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THE PROGRAMS OF THE COUNCILS IN PERSPECTIVE

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THE PROGRAMS OF THE COUNCILS IN PERSPECTIVE

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OUTLINE

SECTION I

The General Setting

This section provides an overall perspective of the total support of scientific activities in Canadian universities since the beginning of the decade. The largest component of the expenditures included under the heading "scientific activities" is "research and development" (R&D); such activities as education support, and the collection and dissemination of scientific information, although included under "scientific activities", are collectively referred to in this text as "related scientific activities" (RSA).

Table 1-1 presents data on assisted research funds to Canadian universities by all sources of funding for the period from 1970-71 to 1976-77.

Between 1970-71 and 1975-76 the funding of research and development in Canadian universities by all sources, that is the federal and provincial governments, universities, municipalities, foundations, etc., rose by about 10.1 per cent per annum. However, during this same period the GNE Implicit Price Index rose at an average annual rate of 8.5 per cent suggesting that the real growth rate is only about 1.6 per cent.

- The period from 1970-71 to 1975-76 saw a decline in the federal government's proportion of funding of R&D from 77.1 per cent to 63.7 per cent. This is a reversal of the pattern in the latter half of the sixties.

- The federal government's support of R&D in Canadian universities increased from $123.5 million in 1970-71 to $165.0 million in 1975-76 which represents an average annual growth rate in nominal terms of 6.1 per cent.

- Although the three research councils distribute the largest amounts of money, the funds disbursed by the federal government's departments represent a significant amount. During the period from 1970-71 to 1975-76 the departments accounted for about one quarter of the total federal expenditures on R&D.

Table 1-2 presents expenditures by the federal government on all scientific activities for the period from 1970-71 to 1976-77; in particular, this table concentrates on payments to Canadian universities.

- The total federal expenditures on all scientific activities rose from $915.7 million in 1970-71 to an estimated $1,724.2 million in 1976-77. This represents a compound annual growth rate of 11.1 per cent in nominal terms,

suggesting that the real growth rate was approximately 2.6 per cent.

- During the period from 1970-71 to 1976-77 the percentage of total federal expenditures on all scientific activities to Canadian universities declined from 15.6 per cent to 12.0 per cent.

- The federal government's payments to Canadian universities for all scientific activities rose from $142.4 million in 1970-71 to $206.5 million in 1976-77, representing an average annual growth rate of 6.4 per cent.

- Most of the federal government's payments to Canadian universities for scientific activities have been for research and development. However, the share attributed to related scientific activities increased from $18.9 million or 13.2 per cent in 1970-71, to $32.3 million, or 15.6 per cent in 1976-77.

- In 1970-71 the research councils' share of the federal government's payments to Canadian universities for scientific activities amounted to $105.4 million or 74.0 per cent. In 1976-77 the research councils' share increased to $160.3 million or 77.6 per cent.

Table 1-3 presents payments to Canadian universities by the three research granting councils for the period from

1970-71 to 1976-77.

- The largest supporter of scientific activities in Canadian universities is the National Research Council, followed by the Medical Research Council and the Canada Council. However, the National Research Council's proportion dropped slightly from 58.5 per cent in 1970-71 to 55.2 per cent in 1976-77. During the same period the share of the Medical Research Council remained fairly stable at about 28 per cent whereas the share of the Canada Council rose from 13 per cent to 16 per cent.

- Payments to Canadian universities by the National Research Council increased from $61.7 million in 1970-71 to $88.5 million in 1976-77; however, when inflation is taken into account this represents a decline of 9.7 per cent in real terms. The Medical Research Council's payments to Canadian universities also increased (from $30.0 million in 1970-71 to $46.3 million in 1976-77), however, the decline in real terms was only 3.0 per cent. The Canada Council was the only council whose payments to Canadian universities increased in real terms' payments in 1970-71 totalled $13.7 million and in 1976-77 $25.5 million representing a real increase of 17.5 per cent.

The distribution of funding sources for health science research in Canada between 1970-71 and 1976-77 is shown in Table 1-4. The total funds for extramural health science research increased from $58.5 million in 1970-71 to $101.2 million in 1976-77 representing an average yearly increase of 12.2 per cent.

During this same period MRC's percentage of total funds provided decreased from 58 per cent to 50.2 per cent. It appears that this has been offset by a concomitant increase in the other Canadian agencies' percentage of total funding from 27.3 per cent in 1970-71 to 33.7 per cent in 1976-77. At the same time, other federal funding sources, namely, National Health and Welfare, have undergone fluctuations in percentage of total funding between 13.2 per cent and 18.2 per cent.

Due to the very close link between the health science researcher and the community it is not surprising that the more localized funding sources, provincial governments, charitable foundations, etc., play a much larger role in health research support. This trend is expected to continue as revenue from provincial lotteries is injected into the health care system.

Table 1-5 summarizes the regional distribution of federal provincial and other sources of funding for university research from 1970-71 to 1974-75.

- The distribution of federal funds to each of the provinces remains fairly constant. The largest receiver of funds is Ontario with an average share of 39.2 per cent followed by the West and Quebec with 29.2 per cent and 25.9 per cent respectively and finally the Atlantic region with about 5.7 per cent.

- In 1970-71 Quebec provided the largest contribution to university research and Ontario the second largest, however, by 1974-75 these provinces had reversed their positions. The smallest proportion of provincial funds is provided by the Atlantic region.

- Over the period 1970-75, Ontario universities have benefited most from "other" sources of funding, followed by universities in the Western provinces, Quebec and the Atlantic region.

SOURCES OF ASSISTED RESEARCH FUNDS TO CANADIAN UNIVERSITIES

	Research Councils	Federal Departments [1]	Provincial Governments [2]	Others [2) 3)]	Total
		{in $ millions)			
1970-71	88.6	34.9	13.2	23.4	160.1
1971-72	92.9	39.6	12.2	34.2	173.9
1972-73	98.3	36.6	18.6	37.5	191.0
1973-74	104.6	38.2	26.1	38.9	207.8
1974-75	109.1	41.7	31.4	51.7	233.9
1975-76	124.6	40.4	41.4	53.0	258.8
1976-77	140.0	34.2	n.a.	n.a.	n.a.
		(Percentage Distribution)			
1970-71	55.3	21.8	8.2	14.6	100.0
1971-72	51.9	22.1	6.8	19.1	100.0
1972-73	51.5	19.2	9.7	19.6	100.0
1973-74	50.3	18.4	12.6	18.7	100.0
1974-75	46.6	17.8	13.4	22.1	100.0
1975-76	48.1	15.6	16.0	20.4	100.0
1976-77	—	—	—	—	—
		(Average Annual Growth Rates)			
	7.9	~0.0	25.7	17.8	10.1

1) Data obtained from Statistics Canada Historical Series (1976 Survey); the figures reported refer to payments to Canadian universities for R & D.

2) Data provided by the Canadian Association of University Business Officers (CAUBO).

3) Others includes, municipal governments, private organizations, foundations and endowments.

NOTE: The number of institutions reporting financial information to CAUBO in anyone year is not constant,

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Table 1-2

FEDERAL EXPENDITURES ON SCIENTIFIC ACTIVITIES

(in $ millions)

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	Growth rate*
Total Federal Expenditures on Scientific Activities	915.7	**1022.0**	1107.0	1203.8	1352.4	1526.2	1724.2	**11.1**
Payments by the Federal Government to Cdn Universities	142.4	151.4	156.1	166.5	175.7	194.S	2G6.5	6.4
Payments by the Federal Government to Cdn Universities for R & D	123.5	131.5	134.9	142.8	150.8	165.0	174.2	5.9
Payments by the Federal Government to Cdn Universities for RSA	18.9	19.9	21,2	23.7	24.9	29.6	32.3	9.3
" " Research Councils	105.4	109.6	114.1	120.5	125.5	143.3	160.3	7.2
" " Departments	37.0	41.8	42.0	46.0	50.2	51.3	46.2	3.8
Payments to Canadian Universities by NRC	61.7	64.4	63.8	65.6	66.2	75.7	88.5	**6.2**
MRC	30.0	31.4	35.3	38.2	40.4	45.1	46.3	7.5
CC	13.7	13.8	15.0	16.7	18.9	22.5	25.5	10.9

Source: Statistics Canada Historical Series (1976 Survey)

* Compound Annual Growth rates in percentages

Table 1-3

PAYMENTS TO CANADIAN UNIVERSITIES BY THE RESEARCH GRANTING COUNCILS

(in $ millions)

	NRC		MRC		CC(SSHR)[1]		
	Current	Constant	Current	Constant	Current	Constant	Inflation^
1970-71	61.7	61.7	30.0	30.0	13.7	13.7	**100.0**
1971-72	64.4	63.1	31.4	30.8	13.8	13.5	**102.0**
1972-73	63.8	53.4	35.3	32.9	15.0	14.0	107.4
1973-74	65.6	55.5	38.2	32.3	16.7	14.1	118.1
1974-75	**66.2**	49.3	40.4	30,1	18.9	14.1	134.2
1975-76	75.73)	52.4	45.13)	31.2	22.53)	15.6	144.6
1976-77	88.54)	55.7	46.35)	29.1	25.5	16.0	159.0
% Change		-9.7%		-3.0%		*17.5%	

SOURCE: Statistics Canada Historical Series (1976 Survey)

includes only payments to Canadian universities for social sciences and humanities research.

Based on GNE Implicit Price Index (1970-71= 100). CANSIM series number 40625.

In June 1975 Treasury Board cut back $2.7 million from the budget of NRC and $1.0 million form the budgets of both the MRC and the Canada Council.

Includes $10.4 million in grants for atomic energy research that were formerly administrated by AECB.

Includes $2.0 million transfered from National Health and Welfare, and $.4 million transfered from Veterans Affairs. "

Table 1-4

Funds Provided for Extramural Health Science Research by Major Federal, Provincial and Voluntary Agencies 1970-1977[1]

(in $ millions)

SOURCE:	1970-71(%)	1971-72(3)	1972-73(%)	1973-74{%)	1974-751%)	1975-76(%)	1976-77(%)
Federal:							
KRC	34.0 (58J0)	35.6 (56.5)	37.5 (54.9)	40.4 (54.1)	42.9 (50.5)	47.4 (50.2)	50.8 (50.2)
Other	8.2 (14.0)	9.3 (14.8)	11.6 (17.0)	13.6 (18.2)	13.7 (16.2)	13.7 (14.5)	13.3 (13.2)
Sub-total	42.2 (72.0)	44.9 (71.3)	49.1 (71.9)	64.0 (72.3)	56.6 (6677)	61.1 (64.7)	64.1 (63.4)
Other Canadian Agencies	16.0 (27.3)	16.9 (26.8)	17.9 (26.2)	18.7 (25.1)	25.6 (30.1)	30.4 (32.2)	34.1 (33.7)
U.S. National Institutes of Health*	0.3 (0.7)	1.2 (1.9)	1.3 (1.9)	1.9 (2.6)	2.8 (3.2)	3.0 (3.1)	3.0 (2.9)
Total	58.5	63.0	68.3	74/6	**85.0**	94.5	**101.2**

*Most U.S. funds obtained by Canadian investigators come through grants and contracts from the U.S. National Institutes of Health. Further support for Canadian medical research also comes from a few other U.S. federal and voluntary agencies, but this has not yet been documented annually and could not be included here. When last tabulated in 1972-73, it amounted to approximately half a million dollars and was continuing to diminish.

No attempt has been made to include health research supported by industry, since reliable figures are unobtainable.

[1] SOURCE; KRC background documentation

Table 1-5

REGIONAL DISTRIBUTION OF ASSISTED RESEARCH FUNDS TO UNIVERSITIES

(in $ million)

	Federal Funds				Provincial Funds				Other			
	Atlantic	Quebec	Ontario	Western	Atlantic	Quebec	Ontario	Western	Atlantic	Quebec	Ontario	Western
1970-71	**6.4**	24.8	42.1	31.2	**0.1**	6,4	3.7	3.0	**.6**	5.4	**11.2**	**6.2**
1971-72	5.8	28.3	43.3	33.7	**0.1**	5.S	**2.8**	3.3	**1.2**	8.3	17.2	7.5
1972-73	6.4	31.8	44.7	34.2	**1.1**	9.0	4.4	4.4	**1.6**	6.5	**21.2**	**8.2**
1973-74	7.4	34.4	49.2	36.9	0.9	9.1	11.9	4.2	1.9	10.3	16.9	9.8
1974-75	.8.5	37.1	56.6	39.3	0.5	**10.6**	13.8	6.5	3.0	11.7	24.2	**12.8**

SECTION II

The Programs of the Councils

1. Introduction

The major vehicle by which the federal government provides financial support to universities for research and research training is the granting councils. These councils have been charged with, in broadest terms, a mandate for providing and supporting the development of research, as well as, the provision of highly qualified manpower. To accomplish this mandate the councils have created programs which they feel best serve this mandate, but more specifically, programs which are appropriate to the individual needs and characteristics of their grantees. For example, the needs of high energy nuclear phsycists, historians and clinical researchers are all quite different. The physicist often works with a team of other researchers and technicians on experiments involving large and expensive facilities. The historian, however, often works alone, requiring only access to suitable library facilities. The clinical researcher confronts the complexities of human disease in a hospital environment through collaboration with a wide range of medical and biological specialists. Thus, it is not surprising that the councils have evolved as quite distinct entities.

The objective of the Medical Research Council (MRC) is to help attain the quality and quantity of research in the health sciences essential to the maintenance and improvement of health services. To accomplish this objective the council, recognizing the close inter-relationships existing amongst the health science research fields, has established programs which emphasize the team approach to problem solving. In so doing the council stimulates the largest possible input into the problem areas identified by the researchers.

The Medical Research Council has also developed programs which, through a continual monitoring of research progress, in general, and national health problem areas, in particular, allow for correction of disciplinary and regional disparities. In addition, the Council has developed programs allowing academic staff the opportunity to concentrate entirely on their research interests. Finally, MRC has created programs which support research trainees in selected research areas.

The National Research Council has as its objective

the provision and support of the development and maintenance of research and the provision of highly qualified manpower in the natural sciences and engineering. As such, the Council supports fields of science as diverse as agriculture, earth sciences, engineering, mathematics, nuclear physics and experimental psychology to name only a few. Because of the diverse and relatively independent nature of the disciplines supported by NRC, the council has established disciplinary selection committees to effectively adjudicate the wide range of proposals submitted for funding.

Most of the programs developed by NRC concentrate heavily on supporting individual excellence over a broad disciplinary base. Nevertheless, the NRC has created specific developmental programs aimed at promoting certain areas of research; for example, programs which create, restore or improve the environment for research in certain regions, and a program which capitalizes on university research showing potential for eventual commercial exploitation in Canada. Finally, the Council has an extensive research training program.

The objectives of the Canada Council (Advisory Academic Panel) are the support of independent research in the social sciences and humanities, the stimulation of Canadian studies and the communication of the results of such research to the public. Because of the nature of research in the social sciences and humanities, little emphasis is necessary by the Council for the support of teams of researchers, extensive facilities or major equipment. What the Council does provide are programs providing access to and support for library facilities, programs defraying communication and publication costs, programs allowing freedom of mobility and interaction, nationally and internationally and finally, research training programs with heavy emphasizes on the development of highly qualified manpower.

2. The Medical Research Council

The objective of the Medical Research Council (MRC) is to help attain the quality and extent of research in the health sciences essential for the maintenance and improvement of health services. The

council uses almost all of its funds to support research and research training in universities and teaching hospitals, maintaining no laboratories of its own.

The work supported by the council extends over the whole spectrum of medical research, from clinical trials designed to determine the efficacy of certain drugs and new methods for the treatment of specific diseases, to varying basic studies in the fields of biochemistry and molecular biology designed to throw light on the cause or mechanisms of disease states.

With the reorganization of the Councils, MRCs role will be expanded to include support of research in public health previously under the jurisdiction of the Department of National Health and Welfare.

MRC Programs

The council has developed three main areas of support programs as outlined in Table II-2.1. The first, Payments Towards Costs of Research and Development

provides direct support of research activities by investigators in the form of various grants and special awards which are considered as personnel support.

The Direct Support section includes:

Grants-in-aid of Research	- grants awarded to assist in defraying the running costs of research programs including grants for specific items of equipment.
Development Grants	- grants awarded to assist in the recruitment or establishment of new faculty members in departments where research activity is thought to be inadequate.
MRC Group Grants	- grants to provide support for groups of two or more accomplished investigators over a period of time for work in what appears to be especially productive areas.
Special Projects	- grants in support of research in clearly defined problem areas in which MRC feels it is desirable to push ahead as rapidly as possible.

General Research Grants - grants awarded to the deans of medicine, dentistry and pharmacy for use, at their discretion, in support of research in their schools.

Travel Grants - to enable an investigator to visit a specific laboratory for the purpose of furthering his research.

Training Grants - to foster the development of research in the clinical dental sciences through establishment of a limited number of training programs.

The awards section includes:

Associateships - grants to enable an individual to make research a full-time career.

Scholarships - grants for support of investigators who have recently completed their research training.

Centennial Fellowships and Fellowships (Ph.D). - to provide support for full-time training in research in the health sciences for those with a Ph.D.

Visiting Scientists - to enable investigators to spend some time in pursuit of their research endeavours in laboratories other than their own.

The second area, Research Training, provides awards to post-graduate students registered for a degree as well as recent holders of a doctorate degree who need further research training. This area consists of the following programs;

Studentships - to provide support for graduate students undertaking full-time training in research leading to an M.Sc. or Ph.D. or equivalent.

Summer Scholarships - to provide support for undergraduates to gain research training during the summer months.

Centennial Fellowships and Fellowships (M.D., D.V.M., D.D.S.) - to provide support for full-time training in research in the health sciences for those with an M.D., D.V.M., or D.D.S.

The third area, Research Related Activities, supports various activities related to the performance of research, such as conferences, visiting professors, symposia, travel grants to attend scientific meetings, seminars, etc.

A more detailed description of a few of MRCs programs and their underlying philosophies is provided below.

The Grants-in-Aid of Research Program

In designing its programs MRC has recognized that its first and major role is the support of research projects and programs of individual investigators or teams of investigators who have identified and chosen their own problems. This is done chiefly through the Grants-in-Aid of Research Program the largest component of the MRC operation, accounting for nearly 64 per cent of its expenditures in 1975-76.

Applications from investigators on the staff of Canadian universities and affiliated institutions are considered on three occasions each year. The basis for this consideration is peer assessment; each application

is reviewed by external referees, expert in the field involved, and then considered by one of seventeen grants committees, each composed of eight to ten senior investigators drawn from universities, government and industry. The recommendations of these committees are then forwarded to the Council and awards are approved to the extent that funds permit.

The majority of awards are made for two or more years; where a research program of high merit has reached a stable level of expenditure, support may be provided for terms of up to five years. The grants are designed to provide for the operating costs of approved programs and for items of special research equipment; they may not be used for the remuneration of the investigator to whom the award is made. In the assessment of applications for grants no preferential treatment is given to the field of research in which the work is proposed. Over time, the distribution of grants by field of research has changed but the methods of adjustment utilized have been confined to measures which lead to an increase in the number of good applications from certain fields and have not involved the adjustment of standards in individual fields.

The Grants-in-Aid of Research Program of MRC is distinct from similar programs in the other councils in that it heavily endorses the bringing together of researchers of varying related skills in a team approach to problem solving. In so doing, it provides the largest possible input into specific problem areas confronting the health science researcher. Because of the complex nature of the life process itself, only the broadest accumulation of expertise can begin to tackle even the smallest problem area. For example, the biochemist studying carbohydrate metabolism in muscle tissue requires an understanding of the major locales of metabolism (anatomy), how those localisations interact in the anatomical matrix (physiology), the relationship between metabolic deficiencies or dere-gulation and the disease state produced (pathology), the substances and sources of control mechanisms (endocrinology, neurology), and the effect of external agents upon this process (pharmacology).

An examination of grants, under the Grants-in-Aid of Research Program, shows over 30 per cent involve more than one principal investigator. Because of this

high degree of collaboration, as well as the high degree of overlap in health research fields, the classification of research personnel according to discipline, field of study, disease category, etc. is a near impossibility. What is important, however, is that the best possible funding framework be provided for the health researcher, and as noted below, specific areas of emphasis have exceeded their expectations under this and other MRC programs.

The Grants-in-Aid of Research Program has received an increase of almost eight million dollars between 1971 and 1976 but its percentage of total expenditure has declined from 66.2 to 63.9 over the same period.

Development Grants Program

The concern over regional disparity, in the levels of research activity, is based on the effect that research activity has on professional education and health care. It is held by MRC that there should be, in every department, the minimum level of research activity that provides an adequate contribution of the type that research makes to professional education and

health care in the region. In departments identified as having less than this minimal level, the addition of competent investigators is assisted by the Development Grants Program. By supporting local initiative when it appears, the Development Grants Program has provided assistance in the recruitment and establishment of over one hundred investigators in selected departments.

Subject disparity is, of course, amenable to attack by the Development Grants Program. In addition, attempts are made to stimulate interest in relatively neglected areas by workshops and conferences. The preference given in some of the training programs to candidates who seek training in certain fields also has an effect.

The Development Grants Program received $0.2 million less in 1976 than in 1971. Its percentage of total expenditures decreased from 3.6 per cent in 1971 to 2.1 in 1976.

Associateship, Scholarship and Groups Programs

The absence of large national medical research institutes creates a special situation to be met by program design. There is a proportion of researchers who do not wish to carry the full load of teaching and administrative work that is the lot of the ordinary faculty member, and yet in Canada it is the university sector which is responsible for the performance of the greater part of basic and clinical biomedical research. If we are to fully exploit our resources in research personnel, some opportunity has to be provided in the university environment for those who wish to spend virtually all their time at research. This is the chief reason for the Associateship and Scholarship Programs.

Under the Associateship Program a researcher may receive salary support from MRC indefinitely while under the Scholarship Program, he may receive salary support for five years at or near the beginning of his career. Both associates and scholars work in universities and are expected to spend at least 75 per cent of their time on research. They must obtain their

operating funds in the Grants-in-Aid of Research competitions and these programs tend to attract researchers who have been productive and highly regarded by their peers.

The Associateship and Scholarship Programs collectively have increased from $3.4 million in 1971 to $4.8 million in 1976. Their percentage of total expenditures in this period remained constant at 9.2 per cent.

Something of the same reasoning underlines the MRC Groups Program. Like associates and scholars, members of groups are expected to spend most of their time at research. They also serve other purposes. They are one means of providing for the support of teams who wish to do intensive work for a period of time in an area of high potential. Their research may or may not be multidisciplinary but the Group Program is one means of putting more emphasis on what is excellent and of high promise.

The largest increase in the share of expenditures between 1971 and 1976 has been in the MRC Groups Program and this will be discussed in a subsequent section.

MRC Special Projects

Emphasis is given by other means to projects, program areas or entire fields of research. MRC Special Projects represent clearly defined problems with which it is desirable to push ahead as rapidly as possible when available personnel and resources permit. Certain fields have been identified by MRC as fields of high potential in terms of present day scientific opportunity or as fields closely connected to or embracing major health problems. There is, of course, overlap between fields which include allergy and immunology genetics, neurosciences, cardiology, respirology and cancer research. MRC has found, however, that simple announcement of interest in these areas has led to higher growth rates than that of the Council's operation as a whole. Thus, the internal dynamics of the field of interest and the abilities of the researchers who work in it have had their effects.

The Special Projects program increased by $0.4 million between 1971 and 1976 and its percentage of total expenditures also rose from 0.8 to 1.4 per cent during this same period.

Studentships and Fellowships

Because of the need for highly qualified researchers, high priority has always been given to research training. In many fields there is a widely acknowledged shortage of competent investigators and candidates in these fields are given a slight preference in the selection process. These fields include behavioural sciences, environmental pollution, infectious diseases, population control, biomedical engineering, dental sciences, drug toxicology, medical genetics, obstetrics and surgery.

So that the selection process may be flexible and take into account various criteria, the selection of research trainees to be supported by MRC is carried out both centrally through national competition and at the local university level by holders of research grants who have been identified by the Grants-in-Aid Committees as being in a position to provide good

training opportunities. In the national competitions the previous academic performance of candidates is a major, even dominant, consideration. Selection at the local level permits more detailed evaluation of the other characteristics of good research trainees and high academic performance need not necessarily be a prerequisite to appointment.

Funding Patterns in Support Areas

A breakdown of expenditures by MRC between 1971 and 1976 in the three main areas of support is provided in Table II.2.1. Total support by MRC rose from almost $34 million in 1971 to $47.4 million in 1976. This represents an average yearly increase of 6.9 per cent.

Payments Towards Costs of R&D have received an average of 91 per cent of the total MRC expenditures for the period 1971-1976. The direct support section has accounted for an average of 76 per cent with awards making up the remaining 15 per cent.

Direct support increased from $25.7 million in 1971 to $36.7 million in 1976, an average yearly increase of 7.4 per cent. Awards support increased

from $5.2 million in 1971 to $6.7 million in 1976, an average yearly increase of 5.2 per cent.

Research Training received an average of 8.5 per cent of the total MRC expenditures between 1971 and 1976. Support has increased from $2.9 million in 1971 to $3.8 million. This represents an average yearly increase of 6.8 per cent.

Research Related Activities received an average of 0.5 per cent of total MRC expenditures between 1971 and 1976 increasing from $0.13 million in 1971 to $0.20 million in 1976.

Regional Distribution of Payments Towards R&D

A breakdown of regional distribution of Payments Towards R&D is provided in Table II-2.2. Only eight provinces have been actively supported by MRC in R&D between 1971 and 1976.

The Atlantic provinces' share of payments to R&D increased from 3.5 per cent of the total expenditures in 1971 to 4.7 per cent in 1976. Quebec remained relatively constant, approximately 34.5 per cent, while

Ontario's share increased from 32.1 to 35.0 per cent. The prairies and British Columbia experienced a decline in their share from 26.5 to 23.0 per cent. Canadian non-university areas receiving MRC support decreased from 0.9 to 0.1 per cent, while support outside Canada increased marginally from 2.4 to 2.7 per cent of the total.

Alberta received $2.3 million in 1971, decreased slightly to $2.27 million in 1972 and increased gradually to $3.9 million in 1976. This represents an average yearly increase of 11.6 per cent ranging from a loss of 1 per cent between 1971 and 1972 to a gain of 30 per cent from 1974 to 1975.

British Columbia received $2.3 million in 1971, increased gradually to $2.58 million in 1975 and declined to $2.51 million in 1976. This represents an average yearly increase of 1.6 per cent ranging from a loss of 2.6 per cent between 1975 and 1976 to a gain of 9 per cent between 1974 and 1975.

Manitoba received $2.3 million in 1971, decreased to $2.1 million in 1972, increased gradually to $2.7

million in 1974 and decreased slightly to $2.6 million in 1976. This represents an average yearly increase of 2.7 per cent ranging from a 10 per cent loss between 1971 and 1972 to a 19.5 per cent gain between 1973 and 1974.

Newfoundland received $0.26 million in 1971, increased to $0.36 million in 1972, decreased slightly to $0.30 million in 1973 and increased steadily to $0.56 million in 1976, ranging from a loss of 16.8 per cent between 1972 and 1973 to an increase of 41.3 per cent between 1971 and 1972.

Nova Scotia received $0.84 million in 1971, increased to $0.93 million in 1972, decreased to $0.87 million in 1973 and consistently increased to $1.49 million in 1976. This represents an average yearly increase of 13.1 per cent ranging from a loss of 6.6 per cent between 1972 and 1973 to a gain of 37.9 per cent between 1975 and 1976.

Ontario received $9.95 million in 1971 and increased steadily to $15.2 million in 1976. This

represents an average yearly increase of 8.9 per cent. The maximum gain was 13.6 per cent between 1975 and 1976 and the minimum gain was 5.6 per cent between 1974 and 1975.

Quebec received $10.7 million in 1971 and increased steadily to $14.9 million in 1976. This represents an average increase of 7.0 per cent. The maximum gain was 11.9 per cent between 1975 and 1976 and the minimum gain was 2.3 per cent between 1974 and 1975.

Saskatchewan received $1.27 million in 1971 decreasing to $0.88 million in 1972 and $0.84 million in 1973 followed by a gradual increase to $1.18 million in 1975 and decreasing to $1.02 million in 1976. This represents an average yearly loss of 2.2 per centf ranging from a loss of 30.3 per cent between 1971 and 1972 to a gain of 27.3 per cent between 1973 and 1974.

Payments to Canadian non-university areas decreased steadily from $0.27 million in 1971 to $0.03 million in 1974. After an increase to $0.11 million in 1975, payments decreased to $0.04 million in 1976.

Payments towards R&D outside Canada rose gradually from $0.73 million in 1971 to $0.93 million in 1976. This represents an average yearly increase of 10.0 per cent ranging from a maximum gain of 27.9 per cent between 1971 and 1972 to a minimum gain of 4.2 per cent between 1973 and 1974.

A comparison of the average yearly percentage increase of Payments to R&D between 1971 and 1976 (Table II-2.3) reveals that Newfoundland had the highest value 19.2 per cent while Saskatchewan had the lowest with a decline over this period at an average of -2.2 per cent. In contrast to the other three western provinces, Alberta has had a strong average increase of 11.6 per cent. Quebec and Ontario have had average increases of 7.0 and 8.9 per cent respectively and were the only two provinces which never sustained a decline in payments over the period examined.

While Newfoundland and Nova Scotia rank first and second with respect to average percentage increases, the Atlantic provinces have nevertheless accounted for less than 5 per cent of the total Payments Towards R&D during the period 1971-1976.

Regional Distribution of Research Training

A breakdown of regional distribution of research training is provided in Table II-2.4 Only eight provinces have been actively supported by MRC in this area between 1971 and 1976.

All the provinces and provincial regions have had their share of Research training reduced between 1971 and 1976. The Atlantic provinces have fallen from 1.5 per cent in 1971 to 1.0 per cent in 1976, Quebec from 28.5 to 24.0 per cent, Ontario from 26 to 22.2 per cent and the Prairies and British Columbia from 19.7 to 18.8 per cent. Support outside Canada has undergone a marked increase in this period from 25.3 to 34.0 per cent.

Alberta received $0.16 million in Research training in 1971 increasing $0.2 million in 1972, decreased through 1973 and 1974 to $0.18 million and then increased steadily to $0.24 million in 1976. This represents an average yearly increase of 8.8 percent ranging from a loss of 8.2 per cent between 1973 and 1973 to a gain of 24.9 per cent between 1975 and 1976.

British Columbia received $0.18 million in 1971 increasing to $0.25 million in 1972, then decreased to $0.19 million through 1973-75 and then increased to $0.21 million in 1976. This represents an average yearly increase of 4.1 per cent ranging from a loss of 18.2 per cent between 1974 and 1975 to a gain of 38.3 per cent between 1971 and 1972.

Manitoba received $0.11 million in 1971 increasing to $0.12 million in 1972, decreased gradually to $0.10 million in 1974 and then steadily increased to $0.15 million in 1976. This represents an average yearly increase of 8.4 per cent ranging from a loss of 11.9 per cent between 1972 and 1973 to a gain of 38.9 per cent between 1975 and 1976.

Newfoundland received $3,000 in 1971 increasing to $11,800 in 1972 and then steadily declined to $3,000 in 1976. This represents a zero average yearly increase for this period.

Nova Scotia received $39,000 in 1971 increasing gradually to $49,000 in 1973, steadily decreased to

$24,000 in 1975 and then increased to $34,000 in 1976. This represents an average yearly increase of 1.5 per cent ranging from a loss of 41.6 per cent between 1974 and 1975 to a gain of 40.0 per cent between 1975 and 1976.

Ontario received $0.75 million in 1971 increasing to $0.79 million in 1972, decreasing to $0.75 million in 1973, increasing to $0.78 million in 1974, decreased to $0.72 million in 1975 and increased to $0.85 million in 1976. This represents an average yearly increase of 2.9 per cent ranging from a loss of 7.4 per cent between 1974 and 1975 to a gain of 18.3 per cent between 1975 and 1976.

Quebec received $0.82 million in 1971, this increased to $0.89 million in 1972, decreased gradually to $0.82 million in 1975 and increased to $0.92 million in 1976. This represents an average yearly increase of 2.6 per cent ranging from a loss of 4.6 per cent between 1972 and 1973 to a gain of 12.8 per cent between 1975 and 1976.

Table II-2.4

MCR Expenditures on Scientific Activities
Research Training

(in $ thousands)

Region	1971(%)	1972(%)	1973(%)	1974(%)	1975(%)	1976(%)
Atlantic:						
New Brunswick	-	-	-	-	-	-
Newfoundland	3	11	8	8	5	3
Nova Scotia	39	46	49	41	24	34
P.E.I.	-	-	-	-	-	-
	42(1.5)	57(1.8)	57(1.7)	49(1.5)	29(0.8)	37(1.0)
Quebec	818(28.5)	892(27.3)	351(25.7).	842(25.4)	816(23.9)	921(24.0)
Ontario	750(26.0)	792(24.2)	750(22.5)	776(23.4)	719(21.1)	350(22.2)
Prairies and B.C.:						
Alberta	162	199	183	179	190	237
B.C.	182	251	242	227	186	205
Manitoba	106	115	101	96	107	149
Saskatchewan	87	82	63	68	61	151
	537(19.7)	647(19.8)	589(17.8)	570(17.2)	544(16.0)	742(18.8)
Canadian Non-Universities	-	11(0.3)	5(0.2)	-	9(0.3)	-
Outside Canada	725(25.3)	869(26.6)	1,064(32.1)	1,080(32.5)	1,293(37.9)	1,301(34.0)
	2,872(100.0)	3,268(100.0)	3,316(100.0)	3,317(100.0)	3,410*100.0)	3,851(100.0)

SOURCE: based on Medical Research Council Tabulations

Saskatchewan received $87,000 in 1971, this decreased gradually to $63,000 in 1973, increased slightly in 1974 to $68,000 decreased to $61,000 in 1975 and increased to $151,000 in 1976. This represents an average yearly increase of 23.0 per cent ranging from a loss of 22.9 per cent between 1972 and 1973 to a gain of 146.3 per cent between 1975 and 1976.

Research training outside Canada was $0.73 million in 1971 and steadily increased to $1.3 million in 1976. This represents an average yearly increase of 12.8 per cent ranging from a maximum gain of 22.5 per cent between 1972 and 1973 to a minimum gain of 0.6 per cent between 1975 and 1976.

Comparing the percent average yearly increases of Research training between 1971 and 1976 (Table II-2.5) reveals that Saskatchewan had the highest value at 23.0 per cent while Newfoundland had the lowest at zero. Comparisons between Table II-2.3 and Table II-2.5 show an inverse relationship with respect to Saskatchewan and the Atlantic Provinces.

Regional Distribution of Research Related Activities

A breakdown of Research Related Activities by region is provided in Table II-2.6. As mentioned before, this area of support of MRC only involved 0.5 per cent of the total expenditures. The significant point here is that Canadian non-university areas receives the majority of these funds and the proportion of these has increased steadily from 78.5 per cent in 1972 to 88.1 per cent in 1976.

MRC Groups

As noted earlier, MRC Group Grants, a program under the Payments to R&D area, has increased its share of total MRC support expenditures markedly between 1971 and 1976. A more detailed analysis of this program follows.

In 1966, MRC established Groups to give special support to intensive work in promising fields. Groups are meant to be the means of seizing special opportunities to permit on occasion, the establishment of a team that could not be brought together within the usual university framework. The establishment of

distinguished multi-disciplinary teams is a definite objective.

The special features of the Group Program include the possibility of salary support for the investigators, operating funds to meet research costs over a five-year period and the possibility of renewal for further five-year periods. The members of a Group are expected to devote their entire research effort to the program of the Group and to be freed of the ordinary responsibilities of a faculty member.

The MRC Groups active up to 1976 are listed in Table II-2.7 and a breakdown of the Group program, according to principal investigators and collaborators involved, is provided in Table II-2.8.

In 1970-71 and 1971-72, there were four MRC Groups. There were two at the University of Montreal; one established in 1967 in Neurological Sciences, the other in 1971 in Drug Toxicology. The other Groups at that time were involved in Transplantation Research at the University of Alberta, established in 1970, and

Developmental Neurobiology at McMaster, established in 1971.

In 1972 two Groups were added bringing the total to six. These were the Medical Genetics Group at McGill University (Montreal Children's Hospital) and the Group in Hypertension at the Clinical Research Institute of Montreal (University of Montreal). In 1973, three additional Groups were formed. First, was the Allergy Research Group at the University of Manitoba, then the Group in Periodontal Physiology at the University of Toronto and finally the Molecular Endocrinology Group at the Centre Hospitaller de l'Universite Laval. In 1974, an additional Group was formed in Protein Structure and Function at the University of Alberta.

Up to 1975-76 ten MRC Groups were in operation with support from MRC totalling $4,002,287. The program, at that time, involved seven universities and supported forty-six principal investigators and seventy-nine collaborators.

MHbAL RESEARCH COUNCIL

LEVEL OF SUPPORT

YEAR ENDING MARCH 31st	1971	1972	1973	1974	1975	1976	1971	1972	1973	1974	1975	1976
PAYMENTS TOWARDS COSTS OF RESEARCH & DEVELOPMENT	($ 000)						(PERCENT DISTRIBUTION)					
GRANTS												
Grants-in-Aid of Research	22,479	23,568	23,837	26,242	27,333	30,318	66.2	66.1	63.6	65.2	63.7	63.9
Development Grants	1,230	1,113	988	762	957	1,003	3.6	3.1	2.6	1.9	2.2	2.1
MRC Group Grants	544	681	1,941	2,499	3,626	4,002	1.6	1.9	5.2	6.2	8.5	8,5
Special Projects	264	460	511	422	615	664	0.8	1.3	1.4	1.0	1.4	1.4
General Research Grants	1,215	815	820	820	624	624	3.6	2.3	2.2	2.0	1.5	1.3
Travel Grants	15	10	20	15	11	19	--	--	--	--	--	--
Training Grants	--	--	--	53	65	77	--	--	--	0.1	0.2	0.2
Sub-total Grants	25,747	26,647	28,117	30,813	33,231	36,707	75.8	74.7	75,0	76.4	77.5	77.4
AWARDS												
Associateships	1,661	1,674	1,723	1,871	1,951	2,215	4.9	4.7	4.6	4.6	4.6	4.7
Scholarships	1,776	2,016	2,175	2,372	2,351	2,634	5.3	5.7	5.9	5.9	5.5	5.5
Centennial Fellowships & Fellowships (PHD) 1	1,578	1,637	1,736	1,607	1,651	1,761	4.6	4.6	4.6	4.0	3.9	3.7
Visiting Scientists	202	145	163	206	89	83	--	--	--	--	--	--
Sub-total Awards	5,217	5,472	5,797	6,056	6,042	6,693	15.4	15.4	15.5	15.0	14.2	14.1
TOTAL RESEARCH & DEVELOPMENT	30,964	32,119	33,914	36,869	39,273	43,400	91.2	90.1	90.5	91.4	91.7	91.5
RESEARCH TRAINING												
Studentships	1,033	1,086	1,013	963	919	972	3.0	3.0	2.7	2.4	2.1	2.0
Summer Scholarships	260	410	312	308	210	215	0.8	1.2	0.8	0.8	0.5	0.5
Centennial Fellowships & Fellowships (MD;DVM?DDS)2	1,578	1.773	2,037	2,046	2,280	2/642	4.6	5.0	5.5	5.0	5.3	5.6
Sub-total Educ. Support	2,871	3,269	3,362	3,317	3,409	3,829	8.4	9.2	9.0	8.2	7.9	8.1
RESEARCH RELATED ACTIVITIES												
Symposia	--	--	47	49	24	37	--	--	0.1	0.1	0.1	0.1
Other Activities	128	244	123	112	145	157	0.4	0.7	0.5	0.3	0.3	0.3
Visiting Professors	--	11	14	11	10	10	--	--	--	--	--	--
TOTAL RELATED ACTIVITIES	2,999	3,524	3,546	3,489	3,588	4,033	8.8	9.9	9.5	8.6	8.3	8.5
TOTAL	33,963	35,643	37,460	40,358	42,861	47,433	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: 1 Estimated Fellowships and Centennial Fellowships awarded to PhD's

2 " " " " " " MDfDDS/DVM's

3 Details of estimates for items 1 and 2 suggested by The Medical Research Council.

Table II-2.2

KCRE>menditures on Scientific Activities

Payments towards R a D

(in $ thousands)

Region	1971(%)	1972{%)	1973(%)	1974(S)	1975(%)	1976(%)
Atlantic:						
New 3runswick	2	5	-	-	-	-
Newfoundland	251	364	303	394	546	560
Nova Scotia	339	928	867	973	1,082	1,493
P.E.I.	-	-	-	-	-	-
	1,098(3,5)	1,297(4.0)	1,170(3.4)	1,372(3.7)	1,628(4.1)	2,053(4.7)
Quebec	10,708(34.6)	11,332(35.3)	12,024(35.5)	13,080(35.5)	13,377(34.1)	14,973(34.5)
Ontario	9,951(32.1)	10,916(34.0)	11,747(34.6)	12,656(34.3)	13,369(34.0)	15,187(35.0)
Prairies and B.C.:						
Alberta	2,304	2,271	2,427	2,541	3,302	3,899
B.C.	2,331	2,336	2,362	2,370	2,585	2,517
Manitoba	2,301	2,071	2,260	2,701	2,580	2,561
Saskatchewan	1,265	882	841	1,071	1,178	1,023
	8,201(26.5)	7,560(23.5)	7,890(23.3)	8,683(23.5)	9,645(24.6)	10,000(23.0)
Canadian Non-Universities	272(0.9)	87(0.3)	75(0.2)	29(0.1)	113(0.3)	38(0.1)
Outside Canada	732(2.4)	928(2.9)	1,009(3.0)	1,051(2.9)	1,139(2.9)	1,150(2.7)
	30,962(100.0)	32,120(100.0)	33,915(100.0)	36,871(100.0)	39,271(100.0)	43,401(100.0)

SOURCE: based on Medical Research Council Tabulations

Table II-2.3

PER CENT AVERAGE YEARLY INCREASE
OF PAYMENTS TO R & D BETWEEN
1971 & 1976*

	(per cent)
Newfoundland	19.2
Nova Scotia	13.1
Alberta	11.6
Ontario	8.9
Quebec	7.0
Manitoba	2.7
British Columbia	1.6
Saskatchewan	-2.2

*Based on data from Table II-2.2

Table II-2.5

PER CENT AVERAGE YEARLY INCREASE
OF RESEARCH TRAINING BETWEEN
1971 & 1976*

	(per cent)
Saskatchewan	23.0
Outside Canada	12.8
Alberta	8.8
Manitoba	8.4
British Columbia	4.1
Ontario	2.9
Quebec	2.6
Nova Scotia	1.5
Newfoundland	0

*Based on data from Table H-2.2

Table 11-2,6

MCR Expenditures on Scientific Activities

Research Related Activities[a)]

(in $ thousands)

Region	1972(%)	1973(%)	1974(%)	1975(%)	1976(%)
Atlantics					
New Brunswick	-	-	-	-	-
Newfoundland	1	-	1	-	1
Nova Scotia	2	1	1	-	1
P.E.I.	-	-	-	-	-
	3(1.0)	1(0.4)	2(1.0)	-(0.2)	2(1.0)
Quebec	8(3.2)	11(5.8)	4(2.4)	1(0.8)	6(2.7)
Ontario	20(8.0)	10(5.6)	4(2.1)	9(5.0)	5(2.7)
Prairies and B.C.*					
Alberta	6	3	2	8	3
B.C.	1	2	1	1	-
Manitoba	5	2	1	1	7
Saskatchewan	2	4	1	2	1
	14(5.6)	11(5.8)	5(2.6)	12(7.5)	11(5.5)
Canadian Non-Universities	200(78.5)	141(76.2)	139(80.4)	155(86.5)	180(88.1)
Outside Canada	9(3.7)	11(6.2)	20(11.5)	-	-
	254(100.0)	185(100.0)	174(100.0)	177(100.0)	204(100.0)

a) Distribution according to region in 1971 unavailable.

SOURCE: based on Medical Research Council Tabulations

MRC Groups

Research Area	Location	Date Established
Neurological Sciences	University of Montreal	1967
Transplantation Research	University of Alberta	1970
Developmental Neurobiology	McMaster University	1971
Drug Toxicology	University of Montreal	1971
Medical Genetics	McGill University {Montreal Children's Hospital)	1972
Hypertension	Clinical Research Institute of Montreal (University of Montreal)	1972
Allergy Research	University of Manitoba	1973
Periodontal Physiology	University of Toronto	1973
Molecular Endocrinology	Laval University	1973
Protein Structure & Function	University of Alberta	1974

SOURCE: MRC Reports of the President, 1970-71 to 1975-76.

Table II-2.8

MRC GROUPS

Principal Participants

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
No. of Groups	2	4	6	9	10	10
No. of Principal Investigators	n/a	14	27	41	45	46
No. of Collaborators	n/a	16	n.a.	51	58	79
Support ($ 000)	544	681	1,941	2,499	3,626	4,002

SOURCE: MRC Reports of the President, 1970-71 to 1975-76.

3. The National Research Council's Office of Scholarships and Grants-in-Aid of Research

The purpose of the National Research Council's Program of Scholarships and Grants-in-Aid of Research is to support, in a comprehensive way, research carried out mainly, but not exclusively, in Canadian universities and to maintain a research capacity and competence in the natural sciences and engineering.

Specifically, the Program aims at achieving the following objective and sub-objectives.

Objective:

- To provide and support the development and maintenance of research and the provision of highly qualified manpower in the natural sciences and engineering.

Sub-objectives;

~ To support excellence in research for the creation of new knowledge in the natural sciences and engineering;

- to provide and support the development of research in selected fields of regional and national importance;

- to assist in the provision and development of highly qualified manpower.

The granting program that NRC has developed to support research in Canadian universities are closely aligned with the sub-objectives and can be thus grouped into three categories. These categories are:

i) peer-adjudicated grants, which includes operating and equipment grants to individuals as well as to groups;

ii) developmental and general research grants, which includes negotiated development grants; and finally,

iii) highly qualified manpower training awards

We will consider each of these categories in turn, briefly describe their purpose, and show the relative importance NRC has placed on these programs since the beginning of the decade.

A fourth activity is a collection of miscellaneous research related activities, referred to in this text as national and international activities. They are not directly related to any of the sub-objectives described

above and include support of the International Biological Program, grants for publications and conferences, and affiliations to international scientific associations.

A breakdown of NRC's expenditures, for the period from 1970-71 to 1976-77, according to these programs, and grouped as described above, is presented in Table II-3.1.

From Table II-3.1 we can see that the distribution of funds between the following four categories, peer-adjudicated grants, developmental grants, HQM training and development awards, and national and international activities, has remained fairly constant. The only significant changes are that the percentage of funds distributed to national and international activities have decreased at the expense of development grants. This has been due basically to the phasing out of the International Biological Program and an increase in the funds distributed as general development assistance grants.

Peer-adjudicated grants to individuals and groups have accounted for the largest percentage of NRC's expenditures; indeed, between 1970-71 and 1975-76, these grants represented about 70 per cent of the total expenditures. Most of the funds in this category were distributed to individuals as opposed to groups of researchers; for example, in 1975-76 $53.0 million was distributed as grants to individuals as compared with $3.1 million as grants to groups. It will be noted from Table II-3.1 that until 1975-76 the expenditures due to peer-adjudicated grants to individuals remained stable around $44 million; only in 1975-76 when they significantly increased to $53.0 million.

Developmental Grants and Highly Qualified Manpower Training and Development Awards accounted for roughly comparable fractions of expenditures, that is to say around 14 per cent. However, various components within these categories changed in different ways during the period from 1970-71 to 1975-76. For example, whereas grants for specific research undertakings have not increased significantly remaining for most of the time around $5 million, grants for general development

assistance rose from $2.9 million in 1970-71 to $5.4 million in 1975-76, representing an average annual increase of 12.9 per cent.

The largest percentage of funds distributed for HQM Training and Development is accounted for by awards to post-graduate students for research training. However, from Table II-3.1 it can be seen that these funds have not increased significantly between 1970-71 and 1975-76 and have remained around $8 million. Awards to post-doctorate fellows and to senior researchers increased from $1.4 million in 1970-71 to $3.1 million in 1975-76 probably reflecting NRC's perception of the present employment difficulties for young researchers.

i) Peer-Adjudicated Grants

a) Grants to Individuals

The largest component of NRC's expenditures in supporting research in Canadian universities is accounted for by the peer-adjudicated grants to individuals. These include operating grants, equipment grants for requests up to $5 thousand, special computing grants, and major equipment grants. Their purpose is to

contribute to the normal operating cost of the individual researcher or assist in purchasing equipment. The special computing grants program was intended to help individual researchers cover their computing costs terminated in 1975-76.

Grants are awarded to researchers on the basis of the merit of their research proposal and their proven excellence in research as judged by their peers. In order to review the applications, they are assigned to appropriate grant selection committees. There are currently eighteen discipline-oriented grant selection committees as well as a special sub-committee that adjudicates requests for equipment in excess of $5 thousand, (see Table II-3.10). The grant selection committees are composed of scientists with recognized research experience, who are mainly from universities but can also be from industry or government laboratories.

Each grant selection committee has an overall budget allocated to it by the NRC Sub-Committee on Allocations. In general, applications for operating grants, etc., are adjudicated only once a year, however,

the NRC does have a speical provision for accepting and reviewing requests at any time of the year for the immediate support of new research ideas when so warranted.

A summary of the distribution of expenditures on peer-adjudicated grants to individuals for the period from 1970-71 to 1975-76 is presented in Table II-3.2. From this table it can be seen that operating grants account for the largest percentage of expenditures; also, the proportion of expenditures attributable to operating grants increased from 81 per cent in 1970-71 to 92 per cent in 1975-76. The expenditures on special computing grants has gradually decreased as this program was being phased out indeed, in 1975-76 there were no awards. Expenditures on equipment and major equipment account for about 1.0 per cent or less of the total expenditures in this category.

Table II-3.3 presents a breakdown of the number of applications and the success rate of applicants for operating grants, computing grants, equipment grants and major equipment grants for the years from 1970-71 to 1975-76.

The number of applications for operating grants increased from 5,260 in 1970-71 to 5,638 in 1975-76, representing an average annual growth rate of only 1.4 per cent. During this period, the success rate remained fairly high, however, it increased slightly from 87.9 per cent in 1970-71 to 90.9 per cent in 1975-76. It is interesting to note that the small increase in the number of applicants and the success rate was accompanied by a significantly larger increase in the expenditures on operating grants. As seen from Table II-3.4 in 1970-71 expenditures on operating grants were $35,223 thousand and in 1975-76 they amounted to $48,880 thousand, representing an average annual growth rate of 6.8 per cent.

The number of applications for equipment grants and the success rates of these applicants has been quite erratic. It seems that the number of applications has declined significantly since 1970-71, however the success rate, although remaining quite low at around 35 per cent, has not increased uniformly. Furthermore, as can be seen from Table II-3.2, the expenditures on equipment grants decreased at an average rate of 2.7 per cent per year, from $3,461 thousand in 1970-71 to $3,015 thousand in 1975-76.

The number of awards and expenditures on major equipment grants is even more erratic. In some years, when the number of applications was quite low (in the order of 10-20), all applicants were successful. However, in other years, when the number of applications was larger (around 50 per year), the percentage of successful candidates was only about 20 per cent. The overall effect is that, with the exception of 1974-75 when only 5 grants were awarded, the number of major equipment grants awarded has been fairly constant (between 13 and 18 per year).

A distribution of the number of awards and expenditures for operating grants (including special computing grants) according to province for the years from 1970-71 to 1975-76 is presented in Table II-3.4. Immediately obvious from this table, the percentage distributions of both awards and expenditures has remained (almost boringly) constant. The ranking of the provinces according to the percentage of number of awards parallels the ranking according to the percentage of expenditures. However, for Ontario, Alberta and British Columbia the percentage of number

of awards is less than the percentage of expenditures whereas for all the other provinces the reverse holds true.

Ontario receives the largest share of operating grants, roughly 42 per cent, Quebec is next with roughly 17 per cent of the total expenditures, Alberta and British Columbia each receive about the same proportion, roughly 12 per cent, whereas, the two remaining Prairie provinces each receive about 4 per cent of the funds.

b) Grants to Groups

The NRC has mechanisms whereby it promotes and supports the research activities of groups of researchers. Sometimes the support is for operation of large facilities such as nuclear reactors (sometimes shared by researchers from several institutions). The majority of these grants are in the fields of chemistry and physics and include Institute Grants as well as Nuclear Physics Grants.

Because of the need of some high-energy nuclear physicists to perform their experiments on very sophisticated experimental facilities which may not exist in the country, a special program known as High Energy Physics Grants has been created by NRC. Also, NRC has a special granting program to assist research groups acquiring very expensive equipment or research facilities and are referred to as Major Installation Grants.

A summary of the expenditures on grants to groups of researchers for the period from 1970-71 to 1975-76 is presented in Table II-3.5. From this table one can see that the expenditures on Nuclear Physics grants accounts for the largest share of the total expenditures; however, the proportion of the expenditures due to High Energy Physics grants has increased since 1970-71 to the point where today it is almost at the same level as the Nuclear Physics grants. In 1975-76 funds to Nuclear Physics grants amounted to $1,219 thousand and High Energy Physics grants amounted to $1,156 thousand.

Expenditures due to Institute grants and Major Installation grants are much smaller and seemingly erratic. The funds distributed as Institute grants increased slightly from $480 thousand in 1970-71 to $596 thousand in 1975-76.

ii) Developmental Grants

The NRC has a program designed specifically to promote either the development of specific research undertakings into selected fields of scientific, socio-economic or resource development in Canada or the enhancement of the quality of research in particular regions.

a) Grants for Specific Research Undertakings

The largest component in the category of Developmental Grants is that of Negotiated Development Grants, a means whereby NRC can enter into a partnership with a university to share the cost of initiating or developing research in areas of significance to the scientific, regional, socio-economic, or resource development of the country. Whereas most of NRC's grants are awarded for only one year, these grants are

awarded over longer periods, normally three to five years. These grants are reviewed by a special committee on Negotiated Grants. In December 1975, the NRC suspended consideration of new proposals for one year during which time the program was reviewed.

One should also include in this category NRC's Project Research Applicable to Industry (PRAI) grants which allow NRC to capitalize on advances in university research that show potential for eventual commercial exploitation in Canada. This program provides financial support for the further development of such advances in university laboratories to the point where they can be transferred to industry. These grants have a maximum duration of two years.

Finally, the NRC has "special grants", awarded on an ad-hoc basis to projects which fall outside the scope of NRC's regular grants programs, sometimes initiated by the NRC itself. These special grants are awarded in very limited numbers and account for small amounts of money.

Table II-3.6 presents a summary of expenditures on all Developmental grants for specific research undertakings. Funds distributed as Negotiated Development grants account for the largest share of expenditures however, the level of funding remained fairly constant at around $4 million between 1970-71 and 1975-76 (see Table II-3.6).

b) Grants for General Development Assistance

The NRC has established programs which help to provide for the establishment of a basic level of research at universities throughout Canada. This responsibility is usually considered to be that of the provinces. The programs included in this category are Regional Development grants, Special Assistance grants to small universities, and General Research grants.

Regional Development grants enable NRC to help in creating, restoring or improving the environment for research in certain regions where the need and value of doing so is clearly in the national interest. At present, this program has only been extended to francophone Quebec and the Maritimes.

Recently, the NRC recognized the problem of assisting small universities and created a special program quite separate from the Regional Development grants program or the General Research grants program.

General Research grants provide a measure of flexibility in the allocation of research monies within universities. The funds are given to the presidents of universities where an appreciable volume of research is already being supported. The allocation of money to each eligible university is calculated on the basis of the operating grants awarded.

Table II-3.7 shows how the General Research grants, Regional Development grants, and grants to small universities have been distributed between the four regions of Canada, namely the West, Ontario, Quebec and the Maritimes. Since the beginning of the decade, the funds distributed through these mechanisms increased from $2.9 million in 1970-71 to $5.4 million in 1975-76; this represents an average annual growth rate of 12.9 per cent which is well in keeping with the rate of inflation during that period. The

percentage distribution did not vary significantly between 1970-71 and 1975-76; Quebec received the largest share (roughly 36 per cent, Ontario the next largest (about 32 per cent), the West 22 per cent, and the Maritimes about 10 per cent.

iii) Highly Qualified Manpower Training and Development Awards

There are three components to this activity. The first is concerned with scholarships awarded to post-graduate students to enable them to study for an advanced degree. In addition to the main scholarship program there are special programs for awards to outstanding students, and also for those studying for an advanced degree in the field of science librarianship and documentation. These latter programs are quite small and account for a very small fraction of the total expenditures on scholarships.

The second component in this category of activities is concerned with post-doctorate fellowships. These are awarded to persons who have recently completed their doctoral studies and would benefit

from an opportunity to add to their research experience. The majority are tenable at universities, however, an increasingly larger fraction are being held in industrial organizations.

The third component is concerned with awards to more senior researchers, some are awarded to university faculties to enable them to spend a period of time at another laboratory, possibly in an industrial organization; while others are designed specifically to provide young, outstanding researchers the opportunity to develop their own ideas.

From Table II-3.1 one can see that the share of NRC's total expenditures that are attributable to the highly qualified manpower training and development program remained fairly stable since 1970-71 at about 14 per cent. In 1970-71, the HQM training and development program accounted for $9.4 million and in 1975-76 this total increased to $11.4 million representing an average annual growth rate of 3.8 per cent. The share of the total expenditure on HQM training

and development distributed as post-graduate scholarships decreased from 85.4 per cent in 1970-71 to 73.2 per cent in 1975-76; at the same time, the share distributed as post-doctorate fellowships and senior researcher awards increased from 14.6 per cent in 1970-71 to 26.8 per cent in 1975-76.

Table II-3.8 presents a distribution, by province, of NRC's post-graduate and post-doctorate awards for the years from 1970-71 to 1975-76. Included in this table are not only all the awards held in Canadian universities but also those held in institutions abroad. It is evident from this table that the distribution of post-graduate awards among the provinces has not changed significantly since the beginning of the decade. It is interesting to note however that wards held outside of Canada increased from in 1970-71 to 6.7 per cent in 1975-76. The largest number of awards were held in Ontario and the second largest number in Quebec, however, the number is only about half that for Ontario. The smallest number of awards are held in

the Maritime provinces accounting for about 4 per cent of all awards.

Table II-3.8 shows that the distribution of post-doctorate awards to Canadian universities and abroad changed slightly between 1970-71 and 1975-76. Most importantly, the number of awards held at institutions outside of Canada dropped from per cent in 1970-71 to 25.7 per cent in 1975-76. The largest number of awards are held in Ontario, and indeed Ontario's share has increased since 1970-71. The number of awards held in Quebec is the second largest, however, it is less than half the number held in Ontario. The total number of awards held in the Maritime provinces is the smallest accounting for only about 2 per cent of all awards.

Table II-3.9 presents a summary of the success rates of applicants for NRC's regular post-graduate scholarships and university post-doctorate fellowships for the period from 1970-71 to 1975-76. It is interesting to note that whereas the number of applications

Table 11-3.1

Distribution of NRC's Expenditures by Activity

(in $ millions)

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
			(in $ millions)			
Peer Adjudicated Grants						
to Individuals[1]	43.5	43.9	43.6	45.6	44,8	53,0
to Groups[2]	2.6	3.0	2.7	n/a	2.7	3.1
Total:	46.1	46.9	46.3		47.5	56.1
Developmental Grants						
Specific Research Undertakings[3]	4.0	4.5	5.1	n/a	5.3	4.8
General Development Assistance[4]	2.9	4.0	4.1	4.4	5.4	5.4
Totals	7.0	8,5	9.3		10.6	10.2
IIQM Training and Development						
Post-graduate Awards	8.0	7.9	7.0	6.9	7.0	8.3
Post-doctorate Awards	1.3	1.5	1.7	2.0	2.1	2.2
Senior Level Awards	0.1	0.3	0.3	0.5	0.6	0.9
Total:	9.4	9.7	9.0	9.3	9.7	11.4
National and Int'l Activities	2.3	2.4	2.0	1.4	1.3	1.3
Grand Total:	64.8	67.5	66.6	68.6	69.3	79.0
			(in percentages)			
Peer Adjudicated Grants	71.1	69.4	69,6		68.7	71.0
Developmental Grants	10.7	12.6	13.9		15.4	13.0
KQM Awards	14.5	14.3	13.5	13.6	14.1	14.4
Nat'l and Int11 Activities	3.6	3.6	3.0	2.0	1.9	1.6

Source: NRC's Annual Report

1) Includes Operating Grants, Special Computing Grants, Equipment and Major Equipment Grants.
2) Includes Nuclear Physics Grants, High Energy Physics Grants, Institute Grants and Major Installation Grants.
3) Includes Negotiated Development Grants, PRAI Grants, and Special Grants.
4) Includes General Research Grants, Regional Development Grants, and Special Assistance Grants;

n/a - not available due to insufficient disaqcrreaation of information

Table 11-3,2

Distribution of Expenditures on Peer-Adjudicated Grants to Individuals

(in $ thousands)

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
Operating Grants	35,223	36,899	37,782	40,662	42,036	48,880
Computing Grants	3,750	2,323	1,746	258	86	-
Equipment Grants	3,461	3,493	2,566	3,209	2,372	3,015
Major Equipment Grants	1,088	1,154	1,490	1,493	355	1,152
Total	43,522	43,869	43,584	45,622	44,847	53,047
			(percentages)			
Operating Grants	80.9	84.1	86.7	89.1	93.7	92.1
Computing Grants	8.6	5.3	4.0	0.6	0.2	-
Equipment Grants	8.0	8.0	5.9	7.0	5.3	5.7
Major Equipment Grants	2.5	2.6	3.4	3.3	0.8	2.2

Source: Data obtained from NRC's Annual Report

Table 11-3,3

Summary of Number of Applications and Success Rate for Peer-Adjudicated Grants to Individuals

	Operating Grants		Computing Grants		Equipment Grants		Major Equipment Grants	
	Applications Received	% Awarded	Applications Received	% Awarded	Applications Received	% Awarded	Applications Received	% Awarded
1970-71	5,260	87.9	n/a	n/a	969	31.6	60	21.7
1971-72	5,540	87,8	1,235	91.0	911	31.7	13	**100.0**
1972-73	5,540	88.5	955	80.7	614	35.0	18	**100.0**
1973-74	5,618	88.6	36	88.8	561	45.1	17	**100.0**
1974-75	5,605	90.4	25	56.0	489	35.4	44	11.4
1975-76	5,638	90.9	-	-	517	38.3	55	23.6

Source: Data obtained from the Office of Grants and Scholarships of the NRC

n/a - not available

Table 11-3,4

Distribution of Operating Grants[1] according to Province

(in percentages)

	1971-72		1972-73		1973-74		1974-75		1975-7$	
	Awards	Expen-ditures	Awards	Expen-ditures	Awards	Expen-ditures	Awards	Expen-ditures	Awards	Expen-ditures
Atlantic Provinces	8.3	6.3	8.4	6.4	**8.8**	**6.6**	**8.8**	**6.8**	9.1	7.1
Quebec	18.1	16.9	18.2	16.6	18.9	16.8	19.2	16.6	19.3	16.6
Ontario	42.1	44.7	41.8	44.7	41.7	45.2	41.8	45.3	42.4	45.7
Manitoba	4.8	4.4	4.8	4.5	4.8	4.3	4.6	4.3	4.7	4.3
Saskatchewan	3.8	3.4	3.8	3.4	3.6	3.3	3.6	3.4	3.6	3.3
Alberta	11.0	11.5	11.1	11.4	10.5	**11.0**	10.3	10.9	**10.0**	**10.8**
British Columbia	**12.0**	**12.8**	11.9	12.9	11.7	12.7	11.6	12.7	**11.0**	12.3
Totals:[2]	4,865	39,277	4,901	39,528	4,977	40,920	5,068	42,122	5,124	48,880

Source: Data obtained from the Office of Grants and Scholarships of NRC

1) Includes also funds distributed as special Computing Grants

2) Totals for expenditures are in thousands.

Table 11-3.5

Summary of Expenditures on Grants to Research Groups and Facilities

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
Nuclear Physics	1,060	1,104	1,075	1,095	1,120	1,219
High Energy Physics	711	980	981	989	1,015	1,156
Institute	480	451	398	421	379	596
Major Installations	300	450	250	n/a	238	90
Total	2,557	2,985	2,704		2,752	3,061
			(in percentages)			
Nuclear Physics	41.5	34.8	39.8		40.7	39.8
High Energy Physics	28.0	32.8	36.3		36.9	37.8
Institute	18.8	15.1	14.7		13.8	19.5
Major Installations	11.7	15.1	9.2		8.6	2.9

Source: NEC's Annual Reports
Analysis of Some Aspects of the Programme of Scholarships and Grants in Aid, NRC, August 1973.
n/a - not available

Table 11-3.6

Summary of Expenditures through Developmental Grants for Specific Research Undertakings

(in $ thousands)

	Negotiated Development Grants	P R A I Grants	Special Grants	Total Grants
1970-71	3,853	n/a	n/a	4,022
1971-72	3,783	n/a	n/a	4,468
1972-73	3,985	n/a	n/a	5,149
1973-74	4,087	821	n/a	
1974-75	3,744	967	549	5,260
1975-76	4,013	609	199	4,821

Sources NRC's Annual Report

n/a - not available due to insufficient disaggregation of present information

Table II-3.7

Distribution of NRC's General Research Grants and Regional Development Grants according to Region

(in $ thousands)

	General Research Grants				Regional Development Grants[1]				Grants to Small Universities[2]				Total			
	Maritimes	Quebec	Ontario	West	Maritimes	Quebec	Ontario	West	Maritimes	Quebec	Ontario	West	Maritimes	Quebec	Ontario	West
1970-71	n/a	n/a	n/a	n/a	-	-	-	-	-	-	-	-	n/a	n/a	n/a	n£
1571-72	284.0	552.5	1309.0	903.0	113.5	881.8	-	-	-	-	-	-	397.5	1434.3	1309.0	903.0
1972-73	291.2	529.1	1310.4	910.1	226.8	869.7	-	-	-	-	-	-	513.0	1398.8	1310.4	910.1
1573-74	300.3	603.8	1308.0	970.2	228.4	968.5	-	-	-	-	-	-	528.7	1572.3	1308.0	970.2
1974-75	191.0	706.3	1663.3	1163.3	442.3	1218.6	-	-	-	-	-	-	633.2	1924.9	1663.3	L163.3
1575-76	226.4	692.0	1552.7	1071.9	358.5	1248.8	-	-	40.0	-	137.0	81.2	624.9	1340.8	1689.7	1153.1

1) The programme of Regional Development Grants only began in 1971-72 and has been restricted to francophone universities in Quebec and small universities in the Maritimes.
2) The programme of Special Assistance to Small Universities only began in 1975-76.

n/a - not available

Table XI-3.8

Percentage Distribution of Post-graduate and Post-doctorate Awards held at Canadian Universities and Abroad

(in percentages)

	Post-graduate Awards					Post-doctorate Awards				
	1971-72	1972-73	1973-74	1974-75	1975-76	1971-72	1972-73	1973-74	1974-75	1975-76
Universities in:										
Atlantic Provinces	4.8	5.1	4.2	3.9	3.8	3.7	2.6	2.4	2.8	1.4
Quebec	20.9	22.9	23.7	23.2	21.5	4.2	6.1	8.0	9.6	6.0
Ontario	44.1	42.8	41.7	43.2	43.6	11.6	13.4	16.3	16.0	14.7
Manitoba	3.6	3.9	3.5	4.4	4.7	3.2	-	-	1.6	2.3
Saskatchewan	2.0	1.5	1.4	1.4	1.9	-	-	-	-	-
Alberta	9.7	9.2	9.1	8.1	7.7	3.7	4.3	2.4	6.4	6.9
British Columbia	11.6	11.4	12.2	10.4	10.2	11.6	10.0	7.6	7.2	8.7
Outside Canada	3.3	3.1	4.2	5.3	6.7	42.6	34.2	26.7	19.2	25.7
Total Numbers[1)]	2,103	2,022	1,723	1,694	1,737	190	231	251	250	218

Source: Statistics made available by the Office of Grants and Scholarships of the NRC.

1) Included in the total number of post-graduate awards are the regular NRC scholarships, the 1976 Science Scholarships, and Bursuaries; and included in the total number of post-doctorate awards are both university and industrial fellowships. The proportions of post-doctorate awards held at industrial institutions within Canada are not included in this table.

Table II-3.9

Summary of the Success Rates of NRC's Regular Post-graduate and Post-doctorate Awards Programmes

	Post-graduate Awards1)					Post-doctorate Awards2)				
	Applications Received	Awards Offered	% Awarded	Awards Accepted	% Accepted	Applications Received	Awards Offered	% Awarded	Awards Accepted	% Accepted
1970-71	4,750	2,072	43.6	1,772	85.5	561	218	38.9	182	83.5
1971-72	4,839	1,977	40.9	1,620	81.9	578	226	39.1	170	75.2
1972-73	4,185	1,933	46.2	1,554	80.4	629	230	36.6	183	79.6
1973-74	4,066	1,923	47.3	1,548	80.5	667	225	33.7	177	78.7
1974-75	3,926	1,959	49.4	1,572	80.2	637	232	36.4	188	81.0
1973-76	4,102	1,985	48.4	1,625	81.9	511	191	37.4	143	74.9

Source; NRC's Annual Reports

1) Post-graduate awards in this table include only the regular NRC shcolarships.

2) Post-doctorate awards in this table include only those fellowships held in universities.

Table 11-3.10

The National Research Council's Discipline-Oriented Grant Selection Committees

Animal Biology
Cellular Biology and Genetics
Plant Biology
Population Biology
Psychology
Chemistry
Physics
Nuclear Physics
Computer and Information Science
Pure and Applied Mathematics
Space Research and Astronomy
Chemical and Metallurgical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering
Earth Science
Global Atmosphere Research Programme
Interdisciplinary Science

TABLE I1-3.11

THE SUPPORT OF POST-GRADUATE STUDENTS BY THE NRC

	Highly Qualified Manpower[1] Training and Development		Peer-Adjudicated Grants and Development Grants	
	Number of Awards Accepted	Expenditures (in $ millions)	Number of FTE Students[2)4)]	Expenditures (in $ millions)[3]
1970-71	2,340	8.23	3,110	9.33
1971-72	2,103	**8.11**	2,959	9.41
1972-73	1,909	**7.10**	**2,686**	8.54
1973-74	1,726	6.90	2,551	8.57
1974-75	1,696	7.03	2,491	8.37
1975-76	1,735	8.32	2,051	9.23
1976-77	1,790[2)]	8.943)	2,060	9.92

1) Data obtained from NRC's annual reports. Included are Post-graduate scholarships, Bursaries, Post-graduate scholarships in Librarianship and Documentation, Post-Industrial Experience Research fellowships, and 1967 Scholarships,

2) Data obtained from NRC's Background study on "Age-Relevant Characteristics of University Researchers Supported by NRC",

3) Data obtained from NRC's Office of Grants and Scholarships.

4) Estimates of the number of full-time equivalent FTE students supported indirectly through peer-adjudicated grants and developmental grants are obtained by dividing the expenditures attributed to the support of post-graduate students from these grants by the maximum payment allowable under NRC regulations to students while being employed as research assistants.

for post-graduate scholarships declined from 1970-71 to 1975-76, the number of scholarships awarded remained almost invariant. Similarly, the number of university post-doctorate fellowships awarded remained fairly constant. Since less than half of those applying for post-graduate and post-doctorate awards are successful, it would be perhaps instructive to know what happened to the unsuccessful ones. Some certainly received money from operating grants awarded to their research supervisors (see Appendix). Finally, one should note that not all awards are eventually accepted; the acceptance rates decreased slightly since 1970-71 remaining around 80 per cent.

4. The Canada Council

The Canada Council, created by an Act of Parliament in 1957 to promote the arts, the humanities and the social sciences carries out its work mainly through a broad program of fellowships and grants. In order to discharge these responsibilities, the Council is divided into two divisions: one devoted to the arts, and the other to the social sciences and humanities. It receives assistance in developing its policies and

program for the support of the latter from the Advisory Academic Panel.

The basic objectives of the Social Sciences and Humanities Division are to support independent research in the social sciences and humanities, to stimulate Canadian studies, and to communicate the results of such research to the public.

Included in the large diversity of fields supported by the Social Sciences and Humanities Division are:

Administrative Studies
Anthropology
Archaeology
Architecture and Design
Classics
Communication Studies
Criminology
Demography
Economics
Education
Geography
History
Industrial Relations
Information Services (Library Science also)
Law
Linguistics
Philosophy
Psychology
Political Science
Religious Studies
Social Work
Sociology
Urban and Regional Studies
Interdisciplinary Studies

Furthermore, the Humanities and Social Sciences Division supports advanced research and studies on the philosophy and history of art, theatre and music as well as biographical studies of artists and certain types of critical analyses of their works.

A variety of granting instruments have been developed to meet the needs of the social sciences and humanities community. These granting instruments can be classified as grants towards the costs of research, research training awards and mechanisms to support research related activities. A breakdown of expenditures by the Canada Council between 1971 and 1976 according to these three categories of support is provided in Table II-4.1. The total support has risen from just over $18 million in 1970-71 to just over $25 million in 1975-76. This represents an average yearly increase of 7.7%.

Payments Towards Costs of R&D now play a considerably more prominent role in the Canada Council funding activities than previously. While in 1971-72, this area of support accounted for 32 per cent of total expenditures, it has since grown to 52 per cent in

1975-76. This growth, from $5.9 million to $13.1 million represents an average annual rate of 18 per cent. The Leave Fellowships program has been the main contributor to this increase, having increased from $1.7 million in 1971-72 to $3.8 million in 1975-76.

The largest component of the Councils[1] grants towards the cost of research are referred to simply as "Research Grants". These grants are offered in support of a coherent project with a clearly stated objective and a well defined plan for reaching that objective. They are intended to defray only actual direct costs attributable to a project and not to contribute to the income of the principal investigators nor university overhead costs.

Each Research Grant proposal is examined by peers within the same discipline and may also involve adjudicators suggested by the applicants themselves. The awards are made on the basis of this peer review and the advice of a broadly representative panel of academic advisors who consider both the assessors' opinions and

Council policies. The awards are tenable for periods up to three years duration.

In the five years since 1971-72, Research Grants have increased from $4.3 million to $5.7 million or by some 5.6 per cent per year. Their share of total expenditures has remained fairly constant arqund 23 per cent. Currently, 681 scholars are supported in this program, compared with 880 supported in 1971-72.

In this category of grants towards the costs of research the Canada Council has established Negotiated Grants that provide funds for projects requiring long-term commitment and support. Most of these grants are referred to as Program, Grants and often involve cooperation among several groups. However, there also exists Major Editorial Grants which provide support specifically for the editing and publication of a clearly defined corpus of research material.

Negotiated Grants cover salaries for principal investigators and support staff, technical services costs, research material, conferences and travel and

publication costs. Begun in 1975, these grants account for 4.9 per cent of total expenditures. In 1975-76, $0.6 million was distributed as Major Editorial Grants, and $0.6 million was distributed as Programme Grants.

The Council also has General Research Grants; these are awarded directly to Canadian universities to enable them to meet certain requirements of their teaching staff, such as costs of travel to conferences and small research expenses. The grants are made on a formula basis according to the number of full-time faculty in the humanities and social sciences and the amount of Canada Council Research Grants and Leave Fellowships received by the institution's faculty. Begun in 1974, General Research Grants have increased from $0.3 million to $1.2 million in 1976, and now account for 4.9 per cent of the total expenditures.

The Humanities and Social Sciences Division shares in a program of the Canada Council as a whole which fosters new forms of expression and public participation

as well as research directed towards the history and cultural heritage of Canada. This program, referred to as the Explorations Program, was begun in 1973. By 1975-76, the funds distributed to the social sciences and humanities amounted to $0.6 million.

Finally, the Canada Council has a special grants and studies program which allows the Council to support projects of individuals which would not be funded under other programs. The funds distributed through this program fluctuate from year to year; in 1975-76 they amounted to $0.6 million.

In order to allow young researchers to undertake research and also to enable established scholars to engage in creative work while on leave of absence, the Humanities and Social Sciences Division has created Post-doctoral Fellowships and Leave Fellowships. The Post-doctoral Fellowships program which distributed about $250 thousand each year has been discontinued since 1975. On the other hand, the Leave Fellowships program has increased its expenditures every year and now distributes nearly $4 million, accounting for 15 per cent of the total expenditures.

The second area, Research Training, provides support to students registered in graduate studies. The Council awards Doctoral Fellowships to students in a PhD program and Special MA Scholarship to students at Canadian universities studying for an MA degree or equivalent.

Research Training is one area in which there has been a noticeable decline in Council emphasis. The Doctoral Fellowships program provided close to $11 million in 1971-72, supporting approximately 2,400 doctoral candidates. At that time, this program accounted for 62 per cent of the Council's expenditures. By 1975-76, the doctoral support was reduced to $8.8 million (approximately 35 per cent of total expenditures), involving less than 1,400 candidates. As might be expected, the number of applications for doctoral fellowships has also declined over this period, but not as dramatically as the awards. In 1971-72, 34 per cent of the applicants were successful in obtaining a fellowship, but by 1975-76, the success rate had fallen to 27 per cent.

The provincial distribution of funds each year of these two main support areas is shown in Table II-4.2. The most striking observation is the lack of variation amongst provinces between 1971 and 1976. Ontario and Quebec receive approximately two thirds of total expenditures, with Ontario receiving twice as much as Quebec. The Western Provinces have received, slightly less than Quebec with British Columbia being the main recipient. The Atlantic Provinces received, on the average, 5.6 per cent of total expenditures, the highest recipient being Nova Scotia.

The third area of support, Research Related Activities, is designed mainly to enhance communication amongst researchers and scholars. The program includes Publication Grants, Conference and Travel Grants, and Research Support Services. The largest component is Publication Grants; expenditures under this title increased from $0.5 million in 1970-71 to $1.6 million in 1975-76, and now accounts for 6.4 per cent of the total expenditures.

Table xl~4.1

CANADA COUNCIL

LEVEL OF SUPPORT

HUMANITIES AND SOCIAL SCIENCES

YEAR ENDING MARCH 31st	1971	1972	1973	1974	1975	1976	1971	1972	1973	1974	1975	1976
	($'000)						(PERCENT DISTRIBUTION)					
PAYMENTS TOWARD COSTS OF RESEARCH & DEVELOPMENT												
Research Grants	4,345	3,662	4,171	4,862	5,352	5,696	23.8	19.9	21.7	23.4	24.0	22.5
General Research Brants	--	--	--	--	289	1,244	--	--	--	--	1.3	4.9
Research Collections	15	15	15	--	--	--	.1	.1	.1	--	--	--
Special Grants & Studies	228	107	403	279	430	572	1.3	.6	2.1	1.3	1.9	2.3
Negociated Grants												
Major Editorial	--	--	--	--	--	629	--	--	--	--	--	2.5
Program Grants	--	--	--	--	--	--	--	--	--	--	--	2.4
Explorations Program [2]	--	339	619	5002	513[2]	6092	--	1.8	3.2	2.4	2.3	2.4
Sub-Total Grants	4,588	4,123	5,208	5,641	6,584	9,366	25.2	22.4	27.1	27.1	29.5	37.0
Leave Fellowships	1,269	1,712	2,382	2,930	3,267	3,780	7.0	9.2	12.4	14.1	14.6	15.0
PostDoctoral Res. Fell.		240	250	270	233	--		1.3	1.3	1.3	1.0	--
Sub-Total R & D	5,857	6,075	7,840	8,841	10,034	13,146	32.1	32.9	40.8	42.5	45.1	52.0
RESEARCH TRAINING												
Doctoral Fellowships	11,316	10,949	8,800	9,125	8,740	8,800	62.0	59.4	45.8	43.8	39.1	34.8
Spec. MA Scholarships	--	--	400	502	573	650	--	--	2.1	2.4	2.6	2.6
Sub-Total	11,316	10,949	9,200	9,627	9,313	9,450	62.0	59.4	47.9	46.2	41.7	37.4
RESEARCH RELATED ACTIVITIES												
Publication Grants	496	745	1,220	1,299	1,765	1,617	2.6	4.0	6.5	6.2	8.0	6.4
Conferences & Travel	397	364	470	740	669	517	2.2	2.0	2.4	3.6	3.0	2.0
Research Support Serv.	172	309	467	312	487	559	.1	1.7	2.4	1.5	2.2	2.2
Sub-Total	1,065	1,418	2,157	2,351	2,941	2,693	4.9	7.7*	11.3	11.3	13.2	10.6
TOTAL	18,238	18,442	19,197	20,819	22,338	25,289	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: 1 Excludes payments from special funds such as Killam and other bequests.

2 Figures represent half of the amount granted under the Explorations Program since 1973-74 and the total amount granted under Canadian Horizons Program in previous years. (The other half expended is included under the Arts Program.)

SOURCE: Canada Council, Annual Reports, various years.

2.11

Table 11-4.2

Canada Council
Provincial Distribution of Some Funds[1)2)]
(percentages)

Provinces	Payments Toward Costs of R & D[1)]					Research Training[2)]				
	1972[3)]	1973	1974	1975	1976	1972	1973	1974	1975	1976
Newfoundland[4)]	1.7	1.3	2.3	**2.1**	**1.1**	1.3	**1.0**	0.9	**0.6**	
Prince-Edward-Island	**0.2**	**0.2**	**0.1**	**0.1**	**0.0**	**0.2**	**0.0**	**0.1**	**0.1**	**0.2**
Nova Scotia	**2.2**	2.1	3.0	**2.0**	2.3	2.4	**2.1**	1.9	2.4	**1.9**
New Brunswick	1.9	1.7	**2.2**	**2.0**	**2.0**	**1.2**	**1.8**	**1.8**	1.5	**2.0**
(Sub-total Atlantic)	(6.4)	(5.7)	(6.6)	(6.4)	(6.4)	(4.9)	(5.2)	(4.8)	(4.9)	(4.7)
Quebec	20.5	25.4	29.0	29.2	28.5	26.6	28.4	27.2	27.7	27.6
Ontario	43.9	46.3	42.1	40.8	43.6	42.7	41.8	45.3	46.0	48.1
Manitoba	3.4	2.5	**2.2**	3.1	1.7	3.7	3.7	3.9	3.5	3.2
Saskatchewan	**1.8**	**2.0**	1.4	0.9	**1.1**	3.2	3.1	**2.2**	**2.8**	1.7
Alberta	8.7	5.3	6.4	5.1	6.3	7.9	7.1	7.1	**6.6**	**6.1**
British Columbia	12.4	12.7	12.0	14.3	12.4	**11.0**	10.7	9.4	8.4	**8.6**
(Sub-total West)	(26.3)	(22.5)	(22.0)	(23.4)	(21.5)	(25.8)	(24.6)	(22.6)	(21.3)	(19.6)

1) Includes Research Grants and Leave Fellowships.
2) Doctoral Fellowships and Special MA Scholarhips (distribution of funds calculated from that of awards recipients and the national averages of awards levels).
3) Year ending March 31.
4) Figures in columns do not add to 100.0% due to funds allocated outside universities.

5. Comparative Summary

The largest share of the MRC's funding, approximately two-thirds, is paid as grants in aid-of-research. Over the years from 1971-1976, this support rose by 35 per cent, from $22.5 million to $30.3 million. The constant dollar growth was less than the rate of inflation.

The sharpest growth in any of the MRC programs, however, was recorded in the group grants, to which now are allocated some 8.5 per cent of the total budget, compared with only 1-2 per cent some five years ago. The group grants are designed to give special support to intensive research in particularly productive and promising areas. There are now 10 groups operating in Canada, receiving over $4 million (1975-76).

The total number of investigators supported by the MRC rose very slightly, from 1395 in 1970-71 to 1508 in 1975-76, or by 8 per cent, compared with a growth of some 40 per cent in total R&D funding (including groups).

On balance, the MRC-financed research tends to be mission-oriented, due to the nature of the problems arising in the bio-medical field. MRC spends a relatively small portion of its funds (some 8-9 per cent) on research training, and even less on "related activities" other than R&D or training.

The largest single program of the NRC is the Operating Grants to individuals. This now amounts to some $48.9 million (in 1975-76), compared with $35.2 million five years earlier. The nominal growth rate was about 6.8 per cent per year, which is slightly less than the rate of inflation over the same time period. This program has also been the fastest growing among the major NRC programs, constituting now some 62 per cent of total funding. (All other R&D programs together account for another 25 per cent, but have not grown as strongly as operating grants).

The number of awards for operating grants rose from 4625 in 1971 to 5124 in 1976, implying an annual growth rate of 2.1 per cent.

Support for research training, now amounting to some 10 per cent of the NRC expenditures, has not grown as rapidly as the support of R&D, reflecting recent supply-demand conditions for researchers in the labour market. (See Table II-5.1 below for a comparison of the councils' expenditures by R&D, education support, and other activities).

The NRC program has a general orientation towards basic research support. It is not possible, nor necessary, to quantify this precisely, but it is interesting to note that over the past five years a little less than one-third of the operating grants have been made in aid of applied sciences programs such as engineering, and over two-thirds in aid of disciplines in the basic natural sciences. The proportions have remained fairly steady over this period. This generalization probably would remain true even if reasonable allowance were made for the fact that some basic research is carried on by engineers, and some mission-oriented research by scientists in the basic natural sciences.

As expected, the basic orientation of the Canada Council programs is quite different from the others. The research training aspect is relatively much larger but, over the period since 1971, it has been significantly reduced, while the support of some R&D programs, and also of publication grants, has become more pronounced.

The most significant feature of the Canada Council program has been the reduction in the number and amount of doctoral fellowships, in response to recent occupational trends. The funds for this program were reduced from $11.3 million in 1971 to $8.8 million in 1976. This represents an average annual decline of about 5 per cent. The number of candidates supported shrank to about 1400, from about 2400, over this period, or by an average annual rate of over 10 per cent.

The largest single program, Research Grants, has more or less retained its relative importance, amounting to around 23 per cent of the total. But there has been a slight reduction in the number of investigators being supported by this program.

The most rapid expansion in the Canada Council's expenditures, however, took place in such areas as editorial and program grants, leave fellowships, and publication grants. For example, the number of leave fellowships rose from 240 in 1971-72 to about 350 in 1975-76, or by about 10 per cent per year. The expenditures for this program, on the other hand, rose by an annual rate of 22 per cent, from $1.7 million in 1971-72 to $3.8 million in 1975-76.

Over the five years ending in 1975-76, the programs of the councils adapted in quite different ways to the challenges and constraints that arose over this period. The budgets of the Canada Council and the MRC grew significantly more than that of the NRC (around 40 per cent for the two former, and 22 per cent for the latter).

Having had a growth cushion, the Canada Council redistributed its funds, away from research training into a range of relatively new and special programs. The MRC continued to support a more or less constant number of R&D investigators, using its growth cushion to

significantly increase its support to groups engaged in particularly productive research. The NRC, not having as large an increase in revenue as the others, adapted its programs by allowing some growth in the number of individual investigators in R&D and by shifting significant portions of its funding into operating grants.

TABLE 11-5.1

DISTRIBUTION OF THE COUNCILS' EXPENDITURES

(Per cent of Total)

YEAR	R&D			Research Training			Research Related Activities		
	N.R.C.	M.R.C.	C.C.	N.R.C.	M.R.C.	C.C.	N.R.C.	M.R.C.	C.C.
1970-71	83.7	91.2	32.1	14.5	8.4	62.0	1.8	0.4	4.9
1971-72	84.3	90.1	32.9	13.9	9.2	59.4	1.8	0.7	7.7
1972-73	85.2	90.5	40.8	13.0	9.0	47.9	1.8	0.6	11.3
1973-74	85.4	91.4	42.5	12.9	8.2	46.2	1.7	0.4	11.3
1974-75	84.9	91.7	45.1	13.2	7.9	41.7	1.9	0.4	13.2
1975-76	85.0	91.5	52.0	13.3	8.1	37.4	1.7	0.4	10.6

SECTION III

SELECTED PROGRAM DETAILS

{This is the section where we should have analysed expenditure trends and patterns by discipline and university, to lay the ground-work for better knowledge of Canada's research strengths, by discipline and by performer. Also, this type of analysis is essential for testing the consistency of the existing programs with emerging national concerns and problems.

Unfortunately, very little of the necessary statistics are currently readily available to MOSST. While the statistics exist in the files of various councils, they are in an awkward format, not accessible for analysis unless considerable resources are spent on coding and classifying.

The University Branch has defined a data system suitable for more relevant analysis of the councils' spending. The data base is designed for analytical flexibility, and would be of great benefit to the councils as well as to MOSST, The data base project is described in a draft

memo by the Forecasting Division to the PMC, dated September 7, 1977. In order to realize this worthwhile project, the full cooperation of the councils is essential, especially on such aspects as coding, classifying and access.]

This Section presents those detailed aspects of the Councils' programs for which data are currently available. In the case of the MRC, this relates to information by university. For the NRC, information by broad discipline is available, at least for the major program, namely Operating Grants. In the case of the Canada Council, information on expenditures by broad discipline is presented for major programs — Research Grants, Leave Fellowships, and Doctoral Fellowships.

1. MRC's Payments Towards R&D by University

Since Payments Towards R&D represents over 90 per cent of MRC's support, an analysis of those universities which are involved in a large proportion of these payments has been undertaken. Table III-l lists thirteen universities whose total R&D payments from MRC are approximately 90 per cent of MRC's Payments Towards R&D programs.

Thirty-two universities received some form of financial support from MRC during the period 1971-1976. Of these, sixteen have Medical Schools[1] and the thirteen listed in Table III-l are included in these sixteen.

McGill and the University of Toronto receive nearly 40 per cent of the funds in Table III-l, Toronto increased its share from 18.1 per cent in 1971 to 20.5 per cent in 1976. McGill has decreased from 20.3 per cent in 1971 to 18.7 per cent in 1976. The University of Montreal increased from 10.3 per cent to 11.9 per cent in 1976. This represents the largest increase in this period, Other notable increases during this period were McMaster from 4.5 to 6.0 per cent and Laval from 3.5 to 4.4 per cent.

The Western universities, excluding the University of Alberta experienced the sharpest decreases in their share since 1971. Saskatchewan decreased from 4.5 to 2.6 per cent, Manitoba from 8.3 to 6.5 per cent and University of British Columbia from 8.1 to 6.4 per cent.

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[1]Universities and Colleges of Canada 1975, Statistics Canada

Table III-1

MRC Expenditures on Scientific Activities

Payments towards R&D by University[a]

(in $ thousands)

University	1971(%)	1972(%)	1973(%)	1974(%)	1975(%)	1976(%)
McGill	5,665(20.3)	6,009(21.0)	6,380(20.8)	6,351(19.0)	6,881(19.5)	7,307(18.7)
Toronto	5,050(18.1)	5,366(18.7)	5,824(19.0)	6,266(18.8)	6,845(19.4)	8,014(20.5)
Montreal	2,875(10.3)	2,985(10.4)	3,469(11.3)	4,132(12.4)	3,890(11.0)	4,666(11.9)
Manitoba	2,300(8.3)	2,071(7.2)	2,260(7.4)	2,701(8.1)	2,578(7.3)	2,561(6.5)
B.C.	2,241(8.1)	2,272(7.9)	2,295(7.5)	2,306(6.9)	2,552(7.2)	2,503(5.4)
Alberta	1,914(6.9)	1,810(6.3)	1,929(6.3)	2,026(6.1)	2,560(7.2)	2,715(6.9)
Western	1,319(4.7)	1,508(5.3)	1,452(4.7)	1,714(5.1)	1,809(5.1)	2,081(5.3)
Saskatchewan	1,265(4.5)	882(3.1)	841(2.7)	1,071(3.2)	1,178(3.3)	1,023(2.6)
McMaster	1,257(4.5)	1,565(5.5)	1,877(6.2)	1,843(5.5)	1,894(5.4)	2,355(6.0)
Queen's	1,104(4.0)	1,120(3.9)	1,169(3.8)	1,353(4.1)	1,246(3.5)	1,283(3.3)
Ottawa	1,025(3.7)	1,099(3.8)	1,273(4.2)	1,336(4.0)	1,446(4.1)	1,450(3.7)
Laval	988(3.5)	1,051(3.7)	1,000(3.3)	1,314(3.9)	1,401(4.0)	1,703(4.4)
Dalhousie	839(3.1)	928(3.2)	867(2.8)	975(2.9)	1,082(3.1)	1,493(3.8)
	27,842(100.0)	28,666(100.0)	30,636(100.0)	33,388(100.0)	35,362(100.0)	39,154(100.0)

a) Those universities whose total R&D payments are approximately 90% of MRC's payments towards R&D program.

SOURCS: based on Medical Research Council Tabulations

2. The disciplinary distribution of NRC's operating grants programme

As mentioned in the previous text, operating grants to individuals constitute the largest fraction of the funds distributed in aid of research. In order to adjudicate applications for operating grants, NRC has established disciplinary selection committees. There are presently eighteen disciplinary selection committees (including one allocated to the Global Atmospheric Research Project) and one committee for "interdisciplinary" research. Because of the relatively independent nature of the areas of interest of these disciplinary selection committees they operate more or less independently.

Table XXIv2.1 presents data on the number of applicants and the success rate for operating grants by selection committee for the period from 1970-71 to 1975-76. The number of applicants has increased from 5,260 in 1970-71 to 5,638 in 1975-76, representing an average annual growth rate of only 1.4 per cent. During this period the success rate was always fairly high, however it increased slightly from 87.9 per cent in 1970-71 to 90.9 per cent in 1975-76.

The greatest increase in applications has been in the field of mathematics, which when including computer and information sciences, increased from 758 in 1970-71 to 994 in 1975-76; in terms of the total number of applications, this represents an increase from 14.4 to 17.6 per cent. The number of applications in the fields of biology, and engineering also experienced increases, however their proportions, relative to the total number of applicants, remained fairly constant at about 24 and 22 per cent respectively. The number of applications in the field of physics remained fairly constant and represent about 9 per cent of the total; however, the number of applications in the field of chemistry has decreased and their proportion of the total has similarly decreased from 13.1 to 10.6 per cent.

Table III-2.2 presents data on the distribution of funds through operating grants to individuals according to selection committee for the period from 1970-71 to 1975-76. During this period the total funds distributed increased from $35.2 million in 1970-71 to $48.9 million in 1975-76, representing an average annual growth rate

Table 111-2.1

Number of Applicants and Success Rate for Operating Grants by Selection Committee

	No. of Applications						Success Rate (in percentages)					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
Animal Biology	303	303	316	317	32?	354	83.8	87.8	88.0	91.2	93.0	89.3
Cellular Biology	380	337	346	395	377	362	78.7	84.3	82.7	79.5	80.6	89.8
Plant Biology	246	279	278	291	289	283	82.1	83.5	86.7	84.5	85.8	85.2
Population Biology	338	351	359	355	360	392	82.5	87.5	87.7	88.5	92.2	91.6
All Biology:	i,267	1,280	1,299	1,358	1,354	1,391						
Psychology	288	274	271	271	.286	265	80.2	74.5	83.0	85.6	83.2	85.3
Chemistry	**6S1**	693	568	640	595	599	91.8	87.3	84.1	85.2	90.8	90.7
Physics	478	502	490	450	455	447	88.3	83.4	91.0	91.6	93.0	93.5
Nuclear Physics				38	43	33				**100.0**	93.0	**100.0**
All Physics:	478	502	490	488	498	480						
Space Research	151	147	149	153	150	154	92.7	98.0	94.6	94.8	96.0	99.4
Cbemical/Metall Eng.	323	339	326	319	319	324	92.3	92.3	92.0	92.2	97.5	58.5
Civil Engineering	**210**	223	228	222	252	259	.86.7	84.8	90.4	93.7	94.8	95.8
Electrical Ena.	307	339	334	333	316	329	94.1	88.8	91.3	90.1	92.7	92.1
Mechanical Eng.	301	327	295	297	278	275	88.7	88.7	95.3	89.2	94.2	93.8
Industrial Eng.			28	34	50	52			78.6	85.3	84.0	86.5
All Engineering:	1,141	1,228	**1,211**	1,205	1,215	1,239						
Earth Sciences	486	495	510	507	507	499	89.9	93.1	93.9	89.0	**86.2**	85.2
Computer/Info Sci.	158	**201**	206	224	224	240	77.8	76.1	81.1	82.6	88.4	84.2
Pure/Applied Maths	600	707	710	745	758	754	94.7	91.3	88.0	91.3	92.2	SI.9
All Mathematics:	758	908	916	969	982	994						
Global Atmosp.		13	17	13	**11**	14		***100.0***	94.1	92.3	**100.0**	**100.0**
Interdisciplinary			9	14	7	3			66.7	78.6	28.6	**100.0**
Total	5,260.	5,540	5,540	5,618	5,605	5,638	87.9	87.8	88.5	**88.6**	90.4	90.9

SOURCE: NEC's Office of Grants and Scholarships.

Table JLJLJL-2.2

Distribution of Operating Grant Funds by Selection Committee

	1970-71		1971-72		1972-73		1973-74		1974-75		1975-76	
	Awards	%	Awards	%	Awards	%	Awards	%	Awards	%	Awards	%
Animal Biology	1,905.5	5.4	2,039.4	5.5	2,104.9	5.6	2,229.1	5.5	2.399.3	5.7	2.854.3	5.8
Cellular Biology	2,550.3	7.3	2,491.9	**6.8**	2,705.8	7.2	3.100.5	7.6	3,129.9	7.4	3.665.3	7.5
Plant Biology	1,684.8	4.8	1,946.3	5.3	1,961.4	5.2	1.997.6	4.9	2,181.7	5.2	2,493.7	5.1
Population Biology	2,024.6	5.7	**2,221.6**	**6.0**	2,294.6	**6.1**	2,288.8	5.6	2.390.4	5.7	2,911.9	**6.0**
All Biology	8,175.2	23.2	8,699.2	23.6	9,066.7	24.0	9,616.0	23.6	10,101.3	24.0	11,925.2	24.4
Psychology	1,751.4	5.0	1,637.8	4.4	1,745.1	4.6	1,909.1	4.7	2,030.6	4.8	2,241.9	4.6
Chemistry	6,338.7	18.0	6,093.2	16.5	6,026.1	16.0	6,487.0	16.0	6,515.6	15.5	7,542.7	15.4
Physics	3,390.5	9.6	3,723.9	10.1	3,689.4	9.8	3,661.6	9.0	3,836.4	9.1	4,364.8	8.S
Nuclear Physics	**0.0**	0.0	**0.0**	**0.0**	**0.0**	**0.0**	458.3	**1.1**	487.2	**1.2**	471.9	**1.0**
All Physics	3,390.5	9.6	3,723.9	10.1	3,689.4	9.8	4,119.9	**10.1**	4,323.6	10.3	4,836.7	9.9
Space Research	1,539.2	4.4	1,497.4	4.1	1,465.0	3.9	1,583.5	3.9	1,595.5	3.8	1,956.7	4.0
Cbem/Ketall. Eng.	2,525.9	7.2	2,707.0	7.3	2,654.0	7.0	2,762.1	6.8	2,861.9	**6.8**	3.330.5	6.8
Civil Eng.	1,308.0	3.7	1.386.1	3.8	1,497.9	4.0	1,677.6	4.1	1,356.4	4.4	2,138.4	4.4
Electrical Eng.	2,307.0	6.5	2,403.3	6.5	2,479.1	**6.6**	2.666.5	**6.6**	2,655.6	6.3	3,074.7	6.3
Mechanical Eng.	2,063.6	5.9	2.247.2	**6.1**	2,265.8	**6.0**	2,322.9	5.7	2,411.3	5.7	2.748.6	5.6
Industrial Eng.	**0.0**	**0.0**	**0.0**	**0.0**	103.7	0.3	174.4	0.4	258.0	**0.6**	306.3	0.6
All Engineering	8,204.5	23.3	8,743.6	23.7	9,000.5	23.8	9.603.5	23.6	10,043.2	23.9	11,59.8.5	23.7
Earth Sciences	2,950.7	8.4	3,228.6	8.7	3,353.9	8.9	3,469.0	8.5	3,560.7	8.5	4,067.1	8.3
Computer/Info Sci.	796.3	2.3	905.4	2.5	966.4	**2.6**	1,250.9	3.1	1,301.0	3.1	1,663.3	3.4
Pure/Applied Maths	2,076.2	5.9	2,221.9	**6.0**	2,232.4	5.9	2,420.0	**6.0**	2.382.6	5.7	2,834.7	5.8
All Mathematics	2,872.5	8.2	3,127.3	8.5	3,198.8	8.5	3,670.9	9.0	3.683.6	**8.8**	4,498.0	9.2
Global Atmosp.	**0.0**	**0.0**	147.7	0.4	170.0	0.5	125.C	0.3	158.7	0.4	189.9	0.4
Interdisciplinary	**0.0**	**0.0**	**0.0**	**0,0**	36.8	**0.1**	78.0	0.2	23.0	**0.1**	23.9	0.0
Total	35,222.7	100.0	36,898.7	100.0	37,752.3	100.0	40,661.9	100.0	42,035.8	100.0	48,880.6	100.0

SOURCE: NRC's Office of Grants and Scholarships.

1) Awards are in $ thousands.

of 6.8 per cent. However, the distribution of funds according to the selection committees remained fairly constant: all the biology committees together accounted for about 24 per cent of the funds distributed, all the engineering committees for about 23 per cent, physics for about 10 per cent. The proportion of funds distributed by the chemistry committee decreased from 18.0 to 15.4 per cent; whereas the funds distributed by all the mathematical fields increased from 8.2 to 9.2 per cent, but this was mainly due to an increase in the funds distributed for computing and information sciences.

3. The Disciplinary Distribution of the Canada Council's Major Programs

In the previous section it was noted that the Canada Council made substantial changes in the allocation of funds from research training support (primarily Doctoral Fellowships) to research and development activities (leave fellowships and research grants) during the period 1971 to 1976. In terms of proportions of the total expenditure, R&D represented 52.0 per cent of the total in 1976 compared to 32.1 per cent in 1971. In contrast, research training declined to 37.4 per cent in 1976 from 62.0 per cent in 1971.

This section presents a review of the allocation of support by discipline within R&D and research training, examining such aspects as the number of applications, the success rate of applicants and the distribution of funds.

Applications for Research Funds

Table III-3.1 lists the total number of applications for Research Grants and Leave Fellowships, the two main R&D components of the Canada Council program and the success rate by academic discipline for the period 1971 to 1976. Over this period, the number of applicants increased from 1,324 to 1,822 an average annual growth rate of 7.5 per cent. The success rate of applicants, in total, declined significantly from 78.9 per cent in 1971 to 56.4 per cent in 1976. The decline in the success rate was evident across nearly all disciplines and progressed relatively smoothly from year to year throughout the period under review.

With regard to the academic disciplines, most of the applications for research funds were received in the fields of humanities and social sciences. As a

percentage of the total, the humanities declined from 48.6 per cent in 1971 to 44.3 per cent in 1976. Similarly, the social sciences also recorded declines in the share of total applications, moving from 43.7 per cent in 1971 to 41.7 per cent in 1976. Significant increases in applications for research in education and in other disciplines, such as law, administration and others, were recorded over the period which raised the share of these two groups from 7.7 per cent in 1971 to 15.0 per cent in 1976.

Distribution of Research Funds

Table III-3.2 presents the total value of Research Grants and Leave Fellowships by discipline for the period 1971 to 1976. In total, research funding through these two programs increased to $9.5 million in 1976 from $5,6 million in 1971, an average annual rate of increase of 13.7 per cent. The funding of humanities research displayed the largest absolute increase in dollars, rising from $1.9 million in 1971 to $3.9 million in 1976, for a net gain of $2.0 million over the period. Social science research also recorded substantial gains in funding in absolute terms, increasing

by $1.2 million between 1971 and 1976, to reach $4.5 million in 1976. Most of the above increase was reached by 1974 and the level of funding has remained relatively flat at approximately $4.5 million since 1974. In terms of annual average growth rates, the largest proportional increases in funding were observed in education research, at 75.0 per cent per year and in other disciplines at 22.6 per cent per year.

The distribution of funds by discipline summarizes the above observations. Humanities research has moved from 33.9 per cent of the total in 1971 to 41.2 per cent in 1976, while social science research has declined from 58.6 per cent in 1971 to 47.8 per cent in 1976. Education and other disciplines have increased in shares of the total, moving from 7.5 per cent in 1971 to 11.1 per cent in 1976.

Applications for Research Training Support

Table III-3.3 presents an analysis of new applications and success rates for doctoral fellowships by discipline for the period 1971 to 1976. In total, the number of applications has declined from 3,070 in

1971 to 2,083 in 1976, an average annual rate of decrease of -6.4 per cent. The decline in applicants was general across all disciplines.

Success rates varied considerably over the period and between disciplines. In general, the rate of success was low, averaging 33.6 per cent of total new applicants in 1971 and declining to 27.3 per cent by 1976. Most of the decline in the success rates began in 1974 and progressed steadily in subsequent years.

Distribution of Doctoral Fellowships Funds

Table III-3.4 shows the allocation of doctoral fellowships funds by discipline. In total, funding has declined from $11.3 million in 1971 to $8.8 million in 1976, an average annual rate of decrease of -4.4 per cent. Most of the decline was reached by 1973 after which time funding has been held at a level of approximately $8.8 million. By discipline, funding has declined by $1.9 million in the humanities and by $0.8 million in the social sciences over the period under review. In 1976, the level of funding for these two field categories was in approximate balance with humanities receiving $3.5 million and

social sciences $3.8 million. Support for education related doctoral candidates increased significantly over the period rising from $0.5 million in 1971 to $1.0 million by 1976, an average annual rate of growth of 21.2 per cent.

In terms of relative shares of total funds, the Canada Council has reduced humanities support from 47.8 per cent in 1971 to 39.7 per cent by 1976. In contrast, support of doctoral candidates in the social sciences moved from 40.6 per cent of total funds in 1971 to 43.0 per cent in 1976. Education funding increased from 4.3 per cent of the total in 1971 to 11.3 per cent of the 1976 total.

Table III-3.1

CANADA COUNCIL

NUMBER OF APPLICATIONS AND SUCCESS RATE FOR RESEARCH GRANTS AND LEAVE FELLOWSHIPS

	NO. OF APPLICATIONS						SUCCESS RATE (in percentages)					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
HUMANITIES												
Fine Arts	45	40	62	61	65	72	71.1	75.0	77.4	68.9	53.8	54.2
History	229	239	259	261	288	246	83.4	82.0	80.7	75.5	69.4	72.8
Classics	26	25	41	28	42	36	84.6	68.0	70.7	67.9	66.7	66.7
Philosophy	46	70	62	66	86	79	71.7	77.1	72.6	62.1	62.8	49.4
English Literature	122	161	152	171	197	162	90.2	77.6	78.9	71.9	65.5	57.4
French Literature	83	55	63	82	80	85	78.3	74.5	77.8	75.6	67.5	55.3
Other Mod. Languages	73	85	100	85	92	82	60.3	81.2	78.0	63.5	57.6	63.4
Other Humanities	IS	20	28	23	31	45	73.7	60.0	67.9	43.5	45.2	55.6
Sub-Total	643	695	767	777	881	807	79.5	78.3	77.8	70.5	64.4	61.7
SOCIAL SCIENCES												
Anthropology	49	50	46	46	53	53	91.8	82.0	84.8	89.1	69.8	67.9
Archaeology	45	43	27	52	57	56	88.9	88.4	88.9	88.5	82.5	78.6
Economics	88	95	97	125	112	84	81.8	76.8	70.1	60.8	61.6	50.0
Political Science	93	80	99	116	109	103	82.8	75.0	59.6	59.5	56.0	60.2
Psychology	114	113	131	149	186	170	77.2	80.5	68.7	67.8	53.2	52.9
Sociology	78	65	66	96	107	106	67.9	78.5	59.1	54.2	51.4	48.1
Geography	45	56	61	64	64	71	77.8	83.9	75.4	75.0	65.6	45.1
Linguistics	37	39	55	70	59	70	86.5	74.4	67.3	65.7	72.9	67.1
Other Social Sciences	30	37	29	56	94	47	63.3	45.9	55.2	51.8	48.9	31.9
Sub-Total	579	578	611	774	841	760	79.6	77.3	68.4	65.6	59.3	55.1
EDUCATION	19	32	53	62	95	86	52.6	40.6	45.3	43.5	42.1	36.0
OTHER DISCIPLINES												
Administration	16	24	15	27	44	68	62,5	66.7	66.7	48.1	43.2	41.2
Mathematics	7	12	16	16	28	30	71.4	75.0	56.3	62.5	60.7	50.0
Law	34	38	33	41	39	37	79.4	84.2	87.9	63.4	53.8	56.8
Other Disciplines	26	14	11	21	30	34	80.8	50.0	63.6	42.9	53.3	44.1
Sub-Total	83	88	75	105	141	169	75.9	72.7	73.3	55.2	51.8	46.7
TOTAL	1,324	1,393	1,506	1,718	1,958	1,822	78.9	76.7	72.6	66.4	60.2	56.4

SOURCE: Canada Council, Annual Reports

Table 111-3,2

CANADA COUNCIL

DISTRIBUTION OF RESEARCH GRANTS AND LEAVE FELLOWSHIPS AWARDS BY DISCIPLINE

	AWARDS (in thousands of dollars)						DISTRIBUTION (in percentages)					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1970-71	1971-72	1972-73	1973-74	1974-75	1575-76
HUMANITIES												
Fine Arts	101.4	108.5	237.2	182.4	247.3	346.0	**1.8**	1.9	3.5	2.3	**2.8**	3.7
History	714.4	788.7	959.1	1074.4	1147.1	1366.1	12.7	14.0	14.1	13.3	13.0	14.4
Classics	75.8	70.9	156.4	124.7	195.7	184,0	1,3	1,3	2,3	1,5	**2.2**	1.9
Philosophy	**122.6**	235.8	249,7	253.8	349,9	307.9	2,2	4.2	3.7	3.1	4.0	3.2
English Literature	403.4	495.4	599.2	749.4	815.0	718.7	7.2	8.8	**8.8**	9.3	9.2	7.6
French Literature	284.5	198.5	152.9	432.0	291.3	453.9	5.1	3.5	2.8	5.4	3.3	4.8
Other Mod. Languages	132.2	237.0	352.2	186.8	254.0	312.8	2.4	4,2	5.2	2.3	2.9	3.3
Other Humanities	72.1	29.8	93.5	64.6	73.7	**212.2**	1.3	0.5	1.4	**0.8**	0.9	**2.2**
Sub-Total	1906.4	2164.6	2840.3	3068.1	3380.0	3901.6	33.9	38.6	41.8	38.1	38.2	41.2
SOCIAL SCIENCES												
Anthropology	308.1	247.8	387.5	390.2	282.0	285.4	5.5	4.4	5.7	4.8	3.2	3.0
Archaeology	341.7	236.5	191.7	299.4	492.2	555.2	**6.1**	4.2	2.8	3.7	5.6	5.9
Economics	480.1	402.1	406.9	606.3	523.4	380.8	8.5	7.2	**6.0**	7,5	5.9	4.0
Political Science	395.0	344.7	449.2	699.1	423.4	**668.1**	7,0	**6.1**	**6.6**	8.7	4.8	7.1
Psychology	675.7	657.6	676.6	885.3	879.4	964.4	**12.0**	11.7	9.9	**11.0**	9.9	**10.2**
Sociology	452.5	403.3	455.7	431.4	492.2	525.3	**8.1**	7.2	6.7	5.4	5.6	5.5
Geography	169.0	243,5	316.9	313.4	277.0	256.4	3.0	4.3	4.7	3.9	3.1	2.7
Linguistics	279.0	267.9	456.0	378.9	583.5	605.3	5.0	4.8	6.7	4.7	**6.6**	6.4
Other Social Sciences	188.1	117.2	117,4	289.6	500.0	287.0	3.3	**2.1**	1.7	3.6	5.6	3.0
Sub-Total	3289.1	2920.8	3457.8	4293.6	4453.2	4528.0	58.6	52.0	50.8	53.3	50.3	47.8
EDUCATION	57.5	143.1	154.1	267.1	402.6	273.1	**1.0**	2.5	2.3	3.3	**4.5**	2.9
07HER DISCIPLINES												
Administration	69.7	83.9	60.0	97.8	152.1	218.1	**1.2**	1.5	0.9	**1.2**	1.7	2.3
Mathematics	39.4	64.5	73.5	86.4	143.7	163.9	0.7	**1.1**	**1.1**	**1.1**	**1.6**	1.7
Law	146.8	212.4	179.7	152.7	185.9	233.1	**2.6**	3.8	**2.6**	1.9	**2.1**	2.5
Other Disciplines	106.8	25.1	37.2	96.4	133.9	158.0	1.9	0,4	0.5	**1.2**	1.5	1.7
Sub-Total	362.7	385.9	350.4	433.3	615.6	773,1	6.5	6.9	5.2	5.4	7.0	**8.2**
ICTAL	5615.6	5614.3	6802.7	8062.2	8851.5	9475,7	**100.0**	**100,0**	**100.0**	**100.0**	**100.0**	**100.0**

SOURCE: Canada Council, Annual Reports

CANADA COUNCIL

Table III-3.3

NUMBER OF NEW APPLICANTS AND SUCCESS RATE FOR DOCTORAL FELLOWSHIPS

	NO. OF APPLICATIONS						SUCCESS RATE (in percentages)					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1970-71	1971-72	1972-73	1973-74	1974-75	1975-75
HUMANITIES												
Fine Arts	88	89	73	85	86	68	36.4	38.2	39.7	27.1	37.2	26.5
History	320	297	248	240	241	211	29.1	33.3	35.1	26.7	25.7	26.1
Classics	38	31	24	21	21	17	39.5	45.2	33.3	38.1	47.6	41.2
Philosophy	172	181	143	166	136	nO	33.1	37.0	26.6	31.9	23.5	27.3
English Literature	345	314	260	281	227	190	33.6	33.8	28.5	28.5	26.9	27.4
French Literature	154	144	109	99	75	68	32.5	33.3	33.9	32.3	26.7	25.0
Other Mod. Languages	188	160	130	155	150	109	27.1	28.1	33.1	22.6	27.3	22.9
Other Humanities	73	73	67	63	76	42	35.6	31.5	16.4	30.2	21.1	16.7
Sub-Total	1378	1289	1054	1110	1012	815	31.9	33.8	31.0	28.3	27.1	25.9
SOCIAL SCIENCES												
Anthropology	64	72	55	57	69	61	51.6	45.8	49.1	47.4	50.7	21.3
Archaeology	22	28	27	20	13	20	40.9	17.9	40.7	35.0	30.8	25.0
Economics	236	190	133	142	137	128	34.7	32.6	27.8	38.0	31.4	28.1
Political Science	227	219	184	184	173	152	32.6	32.0	34.2	30.4	28.3	23.7
Psychology	232	243	223	229	249	239	40.5	44.0	37.7	36.7	32.1	28.9
Sociology	186	210	139	157	125	120	29.6	29.0	33.1	33.1	32.8	28.3
Geography	59	58	56	42	41	32	49.2	36.2	35.7	38.1	34.1	28.1
Linguistics	81	73	50	51	37	45	39.5	32.9	30.0	45.1	21.6	33.3
Other Soc. Sciences	86	90	58	64	67	45	27.9	25.6	41.4	25.0	23.9	33.3
Sub-Total	1193	1183	925	946	SI1	842	36.2	34.3	35.4	35.4	31.8	27.6
EDUCATION	259	247	273	292	322	259	28.6	23.1	41.8	34.2	30.4	30.1
OTHER DISCIPLINES												
Administration	108	108	65	55	64	59	32.4	29.6	32.3	38.2	20.3	22.0
Mathematics	54	31	42	56	16	8	42.6	61.3	42.9	35.7	37.5	37.5
Law	47	32	53	64	78	87	36.2	34.4	41.5	40.6	33.3	32.2
Other Disciplines	31	15	25	27	17	13	32.3	40.0	36.0	48.1	35.3	30.8
Sub-Total	240	186	185	202	175	167	35.4	36.6	37.8	39.6	29.1	28.7
TOTAL	3,070	2,905	2,437	2,550	2,420	2,083	33.6	33.3	34.4	32.5	29.5	27.3

SOURCE: Canada Council, Annual Reports

DISTRIBUTION OF DOCTORAL FELLOWSHIPS AWARDS BY DISCIPLINE

	AWARDS (in thousands of dollars)						DISTRIBUTION (in percentages)					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
IMANITIES												
Fine Arts	336.3	388.6	301.6	291.5	358.9	304.4	3.0	3.5	3.4	3.2	4.1	3.5
History	1184.7	1193.3	963.3	927.3	849.0	793.1	10.5	10.9	10.9	10.2	9.7	9.0
Classics	198.1	150.8	99.0	95.3	108.2	114.2	1.8	1.4	1.1	1.0	1.2	1.3
Philosophy	843.0	777.2	526.7	530.0	461.5	545.7	7.4	7.1	6.0	5.8	5.3	6.2
English Literature	1442.6	1307.6	918.3	917.0	774.9	786.8	12.7	11.9	10.4	10.0	8.9	8:9
French Literature	635.7	512.0	409.6	392.1	341.9	310.9	5.6	4.7	4.7	4.3	3.9	3.5
Other Hod. Languages	520.5	525.7	396.0	408.0	427.0	475.8	4.6	4.8	4.5	4.5	4.9	5.4
Other Humanities	253.4	265.2	193.6	212.0	205.1	165.0	2.2	2.4	2.2	2.3	2.3	1.9
Sub-Total	5414.3	5120.4	3808.1	3773.2	3526.5	3495.9	47.8	46.8	43.3	41.4	40.3	39.7
)CIAL SCIENCES												
Anthropology	363.9	352.0	310.6	318.0	353.2	380.7	3.2	3.2	3.5	3.5	4.0	4.3
Archaeology	92.1	86.9	94.5	79.4	79.8	88.8	0.8	0.8	1.T	0.9	0.9	1.0
Economics	940.5	781.8	576.2	567.0	501.4	501.3	8.3	7.1	6.5	6.2	5.7	5.7
Political Science	893.7	836.7	688.7	704.8	695.2	653.5	7.9	7.6	7.8	7.7	8.0	7.4
Psychology	769.3	914.4	823.7	927.3	968.6	1097.7	6.8	8.4	9.4	10.2	11.1	12.5
Sociology	760.1	758.9	598.7	635.9	581.2	494.9	6.7	6.9	6.8	7.0	6.6	5.6
Geography	258.0	233.2	189.1	174.8	165.2	158.6	2.3	2.1	2.1	1.9	1.9	1.8
Linguistics	313.2	301.7	198.1	222.5	188.0	222.1	2.8	2.8	2.3	2.4	2.2	2.5
Other Soc. Sciences	202.6	251.6	193.5	180.1	216.5	190.2	1.8	2.3	2.2	2.0	2.5	2.2
Sub-Total	4593.4	4517.2	3673.1	3809.8	3749.1	3787.8	40.6	41.3	41.7	41.8	42.9	43.0
5UCATION	483.7	498.4	697.7	895.5	934.5	996.2	4.3	4.6	7.9	9.8	10.7	11.3
;HER DISCIPLINES												
Administration	354.7	379.5	238.6	222.6	188.0	177.6	3.1	3.5	2.7	2.4	2.2	2.0
Mathematics	202.7	201.2	144.0	143.1	108.2	88.8	1.8	1.8	1.6	1.6	1.2	1.0
Law	184.3	118.9	153.0	180.1	176.6	215.7	1.6	1.1	1.7	2.0	2.0	2.5
Other Disciplines	82.9	114.3	85.5	100.7	57.1	38.0	0.7	1.0	1.0	1.1	0.7	0.4
Sub-Total	824.6	813.9	621.1	646.5	529.9	520.1	7.3	7.4	7.1	7.1	6.1	5.9
)TAL.	11316.0	10949.9	8800.0	9125.0	8740.0	8800.0	100.0	100.0	100.0	100.0	100.0	1C0.0

)URCE: Canada Council, Annual Reports.

SECTION IV

RECENT DEVELOPMENTS IN THE UNIVERSITIES, AND TRENDS IN HIGHLY QUALIFIED MANPOWER

This Section reviews recent and anticipated manpower developments in the universities, for a better understanding of some of the possible implications arising out of the changes that the university system is now undergoing.

Basic research in Canada is performed essentially by the university professoriate, and the main supporters of such research are, essentially, the granting councils. The system that has evolved over the years is one in which the number of university teachers is governed by the country's demand for education, especially undergraduate education, but in which the level of research support has relatively little effect, at least in a direct manner, on the number of researchers who are available. The education support provided by the councils helps in the training of qualified researchers, but this does not appreciably affect the growth in the available positions. In the current system, in other words, the available stock of such researchers is determined by influences that are

outside the sphere of scientific research, and the research capacity depends, therefore, to a considerable extent on undergraduate enrolment trends and provincial education budgets.

The degree of dependence of the research capacity varies, of course, among the different fields of study. Two factors should be considered in this:

~ the extent of faculty participation in research, especially research funded by the granting councils. Participation is often a function of the availability of alternative sources, but also of other factors such as the nature of the subject, and tradition. Rates of participation vary significantly from one discipline to the next.

- the kind of control, or lack of control, over student admission into the various fields of study. The tendency is for disciplines that are exercising admissions control, for whatever reason, to have avoided enrolment inflation in the past. They are also likely to escape the effect of future declines. Disciplines that traditionally have more open admissions are likely to experience

much sharper changes in enrolment levels in the future, espcially in undergraduate programs.

In view of the close relationship between undergraduate enrolments and the demand for the number of university teachers, institutional characteristics such as these will tend to have important influences on the various disciplines' future research capacity evolution and participation.

In analysing this, a description is first provided of the recent and current situation in university enrolments, degrees, and faculty, and the extent to which the faculty participates in the various councils' programs. Evolution in the natural sciences is related to the NRC program, while evolution in the human sciences to the program of the Canada Council. For the health field, there is a brief description of the institutional set-up in which Canadian health research, health research training, and medical training, functions.

Anticipated developments in the university sector are derived with the help of the MOSST HQM demand model.

In particular, the model is used to derive the demand for university teachers in future years. Having regard for the parameters of faculty participation in research, and likely trends in enrolments and faculty, it is possible to derive, at least broadly, the implications for research in the universities arising out of the anticipated adjustments in the stock of faculty in the various disciplines.

1. Trends in the Natural Sciences

This group of disciplines includes the physical sciences and mathematics; engineering and architecture; and the life sciences. The first set of statistical tables (Table; IV-1.1 to IV-1.4) show details of enrolments by level; degrees awarded by level; and number of faculty, for the years 1970-71 to 1975-76.

In the second set of tables, the faculty in these disciplines is related to the NRC operating grants (Tables IV-1.5 to IV-1.7).

Since the beginning 1970s, undergraduate enrolment and faculty have steadily increased in the physical

sciences and in the life sciences. Enrolment and faculty have increased at about the same rate, and the student/faculty ratio (undergraduate) has remained fairly stable. Undergraduate enrolment in engineering was almost constant from 1971 to 1975, at around 21,500. In 1975-76, it rose by close to 3,000. There was a commensurate increase in the engineering faculty.

As far as PhD enrolments are concerned, the evidence is clear: enrolments have fallen significantly in each of the natural sciences fields. For the natural sciences as a whole, PhD enrolments fell from 4,865 in 1970-71 to 3,462 in 1975-76. The largest drop was in the physical sciences. This is beginning to be reflected in the number of PhD degrees awarded, which has begun to diminish in recent years.

The evidence for the MA enrolments is less clear. It seems that in each of the three natural sciences fields such enrolment declined for several years from the high levels of 1970-71, but has increased again in 1975-76.

The faculty participation in research funded by the NRC is relatively very high in the natural sciences. (The NRC requires applicants to hold a university faculty position in order to be eligible for funding). In the non-engineering fields (ice. physical sciences and life sciences), some two-thirds of the faculty tend to apply for NRC operating grants. This percentage has been falling slightly in recent years, mainly because the number of applications has remained more or less stable, while the number of science faculty has been rising (see Table IV-1.6).

The engineering faculty also has a relatively high participation rate in NRC operating funds, but it is not quite as high as in the other fields. In 1975-76, the rate was some 55 per cent. This also is lower than five years earlier, as the number of applications has remained stable over the period, while there has been a recent increase in engineering faculty.

Table IV-1.1

Enrollments, Degrees Awarded and University Faculty in the Natural Sciences - Total[1]

Year	Enrollments (FT)			Degrees Awarded			Faculty
	BSC	MSC	PhD	BSc	MSc	PhD	
1970-71	57,224	6,110	4,865	12,163	2,676	1,029	n.a.
1971-72	53,403	5,720	4,661	13,138	2,537	1,025	7,974
1972-73	55,417	5,046	4,280	12,927	2,409	1,106	8,252
1973-74	58,450	5,178	3,890	13,533	2,197	1,022	8,394
1974-75	58,160	5,070	3,464	14,095	2,216	879	8,723
1975-76	61,250	6,019	3,462	n.a.	n.a.	n.a.	8,902

[1] Includes Physical Sciences; Engineering; and Life Sciences

Table IV-1.2

Enrollments, Degrees Awarded and University Faculty - Physical Sciences

Year	Enrollments (FT)			Degrees Awarded			Faculty
	BSc	MSc	PhD	BSc	MSc	PhD	
1970-71	13,085	2,261	2,526	3,828	949	528	n.a.
1971-72	12,187	2,130	2,376	4,188	957	524	3,986
1972-73	13,103	1,947	2,157	4,078	925	557	4,052
1973-74	13,814	1,924	1,910	4,356	821	478	4,053
1974-75	14,170	1,754	1,670	4,243	831	425	4,174
1975-76	14,535	1,943	1,649	n.a.	n.a.	n.a.	4,289

Table IV-1.3

Enrollments, Degrees Awarded and University Faculty - Engineering

Year	Enrollments (FT)			Degrees Awarded			Faculty
	BSc	MSc	PhD	BSC	MSC	PhD	
1970-71	23,694	2,233	1,207	4,205	1,135	216	n.a.
1971-72	21,555	2,104	1,163	4,431	987	258	1,989
1972-73	21,584	1,876	1,140	4,448	973	290	2,069
1973-74	21,857	1,874	1,017	4,476	902	295	2,091
1974-75	21,636	2,043	934	4,284	857	209	2,208
1975-76	24,204	2,323	903	n.a.	n.a.	n.a.	2,268

Table IV-1.4

Enrollments, Degrees Awarded and University Faculty - Life Sciences

Year	Enrollments (FT)			Degrees Awarded			Faculty
	BSc	MSc	PhD	BSc	MSc	PhD	
1970-71	20,455	1,615	1,132	4,130	592	285	n.a.
1971-72	19,661	1,485	**1,122**	4,519	593	243	1,999
1972-73	20,730	1,223	983	4,401	511	259	2,130
1973-74	22,779	1,380	963	4,701	474	249	2,250
1974-75	22,354	1,273	860	5,562	528	245	2,341
1975-76	22,511	1,753	910	n.a.	n.a.	n.a.	2,405

TABLE IV-1.5

NATURAL SCIENCES FACULTY[1] PARTICIPATION IN NRC OPERATING GRANTS PROGRAM

	Faculty	Applications	Applications per Faculty	Success Ratio
	(number)		(percent)	
1971-72	7,974	5,540	69.5	.88
1972-73	8,252	5,540	67.1	.89
1973-74	8,394	5,618	66.9	.89
1974-75	8,723	5,605	64.3	.90
1975-76	8,902	5,638	63.3	.91

[1]Includes Physical Sciences; Life Sciences; and Engineering

TABLE IV-1.6

NATURAL SCIENCES (EX. ENGINEERING) FACULTY[1] PARTICIPATION IN NRC OPERATING GRANTS PROGRAM

	Faculty	Applications	Applications per Faculty
	(number)		(percentage)
1971-72	5,985	4,312	72.0
1972-73	6,183	4,329	70.0
1973-74	6,303	4,413	70.0
1974-75	6,515	4,390	67.4
1975-76	6,634	4,399	66.3

[1]Includes Physical Sciences, and Life Sciences

TABLE IV-1.7

ENGINEERING FACULTY PARTICIPATION IN NRC OPERATING GRANTS PROGRAM

	Faculty	Applications	Applications per Faculty
	(number)		(percentage)
1971-72	1,989	1,228	61.7
1972-73	2,069	1,211	58.5
1973-74	2,091	1,205	57.6
1974-75	2,208	1,215	55.0
1975-76	2,268	1,239	54.6

2. Trends in the Human Sciences

The following disciplines are included in this category: humanities; social sciences; education; and other (law, commerce, business administration, accounting, and general arts). The first set of statistical tables summarizes recent trends (1971-72 to 1975-76) in university enrolments, by level; degrees awarded, by level; and faculty (Tables IV-2.1 to IV-2.3). The second set of tables summarizes the relationship between the faculty in the human sciences, and the Canada Council research grants and leave fellowship programs (Tables IV-2.4 to IV-2.5). The last table (IV-2.6) shows PhD enrolments in relation to Canada Council doctoral grants.

In the humanities, undergraduate enrolments and the size of faculty have continued to increase over the period since 1970-71, and the ratio of undergraduates to faculty has remained more or less constant. Graduate enrolments, after reaching a peak in 1972-73, have begun to decline. This decline is too recent to be reflected already in the number of graduate degrees granted.

A similar situation exists in the social sciences. Undergraduate enrolment and faculty have continued to expand relatively strongly since 1970-71, but MA enrolment appears to have declined somewhat. PhD enrolment, however, has not shown any indication of recent decline. Also, the MAs and PhDs granted show as yet no decrease, reflecting the high recent enrolment levels and the continuing part-time programs.

In education, the level of undergraduate full-time enrolments has not changed since the beginning of the 1970s, but the size of faculty has risen considerably. This is explained by the fact that part-time enrolment, at all three levels, doubled over this period. The persisting increases in the number of degrees granted, at each of the three levels, is also explainable by this phenomenon.

Faculty participation in the Canada Council's Research Grants program has been fairly constant over the period since 1971-72. There have been roughly 1,000 applications each year, but the chances of

getting an award tend to have diminished somewhat, as indicated by the decline in the success ratio from .84 in 1971-72 to .70 in 1975-76.

The faculty interest in another Canada Council program, Leave Fellowships, appears to have increased considerably in recent years. The number of applications almost doubled from 1971-72 to 1975-76, from 433 to 843. Although the chances of being successful have been sharply reduced (from 6 out of 10 to 4 out of 10), actual awards rose from 264 to 345. As noted above, this is one of the growing Canada Council programs.

The Doctoral Fellowship program, on the other hand, has been sharply reduced. Despite an overall increase in PhD enrolment, the number of applications received fell by close to one-third (from 2,905 in 1971 to 2,085 in 1975-76), indicating that currently less than 40 per cent of qualified students apply, compared with over 60 per cent at the beginning of the decade. Further, the success ratio in this program has also fallen, from .33 to .27.

TABLE IV-2.1

ENROLMENTS, DEGREES AWARDED AND UNIVERSITY FACULTY IN THE HUMANITIES

	Enrolments (FT)			Degrees Awarded			
	BA	MA	PhD	BA	MA	PhD	Faculty
1970-71	26,848	4,242	1,916	10,197	2,084	188	n.a.
1971-72	25,799	4,527	1,916	11,157	2,359	208	6,808
1972-73	26,431	4,477	2,108	10,865	2,366	233	6,890
1973-74	27,684	4,405	1,990	11,604	2,116	268	6,846
1974-75	28,197	3,872	1,942	12,151	2,211	301	6,961
1975-76	28,763	3,780	1,864	n.a.	n.a.	n.a.	7,152

TABLE IV - 2.2

ENROLMENTS, DEGREES AWARDED AND UNIVERSITY FACULTY IN THE SOCIAL SCIENCES

	ENROLMENTS (FT)			DEGREES AWARDED			FACULTY
	BA	MA	PhD	BA	MA	PhD	
1970-71	29,722	5,094	I,925	13,212	2,055	210	na
1971-72	27,940	5,137	2,010	14,549	2,196	215	4,952
1972-73	25,510	4,792	2,087	13,591	2,314	275	5,006
1973-74	26,238	5,082	2,189	13,539	2,143	311	5,176
1974-75	29,971	4,402	2,067	14,530	2,325	345	5,457
1975-76	34,461	4,831	2,156	na	na	na	5,607

TABLE IV - 2.3

ENROLMENTS, DEGREES AWARDED AND UNIVERSITY FACULTY IN EDUCATION

	ENROLMENTS (FT)			ENROLMENTS (PART-TIME)			DEGREES AWARDED			FACULTY
	BA	MA	PhD	BA	MA	PhD	BA	MA	PhD	
1970-71	32,678	2,223	580	11,697	3,224	294	15,209	1,421	77	na
1971-72	32,443	2,156	618	15,927	3,662	369	16,019	1,721	109	2,476
1972-73	33,319	1,893	654	22,000	4,282	428	15,285	1,952	122	2,606
1973-74	33,768	2,095	659	19,269	5,591	524	15,332	1,992	128	2,694
1974-75	31,375	1,591	653	19,965	5,950	592	18,420	2,161	155	3,034
1975-76	32.211	1,790	671	20,033	6,779	624	na	na	na	3,118

TABLE IV - 2.4

FACULTY PARTICIPATION IN CANADA COUNCIL RESEARCH GRANTS PROGRAM -- HUMANITIES; AND SOCIAL SCIENCES

	FACULTY (number)	APPLICATIONS (1)	APPL. PER FACULTY (percent)	SUCCESS RATIO (2)
1971-72	11,760	960	8.2	.84
1972-73	11,896	987	8.3	.78
1973-74	12,022	1,042	8.7	.74
1974-75	12,418	1,160	9.3	.68
1975-76	12,759	979	7.7	.70

(1) Includes a small number from Education and Other Disciplines.

(2) Awards per applications.

TABLE IV - 2.5

FACULTY PARTICIPATION IN CANADA COUNCIL LEAVE FELLOWSHIPS PROGRAM -- HUMANITIES; AND SOCIAL SCIENCES

	FACULTY	APPLICATIONS(1)	APPL. PER FACULTY	SUCCESS RATIO(2)
	(number)		(percent)	
1971-72	11,760	433	3.7	.61
1972-73	11,896	519	4.4	.63
1973-74	12,022	676	5.6	.54
1974-75	12,418	798	6.4	.49
1975-76	12,759	843	**6.6**	.4T

(1) Awardsperapplications.

(2) Includes a small number from Education and Other Disciplines.

TABLE IV - 2.6

PARTICIPATION IN CANADA COUNCIL DOCTORAL FELLOWSHIPS PROGRAM -- HUMANITIES; AND SOCIAL SCIENCES

	PH.D ENROLMENT (FT)	APPLICATIONS (number)	APPL. PER ENR'T (percent)	SUCCESS RATIO
1971-72	4,708	2,905	61.7	.33
1972-73	4,967	2,437	49.1	.34
1973-74	4,935	2,550	51.7	.33
1974-75	5,286	2,420	45.8	.30
1975-76	5,426	2,085	38.4	.27

*

3. Health Research - Faculty and Institutions

Canadian Medical Colleges are comprised of two basic elements. The first is the doctoral (medical) training element which provides an education for students in training for an MD; internships; and residencies or specializations in medical practice. Thus education-training of the physician is the chief responsibility of the first element.

The second element is research and research training, and this provides the research environment, on the one hand suitable for the education of Masters and PhD's in the basic medical sciences while on the other hand suitable for faculty and post-doctoral personnel to do health science research. It is this second element which the Medical Research Council supports.

Table IV-3.1 shows the enrolments in Canadian Medical Schools by Province for 1973-1976. The small increases each year in first year enrolments reflect the very tight control which the medical schools have

over the ultimate supply of Canadian educated physicians. Although Quebec has less medical schools (4) than Ontario (5) total enrolment has traditionally been 10-20 per cent higher. In fact, in 1975-76, Montreal, Laval and McGill were ranked first, third and fourth respectively out of all Canadian medical schools in terms of total enrolment;.

Enrolment in basic medical science programs in 1975-76 by province is shown in Table IV-3.2. The provinces of Ontario and Quebec account for greater than 70% of all Masters and PhD students in basic medical sciences yet have only 56 per cent of all Canadian Medical Schools. The number of post-doctoral personnel is quite small (123) with Quebec being the major region of concentration. Biochemistry is the largest field of specialization for all three categories of enrolment.

The faculty of Medical Schools are one component of a connecting link between the two elements described above. As shown in Table IV-3.3 the reaching responsibi-

lities of faculty members cover medical students, interns and residents (element 1) and Masters, Doctoral and Post-doctoral personnel (element 2). Thus as in other basic science department at universities the faculty teaching strengths are demanded both at the undergraduate and graduate levels. There is, however, a major or compositional difference between science faculty and medical school faculty. Table IV-3.4 shows the faculty members in Medical Schools by rank and department for 1975-76. The significant point is the nearly 2:1 ratio of part-time and volunteer faculty members as opposed to full-time staff. This part-time element often includes people with joint appointments, guest specialists from affiliated hospitals and clinical institutes, private physicians, etc. Thus this heterogeneity of staff at medical schools provides a link with the community medical profession and is thus a distinct characteristic of medical schools as compared to university science departments.

An additional link between the two components (element 1 and 2) of medical schools in Canada is the existence of clinical teaching facilities. By spending part of his training period in area hospitals or research institutes equipped with clinical teaching facilities the developing physician receives valuable practical experience in his profession. Moreover, the basic and clinical researchers can also use this environment for performing their studies and often achievements are thus immediately transferred to the community. Table IV-3.5 shows an example of a medical school (Dalhousie University) and the clinical facilities associated with it.

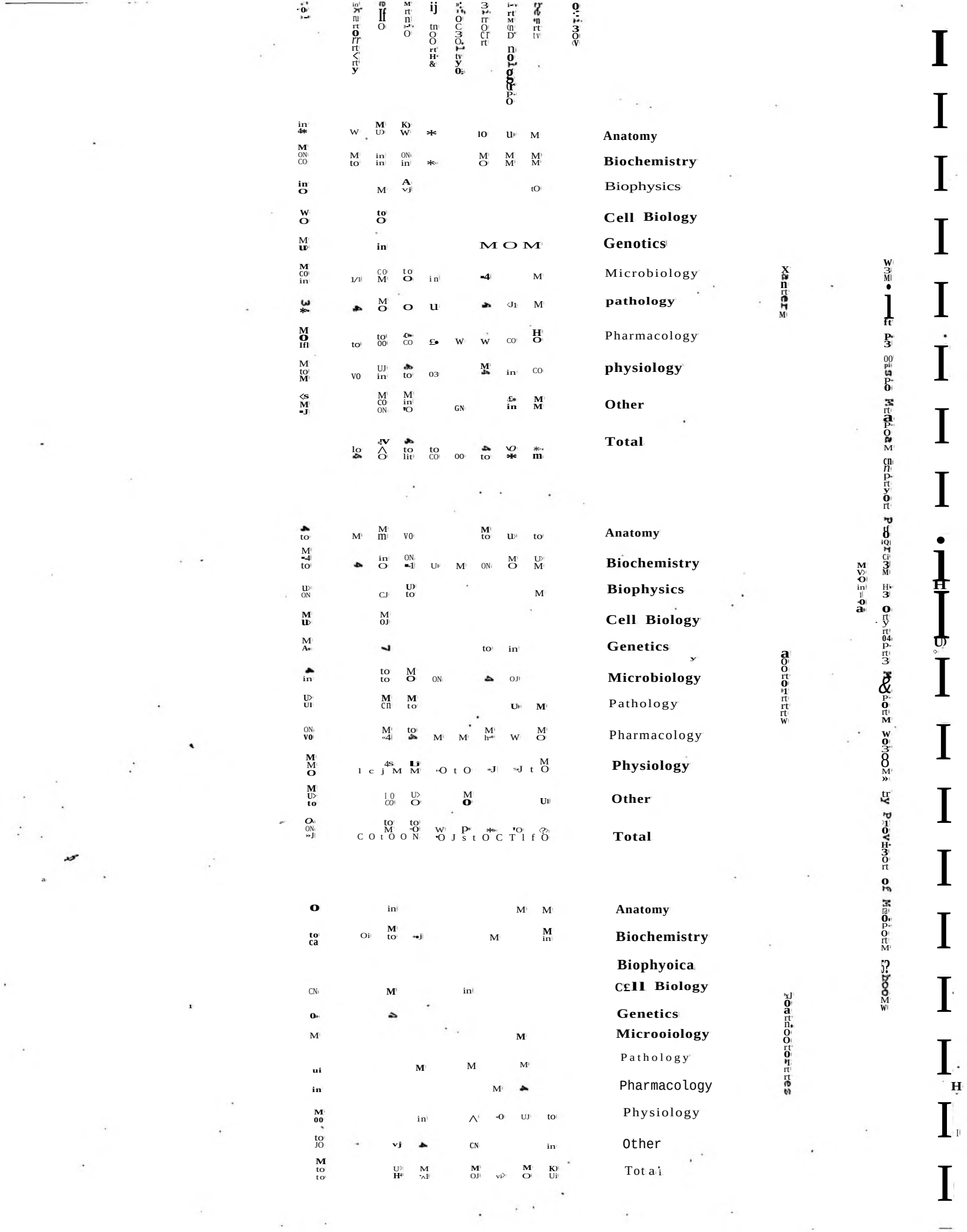
The Canadian Medical schools are unique when compared to other university science areas. The teaching staff are most likely to be affiliated with some other external agency and this provides an academic environment which draws heavily upon the medical profession at large. In so doing their doctoral training, research and research training programs have become closely aligned to the needs

of the Canadian population. Their close affiliations with area hospitals through the use of clinical teaching facilities makes the medical school an integral part of the health care and delivery system.

Table 17-3.1

SHffiIment in Canadian Medical Schools by Province

Frrrince	First Year			Intermediate Years			Graduating Year			Total		
	1973-74	1974-75	1975-76	1973-74	1974-75	1975-76	1973-74	1974-75	1975-76	1973-74	1974-75	15~5-~f
Alterra (2)	132	132	183	290	298	305	149	158	173	621	638	66:
British Coluriiia (1)	30	80	02	159	168	164	60	74	84	299	322	3i:
Manitoba (1)	**101**	**100**	3.01	175	205	200	75	72	103	351	377	4?4
Newfoundrland Cl)	48	48	59	112	**120**	164	41	50	53	**201**	218	276
Vova Scctia (1)	97	97	96	189	187	190	178	89	91	464	373	377
Ontario (5)	578	589	605	**1,148**	**1,088**	**1,101**	533	551	567	2,259	2,228	2,273
Quetec (45	627	635	625	**1,333**	**1,427**	**1,431**	482	498	592	2,442	2,560	2,648
Saskatchewan (1)	65	61	61	185	196	193	44	56	52	294	313	316
Canada (26)	**1,773**	**1,792**	**1,812**	3,591	3,689	3,748	**1,562**	**1,548**	**1,725**	6,931	7,029	7,255



Estimated Total Teaching Responsibilities of Canadian Medical Schools by Province of Medical School

1975-76

PROVINCE OF SCHOOL	Medical Students	Interns	Residents	Masters Basic Science	Doctoral Basic Science	Postdoctoral Basic Science	Total of Columns 4, 5, and 6	No. of Other Students	Other (Medical Students Equivalents)	Total of Columns 1, 2, 3, 7, and 9
Alberta	581	138	381	43	72	28	181	[illegible]	81	1948
British Columbia	480	94	[illegible]	90	[illegible]	10	140	[illegible]	851	1207
Manitoba	404	108	185	42	[illegible]	40	100	3880	215	1001
Newfoundland	[illegible]	[illegible]	83	8	14	18	[illegible]	974	81	501
Nova Scotia	377	[illegible]	[illegible]	28	17	9	[illegible]	[illegible]	193	[illegible]
Ontario	[illegible]	[illegible]	1835	425	275	17	218	[illegible]	1580	5888
Quebec	[illegible]	[illegible]	[illegible]	[illegible]	212	[illegible]	308	12587	881	5858
Saskatchewan	316	55	114	94	8	8	45	[illegible]	[illegible]	815
TOTAL	[illegible]	1888	4780	1117	557	125	1810	45174	8518	18087

Table IV-3.4

Faculty Members In Canadian Medical Schools by Rank and Department

1975-76

FULL-TIME FACULTY MEMBERS

DEPARTMENTS	NO. FULL-TIME FACULTY EMPLOYED: PROFESSOR	ASSOCIATE PROFESSOR	ASSISTANT PROFESSOR	INSTRUCTOR	TOTAL	NO. BUDGETED POSITIONS VACANT: PROFESSOR	ASSOCIATE PROFESSOR	ASSISTANT PROFESSOR	INSTRUCTOR	TOTAL	PART-TIME AND VOLUNTEERS: PART-TIME	SALARIED	TOTAL
BASIC SCIENCE													
[illegible]	63	60.5	45	7	183.5	1		5	1.5	8.5	39	10	49
[illegible]EHISTftY	00	69	30	5	192	i	i	4		6	32	n	64
[illegible]10LOCT—	36.5	S3	4J	4	136.$	1		3		5	65	2X	70
[illegible]GY	69	75	72.5	21	237.5	4	3	Z		9	178	m	291
ap [illegible]QLOGt	47	51	45.5	5	148.5	2		1		3	25	21	46
[illegible]06Y	71	58	61	6	196	1	1	3		5	34	U	48
HE?	41	55	63.5	31.5	191	1		9	r	1!	126	43	1.69
[illegible]TAPS	407.5	429.5	360.5	79.5	1285	12	6	27	2.5	47.5	409	256	745
jMC/U.													
rc [illegible]S10L.OGY	29	36	47.5	15	127.5	1	1	1		3	274	174	440
[illegible]LO&Y								\		I	\	4	S
ll [illegible]KtUlCIHE	17	45	71	27	160			3	2	5	325	2U0	605
[illegible]	165	262.5	300.5	34	762	4	8	16	1	29	643	564	1207
URQiOGY	11	9	13	2	35		1			1	39	5	44
[illegible]IftKCS.													
[illegible]ZQLOGY	32	35.3	72	12	151.3	\		3		4	264	141	405
it [illegible]LHOLOGY	15	9	20	IS	60	1		2		3	122	03	205
[illegible]lines	2	2	3		7	?				]	15	12	27
OLAHYNGOLOGY	0	12	15	1	36	1				]	aa	39	127
[illegible]RICS	58.5	98	93	13	262.5	2	2	4		a	335	215	550
/SICAL 8E0KCIKE	4	4	11	1	20			2		2	1	4	5
[illegible]TRV	60	95.3	122	37.5	322.0		2	1		J	303	579	882
IL!C HEALTH A													
V [illegible]T1V£ MEDICINE	30	27.5	42.5	17.5	117.5	1	2	1		4	151	107	258
[illegible]OGY	16	14	38	13	01	4		1		5	314	237	551
RGEOY	67.3	102	107	48	324.3	1	5	1		7	673	448	1121
[illegible]Y	4	3	7	2	16		1			1	30	9	39
£ft	55.5	39	57	22	173.5	5		7	. 1	13	169	10	179
[illegible]TALS	502.3	793.6	1019.1	261	255$.*	22	22	43	4	91	3747	2911	ñ056
.IS	909.8	1223.)	J2K0	340.5	W* 4	34	211	15	6.5	13«.5	4230	3167	7403

tone of Vi mical Fou.i.ly	Affiliated						Clerkship						
	Owned	Major	Limited	Undergrad	Number of Beds	Visits/Year	Family Medicine	Medicine	Pediatrics	Psychiatry	Obstetrics/Gynecology	Surgery	Other
Victoria fcivjral [iospi		X			424	43.v)i		X		X	X	X	
E.W.K. HoCpitdl		X			HOT	356";			X				
nilfax Infbinary		X			449	279b..	X	X		X	X	X	
Jr c Maternity					1!0	11899					X		
V Hill Hospital		X			397	.507]		X		X		X	
1a:i Armed Forces			å		!61	3097		X				X	
dK. ly Medicine Centre	X						X						

4. HQM Trends and Implications

As noted above, the number of university teachers required follows very closely the trends in enrolment, especially at the undergraduate level. Trends in enrolment, however, are governed by quite different considerations in the various disciplines. In the extreme cases, there are disciplines with completely "controlled" admissions and disciplines that exercise virtually no control, other than the fulfillment of a set of basic requirements. Many disciplines tend to have policies somewhere between the two extremes.

The anticipated decline in student enrolment over the coming decade will, therefore, have quite different effects on the various disciplines. Those disciplines whose enrolment is more or less "controlled", are not likely to be affected by this decline. The reason is that in the development of admissions policies over the years by such disciplines, explicit or implicit

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[1] The terms "controlled" and "uncontrolled" should only be taken as approximations and convenient short-hand expressions that are reflective of admissions policies.

account was taken of labour market requirements and the need of the country for their graduates. Their enrolments grew in line with national requirements, and were not overly "inflated" by the general expansion of the university system over the past 15 years. If the close relationship between capacity and demand that currently prevails in the controlled university fields persists into the future — and there is no reason to assume that it will not -- then labour market conditions for highly qualified manpower will continue to determine the growth of enrolment and teachers of such faculties, at least in the medium term. Disciplines that fall into this category are the professional health disciplines (medicine, dentistry); veterinary medicine; and, to a certain extent, pharmacy; engineering; and law. Other disciplines whose admissions policies are less controlled, but whose graduates have been largely absorbed into HQM jobs are geosciences; agriculture and forestry; accounting; and economics.

The Canadian university system expanded rapidly from the beginning of the 1960s to the early 1970s.

The post-war birth wave contributed significantly but the major factors were increases in age-specific participation rates, the catching-up of female enrolment rates, and the expansion of adult part-time enrolment. The growth of the university system was concentrated in disciplines with open admissions policies. By the middle 1970s, the number of graduates from such disciplines tended to have risen to a level in excess of the availability of HQM jobs. This imbalance persists, and is quite large in some disciplines such as education, for example. Nevertheless, the enrolments, especially at the undergraduate level, are governed by factors other than strictly the availability of HQM jobs. Enrolments at universities are anticipated to level off from now to the beginning of the 1980s, and then to decline to the beginning of the 1990s, by a considerable margin, even after allowing for the possibility of further growth in part-time enrolments. The brunt of the decline will be borne by the "uncontrolled" disciplines. Given the close relationship between teaching staff and enrolment, this also implies a downward adjustment in the number of teachers, and

thereby in the potential research capacity in those disciplines. The following fields of study are estimated to fall into this category: biology and related; bio-chemistry; physical sciences (except the geosciences); humanities; education; commerce and business administration; social sciences (except possibly economics); and general arts.

The following is a more detailed examination of trends in specific disciplines:

Physical Sciences

The MOSST HQM model indicates a current excess of graduates in physics and chemistry, mainly as a consequence of high enrolment growth in the past, and also to a certain extent due to the virtual disappearance of teaching jobs (especially in high schools). Enrolments in these disciplines have grown in line with public demand for university education rather than HQM job requirements. According to current indicators of attitudes, budgets, and demography, enrolment may, at best, remain at today's level to the mid 1980s, and then decline by about 10-15 per cent to the mid 1990s. Similarly, other things

being equal, there will be pressures to reduce the teaching staff over the next two decades by about the same percentage. Traditionally, the faculty in these disciplines has had a high rate of participation in research funded by the NRC. As was shown above (Table IV-1.7), about two-thirds of the faculty currently apply for NRC operating grants in the basic natural sciences (about 4,400 applications for a faculty of about 6,600). The first implication of the anticipated trends appears to be, therefore, a reduction in the number of potential researchers necessary to maintain the current quality and quantity of research.

The second implication is the disappearance, for the coming two decades, of the traditional employment opportunities in these disciplines for new PhDs: no growth in the demand for faculty initially, relatively little attrition because of the age-structure of the existing faculty[1], and then

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[1] Attrition and age estimates for faculty by field of study have been made with the HQM model — see "HQM Attrition Estimates to 1985" (Forecasting Division).

an absolute reduction in the faculty. Graduate enrolment, at the MA and the PhD levels, has been declining significantly for several years (see Table IV-1.2 above). While this is consistent with current and expected conditions on the traditional job market, attention will have to be paid to this aspect, to assure adequate future supplies of researchers in these disciplines.

As far as the geosciences are concerned, the HQM demand model indicates that there is currently an approximate balance between graduates and HQM jobs. This applies more or less to the component fields such as geology; mining, geological, and petroleum engineering; oceanography; and related fields. The occupational demand projections would seem to imply continuing demand strength for graduates from these disciplines[1]. This would seem plausible, given the future development and production problems to be solved in the resources and energy fields.

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[1]The Forecasting Division has carried out an analysis of HQM in the geoscience to 1985, for consultation with the Canadian Geosciences Council.

This would imply that while there will be reductions in enrolments elsewhere in the system, the geosciences may not be measurably affected. Further, this would indicate that staff and research capacity remain intact over this period of adjustment, and that there should be sufficient employment opportunities for post-graduates, in the university system as well as elsewhere.

Engineering

The HQM model indicates that the current labour market for engineers is in approximate balance. The current levels of graduations are estimated to be in line with demand trends to 1985, indicating that an increase in enrolments is probably not required over this period. This field of study should be classified in the category of fields with "controlled" admissions, even though the practice of control differs from that in some other professions. The effect of the admissions policy, however, has been the same, at least up to now: resistance to inflate enrolments in response to rapidly-

increasing applications for admission, and reasonable maintenance of balance between graduations and requirements for engineers on the labour market.

The faculty participation in NRC research funding is relatively high, amounting currently to around 55 per cent (see Table IV-1.6 above). This research capacity is expected to remain unaffected over the next ten years, since enrolments, and the number of faculty required for teaching, would remain at least at today's level. In this field of study, the size of faculty is not likely to be affected by the general downward pressures that will be felt in other parts of the university system. Rather, the demand for engineering should continue to be determined by economic and technological requirements.

As far as architecture is concerned, the demand for graduates is a function of construction activity. Construction has showed down considerably compared with the early 1970s, and it appears that the universities are graduating substantially more achitects than can be absorbed into the occupation. Unlike

some of the other professional fields, architecture experienced a considerable increase in enrolments in the 1970s, and the number of degrees granted today is double the number at the beginning of the decade. The production of graduates is clearly in excess of current professional requirements and, if the enrolment levels are maintained, will remain in excess. It would be extremely difficult to predict future enrolment trends in this field, despite the scarcity of jobs in architecutre. The universities, in the light of this, may begin to curtail the size of faculty, which could have a marginal effect on the available research capacity.

Life Sciences

Veterinary medicine clearly belongs to the category of fields that practice explicit admissions controls in enrolment. The HQM model indicates that there is currently a balance between the demand for veterinarians and the graduates that are being produced. With the "production capacity" of this discipline so closely aligned with the country's requirements for veterinary services, the number of enrolled and of faculty should continue to expand

with the underlying demand factors[1]. The research capacity does not appear to be endangered by the pressures that are affecting other sectors of the university system. Also, researchers in this field have access to research funding from several sources other than the NRC.

While the current size of the agriculture and forestry disciplines appear to be in balance with the occupational requirements, this balance has evolved without the kinds of explicit enrolment controls practiced by some of the professional schools. The HQM model suggests that, to 1985, the annual demand for graduates in these disciplines is roughly what they are currently turning out. This would imply the maintenance of the current enrolment and faculty levels, and no significant change in the basic research capacity. As in the

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[1] A statistical analysis of the future demand for veterinarians was discussed with the professional association (at Guelph). The current debate in this discipline is whether the anticipated growth in demand is sufficient to warrant the establishment of another school of veterinary science.

case of veterinarians, agricultural researchers in the universities have access to research funding from several sources other than the NRC.

In biochemistry, biology and related fields, the situation appears to be quite different. The current output of graduates is far in excess of occupational demands. This is aggravated by the fact that, on the demand side, one of the more important sources for jobs, namely high school teaching, has dwindled because of demographic changes. In the absence of rigorous admissions controls (of the type practiced by some of the professional schools), enrolments and faculty have increased in response to the pressures arising out of the general rapid increase in the demand for university education, rather than in response to the underlying HQM job requirements in the economy which are substantially lower than current outputs of graduates. New jobs for graduates from these fields of study have been projected with the HQM model, and the indications are that while requirements to 1985 are not expected to be substantially different from today's (relative) level, they are far below the current, and probably future, supply. It would therefore not be unreasonable to argue that the

anticipated downward pressures on the university system would tend to fall on "inflated" disciplines such as biology with greater force than on disciplines whose growth is in line with economic and demographic requirements. While this cannot be predicted, this would at least appear to be the sensible interpretation to accept at this point in time. If there is a decline in enrolment in these fields over the coming years, this should affect the size of faculty and the available research capacity. The faculty participation in NRC funding of operating grants is relatively high, so that attention should be paid to assure the maintenance of sufficient research capacity in these fields.

Humanities

With the exception of perhaps theology, the HQM model indicates that there are currently substantially more graduates in the humanities than required for occupational HQM employment, espeically in the traditional secondary school teaching. This situation is not expected to change over the next decade -- i.e. despite the expected maintenance of the current number of HQM jobs, the enrolments appear to be so

high that it would not be reasonable to expect labour market balance over this time period. Given the admissions process which facilitated the rapid growth when there were expansionary pressures, it is likely that the anticipated downward pressures would similarly affect these disciplines more than others who managed to keep in line with the labour market. The universities themselves might be tempted to make cuts in these areas, although a reduction in enrolments in the humanities may not be accompanied by the same reduction in faculty, because of students from other fields, including those that are not expected to experience declines, are often required to take at least some courses in the humanities (and, to some extent, in the natural sciences, and the social sciences). The proportion of humanities faculty applying for Canada Council research funding is quite low (see Table IV-2.A and IV-2.B above). It is not likely, therefore, that any changes in the research capacity, due to a reduction in the size of faculty, need result in a reduction of the amount of research performed.

Social Sciences

The situation in the social sciences is quite similar to that in the humanities. With the exception of perhaps economics, and accounting, the supply of graduates far exceeds the available HQM jobs. As there are no rigid admissions controls, enrolments and faculty are currently at relatively inflated levels, and the expected future adjustments could similarly be of relatively stronger impact here than in the more balanced disciplines. The participation in Canada Council research funding by the social sciences faculty is quite low, and future adjustments in the size of faculty should not affect the amount of research performed.

Education

There are almost no jobs for graduates, but despite this fact, this is one of the most popular fields of study in the university system. Students appear to value a degree in education more highly than a pass-BA, but perhaps not as highly as one of the professional or engineering degrees for which they would not be admitted. Conditions on the labour market for education graduates certainly do not

appear to provide a clear guidance about future enrolment and faculty trends. However, the use of Canada Council funding by the education faculty is quite small.

Law

The labour market appears to be still in balance, despite significant and persisting increases in the number of graduates. Up to now, the explanation was that lawyers went to small communities or into specialities where there were gaps. How much of a backlog still exists is not known, but it would not seem reasonable to expect law enrolments to continue to grow. The law faculty uses very little Canada Council research funding.

Health

The university research capacity in the medical fields is relatively much less dependent on enrolment factors, in contrast to the other disciplines. As noted above, medical research in Canada is much more closely integrated than research in other fields. There is close association between universities, the major hospitals, and the medical research institutes. The research is relatively less dependent on a single

source of funding. And the number of researchers is determined by factors that are different from the factors that govern the number of faculty.

While access to financing of research in this area does not appear to be as much of a problem as in some of the other disciplines, there are indications that the supply of new researchers could be falling. A more thorough search of the situation is necessary, as it appears that the PhD enrolment in the various basic medical fields of study has declined considerably in recent years.

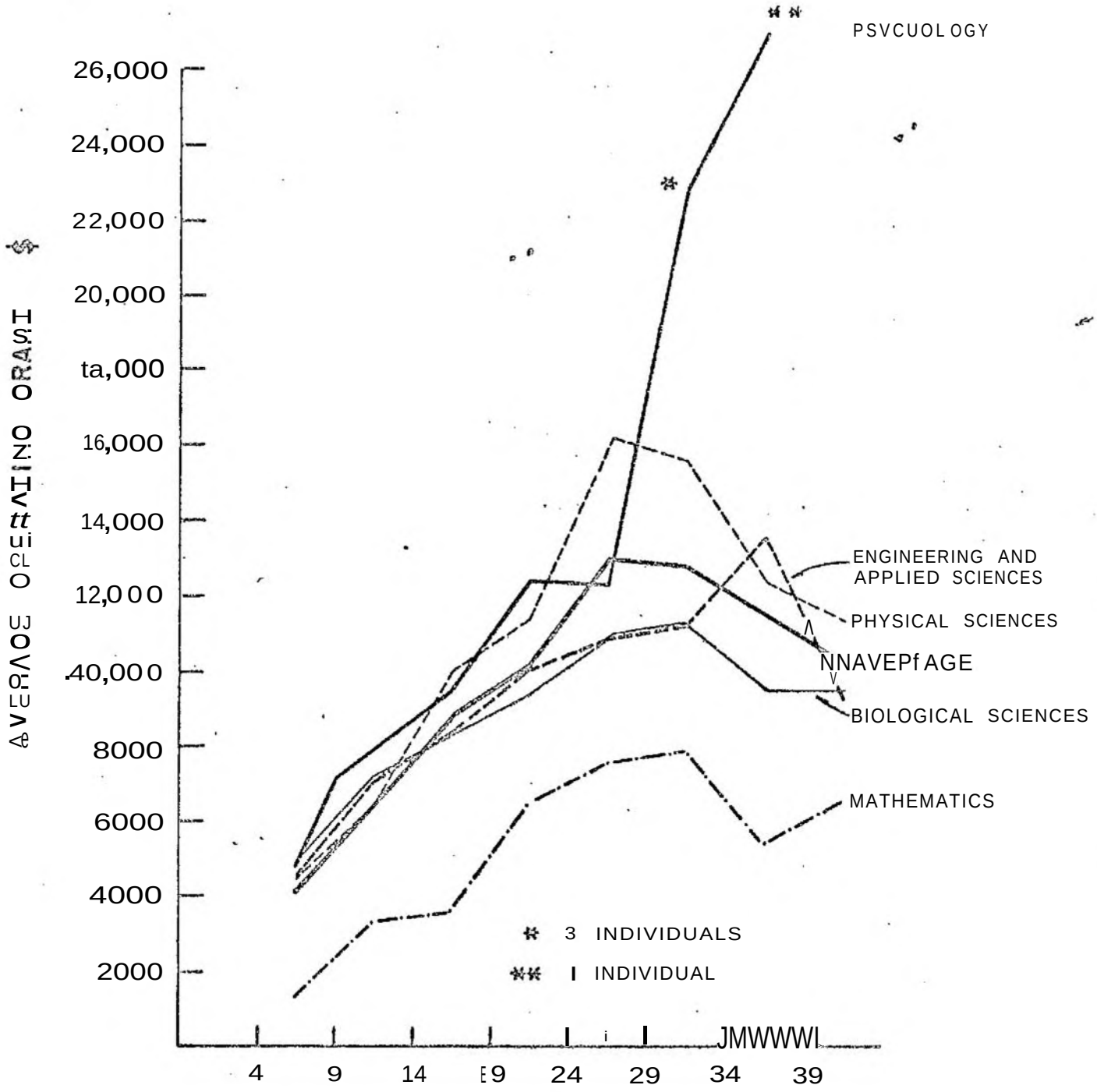
SECTION V

Selected Topics

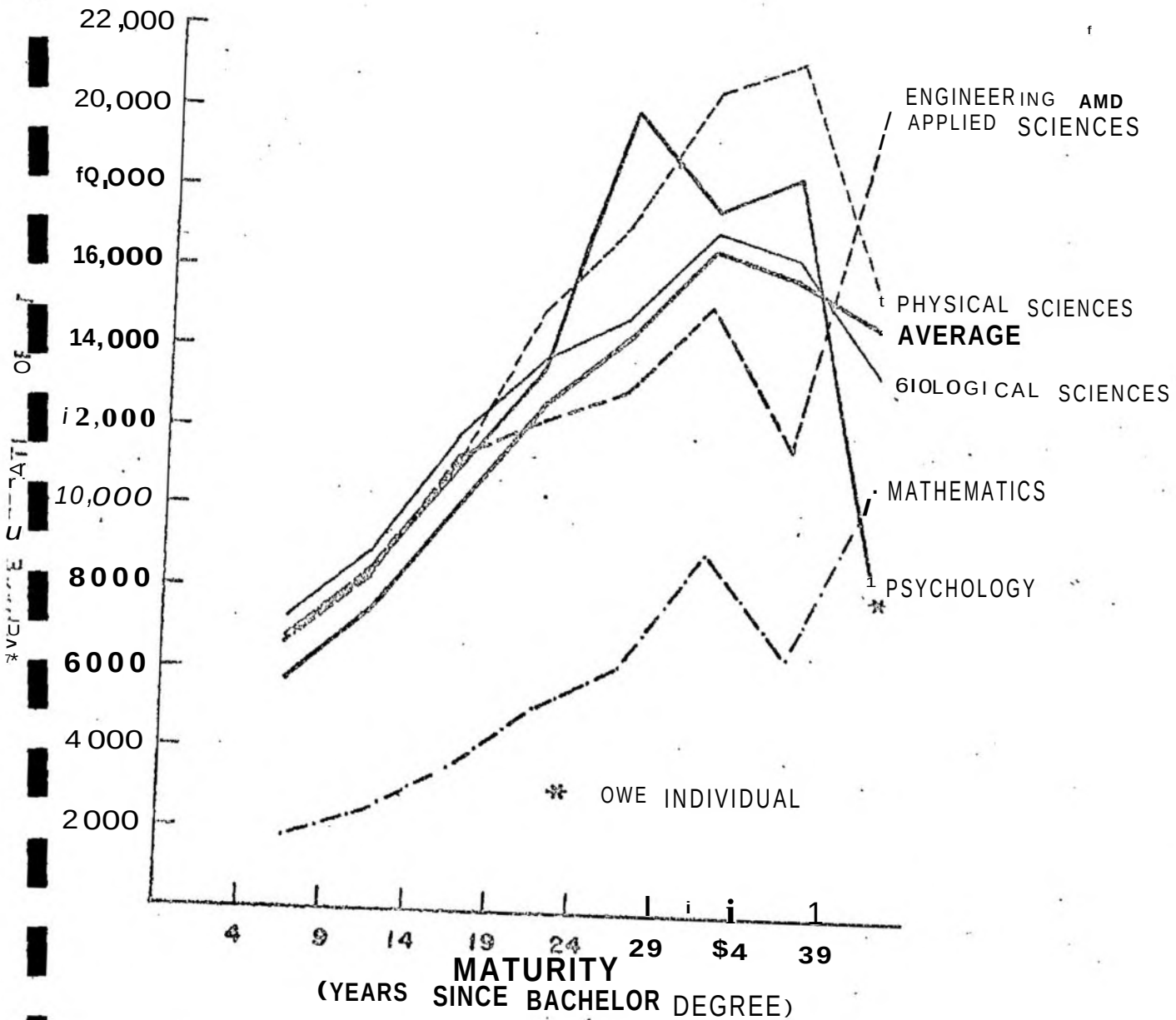
1c The Maturity of the Recipients of NRC's Operating Grants

The Office of Grants and Scholarships of the National Research Council recently produced a background study on "Age Relevant Characteristics of University Researchers Supported by the NRC". One of the topics dealt with in this study was the maturity of the recipients of the NRC's Operating Grants; where maturity if defined as the number of years since the recipient obtained a Bachelor degree.

The average operating grant for several disciplinary areas, as a function of maturity, is presented in graphs 10A and 10H for the years 1970-71 and 1977-78 respectively. From these graphs, it will be noted that the peak of the "average" curve has shifted to more senior researchers; indeed the shift from a peak position of approximately 26 years in 1970-71 to roughly 32 years in 1977-78 corresponds closely to the time interval between the two graphs. Furthermore, the peak of the "average" curve has increased from around $13 thousand in 1970-71 to roughly $17 thousand in 1977-78.



GRAPHEOA AVERAGE OPERATING GRANT AS FUNCTION Of MATURITY, 1970-71



APH /0 H **AVERAGE OPERATING GRANT AS FUNCTION OF MATURITY, 197T-70**

The absolute value of operating grants for more junior researchers, that is to say those who received their bachelor's degree only 4-9 years ago, has increased from about $4 thousand in 1970-71 to $6 thousand in 1977-78. However, the rate of increase of the operating grants with maturity has not changed significantly and has remained at approximately $430 per year.

2. Profile of MRC Grantees in 1975-76

In order to determine certain characteristics of MRC grantees, a study[1] was undertaken of those individuals who received financial support for their research programs during the 1975-76 fiscal year. The basic data were taken from the grantees' curriculum vitae and the list of grantees was obtained from the 1975-76 President's Report[2].

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1 MRC Background Study, June 1977

2 MRC Report of the President 1975-76

The total of 1,497 grantees is broken down as follows:

No. supported through Groups	46
Development Grants Only	27
Development Grants and Operating Grants	8
Operating Grants	1,416
	1,497

With regard to the institution at which the grantee was located, a further breakdown by faculty was done using the following guidelines: a) Those grantees who had no academic appointment but who were located in university-affiliated teaching hospitals or institutes were included in the medical school statistics; b) those grantees who had equal cross-appointments in a medical school department and in a department of another faculty were placed in the medical school statistics; and c) those with unequal cross-appointments were placed in the faculty in which they held the highest appointment.

With regard to the departmental affiliation of the grantee, two tabulation methods were used:

method A, whereby each grantee was assigned to only one department; and method B, whereby those grantees holding cross-appointments were assigned to more than one department on a proportional basis. The list of department used was the same as that used by Statistics Canada (Appendix A).

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Some of the major items of interest arising from this study are discussed below.

Table I

1. Of the total number of grantees receiving support from MRC in 1975-76, 50.4 per cent had a PhD as their major degree, 46.8 per cent an M.D., 1.7 per cent a D.D.S. and 1.1 per cent a D.V.M.

2. Of the total number of grantees, 51 per cent were less than 40 years of age, 35 per cent were between 40 and 49 years old, and 14 per cent were over 49 years of age. Analysis by major degree showed that 59 per cent of those whose major degree is a PhD are less than 40 years of age and 28 per cent between 40 and 49,

whereas in the M.D.cf D.D.S.*f D.V.M. group, 43.5 per cent are less than 40 years of age and 43 per cent between 40 and 49.

Table II

1. Using a system whereby grantees holding cross-appointments were assigned to more than one department on a proportional basis, it was shown that 87.1 per cent of all 1975-76 MRC grantees were located in medical schools, 2.5 per cent in dental schools, 1.9 per cent in pharmacy schools, 0.7 per cent in veterinary schools, and 7.8 per cent in other faculties and institutions (primarily in departments of chemistry, biology, psychology and engineering).

Table III

1. The average age of all 1975-76 MRC grantees was 40.8 years (41.0 years for those located in medical schools).

2. Amongst medical schools, the University of British Columbia had the highest average age for MRC grantees (44.1), followed by the University of Ottawa (42.0), the University of Saskatchewan (41.7) and the University of Manitoba (41.6). Laval University had the lowest (38.5).

3. Among departments in medical schools, psychiatry had the highest average age for MRC grantees (43.0), followed by obstetrics and gynaecology (42.6), anatomy (42.3), pathology (42.2), and microbiology (42.1). Pediatrics had the lowest (38.9), followed by psysiology (39.5) and medicine (40.1).

Table IV

1. In the case of those grantees having an M.D.$_e$ D.D.S$_{«f}$ or D.V.M. degree, 53 per cent received their university education completely inside Canada, 34 per cent completely outside Canada and 13

per cent partly inside and partly outside Canada. On the other hand, in the case of those having a PhD degree, 39 per cent received their university education completely inside Canada, 37 per cent completely outside Canada, and 24 per cent partly inside and partly outside Canada.

Table V

1. Of those 1975-76 MRC grantees having an M.D. of D.D.S. or D.V.M. degree, 59.6 per cent received their major degree from a Canadian university (with the largest numbers graduating from Toronto, McGill, Montreal and Manitoba), 11.8 per cent from a universtiy in the United Kingdom, 13.3 per cent from European universities other than in the United Kingdom, and 3.8 per cent from American universities.

2. Of those grantees having a PhD as a major degree, 48.4 per cent received their PhD training at a Canadian university (with the largest numbers graduating

from McGill, Toronto and Montreal), 26.3 per cent at American universities, and 16.2 per cent at universities in the United Kingdom.

Table X

Distribution of 1975-76 MRC Grantees by
Age Group and Major Degree[1]

	Age group									
	25-29	30-34	35-39	40-44	45-A9	50-54	55-59	60-64	65 & over	Total No.
A. Major degree: M.D.										
Number	3	89	2C7	182	118	54	28	15	5	701
%	0.4	13	30	26	17	0	4	2	0.7	
Be Major degree: D.D.S.										
Number	1	8	5	5	4	—	2	—	—	25
%	4	32	20	20	16	—	8	—	—	
C. Major degree: D.V.M.										
Number	—	4	5	4	2	2	—	—	—	17
%	—	24	29	24	12	12	—	—	—	
p. Kujor degrees Ph.D.										
Number	27	217	199	113	100	54	27	11	6	754
%	4	29	26	15	13	7	4	JL	0.8	
E. M.D.$_8$ D.D.S., and D.V.M. groups combined										
Number	4	101	217	191	124	56	30	15	5	743
X	0.5	14	29	26	17	8	4	2	0.7	
***. M.D.$_i$ D.D.S.$_*$ D.V.M. group and Ph.D. group combined**										
Number	31	318	416	304	224	110	57	36	11	1497
X	2	21	28	20	15	7	4	2	1	

ΛIncludes those receiving research support through Groups and Development Grants, but excludes those holding only maintenance grants or major equipment grants and no operating grant. Percentages do not add up to 100% in all cases because of rounding.

Tabic II

Distribution[a] of 1975-76 MRC Grantees by Department Using Two Methods[b]

Faculty & dopar tinertt	Humber of grantees Method A	Method B	Z of total No. grantees Method A	Method B
MEDICAL SCHOOLS				
Basic sciences				
Anatomy	74	78.0	**A.9**	5.2
Biochemistry	177	186.25	**11.8**	12.4
Pharmacology	71	78.5	4.7	5.2
Physiology	133	147.25	8.9	9.8
Other	38	44.75	2.5	3.0
Sub-total	493	534.75	32.9	35.7
Paraclinical sciences				
Microbiology	90	92.75	**6.0**	**6.2**
Pathology	81	85.5	5.4	5.7
Other	29	32.75	1.9	2.2
Sub-total	**/200**	**211.0**	13,4	14.1
Medicine A medical specialties				
Medicine	285	265,75	19.0	17.8
Pediatrics	125	**88.0**	8.4	5.9
Psychiatry	31	29.5	**2.1**	**2.0**
Other	29	27.5	1.9	**1.8**
Sub-total	470	410.75	31,4	27.4
Surgery & surgical specialties				
Surgery	95	96.75	6.3	6.5
Obstetrics & GYNCIOLOGY	29	27.75	1.9	1.9
Othxr	19	19.25	1.3	1.3
Sub-total	143	143.75	9.6	9.6
Other departments not classified in above groups	**2**	3.0	**0.1**	**0.2**
Sub-total (all departments in tocdical schools)	1,308	1,303.25	87.4	87.1
DENTAL SCHOOLS	39	37.75	**2.6**	2.5
PHARMACY SCHOOLS	29	29,0	1.9	1.9
VETERINARY SCHOOLS	**10**	**10.0**	0.7	0.7
OTHER FACULTIES & INSTITUTIONS				
Chemistry	14	14.0	0.9	0.9
Biology	14	16.5	0.9	**1.1**
Biochemistry (Science)	4	5,5	0.3	0.4
Microbiology (Science)	**6**	5.5	0.4	0.4
Physics	4	4.0	0.3	0.3
Psychology	33	34.0	2.2	2.3
Engineering	19	**21.0**	1.3	1.4
Others	17	16.5	**1.1**	**1.1**
Sub-total	**111**	117.0	7.4	7.8
TOTAL	**1,49?**	1,497.0		

a) Includes those receiving research support through Groups and Development Grants, tut excludes those holding only maintenance grants or major equipment grants and no operating grant. Percentages do not add up to 100% In all cases because of rounding.

b) Method A - each grantee assigned to only one department
Method B - grantees holding crojm-appoinUnonCs were assigned to more than one department on u proportional buaio

Table III

Average age of 1975-76 MRC Grantees
by Institution and by Department*

Faculty & Institution	Average age (in years)
MEDICAll SCHOOLS	
British Columbia	44.1
Alberta	40.3
Calgary	40.0
Saskatchewan	41.7
Manitoba	41.6
Western Ontario	41.5
McMaster	39.5
Toronto (including Hospital for Sick Children)	41.5
Queen's	40.4
Ottawa	42.0
McGill (including Jewish General Hospital)	41.3
Montreal (including Institut Armand-Frappier)	40.4
Sherbrooke	39.5
Laval	38.5
Dalhousie	38.8
Memorial	39.1
Sub-total	41.0
CENTAL SCHOOLS	38.3
PHARMACY SCHOOLS	38.7
VETERINARY SCHOOLS	38.5
OTHER UNIVERSITY FACULTIES	39.8
OTHER NON-UNIVERSITY INSTITUTIONS	50.8
TOTAL	40.8

Faculty & department	Average age (in years)
MEDICAL SCHOOLS	
Basic sciences	
Anatomy	42.3
Biochemistry	41.2
Pharmacology	41.7
Physiology	39.5
Other	40.1
Sub-total	40.9
Paraclinical sciences	
Microbiology	42.1
Pathology	42.2
Other	41.0
Sub-total	42.0
Medicine A medical specialties	
Medicine	40.1
Pediatrics	38.9
Psychiatry	43.0
Other	41.9
Sub-total	40.2
Surgery A surgical specialties	
Surgery	41.3
Obstetrics & Gynecology	42.6
Other	44.7
Sub-total	42.0
Other departments not classified in above groups	47.0
Sub-total (all departments in medical schools)	41.0
DENTAL SCHOOLS	38.8
PHARMACY SCHOOLS	8.7
VETERINARY SCHOOLS	38.5
OTHER FACULTIES A INSTITUTIONS	39.8
TOTAL	40.8

*Includes those receiving research support through Groups and Development Grants, but excludes those holding only maintenance grants or major equipment grants and no operating grant. The departmental distribution was based on a system whereby those grantees holding cross-appointments were assigned to more than ope department on a proportional basis.

Table XV

MRC 1975-76 Grantees by Major Degree and Location of Univeristy Education*

Category	Number	Percentage
A. Major degree: M.D., D.D.S., D.V.M.		
M.D. inside	301	
M.D. outside	173	
M.D. inside & Ph.D. inside	94	
M.D. Inside & Ph.D. outside	48	
M.D. outside & Ph.D, inside	48	
M.D. outside & Ph.D. outside	79	
Those educated completely inside	395	53
Those educated completely outside	252	34
Those educated partly inside & partly outside	96	13
Sub-total	743	
B. Major degree: Ph.D.		
B.Sc. inside & Ph.D. inside	289	
B.Sc. inside & Ph.D, outside	107	
B.Sc. outside & Ph.D. inside	71	
B.Sc. outside & Ph.D. outside	276	
B.Sc. irside (no Ph.D.)	5	
B.Sc. outside (no Ph.D.)	5	
Unknown	1	
Those educated completely inside	294	39
Those educated completely outside	281	37
Those educated partly inside & partly outside	178	24
Unknown	1	—
Sub-total	754	
C. M.D., D.D.S., D.V.M. group & Ph.D. group combined		
Those educated completely inside	689	46
Those educated completely outside	533	36
Those educated partly inside & partly outside	274	18
Unknown	1	—
Total	1,497	

*Includes those receiving research support through Groups and Development Grants, but excludes those holding only maintenance grants or major equipment grants and no operating grant. University education refers to studies related to a degree program, specifically an M.D., D.D.S., D.V.M., B.Sc., or Ph.D. degree. "Inside" means inside Canada, and "outside" means outside Canada.

[redacted] few [redacted] g*« [redacted] nd [redacted] fers [redacted] Awi [redacted] ng [redacted] De [redacted] e fo [redacted] 975 [redacted] MRi [redacted] fente [redacted]

Geographical area (Z university if in Canada)	K.D. degree No.	1	D.D.S. degree No.	%	D.V.M. decree No.	%	K.D., D.D.S., D.V.H. srouo as a vholc No.	Z	Ph.P. degreef No.	Z	All degrees together No.	%	3. ?harm. degree^ No.	I
Canada														
British Columbia	12	2.8	—	—	—	—	12	.2.7	26	7.2	38	4.7	—	—
IZberta	27	6.A	5	45	—	—	32	7.2	26	7.1	53	7.2	7	21
Calgary	—	—	—	—	—	—	—	—	4	1.1	4	0.5	—	—
Saskatchewan	9	2.1	—	—	1	1.	10	2.2	7	1.9	17	2.1	7	21
hanlmba	45	10.9	—	—	—	—	46	10.4	20	5.5	66	8.2	3	9
Western Ontario *	23	5.4	—	—	—	—	23	5.2	25	6.8	48	5.9	—	—
Waterloo	—	—	—	—	—	—	—	—	*2*	0.5	2	0.2	—	—
Guelph	—	—	—	—	A	44	4	0.9	1	0.3	8	0.6	—	—
Xc>ascer	—	—	—	—	—	—	—	—	*1*	1.9	7	0.9	—	—
Icroato	75	17.7	6	55	—	—	81	13.3	66	13.1	147	IS.2	9	27
Queen's	37	8.7	—	—	—	—	37	3.A	22	3.3	49	6.1	—	—
Ottawa	S	1.9	—	—	—	—	3	1.8	9	2.5	17	2.1	—	—
Carleten	—	—	—	—	—	—	—	—	1	0.3	1	0.1	—	—
KcOUl	SI	19.1	—	—	—	—	81	13.3	93	25.5	174	21.5	—	—
X=:real	63	16.1	—	—	A	4A	72	16.3	31	8.5	203	12.7	A	12
Sherbrooke	—	—	—	—	—	—	—	—	7	1.9	7	0.9	—	—
Laval	23	5.4	—	—	—	—	23	5.2	19	5.2	A2	5.2	3	3
3aincusio	14	3.3	—	—	—	—	14	3.2	9	2.5	23	2.3	—	—
Sub-total (inside Canada)	423	60.3	11	44	9	53	443	59.6	365	48.4	808	54.0	33	67
Pelted States	25	3.6	2	8	I	6	23	3.8	193	26.3	226	15.1	3	6
United Kingdom	81	11.6	4	16	3	18	83	11.8	122	16.2	210	14.0	5	10
France	12	1.7	—	—	—	—	12	1.6	5	0.7	17	1.1	—	—
Other European countries	82	11.7	2	8	3	18	87	11.7	26	3.4	113	7.5	1	2
Australia 4 ōev Zealand	13	1.9	4	16	1	6	IS	2.A	14	1.9	32	2.1	1	Z
Asia	32	4.6	1	A	—	—	33	4.4	16	2.1	49	3.3	3	6
yjddle East	6	0.9	—	—	—	—	6	0.3	4	0.5	:0	0.7	—	—
Africa	12	1.7	1	4	—	—	13	1.7	1	0.1	14	0.9	2	4
Central America & Caribbean	5	0.7	—	—	—	—	5	0.7	—	—	5	0.3	—	—
South America	10	1.4	—	—	—	—	10	1.3	2	0.3	12	0.3	X	2
Sub-total (outside Canada)	278	39.7	14	56	8	47	300	40.4	388	51.5	683	46.0	16	33
Unknown	—	—	—	—	—	—	—	—	1	0.7	1	0.1	—	—
Total	701		25		17		743		754		2,497		49	

*Includes those receiving research support through Groups and Development Grants, but excludes those holding only maintenance grants or major equipment grants and no operating grant. In the percentage columns, the figures slightly to the left (in the top half) refer to the total number of 1975-76 grantees who received that major degree at a Canadian university, and Indicate the percentage of those graduating from each university; the figures slightly to the right (in the bottom half) refer to the total number of 1975-76 grantees having that major degree, and indicate the percentage who received their education in each geographical area. The percentages do not add up to 100% in all cases because of rounding.

^Includes those who had only a B.Sc. degree and no Ph.D. degree.

‡The B.Fharm. group has been separated out only for information purposes; of the 49 pharmacy graduates, 47 have a Eh.D. degree and 2 an K.D. *degree*, and therefore appear in those groups.

Appendix A

STATISTICS CANADA

Grouping of Departments (or Disciplines)
for Medical School Statistics

1. Basic sciences
   - 31 Anatomy (including histology, morphological sciences)
   - 32 Biochemistry (including Cancer Research Lab at UVG and Best Inst. at Toronto)
   - 13 Pharmacology (including therapeutics, pharmaceutical sciences)
   - 14 Physiology (including neuroscienees at McMaster)
   - 15 Other basic sciences (biophysics, cell biology, biomedical studies, biology, chemistry, neurosciences (except at McMaster))

2. Paraclinical sciences
   - 21 Microbiology (including immunology, bacteriology, virology, parasitology, innuttochemistry)
   - 22 Pathology (including Experimental Medicine and Surgery at Montreal)
   - 23 Other paraclinical sciences (pathological chemistry, clinical biochemistry, nutrition, genetics, biomedical engineering)

3. Medicine and medical specialties
   - 31 Medicine (including neurology)
   - 32 Pediatrics
   - 33 Psychiatry
   - 34 Other medical specialties (radiology, anesthesia, community health, rehabilitation medicine, preventive medicine, family medicine, epidemiology, environmental health, social medicine)

4. Surgery and surgical specialties
   - 41 Surgery (including urology)
   - 42 Obstetrics and gynecology
   - 43 Other surgical specialties (ophthalmology, otolaryngology, optometry)

5. Others, to include those departments (or disciplines) that cannot reasonably be included in one of the above categories (e.g. health administration, medical education, health professions, animal care, continuing medical education, history of medicine, psychology, behavioural sciences, philosophy, theology, management sciences, dean's offices, "not applicable" category, medical laboratory technology, communication disorders, instructional communications, "balancing purposes only" category)