr. Gilles Bertrand has been working with Dr. J. Blundell and Dr. J. Gybels on the development of a stereotaxic method for the investigation and treatment of dyskinesia.

Other clinical investigations have been concerned with the pathological lesions in the vertebral column, nerve roots and the spinal cord secondary to degeneration of the intervertebral disc; intradural neuroma of the cervical anterior roots secondary to nerve root compression by discs and spurs; cervical myelopathy and cervical osteoarthropathy, the treatment of abscess of the brain by aspiration and instillation of crystalline chloromycetin; the treatment of encapsulated fluid subdural haematoma by drainage through twist drill holes; closure of wounds with porous elastoplast; treatment of paralysis of urinary bladder by indwelling catheter and drainage every two hours; the use of pneumatic tools in neurosurgery; and improvement of the Barton skull tongs for cervical traction.

For sterilization of apparatus damaged or destroyed by heat, the new method of sterilization with ethylene oxide has been investigated by Miss Phoebe Stanley with the help of Dr. A. R. Boutros and the advice of Dr. Hugh Starkey. A Sterox-O-Matic gas sterilizer developed by Castle has been supplied by the Company for the tests. Results to date are most encouraging and make it seem likely that the pneumatic tools, camera loaded with film, ampoules containing heat-sensitive drugs and many other items damaged by the usual methods of sterilization can be made aseptic. It is predicted that large sterilizers will be developed which will sterilize without damage blankets, pillows and mattresses, and so make hospitals safer places.

The Neurosurgical Outdoor activities have not increased as much as those of Medical Neurology. However, there were 233 new patients, 39 more than in 1957.

Following the presentation of this report, Dr. Elvidge added.

"I would like to say that those of us who are left are filled with sorrow at the early passing of our great teacher and friend, and, it will

never be quite the same without William Cone. We shall have to strive hard to maintain and advance on the standards he has set for us Students and patients from everywhere returned to pay their respects, and many all over the world mourn his passing.

At the opening of this Institute my teacher in Surgery, Professor Archibald spoke as follows and it seems to describe the character of Dr. Cone so well: 'To gather knowledge, and to find out new knowledge, is the noblest occupation of the physician. To apply that knowledge with understanding, and with sympathy born of understanding, to the relief of human suffering is his loveliest occupation; and to do both with an unassuming faithfulness sets the seal on the whole'."

## REPORT OF THE ASSISTANT DIRECTOR HOSPITALIZATION

DR. PRESTON ROBB

Once again it is my privilege to report on the activities of the clinical side of the Institute.

*Hospital Statistics*

In 1958 there were 2,660 patients admitted as compared to 2,531 in 1957. The total number of hospital days was 45,543, an increase of 4,449 over the year 1957, and 986 more than in 1956. This is an all time record. During 1958 there were not the fluctuations that had been seen in the previous year, one could say that the pressure was on throughout the whole year. The average daily bed occupancy was 95.5%; the average length of stay was 17 days. There were 125 deaths with a death rate of 4.7%. Of these, 28.8% were coroners' cases indicating that they were either due to trauma or had been in less than 24 hours. The autopsy rate, I am sorry to report, has fallen to 73.6%. There were 871 surgical procedures carried out in the operating rooms, as well as the many procedures done in the dressing rooms.

The ratio of private and semi-private to ward patients has remained satisfactory, but the so-called business recession has hit the Institute, and we are gravely concerned over the increasing number of indigent and Q.P.C.A. patients. The cost per patient per day is approximately $30.00, but the rate paid for indigent Q.P.C.A. patients is $10.50. It is easy to see where our financial difficulty lies. The loss from Q.P.C.A. patients, that is, the difference between what it costs and what is paid, is greater than our present deficit.

We take pride in the fact that Miss Flanagan and her staff provide a complete nursing service in almost all cases, and very sick patients are spared the necessity of special nurses. Also that investigation and treatment is carried out promptly and the length of stay is kept to a minimum. Nevertheless, $30.00 a day is a lot of money for any working man to pay. Fortunately the patient is helped in three ways — first, we receive generous grants from the Province of

Quebec and the City of Montreal; secondly, a great deal of expensive equipment, which ordinarily would have to come out of operating expense, is provided by a Federal equipment grant. Thirdly, we have operated at a considerable deficit. I mention these things to let you know that we are gravely concerned over what it costs the patient as well as our increasing deficit.

With the high cost of hospitalization we keep asking ourselves — are we operating efficiently, and how is the money being spent. Mr. Hogan has analysed in terms of percent how the money is spent:

| | |
|---|---|
| For professional and nursing care | 39% |
| For domestic care | 7% |
| For dietary | 8% |
| Administrative, business office and general expenses | 8% |
| Operating room and anaesthesia | 10% |
| Other services including E.E.G., Neurochemistry, Radiology, Pathology, Pharmacy, etc. | 21% |
| Building maintenance | 6% |

*Clinics*

The Neurology and Neurosurgical Clinics operated by the Royal Victoria Hospital continue to be active.

The total number of patients seen was 5,643, an increase of 442 over the previous year. In the Neurology Clinic there were 600 new patients seen, 4,150 revisits and 126 revisits to the night clinic. In Neurosurgery there were 233 new patients seen and 660 revisits. Although the clinics are not our prime responsibility, it grieves us that there is still no help given to hospitals who operate outpatient clinics for indigent patients.

*Records*

Under the direction of Dr. Graham, Mrs. von Nida and their staff, the records continue to advance in a never ending stream toward the record room. When one considers the increased number of admissions, one thinks of the extra load on the nursing and ward staff. This is true, but at the same time there is an increased load on the Business Office and the Registrar's Office. We are unable to expand physically, but steps are being taken to streamline the methods with the hope that we can continue to do the work.

*Business Office*

The re-organization of the Business Office which was outlined in last year's report has proven most satisfactory. Mr. Hogan has an excellent staff, and it is a tribute to them all that they carry the increasing load so cheerfully and efficiently. The fact that there is little to report speaks for itself.

*Maintenance and Repair*

The old building is now 25 years old, and it is a constant battle to handle the burst steam pipes and maintain a neat appearance. Several major improvements should be reported:

New lighting fixtures in the wards and dressing rooms of 2 South and 3 South have improved the appearance of the wards greatly and patients can be examined more readily.

The elevators have been overhauled and next summer the door and cab of the old patient elevator will be renovated. The Typing Pool and the Coffee Shop have been insulated. The Pneumatic Tube System connecting with the R.V.H. has been completed and is proving of great value.

The Surgeon's Dressing Room in the operating room suite has been completely renovated and the whole suite painted. New quarters for internes and Fellows have been provided at 3590 University St., and are proving highly successful. We are grateful indeed to the Women's Auxiliary for the help they gave in providing extras. The old clinical laboratory on the second floor has been converted into an excellent office for Child Psychology. Bathing facilities with spray baths have been provided throughout the hospital. This has met with a warm reception on the part of staff and patients. Parking facilities have improved and the paving and shrubs have pleasingly changed the appearance of the north side of the building.

Next year it is planned to improve the lighting on 4 South and to continue with a program of gradually replacing worn-out hospital equipment.

Over the years there has been an increasing demand for electrical power in the Institute. We are rapidly approaching the point where the present wiring system will no longer carry the load. A survey is to be carried out to re-evaluate the present wiring and try to predict the needs of the future.

All these things seem to shrink in size when compared to the importance of maintaining the wonderful "esprit de corps" which has played such a large part in the success of this Institute, and in providing good patient care. A spirit which is largely due to Dr. Cone.

Donald Hankey wrote in the "Student at Arms" when describing the Beloved Captain;

> "There was a bond of mutual affection between us, which grew stronger and stronger. He had a smile for almost everyone, but we thought he had a different smile for us. We looked for it and were never disappointed. It was a wonderful thing that smile of his — it meant something. When we failed him, when he was disappointed in us, he did not smile — he just looked disappointed. The fact was he had won his way into our affections. We loved him, and there isn't anything stronger than love, when all's said and done."
>
> "He had a kind of innate ability which marked him out as above us. He was not democratic. He was, rather, the justification for aristocracy. We all knew instinctively that he was our superior — a man of finer temper than ourselves. I suppose that that was why he could be so humble without loss of dignity. For he was humble, too, if that is the right word, and I think it is. No trouble of ours was too small for him to attend to."

# REPORT OF THE DIRECTOR OF NURSING

MISS EILEEN C. FLANAGAN

In reviewing the work of the Department of Nursing for the past twenty-five years, it has been borne in on us with increasing force that our Nursing Department has become almost an Institution in itself. There are a constantly increasing number of inquiries about the Post-Graduate Course, for information about our methods and procedures, and requests from Hospitals to send their staff members for periods of observation.

Just recently our staff, under the direction of Miss Cameron and Miss Hall, put on an excellent demonstration for the nurses attending the Joint Meeting of the American College of Surgeons.

The Director of Nursing recently gave three papers for the First International Congress of Latin American Nurses, held in Santiago, Chile, and spent two days with the staff of the Neurosurgical Institute in Santiago, and the Van Buren School of Nursing in Valparaiso.

One of our own post-graduates who lives there had all the material translated into Spanish for the meetings.

The Magazine "Scope" in New York has just completed an illustrated article on nursing and nursing education in this Institute which is to be published very shortly.

This puts a great responsibility on us therefore to set and keep up our high standards of nursing teaching and care, and as has already been stated in previous reports, a reasonable endowment for this purpose is greatly needed. One American Hospital has just set up a Scholarship Fund to send one of their staff here each year for the next five years.

We have graduates studying here now from all over this continent, from Ceylon, Hong Kong, the Philippines, Jamaica, and Australia. Our Nursing Staff has done excellent work all year, under great pressure, and we cannot thank them enough for their loyalty, efficiency and interest.

The Graduate Society has been very active, looking after our social and welfare interests.

We wish as always to thank the members of the Medical Staff for their support and help with teaching.

Finally we wish to announce that one of our very good friends, Mrs. Samuel Reitman, is to give us an annual Bursary, in memory of Dr. Cone. We know that the nursing care of his patients was vital to Dr. Cone's whole conception of the patient's well-being, and we shall endeavour to live up to his high standards.

# DEPARTMENT OF SOCIAL SERVICE

MISS KATHLEEN MACDONALD

*Acting Director*

In this past year, the Social Service Department suffered a severe blow with the departure last October of our Director, Miss Joyce Beatty. All of you who knew Miss Beatty can well understand what it meant to us to be deprived of her leadership, and those unique personal qualities which made working with her a pleasant and inspiring experience.

Throughout the past year our department has continued to help the patient and his family cope with the multitude of problems which illness and disease create. Our focus has continued to be on the individual in helping him to use his own inner strengths, and in helping him to reach out and effectively use the many and diverse community resources which can lead him to a more satisfying life within the framework of his illness. In order to do this, we have always strived to keep in mind those common human needs which are essential to all of us: the need for love, for recognition, self-respect, social acceptance, adequate recreation, security, and freedom of choice. Many of our patients are deprived of the most basic need of all: a physically healthy body. This in no way lessens his other needs, but illness does make it more difficult for him to satisfy them.

We are proud of the fact that this Institute has long recognized that there is a responsibility towards the total patient, and that if we are to give our patients a more satisfying life, we must look to the community to develop resources to assist us in our efforts.

The variety and diversity of community resources in this city are a testament of the community's awareness of the needs of our patients. However, there are still many gaps and often we find ourselves in a position of helping patients accept limitations imposed by these lacks.

However, the situation, though at times frustrating, is not discouraging, as each year we witness the fact that the community is becoming more aware of these needs, and is slowly filling the gap in our resources. We are proud that our hospital has played a significant role in cooperating with the Montreal Council of Social Agencies. For example, the Council has set up a committee on which Dr. Cosgrove is a member, to study the recreational needs of the handicapped. As a result of their findings, we have seen the beginning of a recreational programme for Multiple Sclerosis patients. Though this project is still in a formative and experimental stage, there is every indication that it will meet a further need of our patients — adequate recreation.

Yet another example of close cooperation of our hospital with the community is the formation of a committee to plan an institute on epilepsy in Montreal, to be held under the joint sponsorship of the Montreal Neurological Institute and the Montreal Council of Social Agencies. To quote from the minutes of one of the committee's meetings — "The aim of this institute is to focus attention on the needs of the seizure patients, education of professional groups, and the establishment of facilities to meet existing gaps in the community."

One further project is the discussion groups, one French, and one English, which are held for the young adult seizure patient, under the leadership of Miss Folliott and Mrs. Puvrez, and in the latter's absence, of Dr. Andermann. We are more convinced than ever that these group meetings are beneficial, and play a significant role in helping the patient adjust to his condition.

This year, a long-awaited need was met when the Women's Auxiliary donated a generous grant to replenish our Social Service Fund, which is used in a variety of ways, such as — providing transportation to and from hospital, purchasing braces or other medical appliances, as well as procuring glasses and dental repair.

Before closing, I would like to express our appreciation to those community organizations and individuals who have cooperated with us in planning for the patient, either through offering additional services, or granting funds for these services. Our appreciation is also extended to our doctors and nurses, and other hospital personnel, for their continuing cooperation. In particular, I would like to take this opportunity to express my personal gratitude to the social service staff, who have given so selflessly of their time, and have shared in the extra burden of work. Above all, I thank them for their patience, loyalty and encouragement. During the coming year, we shall look forward to a period of increased stability and development under the leadership of our new Director, Miss Cynthia Griffin.

## DEPARTMENT OF ANAESTHESIA

DR. R. G. B. GILBERT

### *CLINICAL*

Slightly more cases were anaesthetized this year than formerly. Major developments include the more wide-spread use of Fluothane and the anaesthetic use of a ventilator. This latter technique, invoked especially during operations in the prone position, has been introduced in an endeavour to lower the venous pressure by means of a negative expiratory phase, at the same time minimizing the quantity of toxic drugs used. Fewer cases are now being performed under hypothermia. A new experimental drug (Parke-Davis and Co., C.I. 400), has been used to advantage in some twenty seizure operations. This agent appears to produce a state of hypnosis and amnesia. Far from depressing the electrical brain activity, it seems to increase it.

The utilization of lyophilized urea as a dehydrating agent during intracranial surgery has proved successful.

All anaesthetics have been given or supervised by a staff anaesthetist. Interest has been taken in assisting with the care of cases of respiratory difficulty. All members of this department are keen to cooperate in any respect with this type of care. Equipment and monitoring devices are available.

Fewer cases this year were referred to the department for investigation and block therapy.

One death was associated with anaesthesia; one other death was possibly associated with anaesthesia. Postoperative morbidity does not seem to have presented anything unusual. It is often difficult to assess what is due to the operation and what is caused by the anaesthetic management of the case. There were, however, no untoward experiences.

## *EQUIPMENT*

A Bennett Assistor is now in almost constant use to provide controlled respiration during surgery. It appears to be an efficient instrument. Some of the basic anaesthetic machines are getting aged and should be replaced before long. On the wards, Bird's respirators have been in frequent use. A visit from Doctor Forrest Bird himself, was most helpful and instructive. These compact instruments are versatile, efficient and reliable.

Undergraduate teaching has been organized by Doctor Gilbert as Chairman of the Department at McGill. It is not really as thorough as it should be, but a maximum of instruction is given in the time allotted. Twelve lectures and a few sessions in the operating room is scarcely enough to equip a newly graduated doctor for administration of anaesthetics in general practice. Doctor Millar has given lectures and demonstrations in the Department of Pharmacology on anaesthetic drugs.

The Anaesthesia Residents at the Montreal Neurological Institute are posted for clinical instruction from the McGill Diploma Course. As last year, each has spent two months at the Royal Edward on rotation; academic teaching is given according to the McGill program.

A refresher course under the auspices of McGill was held at the Montreal Neurological Institute for one week in September. Thirty attended from outside the Province. Doctors Millar and Gilbert gave lectures and the facilities at the Montreal Neurological Institute were greatly appreciated.

A series of three lectures was given to the postgraduate nurses of each class. Care of the unconscious patient, anaesthesia in relation to neurosurgery, the use of respirators and oxygen therapy were the topics discussed.

## *RESEARCH*

The Anaesthetic Laboratory has had its most active year yet. Through the generosity of Parke-Davis and Co., there is now a full time biochemical assistant working there. Doctor R. A. Millar has directed and carried out a number of projects, while others of long-term interest are in operation. The estimation of the circulating catecholamines under conditions of anaesthesia, surgery and in diffusion respiration is being pursued. Plasma catecholamine levels after the injection of blocking agents have formed a separate study.

The investigation of pCO2 levels during different types of anaesthesia and in cases of respiratory difficulty has been undertaken; the latter is now routine. Studies about the venous pressure during surgery and arterial blood pressure changes during arteriography are being worked out by Doctor Brindle. There has been active cooperation with Doctor Jasper concerning investigation into the mode of action of certain anaesthetic drugs.

# DEPARTMENT OF RADIOLOGY

## Dr. Donald McRae

During the year 1958, 9058 examinations were carried out in this department, the largest number we have ever performed in one year. For the past ten years, the annual rate of increase has been more or less steady at about 7%. An increase of 7% per annum means that the amount of work doubles every twelve years. With so-called "free" hospitalization and diagnostic services on the horizon, we can envisage an even greater increase in the near future. Included in the 9000-odd examinations were 854 pneumoencephalograms, 158 ventriculograms, 244 cerebral angiograms and 443 myelograms.

The above mentioned examinations were standard diagnostic radiological procedures. In the past twelve years, diagnostic procedures utilizing radio-active isotopes have been developed and perfected. Twelve years ago Geiger-Muller tubes and simple counters were used. Their resolution and sensitivity were only fair. For external and internal localization of intracranial tumors, millicurie doses of isotopes had to be given and the procedure took two to four hours. In those days, some 30%-40% of intracranial tumors could be localized with a fair degree of certainty. Today, the resolution and sensitivity of isotope equipment is much greater due to the use of scintillation counters and pulse height selectors. With modern equipment, some 65%-75% of intracranial tumors can be localized using micro-curie doses of isotopes and the procedure takes less than one hour. It is time for us to re-enter the field of brain tumor localization with isotopes. Although some further advances may occur from improvements in the compounds used for such purposes, it is unlikely that there will be any improvement in the equipment, at least in the near future.

The advent of stereotaxic surgery has made necessary the presence of x-ray equipment in operating rooms. Although the work can be done with low power mobile x-ray units, it is done much better with larger fixed units which permit fast exposures, exact positioning and rigid support for the skull frame. We must install permanent x-ray diagnostic equipment in one or more of the operating rooms in the near future.

On July 1st, 1958, Dr. Douglas Sproul joined our staff as Assistant Radiologist. He has already added much to our clinical and teaching program. I look forward to a long and productive association with him.

Undergraduate and postgraduate teaching in Neuroradiology went on as in previous years. During the past year, three postgraduate students, Drs. Robert Parrish, Douglas MacEwan and George Wortzman, from the Diploma Course in Radiology of McGill University, and Dr. Pierre Perras, from the University of Montreal, received part of their training in this department.

Work is proceeding on the radiological findings in a group of patients with temporal lobe epilepsy, on the correlation of the anatomical, pathological and radiological findings in degenerative disease of the spine, and on the comparative effects of hypoxia, starvation and radiation on the mouse embryo.

I am always grateful for the opportunity to thank the rest of the staff of the Institute for their help in handling the patients in the year just passed. It makes our work easier and more pleasant. Without it, we would probably be unable to do the volume of work that has been done in the past year.

## DEPARTMENT OF NEUROCHEMISTRY

PROFESSOR K. A. C. ELLIOTT

## CLINICAL NEUROCHEMISTRY AND WARD LABORATORIES

Since 1956 the volume of work done in the 7th floor clinical neurochemistry laboratory and the 3rd floor ward laboratory has remained at a steady high level. Around 10,000 separate procedures were performed in the 7th floor laboratory, one-third on ward patients and two-thirds on patients in the private or semi-private categories. About 5000 liters of irrigation solution were prepared for the operating rooms as well as 217 liters of nupercaine solution to be used by the clinical services.

The ward laboratory performed 11,200 separate determinations excluding the urine examinations. In addition 4,424 blood samples were drawn for analysis in other hospital departments.

The blood and spinal fluid Wassermann determinations are now being performed by the Provincial Laboratories, without charge to the patient. Spinal fluid protein and colloidal gold curves are also done there but these results are only available after three or four days. If protein and colloidal gold curve results are required earlier, they are done in the 7th floor laboratory.

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

Study of the role of Factor I and gamma-aminobutyric acid (GABA) in the physiology and pharmacology of the brain has been continued by Mr. Nico van Gelder. His results seem to indicate that most of the Factor I is in a "bound" form, some in a labile complex or loosely occluded form which we call "free" and virtually none in a completely free extracellular form. The bound form seems to reside in subcellular particles but to be released by procedures usually used for isolating mitochondria.

At the onset of insulin-induced convulsions and coma in rats, and after administration of convulsant hydrazides, the brain Factor I content decreases, the change being mainly in the bound form. It is concluded that the excitability of central neurons is a function of the levels of the bound Factor. Iproniazid (Marsalid) causes an increase in the free Factor I without causing obvious

symptoms in the rat. Iproniazid, a monoamine oxidase inhibitor, was previously known for its effect on serotonin levels; it is now apparent that it also affects Factor I metabolism. Other convulsant, narcotic or tranquilizing drugs have less obvious effects on Factor I levels.

It has not been possible to induce changes in the Factor I content of brain by intraperitoneal or intravenous administration of large doses of GABA or of certain derivatives of GABA. Mr. van Gelder has therefore injected GABA solutions directly into the brains of unanaesthetized cats by a modification of the cannulation method introduced by Feldberg and Sherwood. Early results indicate that GABA, when introduced into a ventricle or into the supra-optic region causes a curious paresis without loss of consciousness.

Dr. Hanna Pappius and Dr. Dorothy Johnson have completed a study of the changes in high-energy phosphate compounds in brain tissue slices during incubation. The level of pyrophosphate-P (mostly ATP) changes in a way which would be expected if this level is maintained by energy-yielding metabolism. The glycolytic activity of tissue which has been subjected to various pretreatments of physiological interest is closely correlated with the pyro-P level. This observation is in accord with the fact that ATP is necessary for the initiation of glycolysis and explains a number of previously confusing observations made here and elsewhere. On the other hand, there is no correlation with the creatine phosphate level and this level was shown to increase sharply and then decrease during incubation in an unexpected, but explicable, manner. This observation will necessitate re-evaluation of many reports in the literature.

Dr. Pappius has continued a variety of studies in relation to cerebral oedema. In connection with this work, Dr. Sarah Luse, Washington University, visited us and took samples for correlated light and electron micrographic studies.

Mr. Fernand Bilodeau has started work on the relation of potassium to brain tissue metabolism and, by applying observations previously made by Dr. Pappius, has been able to show effects of potassium in low concentrations which have not previously been observed.

Dr. Irving Heller has completed two studies of peripheral nerve metabolism. A variety of substrates have been shown to stimulate the oxygen uptake of nerves from normal rats. The respiration of nerves from rats rendered comatose by insulin was depressed but could be increased by *in vitro* addition of these substrates. The same findings apply to nerves which have undergone Wallerian degeneration. Similar results were obtained from nerves taken from normal hens. Induction of a peripheral neuropathy in hens by the administration of an organic phosphorous insecticide resulted in a depression of the respiratory rate. The addition of suitable substrates caused an increase in oxygen consumption. In both rat and hen experiments the major portion of nerve respiration appeared to be due to the Schwann cells. Further work is continuing on the effect of insulin on nerve metabolism.

# DEPARTMENT OF ELECTROENCEPHALOGRAPHY

DR. HERBERT JASPER
DR. PIERRE GLOOR
DR. DONALD LLOYD-SMITH

With some reorganization of the laboratories of electroencephalography and electromyography it has been possible to increase efficiency with consequent increase in the number of examinations carried out during the past year. A total of 2,933 E.E.G. examinations were carried out on 2,438 different patients, there being 495 re-examinations. Nearly one-half of these examinations (1,359) were done on 1,005 patients with various kinds of epileptic seizures. Electrocorticograms, taken during surgery, numbered 74, or about 7 percent of the epileptic patients examined, a considerable increase over the past year.

We are pleased to announce the addition of Dr. Donald Lloyd-Smith to the permanent staff of this department. He is not only relieving the increasing burden of writing routine E.E.G. reports, but he brings the work of the laboratory more closely in touch with the clinical neurological service, and gives us a stronger orientation toward general medical problems to which electroencephalographic studies may make some contribution.

There has been a marked increase in special types of examination being carried out, particularly the use of sphenoidal needle electrodes to record electrical activity from the basal surface of the temporal lobe, implanted electrodes placed within the brain with a stereotaxic instrument, and the recording of E.E.G. tracings during the injection of sodium amytal into the carotid arteries. The latter technique is employed either for the determination of cerebral dominance for speech, or in order to determine the hemisphere from which may originate a deep seated focal epileptic discharge in patients with bilateral abnormalities in the routine E.E.G. examination. The carotid sodium amytal test is sometimes combined with depth electrode recording. These studies promise to open a new chapter in the understandings and treatment of focal epilepsy. They are being undertaken by Drs. Rovit, Rasmussen, Gloor, Blundell and Lewis Henderson.

Miss Prisko has been continuing to pursue her studies of conditioning, using human subjects and patients with epileptogenic brain lesions.

The work of this laboratory was enlivened during several months by the visit of Dr. G. Arfel-Capdevielle of Paris who contributed much from her large experience with various types of coma. She was also engaged in E.E.G. studies of children undergoing cardiac surgery at the Montreal Children's Hospital, working with Dr. Murphy and the department of anaesthesiology of that hospital.

The Fellows in training during the past year were Dr. R. Rovit, Dr. E. Berger, Dr. J. Garner, Dr. M. House, Dr. M. Morrow and Dr. S. Ray. Dr. V. Susset has joined us on a part-time basis from the Rehabilitation Center to take charge of our electromyographic examinations.

# DEPARTMENT OF NEUROPHYSIOLOGY

DR. HERBERT JASPER

DR. PIERRE GLOOR

In these laboratories are carried out experimental procedures on animals by other departments of the Institute as well as by Fellows and staff of the department of neurophysiology itself. Altogether there were about 32 Fellows and staff using the facilities of these laboratories during the past year for the investigation of a variety of problems in experimental neurosurgery, neuroanatomy, neurochemistry, neuropathology, and anaesthesiology as well as neurophysiology. There were 19 Fellows working on neurophysiological problems: Drs. Rayport, Gonzalez, Cordeau, Gybels, Jane, Mahut, Horn, Ray, Schaeppi, Samson, Aguilar, Lende, Garner, Bovard, Stepien, Smirnov, Morrell, Yamamoto and Reed.

In collaboration with Dr. L. Poirier of the University of Montreal we have been analyzing cerebral and spinal reflex mechanisms of a persistent Parkinson-like tremor experimentally produced by a local brain stem lesion in monkeys. Microelectrode studies of sensory and motor cortical cell activity during the tremor movements in the unanesthetized animal have shown that the cerebral cortex participates importantly in the tremor mechanism, though the timing is probably determined by spinal reflex centers.

Progress has been made in the electrophysiological analysis of seizure mechanisms of the temporal lobe by microelectrode studies of the hippocampus and by studies of changes in unitary discharge of temporal neocortex during amygdaloid afterdischarge in cats. The effect of lesions in the amygdaloid nucleus upon resistance to stress in rats is also under investigation.

The participation of the temporal lobe, amygdaloid-hippocampal complex, and brain stem in learning has been studied in cats and monkeys by conditioned reflex methods with restricted surgical excisions, and by recording the electrical activity from these and other brain areas by means of implanted electrodes. Electrophysiological studies of brain mechanisms of habituation, and attention, are also being continued with interesting, though very complex results.

Microelectrode studies of the firing of single cells in cortex and brain stem during barbiturate anaesthesia have shown that cortical activity may be almost as sensitive to barbiturates as cells of the brain stem reticular formation.

Studies of the steady potential or polarization of the cortical surface during thalamic and brain stem stimulation in relation to mechanisms of arousal and petit mal seizures have shown long lasting slow changes in potential which add another dimension to our understanding of the electrical activity of the brain.

The work of this department has been aided greatly by continued support from the Bronfman family, and by grants in aid from the The National Science Foundation of the United States, The National Research Council of Canada, The Kenny Foundation, The Parke Davis Company, and by a number of fellowships from the United States and Canada.

## DEPARTMENT OF SURGICAL PATHOLOGY

### Dr. William Cone

Dr. Gordon Thompson completed his year as Neuropathological Fellow at the end of June, 1958, and Dr. A. Tarazi has served since then. Five hundred and seventy-one surgical specimens were reported on during the year; twelve miscellaneous examinations; sixty-five autopsies were carried out on patients who died on the Neurosurgical Services and one autopsy under the heading of miscellaneous.

Dr. Thompson has been working on the degeneration of the ganglion cells of the retina following section of the optic tract, a project started some years ago by Dr. Ram Ginde. He is also studying the neuroma of the anterior roots, the result of compression by the bony spurs of chronic hypertrophic osteoarthropathy or chronic disc protrusion. He has also investigated the effects of the direct application to the brain of Delta-1 hydrocortisone sodium succinate. In this soluble form the brain is damaged, and the damage, he suspects, is caused by the sodium succinate.

Dr. Tarazi has been studying the abscesses of the brain treated by aspiration and injection of antibiotics, particularly chloromycetin.

Dr. Ellis Keener has investigated the physiological and histological effects of Kynex and other antibiotics when they are applied to the surface of the uninjured, and also to the lacerated brain. He has done this in both acute and chronic experiments.

## MULTIPLE SCLEROSIS RESEARCH LABORATORY

### Dr. J. B. R. Cosgrove

During the past four years the work of this laboratory has taken three main directions. (1) Paper electrophoretic studies of serum and cerebrospinal fluid. (2) Histochemical studies of nervous tissue. (3) Clinical investigations of multiple sclerosis.

The paper electrophoretic studies have included the development and application of a practical method for the concentration of cerebrospinal fluid protein and its subsequent fractionation by paper electrophoresis. This has been accomplished using 4 ccs. of cerebrospinal fluid and it has been confirmed that the electrophoretic pattern of CSF protein differs from that of serum. The paper electrophoretic technique has been used to estimate the cerebrospinal fluid gamma globulin in various neurological disorders including patients with multiple sclerosis. The results indicate that the cerebrospinal fluid gamma globulin is raised in a large proportion of patients with multiple sclerosis but it is also raised in other neurological conditions. A correlative study of the clinical state and serial electrophoretic protein patterns of serum in patients with multiple sclerosis has been made during the past four years to see if any correlation can be

established between recent attacks and changes in the paper electrophoretic pattern. The results indicate that the albumin-gamma globulin ratio is decreased in a significant proportion of patients who have had recent attacks. At the present time a similar correlative study of the clinical state with the electrophoretic protein changes in the spinal fluid of patients with multiple sclerosis is under way.

In addition to the specific studies concerned with multiple sclerosis the above paper electrophoretic technique is at present being applied to the following problems. (1) A study of gamma globulin in sera and cerebrospinal fluid during the course of treated tuberculous meningitis. This study is being carried out with the cooperation of Dr. G. H. Nickerson from the Department of Paediatrics. (2) Data is being accumulated for a correlative study of the electrophoretic protein pattern in spinal fluid with the histo-pathology of biopsy and post mortem material from the central nervous system. (3) Studies are continuing on the electrophoretic protein pattern of spinal fluid in various types of epilepsy, encephalitis, and hydrocephalus.

The histo-chemical studies of nervous tissue have been concerned mainly with the application of Baker's method for phospholipin staining in human nervous tissue. The specificity of this method for human nervous tissue has been proven by extraction procedures controlled by quantitative chemical analysis. In addition current attempts are being made to develop a specific stain for cerebrosides in human nervous tissue.

Clinical investigations on multiple sclerosis include a long term follow-up of the patients treated by a low animal fat diet. These patients were placed on this diet by Dr. Swank nine years ago, and Dr. Swank has returned each spring for re-examination of their clinical condition. A control group for Dr. Swank's patients is being followed at the multiple sclerosis clinic of the Royal Victoria Hospital. There are now over 200 patients registered in this clinic and the load is becoming increasingly heavy. In addition to the follow-up studies, several new methods of treatment are being studied. These include the use of intrathecal purified protein derivative, ACTH and the newer cortisone derivatives. In co-operation with the departments of orthopedics and urology at the Royal Victoria Hospital studies are underway to determine the best form of treatment for bladder disorders and spastic limbs in patients with multiple sclerosis.

In summary, it may be stated that the work of this laboratory has confirmed certain changes that may occur in the protein of the serum and spinal fluid of patients with chronic neurological disorders. This finding will serve as a jumping-off point for a new area of investigation. In addition, histo-chemical techniques are being developed for the investigation of the process of demyelination which is such a common phenomenon in many neurological diseases. At the same time the relief of suffering of patients has not been overlooked and continuing efforts are being made to find the best means of relieving symptoms due to chronic nervous system disease.

## DEPARTMENT OF NEUROANATOMY

DR. FRANCIS MCNAUGHTON

As in recent years, the Fall Term was taken up with the undergraduate combined course in Neuroanatomy, Neurophysiology and Psychology for McGill students of the Second Year, sometimes called "An Introduction to Neurology". Dr. John Blundell, Dr. Allan Morton, and a group of Fellows assisted in the teaching of Neuroanatomy. Under the new curriculum planned for 1959-60, this course will be expanded considerably.

Dr. E. Ramon-Moliner has completed an important study on the microscopic structure of the Postcentral Gyrus, with the support of a Graduate Medical Research Fellowship from the National Research Council of Canada, and has been awarded his Ph.D. degree by McGill University. We wish him every success, as he leaves us in June to become Assistant Research Professor of Anatomy at the University of Maryland.

Dr. Allan Morton is now completing a two-year quantitative study of the cell changes in the human hypothalamus following hypophysectomy.

## DEPARTMENT OF NEUROLOGICAL PATHOLOGY

DR. GORDON MATHIESON

During the calendar year 1958, systematic neurological autopsies have been carried out on 33 patients dying in the Institute. In all, 19 biopsy studies have been made in neurological patients; of these, 2 have been brain biopsies in cases of obscure progressive encephalopathy. In association with the Pathological Institute, the brains from 284 autopsies on patients from the Royal Victoria and associated hospitals have been examined. Neuropathological study, usually on the whole brain, has been made on 11 patients previously in the Institute but dying elsewhere. Eight other outside cases have been referred to the department.

During this year the main effort has been concentrated upon achieving a high standard of histopathological investigation of this material and upon its presentation at our regular clinico-pathological conferences. Drs. Frederick Andermann and Floyd Cooper participated in this during the first half of the academic year, while Drs. Dave, Garretson and H. Mavor have taken their place in the second six months. The enthusiastic cooperation of Dr. David Howell has been of great help in the supply and arrangement of material for these conferences.

Structural work is still in progress in the Museum but enough has been done to allow a small start to be made in the display of material from suitable cases.

## TUMOUR REGISTRY

### Dr. Arthur R. Elvidge

The detailed follow-up of patients suffering from tumour of the nervous system forms an important basic facet of tumour research and is essential to the proper management and treatment of the patient.

The tumour registry is concerned with the accurate recording and follow-up data on all patients who have had tumours of the nervous system. This task is carried on with the cooperation of the private offices of the Montreal Neurological Institute, the outdoor clinics and by correspondence with referring doctors. Clinic patients are encouraged to keep in touch with their hospital and doctor. Through the Social Service Department, they are reminded to return for treatment and may obtain help from rehabilitation services.

The tumour registry has been under the immediate supervision of the secretary, Mrs. Eva Goodchild. It has been learned with much regret that she will be obliged to leave the registry at the end of April. She will be succeeded by Miss Valerie Case.

The routine medical follow-up in the neurological and neurosurgical clinics has been carried on by Dr. Emil Berger, who continues with a research project on the medulloblastomas. The value of roentgen therapy is again evident, as was shown by Dr. Roth in regard to glioblastoma multiforme. The tumour registry has supplied follow-up information on many cases in connection with research carried on in various departments and close liaison exists with the radiation therapy division of the Royal Victoria Hospital. The tumour follow-up is complete from 1950 and in some categories from 1928, as a result of special research projects. This year 138 new verified cases of brain tumour have been added to the file and 9 of recurrent neoplasm, which is a 10% increase over last year. These have been verified from a total of 284 cases of possible tumour. There were 146 operations performed and 67 patients who received roentgenotherapy. There were 242 clinic visits.

## NEUROPHOTOGRAPHY

### Dr. Gilles Bertrand

Again this year there were the usual number of clinical operation and specimen photographs made by this department. There has been a steady increase in the number of 35 mm color photographs taken during the past few years. The department has started to use a single color material for making line tone lantern slides. This is a new material which is developed in ammonium and adds a very pleasing color to slides; it is cheaper and easier to make than the silver halide materials.

During the year the department purchased an automatic film processor. This equipment will process all the neurophysiology records as well as any future 16 mm black-and-white motion picture film that we may use. It will save many hours of work and give us superior quality over the old hand method of processing.

The department of neurophotography was honoured this year when Mr. C. Hodge won the Best Paper Award at the 28th Annual Meeting of the Biological Photographic Association in Washington, D.C. The paper "Histological Anatomical Specimens in Three Dimensions" describes a method of building of layers of color photomicrographs displaying structures in a three dimensional manner. Much of the credit of this project goes to Mr. John Gilbert for his skill and patience in cutting and staining the original slides.

Mr. Hodge was the first Canadian to be elected a Fellow and also a Director of the Biological Photographic Association.

## THE FELLOWS' LIBRARY

DR. BERNARD F. GRAHAM

The Fellows' Library continues its fundamental role of storing and transmitting the knowledge of the ages, acquired from countless sources and now made available to any student who, in his quest for knowledge, pursues it within the library's quiet walls.

The rather large group of Fellows and graduate nurses studying at this Institute in recent years has increased the demands upon the library; often the rooms are crowded, and the daily chores that keep any library running smoothly have become more demanding.

During the past year sixty-one volumes have been purchased directly for the Fellows' Library and fourteen books have been received as gifts. Of the seventy-eight journals now received, thirty-two have been provided by Doctor Jasper and the "Journal of Electroencephalography and Clinical Neurophysiology", fourteen have been given by Doctor Penfield, and thirty-two have been secured by direct subscription.

Of the money spent on books and journals, almost four hundred dollars has gone for binding journals, and an equal sum for subscriptions. Less than eight hundred dollars has been spent for direct additions to the Fellows' Library, and over one hundred dollars has been spent for books for the graduate students in the department of nursing.

The difficulty of having our journals well and promptly bound presents a continuing problem, which has received our attention, but as yet remains unsolved.

With the help available, it has not been possible to keep our subject index up-to-date. However, arrangements have now been made to remedy this within the next several months.

Our part-time librarian, Mrs. Casselman has applied her resourcefulness to our problems and we are indebted to her for the ease with which the benefits of the library are available to all the professional staff. Her foresight has made it possible to add books and journals from unusual sources to our shelves, and consequently increase the usefulness of our own direct purchases.

# THE MONTREAL NEUROLOGICAL SOCIETY

*President* ..... DR. K. A. C. ELLIOTT
*Vice-President* ..... DR. R. RABINOVITCH
*Secretary-Treasurer* ..... DR. G. BERTRAND

Twenty-nine meetings of the Section of Neurology of the Montreal Medico-Chirurgical Society were held weekly from October 8th, 1958 to May 13th, 1959.

In addition to clinical meetings held at Notre Dame Hospital, Hotel Dieu, Ste. Justine Hospital, Montreal Children's Hospital, Montreal General Hospital and Montreal Neurological Institute, a welcome innovation was a clinical meeting held at the Maisonneuve Hospital, and it is hoped to continue this association in the future.

Two special meetings were held, one in conjunction with the Neoplastic Division of the Montreal Medico-Chirurgical Society, at which Dr. Jean Bouchard of the Royal Victoria Hospital Department of Radiology spoke on "Radiation Therapy in Tumours of the Central Nervous System", and one at which members were the guests of the Montreal Neurological Institute Fellows Society to hear an address by Dr. Webb Haymaker of the Armed Forces Institute of Pathology at Washington, D.C. on "Kernicterus and Posticteric Encephalopathy".

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

DR. J. KLINGER, University of Basle, Switzerland, DR. P. GLOOR, The Montreal Neurological Institute: "Fiber Dissection Studies of Temporal Lobe Connections in Man".

DR. JON EISENSON, Director, Speech & Hearing Center, New York: "Aphasia—A Differential View".

SIR GEOFFREY JEFFERSON, The Royal Infirmary, Manchester, England: "Recollections of Sir Hugh Cairns".

MR. MURRAY FALCONER, F.R.C.S., The Maudesley Hospital, London, England: "Clinico-Pathological Correlations in Temporal Lobe Epilepsy".

DR. FRED METTLER, Columbia University College of Physicians & Surgeons, New York: "Function of the Striatum" (Annual Neuroanatomical Lecture).

DR. HERBERT JASPER, The Montreal Neurological Institute: "Impressions of Brain Research in the Soviet Union".

DR. SARAH LUSE, Washington University School of Medicine, St. Louis, Mo.: "Electronmicrographic Studies of Brain".

DR. BRENDA MILNER, The Montreal Neurological Institute: "The Role of Psychological Testing in Localization of Cerebral Function".

DR. HUBERT ROSOMOFF, Columbia University College of Physicians & Surgeons, N.Y.: "Hypothermia — Experimental and Clinical Correlations".

DR. EUGENE SPITZ, The Children's Hospital of Philadelphia, Philadelphia, Pa.: "Ventriculo-Jugular Shunt for Hydrocephalus".

DR. THEODORE RASMUSSEN, DR. K. A. C. ELLIOTT, The Montreal Neurological Institute: "Cerebral Edema".

DR. H. M. ZIMMERMAN, Chief, Laboratory Division, Montefiore Hospital, N.Y.: "The Origin of Tumors of the Glioma Group".

DR. JACQUES GAGNON, Ste. Justine Hospital, Montreal: "Addison-Scholz Disease".

MR. J. E. A. O'CONNELL, St. Bartholomew's Hospital, London, England: "Intracranial Aneurysms Causing Subarachnoid Hemorrhage, Their Surgical Treatment and an Assessment of its Value".

Officers for the coming year, 1959-60 were elected as follows:

*President* ..... DR. JEAN SAUCIER

*Vice-President* ..... DR. J. B. R. COSGROVE

*Secretary-Treasurer* ..... DR. G. BERTRAND

## THE FELLOWS' SOCIETY

DR. ANTONE TARAZI, *President*

DR. GORDON THOMPSON, *Vice-President*

DR. ENRIQUE RAMON-MOLINER, *Secretary*

The Fellows' Society has 40 members who come from 12 different countries.

The first meeting of the year, held at the home of Dr. Preston Robb, gave an opportunity to introduce the new Fellows and to make plans for the year. The Fellows' Society held a Christmas party, and participated in a number of social activities with the M.N.I. Wives' Club.

The scientific program of the Society consisted of a number of informal meetings with visiting scientists, many of whom were guests of the Montreal Neurological Society. The speakers were: Sir Geoffrey Jefferson, Mr. Murray A. Falconer, Dr. Fred A. Mettler, Dr. Eugene B. Spitz, Dr. Hubert L. Rosomoff, Dr. Sarah Luse, Dr. Jan Bures, and Mr. John O'Connell.

The highlight of the year's activities was the annual Lecture and banquet. The guest speaker was Dr. Webb Haymaker, who gave a fascinating presentation on Kernicterus and Posticteric Encephalopathy. This was followed by cocktails prior to the banquet.

The annual Fellows' Lecture and the annual Fellows' Society Newsletter, started in 1956, are established traditions now at the M.N.I., providing a closer link among former Fellows and between alumni and present Fellows.

The officers elected for the coming year are:

*President* ..... DR. PHANOR PEROT
*Vice-President* ..... DR. CHRISTIAN VERA
*Secretary* ..... DR. HENRY GARRETSON

## CLINICAL APPOINTMENTS AND FELLOWSHIPS*

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

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

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

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

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

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

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

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

Fellowship in Neuroanatomy — six to 12 months' duration — available January 1st and July 1st.

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

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

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

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

# COURSES OF INSTRUCTION

## UNDERGRADUATE

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

## GRADUATE

In the Faculty of Graduate Studies and Research, courses are offered leading to the degrees 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 arrangements.

A. SEMINAR IN NEUROANATOMY, M.N.I.

1. This course is given in combination with course Med. 2A "Anatomy and Physiology of the Central Nervous System" — September to end of November.
2. Additional graduate seminars will be held co-ordinated with Course B.
3. Graduate students are expected to pass the same examination which is given in undergraduate course Med. 2A, but with higher standing, and to act as demonstrators.

   Professor McNaughton
4. Advanced Neuroanatomy for selected group; times to be arranged.

   Professor McNaughton

B. SEMINAR IN NEUROPHYSIOLOGY.

1. Lectures and examination together with undergraduate course Med. 2A "Anatomy and Physiology of the Central Nervous System".
2. Weekly seminars and demonstrations co-ordinated with Course A-2 (4 months, beginning in December). Mondays, 4:30 to 6:00 p.m.
3. Under exceptional circumstances, a paper on a neurophysiological subject may be written by special arrangements as a substitute for B-1.

   Professors Jasper, Elliott, and Gloor

C. COLLOQUIUM IN CLINICAL NEUROLOGY.

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

Staff and Visiting Lecturers

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

M.N.I. 1½ hours weekly (9 months). Tuesdays, 4:00 to 5:30 p.m.

Professors Penfield, Rasmussen, Jasper, McNaughton, and McRae

E. OUTLINE OF NEUROCHEMISTRY.

Instruction in neurochemistry in addition to that provided in course B-2 may be obtained by special arrangement.

Professor Elliott

F. NEUROPATHOLOGY.

1. Conference in neuropathology, Thursdays, 4:00 to 5:00 p.m.

   Professors Mathieson and Bertrand

2. Six months laboratory work in surgical or medical neuropathology.

3. 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 Nos. 2 and 4 are required and either No. 1 or No. 3 as arranged with the staff. Under special circumstances, written and/or oral examinations may be substituted for No. 1 or No. 2 of the above courses for students who have taken course 5.

G. NEUROLOGICAL RADIOLOGY.

1. Lecture demonstrations (3 months beginning in September). Mondays, 4:30 to 6:00 p.m.
2. Colloquium, 1 hour weekly (9 months) Mondays, 9:00 a.m.

   Professor McRae

# PUBLICATIONS

1958-59

ANDERMANN, F.

*Paroxysmal Dysarthria and Ataxia in Multiple Sclerosis.* Neurology 9: 211-216, 1959, (with J. B. R. Cosgrove, D. Lloyd-Smith and A. M. Walters).

BERRETT, A.

*A Follow-up Study after Thorotrast Carotid Arteriography.* Canad. M. A. J. 78: 916-921, 1958, (with D. L. McRae).

BRANCH, C. L.

*Inhibition of Betz Cell Activity by Thalamic and Cortical Stimulation.* J. Neurophysiol. 21: 380-390, 1958, (with A. R. Martin).

See A. R. Martin, joint author.

COSGROVE, J. B. R.

See F. Andermann, joint author.

CULLEN, C.

See H. H. Jasper, joint author.

ELLIOTT, A. W.

See D. L. McRae, joint author.

ELLIOTT, K. A. C.

*Anaerobic Glycolysis in Brain Slices after Deprivation of Oxygen and Glucose.* Canad. J. Biochem. & Physiol. 36: 721-730, 1958, (with M. Rosenfeld).

*γ-Aminobutyric Acid and Factor I.* Rev. canad. de biol. 17: 367-388, 1958.

*Occlusion and Metabolism of γ-Aminobutyric Acid by Brain Tissue.* J. Neurochem. 3: 28-40, 1958, (with N. M. Van Gelder).

See N. M. Van Gelder, joint author.

ELVIDGE, A. R.

*Examination and Treatment of Post-traumatic Epilepsy.* Experts' Meeting on the Medical, Vocational and Social Rehabilitation of Those with Traumatic Brain Injuries, Helsinki, June 9-14, 1958, p. 1-24.

*Neurosurgery.* Chapter for book, Textbook of Surgery, ed. H. F. Moseley. St. Louis, C. V. Mosby Company, 1959, p. 255-322.

*The Treatment of Tumors of the Cerebellopontine Angle.* Chapter for book, Treatment of Cancer and Allied Diseases, v. 2, ed. George T. Pack and Irving M. Ariel. New York, Hoeber, 1959, p. 156-175.

ENGELS, E. P.

*Roentgenographic Demonstration of a Hypophysial Subarachnoid Space.* Am. J. Roentg. 80: 1001-1004, 1958.

FLOREY, E.

*Studies on the Distribution of Factor I in Mammalian Brain.* J. Physiol. 144: 220-228, 1958, (with E. Florey).

GLOOR, P.

*An Assessment of the Value of Sleep-electroencephalography for the Diagnosis of Temporal Lobe Epilepsy.* EEG Clin. Neurophysiol. 10: 633-648, 1958, (with C. Tsai and F. Haddad).

HADDAD, F.

See P. Gloor, joint author.

HOBBIGER, F.

*Effects of γ-Aminobutyric Acid on the Isolated Mammalian Ileum.* J. Physiol. 142: 147-164, 1958.

JASPER, H. H.

*Analyse par Microélectrodes des Reprises du Cortex Sensoriel du Chat à des Volées Afférentes Spécifiques et Non-spécifiques.* Colloques Internationaux du Centre National de la Recherche Scientifique, no. 67, 325-331, 1957, (with C. Li and C. Cullen).

*Progress and Problems in Brain Research.* J. Mt. Sinai Hosp. 25: 244-253, 1958.

See T. Rasmussen, joint author.

KEENER, E. B.

*Chemodectomas of the Vagal Body.* Canad. M. A. J. 80: 173-179, 1959.

*Experimental Observations on the Use of Rubber in the Treatment of Craniosynostosis.* J. Neurosurg. 15: 642-652, 1958.

See R. A. Millar, joint author.

LI, C.

See H. H. Jasper, joint author.

LLOYD-SMITH, D.

See F. Andermann, joint author.
See T. Rasmussen, joint author.

MCNAUGHTON, F. L.

See T. Rasmussen, joint author.

MCRAE, D. L.

*Pneumographic Findings in Angiomata of the Brain.* Acta radiol. 50: 18-26, 1958, (with V. Valentino).

*Radiological Aspects of Cerebellar Astrocytomas and Medulloblastomas.* Acta radiol. 50: 52-66, 1958, (with A. W. Elliott).

See A. Berrett, joint author.

MARTIN, A. R.

*Microelectrode Studies of Thalamic Afferents to Pyramidal Cells of the Motor Cortex of the Cat.* EEG Clin. Neurophysiol. 9: 381-382, 1957, (with C. L. Branch).

*Spontaneous Activity of Betz Cells in Cats with Midbrain Lesions.* J. Neurophysiol. 21: 368-379, 1958, (with C. L. Branch).

See C. L. Branch, joint author.

MILLAR, R. A.

*Epidermal Blockades and Circulating Catecholamine Levels in a Child with Pheochromacytoma.* Canad. Anaesth. Soc. J. 5: 282-287, 1958, (with P. R. Bromage).

*The Fluorometric Estimation of Adrenaline and Noradrenaline during Haemorrhagic Hypotension.* Brit. J. Anaesth. 30: 158-165, 1958, (with B. G. Benfey).

*Plasma Adrenaline and Noradrenaline after Dibenzyline Administration and during Haemorrhagic Hypotension in Normal and Adrenalectomised Dogs.* Brit. J. Pharmacol. 14: 9-13, 1959, (with E. B. Keener and B. G. Benfey).

MULLAN, S.

*Illusions of Comparative Interpretation and Emotion: Production by Epileptic Discharge and by Electrical Stimulation in the Cerebral Cortex.* Arch. Neurol. & Psychiat. 81: 269-284, 1959, (with W. Penfield).

OLSZEWSKI, J.

See T. Rasmussen, joint author.

PENFIELD, W.

*Centrencephalic Integrating System.* Brain 81: 231-234, 1958.

*The Dawn of Medicine.* Chapter for book, Reticular Formation of the Brain, Boston, Little, Brown, 1958, p. 755-758.

*L'Etat de Conscience et l'Organisation Centrencephalique.* (Translated by G. Bertrand). Laval méd. 26: 469-481, 1958.

*The Liberal Arts in Canada.* Dalhousie Rev. 38: 497-507, 1959.

*Rewards and Fairies in Medicine.* Canad. M. A. J. 79: 930-932, 1958.

*The Role of the Temporal Cortex in Recall of Past Experience and Interpretation of the Present.* Chapter for book, Ciba Foundation Symposium on the Neurological Basis of Behaviour, 1958, p. 149-174.

*Science and the Arts in a Changing World.* J. Med. Educ. 33: 853-857, 1958.

See S. Mullan, joint author.

RASMUSSEN, T.

*Epilepsy.* Chapter for book, Long Term Illness, ed. M. G. Wohl, Philadelphia. Saunders, 1958, p. 429-437, (with F. L. McNaughton).

*Focal Seizures Due to Chronic Localized Encephalitis.* Neurology 8: 435-445, 1958, (with J. Olszewski and D. Lloyd-Smith).

*Pre-operative and Post-operative Care of the Neurosurgical Patient.* Chapter for book, Treatment of Cancer and Allied Diseases, v. 2, ed. George T. Pack and Irving M. Ariel, New York, Hoeber, 1959, p. 43-52.

*Temporal Lobe Epilepsy: Indication for Operation and Surgical Technique.* Second International Colloquium on Temporal Lobe Epilepsy, Springfield, Ill., Charles Thomas, 1958, p. 440-460, (with H. H. Jasper).

ROBB, J. P.

*Neurological Basis of Reading.* International Reading Ass'n. Conference Proceedings. 3: 116-119, 1958. Scholastic Magazines, N.Y.

ROSENFELD, M.

See K. A. C. Elliott, joint author.

TATLOW, W. F. T.

*Diseases of the Nervous System.* Chapter for book, Aids to Medical Diagnosis, 8th edition, ed. G. E. F. Sutton, Rochester, Williams & Wilkins, 1958, p. 273-371.

*The Electroencephalograph.* Chapter for book, Aids to Medical Diagnosis, 8th edition, ed. G. E. F. Sutton, Rochester, Williams & Wilkins, 1958, p. 378-383.

TSAI, C.

See P. Gloor, joint author.

VALENTINO, V.

See D. L. McRae, joint author.

VAN GELDER, N. M.

*Disposition of γ-Aminobutyric Acid Administered to Mammals.* J. Neurochem. 3: 139-143, 1958, (with K. A. C. Elliott).

See K. A. C. Elliott, joint author.

## *RESEARCH FUNDS*

1934 — Rockefeller Foundation Endowment
1947 — Federal Government Consolidated Grant
1951 — Donner Canadian Foundation Grant
1954 — Lily Griffith McConnell Endowment
1957 — Hobart Anderdon Springle Memorial Endowment

## *FELLOWSHIP FUNDS*

1948 — Duggan Fellowship
1950 — Lewis L. Reford Fellowship
1956 — Dr. and Mrs. Charles F. Martin Fellowship

## *GRANTS FOR SPECIAL PROJECTS*

Dominion-Provincial Health Grant — Dr. McNaughton
" " " " — Drs. Penfield and Rasmussen
Elizabeth Kenny Foundation Grant — Dr. Rasmussen
U.S. National Science Foundation Grant — Dr. Jasper
U.S. Public Health Neurological Training Grant — Dr. McNaughton

## DONATIONS TO SPECIAL FUNDS — 1958-59

Research, Education, Social Service

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| ANAESTHESIA RESEARCH FUND: | |
| *Parke Davis & Co.* | $ 10,000.00 |
| BRAIN TUMOUR RESEARCH FUND | |
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| BRONFMAN GRANT FOR NEUROPHYSIOLOGY | 20,000.00 |
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| " " " " " *Mrs. Naomi Graham* | 263.50 |
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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 and by arrangement in the United States.

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

# CLASSIFICATION OF DISEASES

*Nervous System Generally:*

| | |
|---|---|
| Neurosyphilis | 1 |
| Multiple Sclerosis | 124 |
| Motor Neurone Disease | 18 |

*Meninges:*

| | |
|---|---|
| Meningocele & Myelomeningocele | 13 |
| Acute Purulent Meningitis | 14 |
| Tuberculous Meningitis | 5 |
| Headache | 76 |
| Subdural Haematoma | 21 |
| Subdural Hygroma | 13 |
| Epidural Haematoma | 3 |
| Subarachnoid Haemorrhage | 32 |
| CSF Rhinorrhea | 4 |
| Miscellaneous | 14 |

*Brain:*

| | |
|---|---|
| Congenital Anomalies | 5 |
| Hydrocephalus | 27 |
| Brain Abscess | 11 |
| Cerebral Concussion | 122 |
| Cerebral Contusion, Laceration, Traumatic Encephalopathy | 103 |
| Epilepsy | 469 |
| Migraine | 43 |
| Parkinsonism | 14 |
| Cerebral Thrombosis, Encephalopathy due to Arteriosclerosis | 152 |
| Cerebral Haemorrhage | 20 |
| Cerebral Embolism | 9 |
| Intracranial Aneurysm | 24 |
| Encephalitis | 33 |
| Miscellaneous | 35 |

*Tumors:*

| | |
|---|---|
| Gliomas | 28 |
| Perineurial Fibroblastoma | 5 |
| Meningeal Fibroblastoma | 16 |
| Pituitary Adenoma | 10 |
| Craniopharyngioma | 3 |
| Angioma | 3 |
| Glioblastoma Multiforme | 38 |
| Metastatic Carcinoma — general body | 34 |
| Meningioma | 1 |
| Astrocytoma | 23 |
| Medulloblastoma | 6 |
| Tumour Brain | 16 |
| Secondary Tumours, Brain, Spinal Cord | 4 |
| Chordoma Pituitary | 1 |
| Pinealoma | 3 |
| Sarcoma | 4 |
| Neurofibroma | 2 |
| Dermoid Cyst | 4 |
| Oligodendroblastoma | 2 |
| Stenosis Aqueduct of Sylvius | 1 |
| Haemangioblastoma | 6 |

| | |
|---|---|
| Spongioblastoma Polare | 1 |
| Cyst Brain | 1 |
| Chromophobe Adenoma Pituitary | 6 |
| Tumour Cord | 2 |
| Recklinghausen's Disease | 1 |
| Neuroepithelioma | 1 |
| Osteoma | 4 |
| Granuloma, eosinophilic | 1 |
| Hypophyseal Duct Tumour | 2 |
| Miscellaneous CNS and Skull | 10 |
| Miscellaneous Tumours, Body Generally | 6 |

*Spinal Cord:*

| | |
|---|---|
| Compression of the Spinal Cord | 5 |
| Acute Myelitis | 3 |
| Guillain-Barré Syndrome | 5 |
| Myelopathy, Cause Unknown | 21 |
| Syringomyelia | 3 |
| Miscellaneous | 11 |

*Cranial and Peripheral Nerves:*

| | |
|---|---|
| Optic Neuritis | 11 |
| Trigeminal Neuralgia | 50 |
| Bell's Palsy | 5 |
| Menière's Syndrome | 31 |
| Traumatic Peripheral Nerve Lesions | 4 |
| Other Neuralgias | 12 |
| Peripheral Neuropathy | 30 |
| Syncope | 19 |
| Miscellaneous | 14 |

*Muscles:*

| | |
|---|---|
| Myasthenia Gravis | 12 |
| Muscular Atrophy | 13 |
| Miscellaneous | 2 |

*Mental Diseases:*

| | |
|---|---|
| Mental Deficiency | 8 |
| Schizophrenia | 2 |
| Depression | 16 |
| Drug Addiction | 4 |
| Psychoneurosis | 41 |
| Organic Psychosis | 13 |
| Miscellaneous | 2 |

*Other Systems:*

| | |
|---|---|
| Occipitalization Atlas | 3 |
| Congenital Anomalies — Spine | 6 |
| Congenital Anomalies — Skull | 5 |
| Protrusion Disc — Lumbar | 277 |
| — Cervical | 49 |
| Fracture and/or Dislocation of Vertebral Column | 43 |
| Fracture Skull | 123 |
| Back Pain | 29 |
| Intractable Pain | 6 |
| Facial Pain | 5 |
| Traumatic Lesions & Infections Miscellaneous | 31 |
| Arthritis Spine | 6 |
| Miscellaneous — Undiagnosed | 88 |

# CLASSIFICATION OF OPERATIONS

*Craniotomy* (Osteoplastic, miscellaneous, etc.)

| | |
|---|---|
| and Biopsy | 5 |
| and Drainage of Abscess | 4 |
| and Drainage of Subdural Haematoma | 11 |
| and Drainage of Intracerebral Haematoma | 11 |
| and Drainage of Extradural Haematoma | 11 |
| and Excision of Epileptogenic Focus | 45 |
| and Excision of Aneurysm | 3 |
| and Exploration | 3 |
| and Hypophysectomy | 11 |
| and Incision and Drainage of Cyst | 1 |
| and Clipping of Aneurysm | 7 |
| and Plastic Repair of Dura | 8 |
| and Plastic Repair of Skull | 1 |
| and Removal of Adhesions | 1 |
| and Removal of Tumour | 104 |
| and Rhizotomy | 9 |
| and Lobectomy | 22 |
| *Trepanations & Craniocentesis* | 5 |
| and Biopsy | 11 |
| and Drainage of Subdural Haematoma Space | 8 |
| and Placement of Electrodes | 1 |
| and Drainage of Abscess | 2 |
| and Ventriculography | 5 |
| and Pallidotomy | 1 |
| Elevation of Depressed Skull Fracture | 49 |
| Plastic Repair of Skull Defect, Bone | 5 |
| Suture of Lacerated Wound of Scalp | 7 |
| Ventriculocisternostomy (Torkildsen's) | 11 |
| Catheterization of Sylvian Aqueduct | 3 |
| Artificial Cranial Suture | 4 |

*Laminectomy or Hemilaminectomy*

| | |
|---|---|
| and Anterolateral Cordotomy | 9 |
| and Decompression of Spinal Cord | 6 |
| and Exploration | 3 |
| and Incision & Drainage of Cyst | 4 |
| and Incision & Drainage of Abscess | 2 |
| and Removal of Adhesions | 2 |
| and Removal of Haematoma | 1 |
| and Removal of Tumour | 14 |
| and Rhizotomy | 4 |
| and Spinal Fusion | 1 |
| and Spinal Fusion with Bone Graft | 28 |
| and Spinal Fusion with Wire | 8 |
| and Discoidectomy | 187 |
| and Cervical Discoidectomy | 11 |
| and Cervical-Occipital Fusion | 2 |
| and Cutting of Dentate Ligament | 2 |
| Plastic Repair of Cranium Bifidium | 3 |
| Plastic Repair of Spina Bifida | 5 |
| Incision of Scalp & Application of Tongs | 2 |
| Ligation of Artery | 4 |
| Exploration of Nerve | 3 |
| Ligation of Artery with Selverstone Clamp | 10 |

| | |
|---|---|
| Avulsion of Nerve | 8 |
| Neurectomy | 3 |
| Nerve Anastomosis | 2 |
| Re-opening of Wound with Evacuation | 5 |
| Re-opening of Wound with Exploration | 4 |
| Re-opening of Wound with Removal of Bone Flap | 1 |
| Re-opening of Wound with Re-packing | 4 |
| Re-suturing of Wound | 3 |
| Miscellaneous | 28 |
| Plaster Cast | 24 |
| Ventriculo-Peritoneal Shunt | 4 |
| Lumbar Peritoneal Shunt | 3 |
| Cerebral Arteriography — Cutdown | 5 |
| Cerebral Arteriography — Percutaneous | 167 |
| Tic Injection | 10 |
| Diagnostic Spinal | 2 |
| Nerve Blocks | 11 |
| Tracheotomy | 3 |
| Carpal Tunnel | 4 |

## CAUSES OF DEATH

| | |
|---|---|
| Head Injuries | 14 |
| Tumours | 37 |
| Myasthenia Gravis | 1 |
| Hydrocephalus | 1 |
| Peripheral Neuropathy | 1 |
| Aneurysms | 5 |
| Cerebral Haemorrhages | 24 |
| Meningitis | 6 |
| Subdural Haematomas | 3 |
| Oedema of Brain | 3 |
| Cerebral Contusion | 5 |
| Thrombosis | 13 |
| Carcinoma — General | 9 |
| Other Systems | 3 |
| TOTAL | 125 |