awarded federal research grants

OTTAWA (Copyright) — Three Dalhousie University professors have been awarded federal health and welfare grants, for research work on the use and abuse of drugs.

Dr. Mark Segal and Dr. Herman Ellenberger, of the psychology department, received $14,450 to provide drug analysis services to hospitals and physicians in Nova Scotia.

Dr. J. C. Szerb, head of the physiology department, received $8,360 to conduct a series of investigations into the specific action of narcotic drugs — especially morphine — on the brain.

Mail Star

November 13, 1973

Dal News
Volume 15, Number 2, Sept. 20, 1984

John C. Szerb

SZERB

The Medical Research Council of Canada has named Dr. John C. Szerb of Dalhousie's medical school a research professor for 1984-85.

During his sabbatical, he will go to Duke University in North Carolina where a research group is studying epileptic seizures. He wants to learn how to measure electrical activity in correlation with the chemical activity of seizure-prone brain tissue.

Szerb, who's interested in the chemistry of brain function, pioneered research 20 years ago in the activity of the neurotransmitter acetylcholine. About five years ago, researchers discovered that Alzheimer's disease sufferers are greatly deficient in acetylcholine. The deficiency, Szerb says, could explain the deterioration of mental function in Alzheimer patients.

Born in Budapst, Hungary, Szerb received his MD in 1950 from the University of Munich, Germany, took post-graduate training in Paris; became a Nuffield Fellow and later an MRC visiting scientist at Cambridge University in England. He joined the faculty of medicine at Dalhousie in 1951.

Dal scientist named research professor

By Barbara Hinds

Dr. John Conrad Szerb of Dalhousie ersity's School of Medicine, Halifax, e only scientist named a research pro- or for 1984-85 by the Medical Re- ch Council of Canada, to allow him to n sabbatical study.

His interest has long been in the nistry of brain function and, 20 years he was a pioneer basic researcher in activity of the neurotransmitter ace- ioline.

He and co-workers discovered that neurotransmitter was produced by the n in proportion to brain activity. At time, its relevance to human disease unsuspected.

About five years ago, the brains of le who suffered from Alzheimer's dis- were discovered to be greatly defi- in acetylcholine. Only about 15 per of normal amounts was present in nts' brain cells at autopsies.

Thus, the work of Dr. Szerb, physiolo- and biophysicist, typifies the value of research, so often perceived as irrel- evant and unrelated to the immediate pressing problems of medicine.

Dr. Szerb said the neurotransmitter deficiency could explain the deterioration of the mental function of Alzheimer patients.

Shortly after the discovery of the acetylcholine deficiency, he embarked on preliminary work with the Eli Lily Pharmaceutical Company, investigating means of restoring the neurostransmitter to brain tissue.

Little progress was made because there is still insufficient basic research to establish the means by which acetylcholine attaches itself to cell membranes.

An international prize of $10,000 awaits the scientist (probably an organic chemist, says Dr. Szerb) who can solve this problem.

"Basic research has established the missing link in Alzheimer's disease, but we don't have enough information to correct this deficiency yet," he said.

Dr. Szerb said that his current work may appear to be as far-fetched as was his work in the past, but which suddenly became relevant to human disease. (His work has also paved the way for new avenues of investigation by many in the international body of scientists.)

Still working in neurotransmitters, he is now particularly involved in their relation to epileptic seizures.

"When the brain becomes diseased, the disease spreads to other, larger areas of the brain, and it may start abnormal activity, such as seizures. My interest is to find out how this spread occurs."

Epilepsy can be initiated by injury, by gunshot wounds, or by congenital deformity, and although the initially diseased areas may have been small, seizures occur when the disease spreads.

The spread has been demonstrated by EEG recordings. In cases where one side of the head has been damaged, with the passage of time, abnormal electrical activity has been recorded from the opposite side of the brain. The phenomenon is called "mirror focus."

Commonly a pain-killer — now researcher studies...

How morphine changes nerve cell function

One of the common reasons for administering an opium-like drug is to alleviate pain. But how these narcotics affect the brain is just now beginning to be understood.

One researcher who has been attracted to this field of endeavour is Dalhousie physiologist John Szerb.

Scientists to date have been able to localize a special protein in which these drugs act in the brain's nerve cells. They have also been able to establish the fact that these opium-like drugs imitate the effect of substances which occur naturally in the brain, both being able to alleviate pain.

Dr. Szerb has gone one step further with his research work. He has studied how morphine, the drug he works with, alters the function of the nerve cell. Working on simple nervous networks in the intestine and vas deferens of experimental animals (they respond to morphine in the same way as networks in the human system), he has learned that the drug acts as a depressant only on cells which are normally highly excitable and which release a chemical substance called acetylcholine much more readily than other cells do.

In his tests he has exposed the nerve networks to a radioactive precursor (choline) and measured how fast the radioactive acetylcholine is produced and then released. In those highly excitable cells which are sensitive to morphine it appears that the drug serves as a stabilizing factor, reducing their excitability to the level of other cells which are insensitive to morphine.

This observation has relevance to the understanding of the phenomenon of addiction to opium-like drugs such as heroin: after repeated exposure to these drugs, morphine sensitive cells regain their greater excitability in spite of the presence of the drug, thus the individual will become tolerant to the drug and will require greater and greater doses to obtain an effect. When the drug is withdrawn, these drug-sensitive cells will become even more excitable than before and are probably responsible for producing the well-known sysmptoms of drug withdrawal. These changes are likely to occur in the cell membrane and the understanding of the properties of the cell membrane of these excitable cells will help in producing pain-killing drugs which do not lead to addiction.

Dr. Szerb, who has been conducting his research under a grant from the federal Department of Health and Welfare's drug directorate division, plans to continue work on the effect of opiates in the release of other substances than acetylcholine. When he retires in June as head of the Physiology and Biophysics Department he also plans to devote his energies to another area that has a special interest for him — the relationship between behavior and the release of chemical substances from the brain.

Dr. John Szerb

news
Dalhousie University
February 11, 1977
I - 11

Contact:

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Effects of alcohol in the body described

By BARBARA HINDS
Staff Reporter

To see a middle-aged man, clutching bed sheets, recoiling from the pursuit of demons in his delirium tremens, begs the questions: Why do we drink alcohol? What happens when we drink alcohol?

Dr. John C. Szerb, head of physiology and biophysics, Dalhousie University, provided answers in an interview.

Basically, alcohol is like any other anesthetic, and if used in sufficient quantity, it causes unconsciousness, he explained.

Major difference between ether and ethyl alcohol is, ethyl alcohol is much less potent. People can regulate much more easily how much anesthetic they give themselves.

When any general anesthetic is used, initially there is a state of excitement before unconsciousness, and alcohol stimulates a similar, but more prolonged process.

With alcohol being so weak, comparatively, the initial state of excitement can be maintained and one can control the phenomenon.

When alcohol is swallowed, it is quickly absorbed from the stomach by the blood stream and thence reaches the liver.

Liquid taken into the stomach usually is absorbed from the small intestine. Alcohol is absorbed differently, through the stomach wall.

It can cross the stomach wall because it is fat soluble. The stomach is lined with fatty membrane and the alcohol can dissolve the fatty membrane.

The action can cause inflammation of the stomach and thickening of the lining of stomach and intestine, which prevents proper absorption of other foods.

Many alcoholics suffer from malnutrition, even if they eat properly (which they don't because they spend their money on liquor) because the amount of nutrients absorbed is reduced.

The effect of alcohol on the liver is "very deleterious," said Dr. Szerb. "So alcohol is a very dangerous substance as far as the liver is concerned."

Even moderate drinking causes a fatty liver to develop, but it is reversible. Even after a little alcohol, there are changes. A lot of drinking causes permanent damage.

Apart from the liver damage, body metabolism changes and the breakdown of other substances slows down. Therefore, people who drink are more sensitive to tranquilizers. especially if they are under the influence of alcohol.

"This is dangerous, especially where driving is concerned," said Dr. Szerb.

After prolonged drinking, disease of the liver becomes irreversible. Cirrhosis sets in. Chronic alcoholism causes an increase of fat in the blood stream and promotes hardening of the arteries.

"My personal opinion is, if the two drugs, marijuana and alcohol were introduced to a society simultaneously, and only one were allowed, I would choose marijuana. It is much less dangerous than alcohol," he said.

"That does not mean we should introduce or allow another drug with potential hazards," he cautioned.

Alcoholics are more tolerant to anesthetic in hospital, but when the liver shrinks because of cirrhosis, alcoholics' tolerance to anesthetic disappears.

Alcohol provides the body with calories. It produces heat, but it is the worst form of calorie one can consume, said Dr. Szerb.

Alcohol calories contain no nitrogen, so they cannot contribute to protein synthesis, and protein is the body's most valuable food.

A heavy drinker can supply 50 per cent of his calorie needs, just by drinking; but he will suffer from deficiency because the quality of alcohol calories is so poor.

Among other effects, alcohol causes a sensation of warmth. Actually, the body temperature drops. (Conversely, when the body temperature rises because of a fever, a person shivers.) There is dilation of the blood vessels — the face reddens.

"It is expecially dangerous to drink out in the cold in this climate." Exposure to cold is much more dangerous under the influence of alcohol because a drinker does not preserve his body heat as well as a sober individual does, he said.

Imbibing also causes urine production, and consequently dehydration of the body. Loss of fluid probably is the main cause of a hangover; the cause of awakening the next morning with a "thick tongue."

"Really, they have lost so much fluid, they have a thick tongue," said Dr. Szerb.

The effect on the brain is indirect, due to malnutrition. There are "brain syndromes" which are probably due to lack of vitamins.

"We don't know how this class of drugs acts on the brain. We know it dissolves in the nerve cells." The nerve cells swell up as the alcohol dissolves in the fatty membrane of the cells of the central nervous system.

More and more nerve cells in different areas are affected by heavy drinking.

More vulnerable areas of the brain are affected first, and that causes mood changes, lack of inhibitions, a feeling of well-being.

When more alcohol is consumed, it induces drowsiness and then unconsciousness — progressively involving a larger part of the brain.

Psychological dependence on alcohol is the most common phenomenon, just as smokers or coffee drinkers depend on tobacco or coffee. In such people, abstinence leads only to psychological pnenomenon. They feel unhappy. have discomfort.

In more severe cases, where the drinker has become physically dependent on drink, if he fails to obtain alcohol, or if he withdraws from the drug, he has "the shakes," a nervous tremor, and in the worst form, he has DTs.

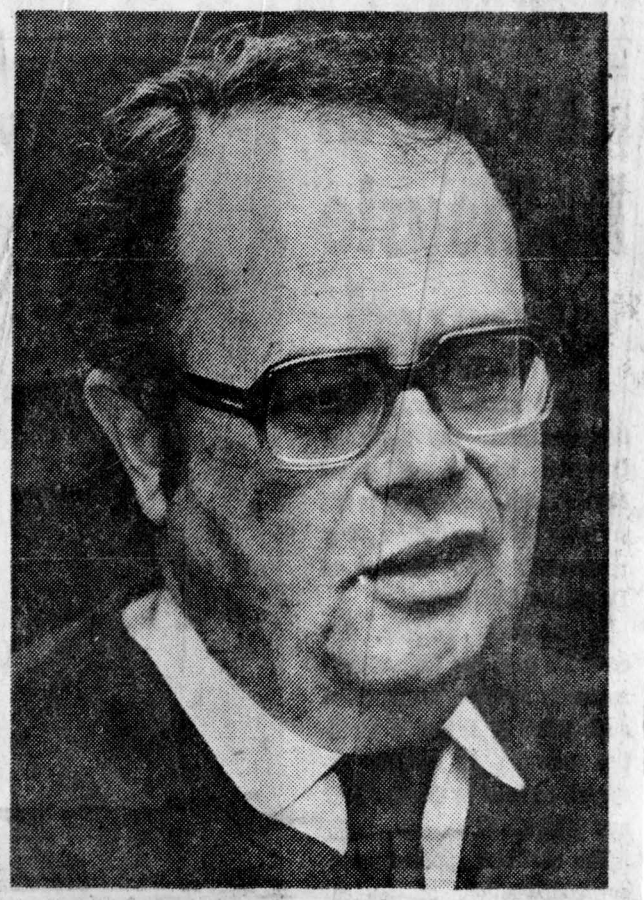
The shaking and delirium are partly due to the brain's tolerance of alcohol and partly due to nutritional deficiency. Another drink would prevent the worst sumptoms of withdrawal.

Patients in a treatment centre during withdrawal from alcohol are given tranquilizers and extra nutrition to restore the deficiency they are suffering, said Dr. Szerb.

"The question remains: How well can they stick to abstinence when they get out?"

Analyses of the effects of liquor on a man are no new exercise. Dr. Szerb quotes Shakespeare. In Macbeth, the character MacDuff asks what three things drink especially provokes.

MacDuff is answered by a porter: "Marry Sir, nose painting, sleep, and urine. Lechery, Sir, it provokes and unprovokes, it provokes desire, but it takes away the performance."



DR. JOHN C. SZERB

Mail Star
March 22, 1976.

SABB

Szerb , John C.	Professorand Head of the Department of Physiology	July 1, 1970 to June 30, 1971

November 1969 INFORMATION OFFICE

NEWS

FROM DALHOUSIE UNIVERSITY, HALIFAX, N. S.

No. 373 October 20, 1965

Dr. John C. Szerb, head of the department of physiology and biophysics at Dalhousie University, has been appointed to the Medical Research Council of Canada.

Also appointed to the sub-committee on clinical research of the council, Dr. Szerb will attend a meeting of the council in Ottawa at the end of next month.

Dr. Szerb, who will continue his work at Dalhousie, has been with the university since 1951 as lecturer, assistant professor, associate professor and full professor in pharmacology.

Educated in Hungary, Munich and Paris, he is the author of numerous scientific papers on physiology and pharmacology, most of them concerned with the function of the brain and the effect on the brain of drugs, such as narcotics.

NEWS

FROM DALHOUSIE UNIVERSITY, HALIFAX, N. S.

No. 275 8 June 1965

Dr. Henry D. Hicks, president of Dalhousie University, has announced the appointment of Dr. John C. Szerb as professor and head of the department of physiology and biophysics in the medical school, effective July . He succeeds Dr. C. Beecher Weld, who is retiring after 30 years in this position.

A teacher and scientist of wide experience, Dr. Szerb has been a member of the faculty of medicine since 1951 successively in the appointments of lecturer, assistant professor, associate professor and full professor in the department of pharmacology.

He is a member of the Pharmacological Society of Canada and the American Pharmacological Society and the author of numerous scientific papers on physiology and pharmacology, most of them concerned with the function of the brain and the effect on the brain of drugs, such as narcotics.

Dr. Szerb's early education was in the public and secondary schools of Budapest, Hungary, and in the medical school of the University of Budapest. He holds the MD degree from the University of Munich and subsequently gained postgraduate experience at L'Institut Pasteur in Paris. In 1960 Dr. Szerb was awarded a Dominion Travelling Fellowship of the Nuffield Foundation and spent a year in study and research with Sir John

more

Gaddum at the Institute of Human Physiology, Babraham, Cambridge, England. His present work is on the dectection and measurement of substances involved in the transmission of nerve impulses in the brain.

Dr. Weld, a native of Vancouver, joined Dalhousie University as professor of physiology in 1936. He graduated from the universities of British Columbia and Toronto after serving as a gunner overseas from 1917 to 1919.

From 1922, he was successively a laboratory technician, a research assistant, a clinical clerk, intern and then in part-time medical practice before joining Dalhousie.

He is a member of the Canadian Physiological Society, the Physiological Society (Britain), the American Physiological Society, the Nova Scotia Institute of Science, the Halifax branch of the Nova Scotia Medical Society, the Royal Society of Canada and the Nova Scotia Society of Artists.

Last year he was appointed chairman of the university senate's cultural activities committee.

1963

Curriculum Vitae.

J.C. Szerb.

Attended medical school at the University of Budapest and Munich, graduating in 1950. Before coming to Dalhousie, worked at the Department of Pharmacology at Budapest, at the Department of Biochemistry at Munich and at the Institut Pasteur in Paris. Came to Dalhousie in 1951. In 1960-61, worked at the Institute of Animal Physiology, Cambridge, England.

Work mainly on drugs acting on the central nervous system, with 16 scientific publications in this field. Presently engaged in research substances released in brain having significance in mental diseases.

Dr. John Szerb has been promoted to the rank of Professor in the Department of Pharmacology which is under the direction of Dr. John Aldous, ~~the Professor and Head of the Department~~. Dr. Szerb is a graduate in Medicine with the M. D. degree of the University of Munich. He joined the staff of Dalhousie University in 1951.

He has done important research on the factors leading to narcotic addiction and other aspects of pharmacology. He has an outstanding reputation as a research worker and his publications have received international attention.

NEWS

FROM DALHOUSIE UNIVERSITY, HALIFAX, N. S.

Three medical scientists at Dalhousie University have been promoted from associate to full professor, President A. E. Kerr announced today. They are Dr. Lloyd B. Macpherson, Dr. J. Gordin Kaplan and Dr. John C. Szerb.

For many years there has been only one person in each of the medical science departments with the rank of professor. The three promotions have been made because of valuable contributions to research and teaching.

DR. LLOYD B. MACPHERSON becomes professor in the department of biochemistry, which is under the direction of Dr. J. A. McCarter. Dr. Macpherson, also assistant dean of the Faculty of Medicine, obtained a bachelor degree at Acadia University and a Ph.D. from Toronto. He has been on the staff of the Medical School since 1952.

During World War II he was officer in charge of research on war gasses and received the M.B.E.

At Dalhousie he did research on the biochemistry of phospholids, in addition to teaching in the department of biochemistry. Since 1958 he has had increasing administrative responsibility in the Faculty of Medicine as assistant dean.

DR. GORDIN KAPLAN has been promoted to the rank of professor in the department of physiology, headed by Dr. C. B. Weld.

Dr. Kaplan took his undergraduate education at City College in New York. He has a master of arts and a Ph.D. degree from Columbia University. He came to Dalhousie University in 1951, was promoted to associate professor in 1954. He is well known for his research in cellular biology, chiefly on the enzyme system of cells.

(MORE)

Dr. Kaplan is very well known as a figure in Halifax public life. He is chairman of the board of directors, the Halifax Grammar School, is on the Nova Scotia Rehabilitation Council's board of directors and board of hospital management; he also has played a major role in the Canadian Committee for Control of Radiation Hazards. He has an extensive record of publications and is well known as a lecturer and TV personality.

DR. JOHN SZERB has been promoted to professor in the department of pharmacology, under the direction of Dr. John Aldous. Dr. Szerb attended medical schools of Budapest and Munich. He graduated in the latter city in 1950.

Before coming to Canada he worked at the department of pharmacology in Budapest, department of biochemistry in Munich and at the Institut Pasteur in Paris. He arrived at Dalhousie in 1951. In 1960-61 he spent his sabbatical year doing research at the Institute of Animal Physiology in Cambridge, England.

Dr. Szerb has done important research on drugs acting on the central nervous system. He has an outstanding reputation as a research worker and his publications have attracted international attention. Presently he is engaged in research of substances which are released in the brain and have significance in mental diseases.

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NEWS

FROM DALHOUSIE UNIVERSITY, HALIFAX, N. S.

Four professors of the Dalhousie Medical School will present papers at the sixth annual meeting of the Canadian Federation of Biological Societies. The conference will be held in London, at the University of Western Ontario.

Dr. J. A. McCarter, head of the department of biochemistry, will present a paper on phases of his cancer research. Dr. J. G. Aldous, head of the department of pharmacology, will speak on the effects of poison on cell metabolism.

Dr. John Szerb, professor of pharmacology, will present results his research into effect of drugs on brain cells. Dr. S. J. Patrick, professor of biochemistry, in cooperation with Mrs. L. C. Stewart, will give a paper on liver metabolism.

The meetings start June 17 and end June 19.

JUN 27 1977

BIOGRAPHY

Information Office,
Dalhousie University, 424-2517

Name: Szerb, John Conrad Date: June 23, 1977

Department: Physiology and Biophysics Rank: Professor

Date of Birth: February 24, 1926 Place of Birth: Budapest, Hungary

Universities attended:	degree(s)	date(s)
U. of Munich	M.D.	1950

Title of Dissertation:

Vergleichende Pharmakologische Untersuchung des Kallikreins, Kallidins, Bradykinins und des Darmstoffes von Vogt.

Teaching Experience:

university	date	subject taught
Dalhousie University	1951-1965	Pharmacology
Dalhousie University	1965-present	Physiology

Promotions at Dalhousie:	Date
Lecturer, Dept. of Pharmacology	1951-56
Assistant Professor, Dept. of Pharmacology	1952-57
Associate Professor, Dept. of Pharmacology	1957-63
Professor, Dept. of Pharmacology	1963-65
Professor and Head, Dept. Physiol. & Biophysics	1965-77

Awards, Honours, Fellowships:

title	date
Nuffield Travelling Fellow, Cambridge	1960/61
MRC Visiting Scientist, Cambridge	1970/71

Professional societies in which you have held office:

Council Member, Pharmacological Society of Canada, 1965-67

President, Canadian Physiological Society, 1973-74

Chairman, Physiology-Pharmacology Grants Committee, MRC, 1967-1970

Member of Executive, MRC, 1967-1969

More Important Publications:

Cortical acetylcholine release and electroencephalographic arousal. Journal of Physiology 1967, 192:329-343.

Demonstration of acetylcholine release by measuring efflux of labelled choline from cerebral cortical slices. Journal of Neurochemistry 1972, 19:2667-2677.

Acetylcholine release from visual and sensorimotor cortices of conditioned rabbits. The effects of sensory cuing and patterns of responding. Brain Research 1976, 104: 243-259.

Research Activities and Interests: (lay language please)

Nerve cells in the brain communicate with each other via chemical substances. Drugs that affect behavior and emotions act by interfering with the production, release and elimination of these substances. These processes are likely to be modified also during learning and forgetting. The release from the brain of one of the substances used for nervous communication, that of acetylcholine, has been investigated under the influence of various drugs and in animals performing different learned tasks.

SPEAKERS BUREAU INFORMATION:

I can speak on: (in order of preference)
topics

1. How do drugs modify behavior?
2. The chemical activity of the brain.
3.

General content of lecture (100 words)

Substances which modify behavior have been used since antiquity. How they affect behavior is just now being found out. Some substances such as opium-derivatives reduce pain sensation and cause a sense of well-being. The brain itself contains substances with similar action which might be involved in regulating awareness of pain and mood. Opium-like drugs appear to imitate the effect of these brain substances. Other mood-modifying drugs such as dexedrine seem to enhance the action of other chemical substances which are normally produced by the brain. Mood and behavior appears to be the result of a delicate interaction of numerous pathways releasing different kinds of chemicals and these chemical processes can be influenced selectively by different drugs.

Audience my topics might appeal to:

1. College educated, non-science audience.
2. Health professionals.
3.

NEWS MEDIA INFORMATION:

would you be interested in responding to media requests for:

1. comment in your area of specialty — Yes ☒ No ☐
2. interviews in your field — Yes ☒ No ☐
3. articles — Yes ☐ No ☒
4. background information — Yes ☒ No ☐

Information Office

NAME : SZERB, J.C.

ADDRESS : 9 Ross St. Birch Cove Telephone: 455-1748

POSITION : PROFESSOR AND HEAD, DEPARTMENT OF PHYSIOLOGY AND BIOPHYSICS.

BIRTHPLACE: : BUDAPEST Date: FEB. 24, 1926

MARITAL STATUS: MARRIED

CHILDREN : TWO

NATIONALITY : CANADIAN

EDUCATION : High School(s) and university(ies)
U. BUDAPEST MED. SCHOOL
U. MUNICH MED. SCHOOL

DEGREES : (with dates)
M.D. 1950 U. MUNICH

EXPERIENCE : Including previous appointments, military service, publications, research projects, etc.
LECTURER, ASSISTANT PROF., ASSOCIATE PROF. PROFESSOR
DEPT. PHARMACOLOGY, DALHOUSIE U. 1951-1965
ABOUT 25 PUBLICATIONS

ORGANIZATIONS : Association or club memberships.
COUNCILLOR, PHARMACOLOGICAL SOCIETY OF CANADA
MEMBER, CANADIAN PHYSIOLOGICAL SOCIETY
" AMERICAN PHARMACOLOGICAL SOCIETY

OTHER PERTINENT INFORMATION: Hobbies, etc.

DALHOUSIE UNIVERSITY
HALIFAX. N. S.
CANADA

INFORMATION OFFICE
B3H 3J5

May 12, 1978

Dr. John Szerb
Professor
Physiology/Biophysics Department
Tupper Building

Dear Dr. Szerb:

Thanks for your co-operation throughout the past year. The University Speakers Bureau has been an extremely successful venture. Between October, 1977 and this June, the Bureau will have answered 90 requests. The total will top the 100 mark by the end of the summer.

I am most grateful for the contribution you have made in terms of time and effort on behalf of the Information Office and the university.

I hope you will seriously consider letting your name stand as a speaker for the coming year. Our office is presently updating our list of resource people.

Please submit the subjects on which you could speak and add an explanatory note. Return to the Information Office by May 31. Thank you so much.

Sincerely

Roselle Green

(Mrs.) Roselle Green, APR
Assistant Director,
Information & Public Relations

Your Name JOHN C. SZERB

Your Department PHYSIOLOGY & BIOPHYSICS

1. Title of talk and brief description NEW IDEAS ON HOW THE BRAIN FUNCTIONS (FOR EDUCATED LAY AUDIENCE)

2. Title of talk and brief description THE EFFECTS OF ALCOHOL ON THE BODY (LAY AUDIENCE)

3. Title of talk and brief description .....

(Use reverse side if necessary)

...search Council of Canada
Conseil de recherches médicales du Canada

Ottawa, Canada
K1A 0W9

MT 81580 - 102006

NOTIFICATION OF AWARD

NOTIFICATION D'OCTROI

The Medical Research Council has approved a grant to you as detailed below. Subject to the appropriation of funds by Parliament, this grant will be made available to the business officer of your institution for disbursement by him as authorized by you, the grantee.

Le Conseil de recherches médicales vous accorde une subvention de recherche tel qu'indiqué ci-dessous. Suivant l'affectation des crédits par le Parlement du Canada cette subvention sera versée dans la caisse commune des subventions du Conseil sous la gestion du trésorier de l'institution où vous conduisez vos travaux, pour couvrir vos dépenses au fur et à mesure que vous autoriserez les paiements.

Dr. J.C. Szerb
Department of Physiology
and Biophysics
Dalhousie University
Halifax, Nova Scotia
B3H 4H7

9973 A

March 31, 1982

PURPOSE / OBJECTIF

Research on the project entitled "Kinetic analysis of endogenous GABA pools" to be undertaken during the period 1 April 1982 to 31 March 1983

N.B. Application for funds for the continuation of your research beyond the period indicated above, and a progress report, should be submitted by 1 November 1982

N.B. Une nouvelle demande de fonds pour continuer vos recherches au-delà de la période prévue ci-dessous devra être soumise avant le
et contenir un compte rendu de vos progrès.

PARTICULARS OF PAYMENT / DÉTAILS DES VERSEMENTS

Type of Grant / Type de subvention	Grant No. / No de la subvention	Fiscal Year / Année budgétaire	Amount / Montant
A-3 - 3rd Instal. Term Grant	MT-740	1982-83	$36,630.00

REMARKS / AVIS

The use of funds from this grant for the support of research trainees is not authorized.

This confirms the award of which you were notified last year.

c.c. Dean of Medicine
Accountant
Research Administration

Mary-Anne Lipka
Program Manager - Grants

jw