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**BULLETIN**

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**d'IMMUNOLOGIE**

**vol. 3 no. 1**

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B U L L E T I N

OF THE CANADIAN SOCIETY FOR IMMUNOLOGY      DE LA SOCIÉTÉ CANADIENNE D'IMMUNOLOGIE

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Vol. 3, No. 1

July 1969

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EDITORIAL

This issue of our Bulletin starts its third volume and the fourth year of the existence of the Society. The first half of the year 1969 was full of activities: vote on an amendment to the Constitution, twelfth meeting of the Federation, election of the officers of the Society, submission of a brief to the Senate Committee, formation of an International Union of Immunological Societies — to name only the more important events. A careful reader will find an account of all these activities in the present issue. To inform the members of the Society of all relevant developments is the prime aim of the Bulletin. However, we have always tried to give our readers a little bit more than just dry information. With this in mind, a new section called "Applied Immunology" was started in this issue. Contributions to this section and to all other sections of the Bulletin are always welcomed from all the members.

S. Dubiski

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THE CANADIAN SOCIETY FOR IMMUNOLOGY

Minutes of the Annual General Meeting of The Canadian Society for Immunology held on June 11, 1969 at 1.00 p.m. in Edmonton, Alberta

The attendance was approximately 20 persons. The meeting was chaired by the President, B. Cinader.

Agenda:

1. President's Report, see page 3 of this Bulletin
2. President-Elect's Address, see page 6 of this Bulletin
3. Secretary's Report, see page 8 of this Bulletin
4. Financial Report, see page 9 of this Bulletin
5. Changes in the Constitution, see page 11 of this Bulletin
6. Election of New Members. The names of the candidates for elected membership and for associate membership as published in the Bulletin, Vol. 2, No. 2, plus the persons listed on page 14 of this Bulletin were recommended by the Council for election. E. Potworowski seconded this recommendation. A unanimous vote followed.
7. Financial contribution to the International Union of Immunological Societies. It was recommended by the Council that the Treasurer of the I.U.I.S. be given \$75 as an advance contribution towards the dues which each Society will have to pay. Dr. Osoba seconded this proposal and an unanimous vote followed.

The meeting was adjourned at 1.30 p.m.

S. Dubiski, Past Secretary



### President's Report

The Canadian Society for Immunology has now functioned for three years and has 306 members. The growth of our Society has reflected the rapid development of Immunology in our Universities, has contributed to information exchange and has advanced education. We have held three International Symposia; the first dealing with the "Regulation of the Antibody Response" (Toronto, January 20th to 22nd, 1966), the second with "Immunological Aspects of Polymorphism" (Laval, Quebec City, organizer: D. Dufour, May 31st to June 3rd, 1967) and the third with "Cellular and Humoral Mechanism in Anaphylaxis and Allergy" (Toronto, organizer: H. Movat, October 3rd to 5th, 1968). The preparations for a fourth International Symposium are now in progress; its organizer is Dr. S. Freedman; it will take place in Montreal, between October 16th and 18th, 1969, and will deal with "Cancer Immunology".

Dr. D. Dufour and Dr. A. Sehon are preparing a new departure in our activities: by organizing our first Summer School with a laboratory-course. We hope it will be successful and that this type of Summer School, in spite of the enormous labour involved in its conduct, will become a feature of our activities. A Summer School, based on lecture courses, is now being prepared by Dr. A. Sehon under the aegis of the Canadian Society for Immunology; it will be a NATO Advanced Study Institute on "Cellular Differentiation and Regulation of the Immune Response" and will be held near Winnipeg in the summer of 1970.

Last year we participated, for the first time, in a meeting of the Canadian Federation of Biological Societies. This year we are doing so as full members of the Federation and with an interesting and stimulating programme of free sessions and a symposium.

The Bulletin of the Canadian Society for Immunology, edited by Dr. S. Dubiski, has become a useful and important factor in the life of our Society, has greatly contributed to discussion and to information exchange and increases the coherence between our members in the period between our meetings. Related to the Society is the network of local Antibody Clubs which stretch from the Eastern to the Western Provinces of Canada and which will be one of the activities of the Society which we may hope to strengthen in the years to come.

The much needed re-organization of Immunology in the Universities has been dealt with in our submission to the Senate and in our report to the Science Council; it may suffice to say here that progress is being made in this field and that the first Department of Immunology has been founded in the University of Manitoba at Winnipeg under the chairmanship of Dr. Alec Sehon.



The trial of antilymphocytic serum, organized by the Medical Research Council, is continuing to produce a useful stimulus for transplantation research in many University centres and will soon begin to yield clinical data.

The research activity of many scientists has been hampered by the "go and stop financing" which has, in the last year, failed to provide the much needed increasing support for growing and germinal fields of research. It is clear that financial stringency affects a developing research area even more profoundly than it affects endeavours which have reached a "steady state".

The need for long-term planning for growth has been felt by many academic and scientific bodies and has given rise to a flurry of surveys, reports and recommendations. The Senate Hearings have opened a unique opportunity for a dialogue between scientists and government. It is hoped that this channel of communication will remain open. It is, therefore, commendable that the Federation-Board has proposed to institute a policy-committee which will represent the views of the biologists organized in the Federation. This policy-committee will become the more effective the further we broaden the membership of the Federation.

We have supported proposals that Microbiologists and Plant Pathologists should participate in the next Federation Meeting. We feel that it would be most desirable that the scientific scope of the Federation should be enlarged further, in particular by the inclusion of the Societies for Clinical Investigation and for Genetics. We have proposed that officers of these Societies should be approached by members of the Federation to discuss with them the possibility of their participation in Federation activities.

Those of you who attended the snow-bound foundation meeting of our Society in January 1966, will recall that we decided that our Society should participate in the International Organization of Immunology which would concern itself with International Congresses, International Symposia, Nomenclature and Standardization. An International Union for Immunology has been founded by the National Societies of Australia, Britain, Canada, France, Germany, Holland, Israel, Yugoslavia, Scandinavia, Switzerland and the U.S.A. I have been elected Chairman of the International Union, Dr. H. G. Schwick of the Behringwerke, Germany, as Secretary-General and Dr. N. Hilschmann of the Max-Planck Institut, Göttingen, Germany as Treasurer. Committees on Standardization, Nomenclature and International Symposia have been set up and are chaired by Dr. M. Raynaud (Institut Pasteur, Paris), Dr. Sheldon Dray (University of Illinois, Chicago) and Dr. B. A. Askonas (Medical Research Council, London, England), respectively. The International Union has requested the American Association of Immunologists, which had already prepared the ground, to take responsibility

for the first International Congress of Immunology. We hope that this congress will take place in Washington, during the summer of 1971, and I am sure that it will receive your support.

Our new International Union needs a modest budget for its first operations and you will, therefore, hear from our Secretary about a proposal to make some money available to the Treasurer of the International Union.

Permit me to end my presidential address on a personal note. I have been charged with the development of our society during its first three years of existence. It was a stimulating and rewarding task because I found so many among you with whom I could share my enthusiasm for the exciting intellectual adventure of modern immunology. My thanks for this go to all members of the Society, to its officers and particularly to its secretary, and to all those who made our diverse activities possible by giving their time. A new group of officers will assure continued success and extension of our activities. I am certain that your support will guarantee their effectiveness.

B. Cinader



ADDRESS OF THE PRESIDENT ELECT

First of all I should like to thank the members of the Nominating Committee for putting my name forward for the office of the President of the Society and to express my appreciation to the members of the Society for their confidence in my ability to fill this office and for their votes. I must confess that my other present preoccupations, with the many urgent problems created by my imminent transfer to Winnipeg to establish the new Department of Immunology at the University of Manitoba, have prevented me from preparing a properly thought-out address for this occasion.

Before any further remarks, I should like to place on record our indebtedness to Dr. B. Cinader, for his hard and steady work over a period of at least four years to get our Society off the ground. It is because of his vision, enthusiasm, tenacity, and above all, because of the high regard in which he is held as a great scientist by our colleagues both in Canada and abroad, that we are gathered here to-day as a group of professionals with an image of our own in the scientific world. It is clear to me that it will be impossible for me, and probably difficult for future Presidents of the Society, to live up to his standards and achievements, and to fill his shoes. I am sure that you share these feelings and that you would like to join me in expressing in the usual way our gratitude for his efforts and to wish him continued success....However, it is also obvious to all of us that the smooth organization of our Society is also the result of the hard work of Dr. S. Dubiski who has fulfilled so ably and tirelessly the demanding job of Secretary of the Society during its most critical period, i.e. during its birth and exponential growth, and of his additional voluntary responsibilities as the first Editor of the Bulletin of the Society. It is regrettable that he has decided to withdraw from the position of Secretary at the same time when we are losing the leadership of Dr. Cinader, but I am glad that both of them will remain members of our Council and that we can count on their continued support and advice, and that Dr. Dubiski has agreed to remain Editor of the Bulletin. I am sure you would like to join in expressing our deep appreciation for the valuable service he has rendered to the Society....I am glad that Dr. F. Paraskevas of the Department of Medicine, University of Manitoba, has willingly accepted to be our new Secretary and am looking forward to our collaboration in Winnipeg during the coming two years.

Obviously, the Society will continue its healthy growth, if we take the trouble to nurture the scientific curiosity and continuing education of our members, young and old, and



in particular of our younger colleagues and graduate students. With this in mind, a number of teaching and professional activities are being planned for the immediate future, e.g. a two-week summer school in the Laboratories of Laval University on Advanced Methods in Immunology, which has been organized in collaboration with Dr. D. Dufour and his associates to be held early in August; and International Symposium on Cancer Immunology organized by Dr. S. Freedman in Montreal towards the middle of October, 1969; another International Symposium on Complement organized by Dr. Ingram at Guelph for the Fall of 1970; and an Advanced Study Institute on Cellular Differentiation and Regulation of the Immune Response to be held during the period of July 5-12, 1970 on a lake near Winnipeg.

For the continued growth and strength of the Society we shall require new recruits as members and above all the active participation of some of you as officers of the Society and as organizers of its scientific and educational activities. Let me stress that it is our Society, not the Council's Society. May I therefore urge you to give some serious thought to the programs which you would like the Society to sponsor and that you actually take the initiative to organize them. All you have to do is to make your ideas known to the members of the Council, who will welcome any suggestions which will ensure the continued vigour of the Society. I can assure you that you will receive full support and that you will find the work satisfying and rewarding.

A. Sehon

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Secretary's Report given at the General Business Meeting of  
the Canadian Society for Immunology held on June 11, 1969 in  
Edmonton, Alberta

**Membership** - Number of members 300. There are 6 applications being processed. Since last General Meeting we admitted 47 new members, the names of 27 of them were published in the last issue of the Bulletin. Four members resigned, the addresses of 2 are unknown.

**Recruitment** - Next issue of the Bulletin will contain an application form for recruitment of new members.

**Constitution** - The change in the Constitution proposed at the Council Meeting in Kingston was phrased by Dr. S. Fedoroff, translated into French and sent to the membership to be voted upon by postal ballot. The majority of members was for the amendment and therefore, it can be regarded as passed — see page 11 of this Bulletin.

**Bulletin** - The new issue of the Bulletin will be published shortly. It will contain all the reports given at the Edmonton meetings, of the CSI submission to the Senate Committee, results of the elections, etc.

**Finances** - The books were audited by G. Lamoureux and M. Richter — see page 10 of this Bulletin. For the financial report as of March 31, 1969, see page 9 of this Bulletin.

**Edmonton Meeting** - This year 69 communications as compared to 1 year's 30 communications were submitted. There was no increase in the total number of papers submitted by all Federation members.

**Elections** - The persons nominated by the Nominating Committee (chaired by J. A. Romeyn — other members: B. Cinader, R. H. Côté, J. Delage and G. Lamoureux) were: A. Sehon (President), Bram Rose (Vice-President), F. Paraskevas (Secretary), L. L. deVeber (Treasurer), J. Dossetor, S. Dubiski, D. Dufour, E. Potworowski (Council Members). A total of 202 ballots were returned. Eleven of them were in open envelopes and, therefore, were spoiled. The remaining 191 sealed ballots were given to the scrutineers, G. A. deVeber and S. Sekiguchi who submitted a report — see page 13 of this Bulletin. On the basis of this report the officers of the CSI are as follows: (the respective retirement dates are given in brackets).

President	- A. Sehon (1971)	Council:	
Vice-President	- B. Rose (1971)	A. G. Borduas	(1971)
Secretary	- F. Paraskevas (1971)	B. Chown	(1971)
Treasurer	- L. L. deVeber (1971)	J. Dossetor	(1973)
Past President	- B. Cinader (1971)	S. Dubiski	(1973)
		D. Dufour	(1973)
		S. Fedoroff	(1971)

S. Dubiski, Secretary



Financial Report CSI — Toronto, as at March 31, 1969

Bank Balance as at May 15, 1968 \$ 518.39

Receipts:

CSI, London, cheque, Jan 8/69	200.00
Subscriptions to Journals	348.17
Bank Interest	1.34
Exchange on U.S. cheques	19.05

Disbursements:

Paper & Multigraph for Bulletins	\$ 74.48
Xerox	100.30
Postage	51.63
Dinner Tickets - Kingston	8.82
Can. Fed. Biol. Soc. - coffee	15.00
Polish Alliance Press - printing Membership Books	250.89
Envelopes	3.75
Touche, Ross, Bailey & Smart, Chartered Accountants	50.00
Dr. S. Dubiski - expenses Ottawa trip	47.25
Receiver General of Canada for subscriptions, 1969	36.00
J. Immunology - subscriptions 1969	239.13
J. Immunochemistry - subscriptions 1969	95.32
University of Manitoba - telephone calls, Dr. Romeyn	75.23
Bank Service Charge	4.00
Collection charge out-of-town cheques	4.00
Bank Balance March 31, 1969	22.15
	<u>\$1,086.95</u>
	<u>\$1,086.95</u>



New Members approved by the Council  
and by the Annual General Meeting

1. AARON, T.H., 221, Medical Arts Bld., 11010 Jasper Ave., Edmonton, Alta.
2. GOLDMAN, B.S., Cardiovascular Unit, Toronto General Hospital, 101 College Street, Toronto 2B, Ont.
3. HASKILL, J.S., Dept. of Pathology, Queen's University, Kingston, Ont.
4. LAPP, W.S., Dept. of Physiology, McGill University, Montreal, Que.
5. LOTZ, F., Dept. of Physiology & Pharmacology, Ontario Veterinary College, University of Guelph, Guelph, Ont.
6. MILLAR, K.G., Dept. of Obstetrics & Gynecology, Hotel Dieu Hospital, Kingston, Ont.
7. OSMOND, D.G., Dept. of Anatomy, McGill University, Montreal, Que.
8. PEREIRA, G., Dept. d'anatomie, Faculté de Medecine, Université Laval, Cité Universitaire, Quebec 10, Que.
9. PERRY, M.B., c/o Dr. C. Milstein, M.R.C. Lab. for Molecular Biology, University Postgraduate Med. School, Hills Road, Cambridge CB2 2QH, England.
10. PHILLIPS, R.A., Ontario Cancer Institute, 500 Sherbourne Street, Toronto 5, Ont.
11. RAY, M., Dept. of Medical Genetics, Children's Hospital, Winnipeg 3, Man.
12. ROBERTS, K.B., Associate Dean, Faculty of Medicine, Memorial University of Newfoundland, St. John's, Nfld.
13. ROSSIER, E., Faculté de Medecine, Université de Sherbrooke, Quebec.
14. SHERIDAN, Sylvia, Dept. of Zoology, University of Alberta, Edmonton, Alta.
15. TAYLOR, H.E., Medical Research Council, N.R.C. Bldg. M-58, Montreal Road, Ottawa, Ont.
16. TOBE, A.D., 917 - 750 W. Broadway, Vancouver 9, B.C.

17. TROTT, J.R., University of Manitoba, Faculty of Dentistry, 780 Bannatyne Avenue, Winnipeg 3, Man.
18. WANG, Mildred, Dept. of Veterinary Bacteriology, University of Guelph, Guelph, Ont.
19. PEREY, D.Y.E., Univ. of Minnesota, Dept. of Pediatrics, 412 Union St. S.E., Minneapolis, Minn.

New Members approved by the Council

1. BULCKO, J.A., Montreal Neurological Institute, 3801 University St., Montreal, Quebec
2. CARR, R.I., Dept. of Allergy & Clinical Immunology, National Jewish Hosp., 3800 East Colfax Ave., Denver, Colorado 80206
3. CENTENO, E.R., Dept. of Immunology, Faculty of Medicine, Univ. of Manitoba, 700 Bannatyne Ave., Winnipeg 3, Man.
4. CORTES, J.L., Professor of the Medical School, Universidad Nacional Autonoma de Mexico, Tlacotalpan 109, Mexico 7 D.P.
5. DOUGLAS, R.J., Dept. of Microb., Univ. of Guelph, Guelph, Ont.
6. ELHILALI, M.M., Faculty of Medicine, Sherbrooke University, 1624 Portland Ave., Sherbrooke, Que.
7. GUINDON, A., Institut d'Immunologie et d'Hygiene de l'Université de Montreal, c.p. 100, Laval-des-Rapides, Que.
8. KELLEN, J.A., Dept. of Path. Chemistry, Univ. of Toronto, 100 College St., The Banting Institute, Toronto 101, Ont.
9. McPHERSON, T.A., Dept. of Medicine, Clinical Sciences Bldg., University of Alberta, Edmonton, Alta.
10. MAGE, R.G., Laboratory of Immunology, Nat. Institute of Allergy & Infectious Diseases, Bldg. 10 11-D-07, NIH, Bethesda, Md. 20014
11. MUTTITT, E.L.C., University of Alberta, 221-11010 Jasper Ave., Edmonton, Alta.
12. NOWRY, S. (Associate Member), 5720 rue St. Urbain, Montreal 151, Que.
13. ROESEL, Catherine E., Dept. of Microbiology, Medical College of Georgia, 1459 Gwinnett St., Augusta, Georgia 30902
14. TAGUCHI, Y., Dept. of Urology, Royal Victoria Hospital, 687 Pine Avenue West, Montreal, Que.
15. UNDERDOWN, B.J., Dept. of Microbiology, Washington University School of Medicine, 4550 Scott Ave., St. Louis, Missouri 63110



## IMMUNOLOGY IN CANADA AND ABROAD

### International Union of Immunological Societies

In recent years several immunological societies in a number of countries have been formed. It was felt that all these societies would benefit if they could form an International Union of Immunological Societies. There is an urgent need for such a move since preparations for the first International Congress in Washington in 1971 are under way and many problems of nomenclature and standardization have to be dealt with.

A meeting of several national societies was organized in Brugge, Belgium on May 5, 1969. Representatives of the following societies were present: American Association of Immunologists, British Society for Immunology, Canadian Society for Immunology, Dutch Society for Immunology, Gesellschaft für Immunologie (Germany), Israel Immunological Society, Scandinavian Society of Immunology, Société Française d'Immunologie and Yugoslav Society of Immunology. Representatives of the Immunological Section of the Union of Medical Societies (Romania) and of Società di Immunopatologia (Italy) were admitted as observers.

Dr. B. Cinader has been elected Chairman of the Union; other officers are: Dr. H. Gerhard Schwick (Secretary and Dr. N. Hilschmann (Treasurer). Several committees have been formed: Symposium Committee (Dr. B. Askonas, chairman), Nomenclature (Dr. S. Dray), Standardization (Dr. M. Raynaud), Policy (Chairman and Secretary of the Council plus Dr. B. Askonas, Dr. M. Sela, Dr. M. Raynaud and Dr. S. Dray).

During the meeting discussion took place regarding the problem of the International Congress to be held in Washington in 1971; the need for establishing close relations with W.H.O.; and the question whether the Union should join the International Council of Scientific Unions. It was also agreed that the constitution of the Union should be drafted as soon as possible.

The Australian and Swiss Societies, whose representatives could not come to Brugge, were admitted to the Union a few weeks after the meeting. Applications from a number of other national societies are being considered.

The addresses of the Chairman, Secretary and Treasurer of the Union are respectively:

Dr. B. Cinader, Dept. of Medical Biophysics, University of Toronto,  
500 Sherbourne St., Toronto 5, Ont.

Dr. H. G. Schwick, Behringwerke, 355 Mahrburg Lahn, W. Germany

Dr. N. Hilschmann, Max-Planck Institut für Experimentelle  
Medizin, 34 Göttingen, Hermann Rein Strasse, W. Germany



## SCIENCE POLICY

### Immunology in Canada -- A report to the Biological Council

The Science Council instituted on December 1st, 1967, an enquiry into the state of the biological sciences in Canada. The Biological Council was charged with this task by the Science Council. Dr. K. C. Fisher undertook the organization of the survey with the aid of thirty-one panel chairmen. Dr. B. Cinader was appointed chairman for Immunology and formed an Immunology panel with Dr. Alec Sehon and Dr. A. C. Wardlaw as additional panel members. The following pages contain the findings and recommendations of this panel.

### Introduction

Canada has a unique opportunity for shaping its future during the rest of the twentieth century; neither densely populated Europe nor the U.S.A. has this same potential. The utilization of the territory of European nations has occurred at the time of the industrial revolution; thus land utilization and population-distribution is determined by the technology of earlier periods. Only Canada, and possibly Australia, could create a Society in terms of the cultural implications of science, and of the technology of the twentieth century. The unique contribution of Canada should therefore rest in provision for the future and hence in a major stress on long-term objectives.

We have little prospect of becoming competitive with the U.S.A. in exploitation of known principles of biology. It is in planning to foster creativity and originality that we may hope to do so.

Any forward-looking science policy requires three elements:

- 1) a vision of the future which allows the identification of short-range and of long-range objectives
- 2) a knowledge of existing facilities in intellectual and material potential.
- 3) an evaluation of the extent to which the existing facilities measure up to the objectives.



Categories such as fundamental and applied research, injected into analyses of this kind, obscure the practical potential of research into basic processes and its role as a pacemaker of social change. Thus it is the time-scale of objectives (immediate or long-range) which has operational significance. It is the so called "fundamental" research which permits major practical advances.

Science policy must be seen not only in relation to the products of research, but also in relation to the educational role of research, and in terms of its cultural influence on society as a whole. Quality of research and of higher education are interdependent.

- 1) Effective teachers are those involved in the evolution of the subjects they teach.
- 2) Teachers are trained largely through research participation as graduate students.
- 3) Good men will not accept teaching posts unless good research climate and facilities go with them.
- 4) The brightest students will not elect academic careers unless stimulated by the interest and excitement of productive research programmes.
- 5) Students should be trained in research-oriented environments in order to equip them with the critical faculties which they will need to adapt to a rapidly and continuously changing society and to evaluate new ideas, new products and new procedures.
- 6) Objectives of long range planning in relation to science policy depend on trained people.

### Summary

In medicine and biology, some long-range objectives for the betterment of mankind depend on advances in neurobiology (the biology and biochemistry of mental processes), human genetics, gerontology (the study of the biology of aging) and immunology. This submission to the senate deals with the fourth of these prongs of advance.

There is little doubt that both the short-range and long-range objectives of any reasonable policy towards advancement in medicine require an adequate balance between research into the cellular and molecular mechanisms of the immune response



and the application of the resulting findings to practical medicine. The application of fundamental discoveries in immunology to every-day practice has progressed swiftly during the last two decades, and the prevention of such immunological diseases as haemolytic disease of the newborn ("Rh-negative babies") may be quoted in this context. At the same time, a number of areas can be pointed to in which applications of immunology is in its infancy.

Transplantation of organs of the human body clearly ushers in a revolution in modern surgery. At the moment, however, a blunderbuss approach to the problem of controlling the rejection of transplants is being resorted to. It is found necessary either to destroy many dividing cells of the body or to destroy a large proportion of the immune apparatus in order to control rejection of a transplanted organ. It is quite clear that a much more specific inhibition of the immune response must be a future target of therapy.

Atopic disease (such as asthma) presents another area in which an undesirable immune response leads to disease. The current approach has become conventionalized: it relies almost exclusively on inhibition or antagonism of the effect of chemical mediators of the undesirable immune response, or on immunization with allergens in an attempt to supplement an undesirable antibody ( $\gamma E$ ) by one that is not harmful. A survey is needed of methods which would allow the selective suppression of the synthesis of disease-inducing classes of antibodies.

We need to determine the role of autoantibodies, which are only rarely disease-vectors, and in some cases, may even play a protective role in inhibiting cellular autoimmunity. Certain autoimmune diseases may represent yet a third target for which it might become necessary to devise means by which the synthesis of antibodies can be prevented. In this context, it might become desirable to learn how to regulate the formation of antibodies of a particular kind of specificity.

We could multiply examples and discuss, among others, immunotherapy of cancer as an area which should be fostered. However, enough has been said to support our contention that frontiers of future medical practice are to be found in many fields of immunological research.

If one examines the above practical objectives, one finds that all of them depend on detailed knowledge of the regulation of the immune apparatus: we need to learn how antibodies of different specificities and of different classes are synthesized and how this synthesis can be interrupted or augmented. This is one of the principal targets of the long-



range objectives of contemporary immunology. Any forward-looking medical school would have to plan for conditions which create a climate in which basic work of this type can flourish, and in which clinical departments take a hand in the application of newly acquired knowledge. It will become evident in the following pages that only a few medical schools have given thought to this aim. Not all medical schools are defining their research-role as a task of pioneering the procurement of scientific information and its speedy translation into clinical trials.

We have so far stressed central issues in which the long-range and short-range objectives of immunological research are closely related. We have done so because some aspects of these problems must be relevant to the research targets of every medical school. In addition, there are objectives which could be approached directly with knowledge and techniques which are already available. This may be exemplified by the problem of infertility and birth control - which are but two aspects of the same problem and which impinge on the happiness of some individuals and also on the survival of mankind. Immune processes may be involved in some cases of infertility and may have a major role to play in future approaches to population control. We find little evidence that this or any one of a host of definable problems, such a gerontological aspects of the immune response, has been regarded as an area of research-specialization by any medical school.

Recent developments in the role of granting agencies have been favourable to the development of fundamental and clinical aspects of immunology. The Medical Research Council has set up a grant committee, dealing with immunology and transplantation, and has taken the initiative in the organization of nation-wide clinical trials. At present, a test of the effectiveness of antilymphocyte sera is underway. The "fall-out" from these endeavours goes far beyond the important practical objectives of transplantation. The trial necessarily involves contract research into methods and side effects and necessitates the diffusion of new immunological techniques into service laboratories right across the country. At the "grass roots" level, the final outcome of these activities will depend on the vision and imagination with which plans are made in the universities to prepare the ground for creative developments in the future. In this area, there are propitious signs. Some medical schools have become aware of the need for an effective immunological contribution to the solution of the practical problems arising from the revolution in modern surgery, from the need to develop methods capable of dealing with autoimmune disease and from the need for a rational and forward-looking approach to atopic disease and to tumour-immunology. It has become quite clear that isolated immunologists,



in departments such as surgery and medicine, would be largely concerned with empirical applications of presently available knowledge in a service function and might therefore fail to contribute in sufficient depth for effective developments in the future. To avoid this danger, it is necessary to link service units with groups which are primarily concerned with fundamental research. The recognition of this need has motivated at least three Canadian medical schools to consider ways which might provide their pioneering surgeons, internists, dermatologists, obstetricians and allergologists with the "back-pressure" of fundamental research. With this aim in view, one medical school (University of Manitoba) has founded a Department of Immunology and two others have advanced to preliminary administrative measures (Alberta and Sherbrooke). In advocating the establishment of Departments of Immunology there is no thought of taking over or directing work on immunology in other departments. On the contrary, a Department of Immunology, engaged in active research and from which guidance and counsel could be sought, would serve as a stimulus to independent immunological research in whatever branch of science. Several European countries have led the way in this new development. The Universities of Freiburg, Copenhagen, London, Milan and Birmingham are among those who have set up independent Departments of Immunology, and, already, the fruits of these ventures have proven their value.

The aims of immunology have so far been examined in terms of the long-range and short-range objectives of modern medicine. Immunology has, however, other very exciting aspects which should entice science faculties to promote investigative work.

At the heart of all biological studies must lie the question of the evolution of biochemical processes. This contention is partly motivated by a profound need to understand man's origin and partly by the growing need to manipulate our environment.

If one examines the biochemical processes, from micro-organisms to higher animals, one finds an extraordinary conformity of biochemical mechanisms. This is exemplified by the universality of the genetic code and of intermediary metabolism. Indeed, one might well generalize and say that the main advances that have occurred in evolution during the last six hundred million years lie in the complexity of organization rather than in the acquisition of new biochemical apparatus. One of the few exceptions to this general statement lies in the acquisition of the ability to make antibody to an enormous range of different foreign substances. It is clear that this process must have developed gradually and that its study may well serve as an instructive guide-line by which refinements in our knowledge of evolutionary processes can be



acquired. This is a "philosophical" inducement for research; there is also an important practical one. Our civilization has increasingly encroached on the conditions for the survival of many mammals, fishes and birds. The population of many species is being progressively reduced and epidemics are thus a great potential danger to the survival of some species. It may be important to develop strains of animals which are resistant to disease and to examine, in this context, the genetics of the capacity to make a vigorous immune response. Thus, fundamental studies of the inheritance of the specific immune response and breeding experiments with selected wild and domesticated species are indicated.

At the same time, a search for inherited defects and their analysis would help to determine the steps in cellular differentiation and interaction which result in the productive immune response. This might also lead to the discovery of regulatory substances which may be required in this process.

Immunochemistry has provided tools, for the enumeration of macromolecules and for the inhibition of biological activity. This approach deserves extensive further development; existing knowledge should find a place in the training of biochemists, biologists and chemists as well as in the training of chemical engineers and veterinary and medical researchers. It is surprising to find how little immunological research is being carried out in Canadian Departments of Biology. It is equally remarkable that no provisions are made for adequate training towards postgraduate qualifications in immunology. A strengthening in this area is as badly needed as is strengthening and integration of the dispersed immunological research in medical schools.

Recommendations of this panel include: the foundation of Departments of Immunology in medical and graduate schools; the recruitment of outstanding investigators in immunology; encouragement of young and original workers by extensive long-range support; and provisions for specialized graduate training and research in Faculties of Arts and Sciences as well as in Faculties of Agriculture.

In order to make recommendations for the future, we have attempted to survey the current state and directions of immunological research in Canada, using information obtained from the Medical Research Council and other granting agencies, and from questionnaires sent to immunologists and persons working in related fields.

The following pages will present our findings. The challenge sketched in the foregoing pages is not met by the existing situation in the majority of our institutions.



## SURVEY

### What is immunology?

Immunology is a branch of medical science started about ninety years ago with Pasteur's work on vaccination against anthrax and rabies. Around 1900 Landsteiner discovered the human blood groups and Richet uncovered the phenomenon of allergy, or hypersensitivity. These seemingly unconnected events provided the foundation on which modern immunology is built, for they all contain, as a common denominator, the tissue reactions of animals (and man) to foreign cells or substances that enter the body. These tissue reactions which constitute the "immune response", can be beneficial or harmful, as seen respectively in the fields of immunity to infectious diseases and allergy. Cells or substances which provoke the body to make an immune response are called "antigens" and the response that the body makes consists usually in the synthesis of specifically reactive proteins known as antibodies which combine with the antigen and speed up its removal. Among the antigens that have been most extensively studied are a) those on bacteria and viruses because of their importance in vaccines, b) those on the red cells of the blood, because of their importance in blood transfusion, c) antigens of skin, kidney, heart and other organs, because successful surgical transplantation depends on proper immunological matching of donor and recipient, d) environmental antigens such as those in grass pollen, house dust, etc., because of their importance in allergy, e) "self" antigens, that is the components of the body which are involved in autoimmune diseases - literally diseases such as rheumatoid arthritis where, by an aberration of the body's immunological machinery, it makes an immune response against itself. Pervading these diverse aspects is the unifying concept that immunology is centrally concerned with the nature and activities of antigens and antibodies and with "self" and "not-self" recognition and reaction processes in the tissues of higher animals and man.

Immunology has always been the Science in which outstanding fundamental work and revolutionizing practical advances have been closely linked in time and in the outlook of the leading research workers. In the second and third decade of this century, preventive immunological measures led to the effective control of such dread diseases of childhood as diphtheria and in the following decades, whooping cough and poliomyelitis were added to the diseases which could be controlled by routine immunization.



In recent years, the principal theoretical advances in immunology have come from studies of antibody structure, of regulation of antibody-response and of the cellular processes which underlie the immune response. From a medical point of view, the second of these approaches has been the most rewarding and remains the most promising; we have already spoken of the successful prevention of hemolytic disease (Rh-babies) and of the continuous progress in transplantation of organs which depends on our ability to regulate the immune response.

Biological research with long range objectives has come under attack in many countries, and the demand was made that scientists should concentrate on immediate practical goals. Few groups can show the erroneous nature of such demands more effectively than can immunologists. Their science has contributed immeasurably to the increased health and longevity of man, while pursuing research into a fascinating aspect of biology.

What aspects of immunology are being investigated in Canada?

To answer this question we have relied mainly on the lists of research grants from the various grant-giving agencies in Canada. This gives us a fairly complete picture of what is going on in universities and in some hospitals but it does not fully report immunological research done in government laboratories such as the Laboratory of Hygiene or the National Research Council in Ottawa or various branches of the Canada Department of Agriculture. Nor does it cover the immunological research work done in the pharmaceutical industry or in self-supporting institutes like the Connaught Medical Research Laboratories of the University of Toronto.

Immunological research in Canada can be divided up among the following fields (with some overlap):

- a) Allergy, hypersensitivity, autoimmunity, immunopathology, hemolytic disorders.
- b) Immunochemistry, meaning the study of the chemical structure of antigens and antibodies, the molecular reactions between antigens and antibodies, the action of antibodies on biologically active antigens such as enzymes, hormones and toxins; complement.
- c) Transplantation of organs; tissue antigens and tissue typing, antigens of red cells, leucocytes and platelets, immunological tolerance,



suppression of the immune response including preventing the rejection of grafts and preventing Rh immunization during pregnancy.

- d) Cellular Immunology: cells and organs of the body involved in the immune response, localization of antigens in the tissues, origins and development of antibody-producing cells, role of the thymus. The fetus in utero considered as a foreign graft.
- e) Microbial Immunology: antigens of bacteria, viruses and protozoa; mechanisms of resistance to infectious diseases; development of vaccines and antisera.
- f) Cancer Immunology: antigens of tumour cells; possibilities of immunological therapy of tumours.

We have summarized main areas in which research in immunology is now in progress. Applications in some areas seem to be in their infancy. This applies to immunological studies with dental applications; only two investigators in Canada seemed interested in this type of study. Since most oral diseases are "chronic inflammatory or destructive" it would appear that immunological investigation may well be relevant to the future development of dental practice.

We have found little evidence of the use of immunological techniques in biological industries, such as those concerned with fermentation. Immunological methods for the analysis of macromolecular composition have much to offer in product-development and ways should be found to teach such techniques at the appropriate educational levels.

We have attempted to quantitate and tabulate in Table 1 the numbers of individual research projects in these different categories using information from the reports of the Medical Research Council (MRC), Public Health Research Grants (PH), National Cancer Institute (NCI), Canadian Arthritis and Rheumatism Society (CARS), the Defence Research Board (DRB) and the Banting Research Foundation (BRF). We consider that the above sources, while not giving a complete picture, for reasons stated above, cover the main mass of immunological research activities in this country.



What are the current applications of immunological research?

This can be answered under two headings a) Immediate practical applications and b) Applications of probably long-range benefit to the Life Sciences.

a) An understanding of immunological principles is essential in several areas of human and veterinary medicine such as the control and treatment of infectious diseases, autoimmune diseases, Rh disease of the newborn, allergies, blood transfusion and transplantation of organs. In addition, the immunological typing of red blood cells is of great value in genetics, (red cell antigens are good genetic markers), anthropology, (origins and relationships of the races of mankind), forensic medicine (identification of blood stains etc.). Immunological techniques find application in many areas of bio-medicine since they provide tools of great sensitivity and precision for measuring and identifying biologically active macromolecules, notably proteins. For example, physiologists use various types of radio-immuno assay for detecting incredibly low concentrations of hormones (insulin, parathyroid hormone) in blood.

b) In recent years the phenomenon of the immune response has attracted the attention of workers from several other areas of biology since it constitutes a model system for studying at the cellular and molecular levels some of the contemporary ideas about the differentiation of mammalian cells, the induction and regulation of protein synthesis and the relationship between structure and function of protein molecules. The fruitful exploration of these fundamental areas of vertebrate biology requires the closest collaboration of the biochemist, the immunologist and the cell biologist.

How many immunologists are there in Canada?

This question is difficult to answer because of the scattered nature of immunological effort in Canada. Also it depends on how one defines an "immunologist", since there are no Departments of Immunology, as such, in Canadian universities and many people doing immunological research could also be classified as biochemists, microbiologists, paediatricians, pathologists, etc. Thus different criteria for selection lead to different numerical estimates.

If we count as an "immunologist" any individual receiving a research grant during 1967-68 for an immunological project then we get a list of 105 names (Appendix). However, this



only takes account of the project leaders and excludes professional assistants, post-doctoral fellows, technicians and graduate students. It also omits researchers in industry and other self-supporting institutions such as the Connaught Laboratories in Toronto, the Laboratory of Hygiene in Ottawa and the Animal Diseases Research Institute in Hull.

Another index is membership of the Canadian Society for Immunology, which has 223 graduate members in Canada (and a few in the U.S.A.). However, many of these are individuals with sufficient interest in immunology to join the society. Of the total of 223, 53 are already counted as grant holder and 170 are not. A third index is membership of the British Society for Immunology and/or the American Association of Immunologists who live in Canada. Since membership of these societies is restricted to individuals with published work in the field of immunology, it is legitimate to include them in our survey. There are 37 persons in this category, most of whom have already been included in the count of grant holders or as members of the Canadian Society for Immunology.

We therefore, conclude that a reasonable estimate of the number of research workers in the field of immunology and having the status of project leader is between 120-150. In addition, there are about 166 graduates, mostly with higher degrees who have some connection or interest in immunology but who do not have project leader status in respect of their immunological activities.

#### Where do Canadian immunologists work?

One of the most striking features of modern immunology is the penetration of its concepts and techniques into other biomedical disciplines. On the one hand this may be taken as an index of the strength or potency of immunology as a discipline and the value of its techniques. On the other hand this fragmentation of the subject can be considered a weakness for it means that no one department provides a "scientific home" for immunology in the universities. In Table 2 we present a breakdown showing that eighteen different types of University Departments - none of them a Department of Immunology - together with hospitals share the 124 projects which are supported by the major granting agencies.

The largest number of immunological projects are located in Departments of Microbiology or Bacteriology or Bacteriology and Immunology and this reflects the historical development of



immunology as an offshoot of Medical Microbiology. However, Departments of Pathology and Pathological Chemistry, Medicine, Biochemistry and Surgery also have significant numbers of immunological projects.

A similar picture indicating the broad dispersal, or fragmentation, of immunology among biomedical departments in universities is provided by the 1968 MRC publication "Canadian Medical Research Survey and Outlook". This survey divided up the whole field of medical research in Canada into 20 sections and it is noteworthy that ongoing immunological research activities were reported in 14 of the 20 section reports viz: Anatomy, Physiology, Biochemistry, Pathology, Microbiology and Immunology, Genetics, Medicine, Preventive Medicine, Endocrinology, Paediatrics, Surgery, Obstetrics and Gynaecology, Medical Research in Departments of the Federal Government and Pharmaceutical Industry.

We shall turn briefly to the special problems of immunologists outside the universities. Immunological units exist in such organizations as the Blood Transfusion Service of the Canadian Red Cross, Hospital-centres and various Departments of the Federal and Provincial Governments. The majority of these units tend to concentrate on the application of basic techniques to current problems of immediate medical and veterinary consequence. Despite the routine nature of much of this applied research, it provides information on the distribution of specific pathological conditions and on the efficacy of measures adopted for their eradication. Furthermore, laboratories engaged in this type of investigation often possess a facility for rapid deployment of forces for the solution or urgent *ad hoc* problems of applied immunology. Unfortunately, it is in this respect that the greatest weaknesses appear to occur: when the value of a project becomes evident, the workers closest to the sources of clinical, epidemiological and epizootological material often encounter difficulty in devoting adequate time and effort to investigation in depth. Such deficiencies stem principally from lack of adequate funds and staff. These deficiencies could be overcome by modest increments in staff and facilities.

What financial support is given to immunological research in Canada?

It is not possible to estimate the total financial support given to immunological research in Canada because of the hidden costs such as buildings and their maintenance and the salaries of principal investigators which are usually paid by the

University or Institution. Thus, the main figures we have to work with are the Operating Grants which pay for equipment, supplies and salaries of assistants and some students.

In the case of the MRC, the major supporter of immunological research in Canada, a sum of \$1,116,000. went to Operating Grants for immunological research (77 projects) in 1967-68. This sum represents 7.1% of the total MRC Operating Grant Budget of \$15,388,049.

The other main granting agencies also give substantial support for immunological research, as follows:

DRB	\$ 22,000.
PH	431,000.
CARS	62,700.
NCI	276,700.
BRF	12,360.

Adding up all these sources of funds gives a total of about \$2 million available during 1967-68 in the form of Operating Grants for immunological research. As emphasized before, this does not include research done in industry, in Government Departments or in self-supporting Institutes, nor does it include capital costs of University buildings and the overhead for heating, lighting etc., janitorial services, secretarial and some technical services. Nor does it include the purchase of major items of equipment.

Through what channels are immunological researchers communicated?

The English language journals that are devoted exclusively to the publication of original research in Immunology are:

The Journal of Immunology  
Immunology  
Immunochemistry  
International Archives of Allergy  
Journal of Allergy

Other journals with major but not exclusive commitment to Immunology are:

Annales de l'Institut Pasteur  
The Journal of Experimental Medicine  
The Journal of Bacteriology  
Folia Microbiologia  
Vox Sanguinis



In addition there are two or three dozen other journals in the biomedical sciences with a 10-30% content of immunological articles.

Another index of the importance of current research activities by immunologists is that about 12% of the letters to "Nature", relating to the whole of the biological sciences, deal with immunology.

There are no Canadian Journals with a major commitment to Immunology although both the Canadian Journal of Biochemistry and the Canadian Journal of Microbiology have Immunological Sections.

It is only three years ago that the Canadian Society for Immunology was founded. Already it has a substantial membership (over 300 members) and has sponsored three very successful International Symposia. Recently this Society joined the Canadian Federation of Biological Societies and has arranged open sessions and symposia within the framework of Federation meetings. A network of Antibody Clubs supports regional need for contact and is being correlated on a national level. Moreover, two International Advanced Summer Institutes, one of which was supported by the NATO Science Bureau, were held in Canada in 1966 and 1968, and an International Summer School is being held in 1969. The Canadian Society is a member of the International Council for Immunology and a member of the Canadian Society has been elected as Chairman of the International Union for Immunology.

#### Responses to a Questionnaire on the position of immunology in Canada.

In order to gather opinions on the current strength, weaknesses and future prospects for immunology in Canada, a questionnaire was sent to:

- a) Deans of all medical schools in Canada
- b) Chairmen of departments in Canadian Medical Schools
- c) Members of the Canadian Society for Immunology

Eighty-nine replies were received, 9 from group A, 40 from B and 40 from C. The universities from which replies were received were Alberta, British Columbia, Dalhousie, Manitoba, McGill, McMaster, Montreal, Ottawa, Queens, Saskatchewan, Sherbrook, Toronto and Western Ontario.

In general most respondents expressed dissatisfaction with the overall level of teaching and research activities in Immunology in Canada. There are few concrete suggestions on how the situation could be improved, except that over 60% of respondents thought that separate Departments of Immunology should be created in the universities, which no doubt would provide committed "homes" for the integration and consolidation of teaching and research in Immunology.

Question 1: "Are the present research activities adequate to provide the fundamental "back pressure" for applications in Surgery, Medicine, Allergy, Pediatrics, in Agricultural research and in Biological Industries?"

Answers: 54 No  
6 Yes  
29 No response

... In other words, 90% of those who expressed an opinion believed that research activities are inadequate.

Question 2: "Do Canadian Universities at present provide adequate training in modern Immunology and/or related disciplines appropriate for careers in the various fields of Immunology - universities, hospitals, government or industry?"

Answers: 48 No  
8 Yes  
33 No response

Question 3: "Is the output of qualified personnel from Canadian universities for work in areas related to Immunology adequate? Should this output be increased? If the output were to increase in the coming years, how many positions and at what level of competence, do you think will, or should be, open in your organization over the next 3 - 5 years?"

Answers: 44 stated output was not adequate.  
One respondent felt that output was adequate.  
Remainder made no reply.

Forecasts of numbers of positions, mainly at Ph.D. level, varied from 1 - 4, per respondent.

Question 4: "Are the qualifications of personnel at present being recruited from Canadian universities for work on immunological problems satisfactory?"

Answers were very variable. The general opinion was that quality is mostly satisfactory, but well qualified personnel are spread very thin and some units "teeter on the verge of viability". There were 6 unqualified "Nos".



Question 5: "Should the teaching of Immunology be continued under the aegis of Departments of Microbiology, Bacteriology, Microbiology and Immunology, Bacteriology and Immunology, or should immunology be taught in separate Departments of Immunology with the possibility of offering broad honours courses and major programmes in immunology per se, as distinct from service courses in the medical curriculum?"

Answers: Most respondents to the questionnaires expressed an opinion on this question, some at considerable length. Opinions were very variable although almost everyone stated that immunology should continue to be taught and that teaching should be strengthened and be as coherent as possible.

Answers can be divided into 6 general categories:

- a) Those who favoured a separate Department of Immunology which would act as an academic home for the subject, but possibly with cross appointments to staff engaged in immunological research and teaching in other departments: 57 respondents (64%).
- b) Those who thought that the granting of departmental status to Immunology could not be determined as a question of principle but should be decided by local conditions prevailing at the particular institution: 7 respondents.
- c) Those who believed that creation of a separate Department of Immunology was not justified: 13 respondents.
- d) Those who felt that actual departmental status for immunology was irrelevant or obsolete in a "systems-based" curriculum and that the important thing was the acquisition of personnel of the proper calibre for teaching the subject: 2 respondents.
- e) Those who stated that Immunology is intrinsically a multi-focal discipline and should continue to be taught that way: 3 respondents.
- f) No definite opinion: 7 respondents.

Question 6: "Are there strong centres for teaching and/or research in Immunology in Canada? Would it be desirable to consolidate existing centres or establish new ones?"

Answers: There were few very informative replies to the first part although some respondents cited Montreal and Toronto as having strong centres. A majority of respondents thought that additional new centres should be established, rather than strengthening existing ones, and, where an opinion was expressed, that these new centres should be distributed on a more equitable geographical basis, e.g. one in Western Canada.

Question 7: "Are there areas of Immunology which are being neglected in Canada?"

Answers: A few "Yes", many "don't know" or no reply, or "not more neglected than many other areas".

Question 8: "Do you believe that research in Immunology in your particular sector of activities is being conducted at a level competitive with that in some of the other Western countries, or is it handicapped by lack of

- (i) supply of trained personnel
- (ii) sufficient funds for operating grants
- (iii) major pieces of equipment
- (iv) information retrieval and other library services

Answers: Few people answered the first part. Those who did thought that quality was good but that it was spread very thinly, taking the country as a whole. In regard to factors limiting research -

- (i) Personnel:
  - 28 thought this a limitation
  - 2 thought the position in Immunology was barely adequate or no worse than other areas
  - 16 had no specific comment
- (ii) Operating funds:
  - 9 cited this as a limitation
  - 2 thought situation was barely adequate or no worse than other areas
  - 1 stated that his needs were covered
- (iii) Major equipment:
  - 5 thought this was a limitation
  - 2 thought position was "not too bad"
  - 1 thought situation was "reasonably good"



(iv) Library

only one person asked for better information retrieval facilities, something along the line of MEDLARS in the U.S.A.

In summary it seems that lack of personnel was regarded as the major limitation. Lack of sufficient laboratory space was also cited. Lack of operating funds, funds for major equipment or library facilities were not the subjects of many complaints. However, it is clear that if we could attract a few first-class experts in this field to Canada, more funds will have to be provided to enable them to continue good research in one of the fastest developing areas of the bio-medical sciences.

Question 9: Asking whether the creation of interdisciplinary research institutes was desirable.

Answers: Almost nobody was wholeheartedly in favour of creating interdisciplinary research institutes except on a very limited scale. Those who did favour such institutes thought they should be university-affiliated. The main objection cited was the problem of what to do with the institute after the departure of the outstanding scientist around whom it was created.

Question 10: "Is it desirable to promote increased collaboration between industrial, academic and government research centres? If so, how might this be achieved, in your opinion?"

Answers: Most respondents felt that increased collaboration was a desirable ideal, but difficult to achieve in practice except in cities where the different spheres of activity were close together. "Co-operation cannot be legislated for" was a typical answer.

Question 11: "Is there a need for more training and for defined service units in Clinical Immunology, Agricultural Immunology and Industrial Immunology?"

Answers: 7 responders thought that there was a need for more clinically-trained immunologists especially to cope with the increasing demand generated by recent advances in transplantation. No one specifically thought there was a deficiency in the other two areas.

Question 12: "Are there other aspects of research in Immunology which you feel this questionnaire did not cover and on which you would like to comment?"

Answers: No significant comments.

#### Forecasts and Recommendations.

Immunology will continue to permeate a wide range of biomedical disciplines to the extent that no serious researcher in these disciplines can nowadays afford to be ignorant of the potential of immunochemical techniques, any more than he can afford to be uninformed in biochemistry.

Immunological methods and concepts will increasingly be applied in the fields of transplantation, cancer, infectious diseases, allergies and autoimmune diseases.

The phenomenon of the immune response, together with its primary product - the antibody molecules - will continue to attract the attention of cell biologists, biochemists, biophysicists, geneticists, because of its utility in the study of cell differentiation and the control of protein synthesis in vertebrates.

Universities should be provided with funds to strengthen existing immunological groups and, where considered desirable, create Departments of Immunology at least in the major centres. The Universities of Manitoba and Sherbrooke have already taken this step.

Very few of the existing hybrid departments which are formally responsible for the teaching of immunology contain a satisfactory "critical mass" of immunologically oriented investigators and this produces an isolation which seriously impairs the effectiveness of the individual immunologist who finds himself alone in a department whose main interest is centred elsewhere.

The government research institutes in Britain (Mill Hill Laboratories of the MRC) and U.S.A. (National Institutes of Health, Bethesda) do eminent work in immunology and act as a central clearance house. It would be desirable to have a similar institute in Canada, probably located in Ottawa.



Table 1: Grant Support for Immunological Research (1967-8)

Area of Immunology	Number of Research Projects Supported by						Total
	MRC	PH	NCI	CARS	DRB	BRF	
a) Allergy, autoimmunity, immunopathology	23	3		4			30
b) Immunochemistry	21	1		3		2	27
c) Transplantation, immunosuppression	8	4		1	1		14
d) Cellular immunology	15	1				1	17
e) Microbial immunology	9	8			3		20
f) Cancer immunology	1		15				16
TOTAL	77	17	15	8	4	3	124

In the case of the major granting agency, the MRC, the 77 immunology grants make up about 7% of their 1008 operating grants issued in 1967-68.

Table 2: Distribution of Research Grants for Immunology in University Departments

Department	Number of research projects supported by						Total
	MRC	PH	NCI	CARS	DRB	BRF	
Microbiology <u>or</u> Bacteriology <u>or</u> Bacteriology and Immunology	15	3	3	1	2		24
Pathology and Path. Chemistry	11		1	2			14
Medicine or Experimental Med.	10		1				11
Biochemistry	4		2			1	7
Surgery or Experimental Surg.	4		1				5
Medical Biophysics	2		1	1			4
Physiology	2						2
Anatomy	1						1
Chemistry	1					1	2
Cancer Research	1						1
Ophthalmology	1						1
Obstertrics and Gynecology	1	2					3
Paediatrics	2	3					5
Parasitology		2					2
Pharmacology	1						1
Psychiatry	1					1	2
Zoology or Biology	1		1		1		3
Hospitals	16	4	4	4			28
Research Institutes	3	3	1		1		8
TOTAL	77	17	15	8	4	3	124

B. Cinader  
A. C. Wardlaw  
A. Sehon



THE ROLE OF SCIENCE IN SOCIETY

Dr. Cinader presented a brief to the Senate on June 4th, 1969. This brief pre-dates the submission to the Biological Council but does not differ from it sufficiently to warrant its separate publication in this bulletin. In formulating his verbal submission to the Senate, Dr. Cinader felt that the specific requirements of Immunology ought to be presented in the wider context of the social and intellectual role of Science and the following represents his aide memoire:

Mr. Chairman, members of the Senate Committee, ladies and gentlemen, our submission is in your hands, it deals with an analysis of future objectives of medical research, a demonstration of the central role of immunology in the attainment of many of these objectives and with the difficulties of creating adequate provision for the development of new germinal areas such as immunology. This is a general dilemma in the interaction between new endeavours, arising from the rapid shifts of developing approaches and the inertia of institutions, such as the Universities, which are historically organized to conserve knowledge and scholarship rather than to create new knowledge. I am sure that I can take this submission as read and would be grateful for your indulgence to generalize from this basis. Permit me to start with two questions:

What is the social role of scientific research apart from its obvious contribution to the solution of immediate practical problems and of preparing the ground for the solution of future practical problems? These other roles clearly exist and they consist in an effect on the methods by which social action is arrived at, in opening up new avenues to the solution of problems and in providing a background of facilities for the solution itself. Perhaps one should call these other roles the cultural and sociological functions of scientific research.

How can long-term objectives be recognized and how can they be promoted? This question is pretentious if we ask ourselves what the future would be like but is quite meaningful if we ask ourselves how we would like the future to be. It is evident, however, that our social and cultural goals must be determined in relation to the physical framework within which the solution is to occur. To discuss our two questions, we shall therefore have to make assumptions of what Canada is in terms relevant to our questions. In other words, we need to formulate an idea as to the unique features of our society and its unique possibilities. I propose to



assume that the uniqueness of Canada lies in its huge area and in its small population and in the resulting opportunity of utilizing land and forming a society on the basis of the insights and knowledge of the late twentieth century. In dealing with this tremendous opportunity, Canada has difficulties and advantages which are peculiar to its geographic position. Both lie in the superb industrial, scientific and cultural developments of its neighbour. These are responsible for the high standard of living which is usually absent in sparsely populated societies but they are equally responsible for the underdevelopment in many industrial areas. This is a striking experience when one attempts to deal with chemical firms which very frequently are found to have no research or development laboratories and to rely entirely on the import of ready-made compounds.

A Canadian science policy must recognize the cultural role of science and the role science can play in Canada in providing an attraction for industries with a local science-basis. For both purposes, it is clearly necessary to have interrelated but separate planning bodies, but it is equally necessary to assure that these are multicentric so that planning does not lead to sterile concentration on limited areas whose yield might well be much less than a planning body might predict for them. It is, furthermore, necessary that the initiative of individuals should not need to depend on such planning bodies and that we should maintain a grant structure which supports the peripheral initiative. The multicentric role of science planning might ultimately be aided by the interrelation between provincial and federal authority but needs to be anchored in the structure of federal and voluntary granting bodies.

We need fundamental research of originality and excellence for many reasons and I would like to discuss some necessary conditions for this to occur. We have relied too often and too much on fundamental work from elsewhere. This is adequate for short-term mission-oriented work, but not for the purposes under discussion here. If the condition for fundamental research of excellence is provided, we still need conditions which allow their effects to penetrate into the area of social action. Let us take this in order: the first problem is how excellence of fundamental research is to be assured. The criterion for excellence can be very simply defined as discoveries which reveal patterns of nature which have previously not been recognized. Implicit in this criterion is the statement that the standards of science are to be applied to science. In other words, the selection objectives should be made after interaction between politicians, technologists, scientists and businessmen. Once this is



achieved, only the scientists can assure adequate selection of subtopics and appropriate individuals. Success in this area depends entirely on the availability of gifted and dedicated individuals and this in turn can only be ascertained by providing the facilities and the research support which will attract such individuals, will allow them to develop and will maintain them in the country. A very important function serving both these purposes arises from the existing grant structure and it is certainly desirable to assure the continuity on a larger scale of these grants, to maintain and strengthen the multicentricity of grant-giving bodies and not to be too impressed by simplicity of administrative arrangements which might tempt one into creation of monolithic organizations. It is most important that the steady growth of these organizations be maintained since a "stop and go" policy does not allow for the organic growth which is absolutely essential for the developments under discussion. However, the simple grant structure itself is not necessarily sufficient to support areas of new growth to which individuals of originality may have turned. Here creation of groups, i.e. unconventional University Departments of limited life-span and the continuing assured support of such groups must be facilitated. Such a policy has already been started by the Medical Research Council and National Cancer Institute but needs to be greatly enlarged and should be extended to other funding organizations. A future coalescence of some of these groups to multidisciplinary institutes, may be particularly useful in medical and biological research. One more element in this process is lacking and I shall return to it, in discussing the research-oriented university.

In order to penetrate social action with scientific culture, more than the mere existence of excellent research is required. It is necessary to penetrate the educational system at all levels, not, as now, with the presentation of scientific results but with the stress on scientific method. At present, the school system stresses the former rather than the latter. In this area, provincial action is paramount, but the National Film Board and similar organizations could provide the much needed material; a federal initiating and co-ordinating body is needed. The same stress on results rather than method occurs in the scientific presentation of the news media. Most scientists who have encountered journalists will have experienced their exclusive interest in whether you can eat it, wear it or, with its aid, live for ever. This type of concern is quite legitimate but it needs to be supplemented by a concern with the philosophy and method of science. It is quite clear that provisions have been made for the education of journalists who can participate in the two worlds of Snow, that is, who can understand scientific method as well as being able to handle the techniques of communication.



I have, so far, referred briefly to the cultural role of science. I would like now to come back to the social problems which I have mentioned as the product of the interrelationship with the United States. I have indicated how this leads, in many sectors, to a colonial industrial role. It is clear that this can only change if we can offer advantages which correspond to raw materials in the primary industries. The most important such advantage would be the availability of personnel of high originality and of a high level of training, and the existence in the universities of outstanding research groups which have not only acted in the training of individuals but are also available for consultation by these individuals. Thus the university-based investigator can provide the back pressure which is needed to maintain a high degree of flexibility in a mission-oriented industrial research organization. Without this second component potential industrial research workers can be and will be moved to another country by recruitment and their education is of no benefit to the country in which training has been provided. Given superior back pressure and supportive political and economic policies, science-based industries can be attracted by the human and social "raw-materials" of scientific industry.

Thus the unique role of Canada in being able to create a society adapted to the last part of the twentieth century and its unique problem of close association with the most highly developed country reveal fundamental research as an important factor in the development of a Canadian identity. I would suggest that any discussion of the portion of G.N.P., to be spent on science and of the distribution of expenditure among different scientific or technological disciplines should use social goals as a point of departure.

I have so far confined myself to the central mechanisms by which fundamental research can be fostered; we must yet come to grips with the peripheral organization of fundamental research since a large and in some areas the largest portion of such work will be housed in universities. This brings us to the problem that the universities have lost the sharp definition of their tasks by having been progressively burdened with new layers of tasks which have often been incompatible. Originally, the university was founded to preserve the scanty knowledge left over from the Roman Empire and it was therefore structured as a conservative institution: it preserved and handed on knowledge and intellectual skills. As scientific research developed and the backroom of a clergyman in Manchester or of a brewer in Denmark were no longer adequate, the university became the home of research. However, this happened within the framework of a basic organization that was fixed for the conservative purpose of



the middle ages and was too rigid and structurally too permanent to allow for change. As the university continued its task of providing scholarly and craft education, a conflict arose, often again not fully expressed, but frequently working to the detriment of either the craft or the scholarly function. The cumbersome structure and the inherent conflicts of purpose were somehow saved intact in the transplantation of the university across the Atlantic. The specific ideology and aspirations of the North American continent imposed yet a third task; it became necessary to admit to the university large numbers of individuals who had no interest in the scholarly or in the craft function of the university but were concerned with a way of acquiring a background that would permit them to lead fuller lives. This had been the central aim of higher education in Greece and it is - without doubt - a very important function of higher education for the generation of the computer age. However, the group of students, exclusively concerned with this function, find the existing university, and its orientation towards research or craft, a place which has little to offer. One component of student riots arises from the fact that such students become alienated from an institution which is concerned with values far from their own. This problem is as yet not a major factor in the development of Canadian Universities but it would seem useful to anticipate these problems and to deal with them before they have led to a major and paralyzing conflict. This means that we should have some institutions in which the three functions are dissociated: a technical or craft university, an institution comparable to the junior college which is frankly and deliberately not concerned with scholarships or craft and finally a research-oriented elite university. It is in the last of these three separate functions that action is most needed and in which, starting from a post-graduate operation, a centre of research excellence should be developed and should later take in a selected number of undergraduate students whose aims are identical with that of the elite institution. The link between the existence of such an elite institute and the social purpose which I have previously discussed is apparent; it could act as the primary vehicle for the fulfilment of these aims. In the meantime, the conflicting tasks of the university and its rigid structure create a need for special mechanism to promote flexibility. The "group" as a "mortal" department for newly emerging disciplines could contribute to the much needed capacity to adapt to the rapid changes in scientific and social objectives.

Bernhard Cinader, Ph.D., D.Sc., F.R.I.C.

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This complement fellow is a thoroughly dark horse  
Whose complexity for students gets worse and worse.  
In nineteen fifty-three he only had four components  
But now he has nine (according to some exponents)  
Like Lepow and Müller-Eberhardt and Leon  
And others who would like to see C prime in neon.  
A big mystery that is scarcely ever debated  
Is why God made him so complicated.  
If Nature makes perfect all things alive  
Then why do some mice lack C prime five?  
And suffer no obvious disadvantages  
Among the hazards of infected cages.

Scientists when failing the big problems to crack  
Often take up a model to attack  
And in order to get a faint glimmering or clue  
Like the witches in Macbeth they prepare a brew;  
Red cells of sheep and hemolysin of rabbit,  
Complement of guinea pig and buffer barbiturate,  
Plus a dash of calcium and magnesium ions -  
Don't forget them or I'll really be bitter -  
For by at least two tubes will fall my titer.  
You may find something new (not published long ago)  
And send an abstract to the Federation in Chicago.  
On alternate years it's Atlantic City for your talk  
Which personally I prefer because of the Boardwalk.  
Thus the web of fact and fancy is casually woven  
With beverage assistance of Martini and Manhattan.

The topic of lysis has had a lengthy fascination.  
Plato's "Lysis", for instance, deals with human tensions.  
Aristophanes' "Lysistrata" showed how war was dissolved  
When the warriors' wives to make no love resolved.  
But I digress from our subject of complement  
Which obviously to tease immunologists was sent  
By a Deity who clearly becomes ever merrier  
When a scientific meeting abounds  
With hypotheses as intelligent as sounds  
From the equine posterior,  
Or following Thomas Huxley's victorian erudition  
"Yesterday's heresy becomes today's fact and tomorrow's  
superstition".

A. C. Wardlaw

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Ludwik Hirszfeld (1884-1954)

Ludwik Hirszfeld can be regarded as a founder of Immunogenetics. From his paper on the inheritance of group specific substances of human blood (1), published in 1910, to the end of his life, his primary interest was always focused on genetics of the immune processes.

He was a great scientist, always full of new ideas, and a devoted teacher always ready to give away his ideas to young immunologists. His deep humanitarian attitude compelled him, during World War I, to help the Serbs in their fight for freedom. He joined the Serbian Army as a volunteer and was appointed chief bacteriologist. During his service in the Serbian Army he made his second important discovery -- the observation that blood group genes differ in various populations (2).

He was a gifted writer and in 1946 published his autobiography (3) in which among other things he described his ordeal in the Warsaw ghetto during World War II.

After the war he took an active part in organizing Polish scientific life. In connection with this activity he attended countless conferences and meetings. It was during these conferences that he started to write down his thoughts. Originally he expressed his protests against the activity of people who were taking over the administration and organization of scientific life. "Those who never made any scientific discovery or otherwise actively contributed to research, but who appoint themselves as judges of who is right, should be banned from organizing science", he writes in one of his thoughts.

Other thoughts reflect his views on the philosophy of scientific research and on relations between young and old scientists. In some of the thoughts he summarizes his credo as a scientist and as a teacher. His thoughts were never published during his lifetime. The following selection was taken from the book, "Ludwik Hirszfeld", which was edited by H. Hirszfeld, A. Kelus and F. Milgrom, and was published in 1956 in Polish and French as Series B, No. 80, Travaux de la Société des Sciences et des Lettres de Wrocław.

References:

- (1) Zeitschr. f. Immunitäts. exp. Ther. I. Abt: Orig. 1910, 4, 531-546
- (2) Lancet, 1919, 2, 675-679
- (3) L. Hirszfeld, Story of a Life (in Polish) Czytelnik, Warsaw, 1946

Thoughts -- Quelques Pensées

Those who sleep, do not proliferate; therefore, conferences inhibit the natural increase of ideas.

Ceux qui dorment n'engendrent pas; c'est pourquoi les séances entravent l'accroissement naturel des idées.

\*

When evaluating research projects one has to adopt a principle that each discovery is valuable and socially needed. A good investigator is in love with his project and we can be glad that Galvani was interested in the frog's muscle and not in an electric streetcar.

En qualifiant les sujets de recherche, il est raisonnable d'avoir pour principe que toute découverte scientifique est utile et précieuse au point de vue social. Un bon chercheur est amoureux de son sujet et c'est par fortune que Galvani s'intéressait au muscle de la grenouille et non pas au tramway. Les premières pensées doivent être libres de tout utilitarisme.

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Planning must not become a permit for uninspired people to rule the people who have talent.

\*

Planning in research is effective if one wants to confirm or describe certain facts, using standard methods. Planning is not satisfactory if one is looking for the unexplored. Here one needs inspiration and luck. Condition number one for good planning is, that it should not discourage from the voyage into the unexplored.

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Subsidizing the research of people who have no ideas of their own is like trying to overcome the woman's infertility with the lustfulness of the male.

\*



A scientist's privilege is liberty and his duty - telling the truth. In old days, telling the truth was a privilege of the jesters, because it was not taken seriously. To day it should be the price for the scientist's liberty.

Le droit du savant est la liberté et son devoir est la vérité. Elle a été jadis le privilège des bouffons, car on ne la prenait pas au sérieux. Aujourd'hui, il faut qu'elle soit le prix de la liberté du savant.

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In a scientific idea there live a joy of life, an admiration for beauty, a protest against death, a desire to last, a question asked of Nature, a desire to experience and the curiosity of the depth. But there is no grandness of the state, no racial hatred, no leader, no orders.

Dans une idée scientifique, il y a de la joie de vivre, et de l'admiration du beau, et de la protestation contre la mort, et de la volonté de durer, et des questions posées à la nature, et du désir d'éprouver le sort, et de la curiosité des profondeurs. Mais il n'y a ni de raisons d'Etat, ni de haine des races, ni de chef, ni de commandement.

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Import of ready-made ideas is as humiliating and costly as the export of natural resources instead of manufactured products.

L'importation des idées toutes faites est aussi humiliante et coûteuse que l'exportation des matières premières au lieu de celle des produits de fabrication.

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There is no progress without heresy.

Il n'y a pas de progrès sans hérésie.

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Ideas are like holy pictures: miracles can happen if you really believe. Therefore premature scepticism of supervisors can do injustice to young investigators.

Les idées sont comme des images sacrées. Elles font miracles lorsqu'on croit en elles. C'est pourquoi le scepticisme prématuré des maîtres fait tort aux disciples.

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One has to be optimistic while starting a project and critical at its completion.

Il faut avoir de l'optimisme au début du travail et du criticisme à sa fin.

\*

If one wants to create a scientific climate one has to learn how to enjoy other people's projects. Scientific climate disappears if one ceases to appreciate the efforts of others.

Si nous voulons créer un climat scientifique, sachons nous réjouir des travaux des autres. Le climat scientifique s'évanouit lorsqu'on cesse de respecter l'effort de l'esprit créant.

\*

An engineer creates inanimate objects, a gardener grows live ones...If I have sometimes dreamed about how I would like to survive in young people's memories, it is never as a professor, or God forbid, as a director, but as a gardener of human souls. And I think that my life's task is to live up to this dream.

Un ingénieur forme les objets morts, un jardinier cultive les êtres vivants S'il m'arrivait à rêver comment désirerais-je vivre dans la mémoire des jeunes, jamais je ne l'entendais ni comme un professeur, ni -- Dieu m'en garde -- comme un directeur, mais bien comme un jardinier des âmes humaines. Et je pensais que le devoir de ma vie était de le mériter.

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### FORTHCOMING EVENTS

25 - 26 August, 1969

A Symposium on Liquid Chromatography will be held at Loyola of Montreal on August 25-26.

The combination of review lectures and extensive discussions on specific topics will make the programme especially interesting to those who are familiar with these techniques, and to those who have not fully explored the application of these techniques to their own separation problems.

The programme includes the following sessions:

Introduction to Liquid Chromatography; Resolution; Adsorption Chromatography; Partition Chromatography; Supercritical Fluid Chromatography; Ion Exchange Chromatography; Gel Filtration Chromatography; Gel Permeation Chromatography; Open Forum; Detectors for Liquid Chromatography; Demonstration and Runs on Liquid Chromatography Systems manufactured by Nester/Faust Mfg. Corp.

Drs. G.J. Trudel and O.R. Schweitzer are the Chairmen of the sessions. The papers will be given by Drs. R.D. Conlon, R.L. Easterday, D.H. Freeman, D.K. Gilding, R.E. Jentoft, L. Snyder.

Registration fee (on Aug. 25) is \$18.50. Pre-registration (by August 18) is \$15.00. Accommodation is available on the Loyola campus (\$9.50 single, \$8.00 double). A complimentary cocktail party will be held on August 25 from 5:30 to 7:00 p.m. A banquet (\$5.00 per person) will be held after the party. Registration, with money orders and requests for accommodation should be sent to Dr. G.J. Trudel, Dept. of Chemistry, Loyola of Montreal, 7141 Sherbrooke W., Montreal 262, Quebec.

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7 - 11 September, 1969

American Chemical Society Symposia on Immunochemistry and Glycoproteins will be held in New York, N.Y.

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7 - 12 September, 1969

Second Conference on Experimental Medicine and Surgery in Primates will be organized by the New York University School of Medicine and held in the auditorium of Hunter College-Bellevue, Department of Nursing Education, 440 East 26th Street, New York.

The preliminary programme includes sessions on:

Cross-circulation; Experimental Transplantation in Primate Animals; Immunological Response between Man and Nonhuman Primates; Reports from Major Primate Laboratories and Programs in the USA; Reports from Major Primate Laboratories and Programs outside USA; Comparative Biochemical and Developmental Genetics; The Nervous System: Similarities between Man and Nonhuman Primates, Perinatal Biology and Development, Neuroendocrinology, Behavioral Physiology; Reproduction; Perinatal, Growth and Development Studies; Virology; Infectious Diseases.

Approximately 100 papers will be presented at these sessions.

The registration fee is \$25. The conference co-chairmen are:

Dr. Edward I. Goldsmith, The New York Hospital-Cornell Medical Center, 525 East 68th Street, New York, N.Y. 10021, and Dr. J. Moor-Jankowski, New York University Medical Center, 550 First Avenue, New York, N.Y. 10016.

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14 - 19 September, 1969

The First Harden Conference on the Structure and Biological Role of Proteins will be held at the Wye College, Ashford, Kent, England, under the chairmanship of Professor D.C. Phillips, F.R.S.

The Conference is the first of a series of annual residential research conferences organized by the Biochemical Society and is supported by the Royal Society Wates Foundation Grant, the Wellcome Trust and the Biological Council.



Principal topics:

Chemical and Physical Studies of Proteins and their Interactions; Chemical Synthesis of Peptides and Proteins; Structures and Specificities of Enzymes; Kinetic Studies of Enzyme Action; Haemoglobin; Active Sites of Antibodies; The Control of Glycolysis and Gluconeogenesis.

Participants will include:

E. Antonini (Rome), C.I. Branden (Uppsala), H. Gutfreund (Bristol), B. Hess (Dortmund), G.W. Kenner (Liverpool), R.B. Merrifield (Rockefeller), C. Milstein (Cambridge), E.A. Newsholme (Oxford), M.F. Perutz (Cambridge), E. Press (Oxford), W. Rittel (Basle), E.M. Bradbury (Portsmouth), M. Eigen (Göttingen), B.S. Hartley (Cambridge), O. Jardetsky (Cambridge), H.L. Kornberg (Leicester), N.A. Mitchison (London), A.R. Peacocke (Oxford), R.R. Porter (Oxford), B.R. Rabin (London), B.E. Strandberg (Uppsala)

The fee for the Conference including full board is 30 pounds.

Further information and application forms are available from the Executive Secretary, Biochemical Society, 7 Warwick Court, London, W.C.1.

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17 - 19 September, 1969

International Symposium on Blood and Tissue Antigens dedicated to Walter T.J. Morgan will be held at the University of Michigan Medical Center, Ann Arbor, Michigan, U.S.A.

The general introduction will be given by W.T.J. Morgan; the following sessions are scheduled: Immunogenetics (Chairman, Henry Gershowitz), Cellular Antigens (Chairman, George F. Springer), Water-Soluble Antigens (Chairman, Elvin A. Kabat), Panel Discussion on Methodology and Presentation of Abstracts (Moderator, W. Ward Pigman), Enzymatic Degradation and Metabolism of Blood Group Substances (Chairman, Shoei Iseki), Biosynthesis of the Blood Group Substances (Chairman, Winifred M. Watkins). The Symposium will be summed up by Ruggero Ceppellini.

The registration fee is \$25. The organizers recommend early application for registration.

Academic questions should be directed to Dr. David Aminoff, Simpson Memorial Institute, The University of Michigan Medical Center, Ann Arbor, Michigan, 48104, U.S.A.

Administrative questions should be directed to Mr. Robert K. Richards, Department of Postgraduate Medicine, Towsley Center for Continuing Medical Education, Ann Arbor, Michigan, 48104, U.S.A.

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16 - 18 October, 1969

The first meeting of the "Gesellschaft für Immunologie" (Society for Immunology, Germany) will be held in Freiburg i. Br., West Germany.

The programme will consist of several plenary lectures and of original contributions from the fields of general immunology, immunobiology, immunopathology, immunochemistry and clinical immunology.

The registration fee is DM 20.-; Dr. H.G. Schwick, Secretary of The Temporary Executive Committee, should be contacted for additional information. His address is Behringwerke AG, 355 Marburg a. d. Lahn, West Germany.

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23 - 24 October, 1969

The Autumn Meeting of the British Society for Immunology will be held in the Wellcome Lecture Hall of the Royal Society, 6 Carlton House Terrace, London, S.W. 1, on Thursday and Friday, 23rd and 24th October, 1969.

The Meeting will be devoted to open papers. The Meetings' Secretary is Professor I.M. Roitt, Department of Immunology, Arthur Stanley House, Middlesex Hospital Medical School, London, W.I.

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2 - 5 November, 1969

Second International Symposium on Atherosclerosis will be held in Chicago at the Conrad Hilton Hotel.

The programme includes sessions on:

Pathogenesis, Reactions of the Arterial Wall, Progress in Preventing and Dissolving Thrombi, Serum Lipoproteins, Triglycerides and Carbohydrate-Lipid Interaction, Sterol Balance and Metabolism, Environmental and Host Factors in Coronary Heart Disease, Nutritional Studies, Recent Advances in Drugs affecting Lipids, Platelets and Autonomic Nerve Mediators, Progress in the Control of Atherosclerosis.

The programme will also include several panel discussions, 40 submitted ten minute papers, extensive social program, special events, shopping trips, etc.

Standard registration fee is \$80. Chartered flights from Paris available.

Further information can be obtained from Chicago Heart Association, 22 West Madison Street, Chicago, Illinois, 60602, U.S.A.

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23 - 24 April, 1970

The Spring Meeting of the British Society for Immunology will be held in the Edward Lewis Theatre, Windeyer Building, Middlesex Hospital Medical School, Cleveland Street, London, W. 1, on Thursday and Friday, 23rd and 24th April, 1970, and will include a symposium on "Allergic mechanisms in infectious disease".

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2 - 8 August, 1970

XIII International Congress of Hematology will be held in Munich, Germany. The organizer is the International Society of Hematology. Mailing address: Secretariat XIII International Congress of Hematology, D-8000 Munchen 12, P.O.B. 200, Germany.

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27 - 29 August, 1970

As announced previously, The Canadian Society for Immunology is planning an International Symposium on The Biological Activities of Complement to be held August 27 to 29, 1970 at The University of Guelph, Guelph, Ontario.

The Symposium will encompass an in-depth review of the biological functions of complement and many of the world authorities on this subject will be participants. The Symposium will be divided into five main topics, namely:

The Complement System - a review of the complement components, their reactions, inhibitors and assay systems; Cell Membrane Damage Caused by Complement - the cytolytic and bactericidal effects, normal and alternate pathways to cell damage; Biologically Active Fragments of Complement - the anaphylotoxin and chemotactic factors and enzymatic activities generated during complement fixation; Complement-induced Changes in Membrane Surface Properties - the complement-dependent reactions of immune adherence, agglutination and adherence of immune complexes to leucocytes and phagocytes; Biology of the Complement Components - biosynthesis, effect of deficiencies, and allotypes and isotypes of complement components.

For further details or information please contact the Chairman of the Organizing Committee, Dr. D.G. Ingram, Dept. of Vet. Microbiology and Immunology, University of Guelph.

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7 - 11 September, 1970

The Third International Congress of the Transplantation Society will convene at The Hague, the Netherlands.

The main subjects will be:

Mechanics and Modifications of Graft Rejection; Genetics of Transplantation; Transplantation Antigens; Organ Transplantation - Fundamental and Clinical Aspects; Organ Preservation;



Transplantation of Haemopoietic Cells; Phylogeny of Transplantation; Heterotransplantation; Impact of Transplantation on Biology.

Plenary sessions will be held in the mornings while the afternoons can be used for parallel sessions. The majority of the papers will be short presentations, at times followed by discussions. There will be a number of symposia dealing with the main subjects as well as "micro-symposia" to cover certain highly specialized areas of research or clinical transplantation.

All correspondence regarding the Congress should be directed to:

The Secretariat of the, Third International Congress of the Transplantation Society, c/o Holland Organizing Centre, 16, Lange Voorhout, The Hague, The Netherlands.

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