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IDENTIFICATION OF CENTRES OF STRENGTH  
IN UNIVERSITY RESEARCH  
(An Appreciation)

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Universities Branch

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IDENTIFICATION OF CENTRES OF STRENGTH  
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Summary

Related to the intended re-orientation of university research is also the concern with the environmental conditions favouring the most productive employment of resources engaged therein. The existing conditions could be ascertained by a review of the present structure and organization of university research providing that the pertinent information is available. The need for changes, if any, may be based on what the experience would suggest is the most favourable arrangement.

In some instances, either because of the complexity, size, urgency or importance of the problems studied or of the nature of facilities required, the most favourable conditions for conducting research can only be assured by concentrating a critical mass and diversity of research talent and other resources into a unit with its own working space, facilities and staff dedicated to research in a particular problem area or areas. Thus, the key operational concepts in the review of the existing conditions in university research are:

research centre, specialization, concentration and excellence (discussed on pages 1 to 6).

Some information concerning university research centres is found in the universities' calendars. The list of such centres is certainly impressive in number (234 in 1976), but in most cases their status as operating entities, their programs and resources are not known. The findings based on information from this source are discussed in section 5, pages 7 & 8 and Appendix I.

Although incomplete and somewhat crude, a much more substantive picture of concentration, specialization and excellence in university research can be obtained from the records concerning funding operations of the Granting Councils.

According to the Councils' information (pages 11 to 13 and Tables 1.1 to 1.4) the most concentrated appears to be research in health sciences followed by natural sciences and engineering. Most dispersed in terms of universities involved is shown to be research in social sciences and humanities. In the case of all three Councils more than 80.0 percent of their researchers and the relevant funds is accounted for by less than 20 universities. The single dominant institution in university research is the University of Toronto.

In the case of natural sciences and engineering supported by operating grants of the NRC (pages 18 to 21 and Tables 2.1 to 3.17) most concentrated is research in nuclear physics and the least in physics other than nuclear. Specialization in this group of disciplines is indicated by the designation of the Grants' Committees distributing the awards. Excellence is identified by the size of the grants awarded (i.e. the largest 25 grants) and/or the presence of a researcher who is also a Fellow of the Royal Society of Canada. Selected excellent researchers and their scientific specialties in such disciplines as physics, astronomy and chemistry are shown in Appendices II and III.

The question of classifying and describing the content of medical research is yet to be satisfactorily resolved. In this review the MRC supported research in health sciences is shown grouped by departments of medical science to which the researchers belong (certain other options for classifying medical research are shown in Appendix IV). Among the 28 groups for which there is separate information (pages 59 to 61 and Tables 4.1 to 6.28) most concentrated in terms of the identified Medical Schools is research in the departments of pediatrics and obstetrics and gynaecology. In this group of research activities, 83.3 percent of the principal researchers and 72.2 percent of the relevant funds is accounted for by

the first five dominant schools. Least concentrated appears to be research in the department of biochemistry.

The Canada Council supported research in social sciences and humanities is grouped into 18 discipline-related categories (pages 93 to 95 and Tables 7.1 to 8.18) with the most numerous researchers being found in the languages and literature class. Most concentrated appears to be the research pertaining to law and jurisprudence and the most dispersed is that in history in which the first twenty universities accounted for less than 69 percent of the researchers involved.

In the case of research funded by the Medical Research Council and the Canada Council the only readily available information thought to be relevant to the identification of Centres of Excellence is confined to that showing the institutional association of the Fellows of the Royal Society of Canada but not their scholarships in terms of scientific disciplines, areas of research, or scientific specialties. Such information could, of course, be obtained by further search of the pertinent sources.

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IDENTIFICATION OF CENTRES OF STRENGTH  
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- 6.6 Pharmacology
- 6.7 Microbiology
- 6.8 Medical Research
- 6.9 Anatomy
- 6.10 Surgery
- 6.11 Paediatrics

- 6.12 Psychiatry
- 6.13 Medical Biophysics
- 6.14 Pharmaceutical Sciences
- 6.15 Obstetrics and Gynaecology
- 6.16 Dentistry
- 6.17 Psychology
- 6.18 Nuclear Medicine
- 6.19 Genetics
- 6.20 Immunology
- 6.21 Anaesthesia
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IDENTIFICATION OF CENTRES OF STRENGTH  
IN UNIVERSITY RESEARCH  
(An Appreciation)

Discussions of research, including university research and its intended re-orientation, contain references to centres of specialization, concentration and excellence and require that they be located and identified.

A prerequisite to this task are operationally meaningful definitions of the basic concepts involved. Its completion requires precisely stated objectives of the inquiry and assembly of the pertinent information.

The review below touches upon some aspects of mapping the structure and organization of university research in Canada. It may help to develop appropriate terms of reference for a comprehensive study of the topic, should such a project be decided upon.

A. Structure and organization of university research-  
basic concepts and their operational definitions.

1. The term centre, when pertaining to university research, refers simply to the geographical and/or organizational location where such activities are performed. The identification of such centres may be made

by reference to various territorial divisions (i.e. region, province) and at different levels of the universities' organization (i.e. college, school, faculty etc.). Should the purpose be to inquire in some detail into the environmental conditions of university research it may be advisable that

*research centre be defined as the smallest identifiable and, with regard to the content and orientation of research activities performed, the most homogeneous performing unit within the universities' organization.*

Moreover in order to be considered as an operational entity such a unit, irrespective of its organizational structure or legal status, should:

- i) have certain autonomy in management and decision making;
- ii) be placed under the authority or supervision of a director or other responsible person;
- iii) have a program of work consisting of one or more projects or subjects;
- iv) dispose of, or have access to a certain amount of financial resources specifically allocated to such work;

- v) have a minimum number of personnel for each of its activities;
- vi) have a relatively permanent character that is a history and/or prospects of a continued existence.

In some cases the smallest identifiable entity performing research which also meets all six requirements mentioned above may be a school, faculty or department. In many instances it will be an institute that is a special formal arrangement and organization for conducting research of a specified nature, i.e. Centre de recherche du développement économique (CRDE) of the University of Montreal, Institute of Aerospace Studies or the Banting and Best Department of Medical Research of the University of Toronto. There, of course, will be circumstances when the smallest identifiable and the homogeneous unit will be the research team with a continuing research program of a specified nature. ✓

2. In addition to organizational features and arrangements for performing their activities, research centres are further identified by their specialization indicating:



*either the scientific content of their research in terms of fields of science, scientific disciplines, specialities, research areas and topics (i.e. earth sciences, physics, public finance, oceanography, drug therapies) or the socio-economic and other non-scientific aims and objectives, if any, the attainment of which constitutes the primary orientation for research being carried out (i.e. production of energy or conservation of energy, reduction of economic disparities, health protection in industry etc.)*

Frequently the specialization of research centres is defined and stated by the centres themselves. Often it is readily indicated by the installations, facilities, data banks, bibliographic and other collections of the institutions they are part of. Sometimes it may be inferred from the information concerning the researchers involved.

The description of centres of specialization may be given "as stated" that is as it is perceived by the researcher involved. It may be given in terms of categories used by various founders of university

research or as provided for in various existing schemes for classifying research activities by fields of science, fields of applications or other aims and objectives. Depending on the purpose of inquiry, specialization may be defined at various levels of differentiation (i.e. chemistry, chemical kinetics or organic syntheses). In some instances the number of centres of specialization may exceed the number of research centres (i.e. Table 1, Appendix I) identified as organizational entities simply because the research of some such centres may pertain and be assigned to more than one category listed in the classification scheme used.

3. Some of the centres of research are also considered to be the centres of excellence. Such an identifying feature refers to:

*the quality of research and research results  
obtained by the centre involved.*

The quality of excellence attributed to a given centre of research reflects the standards of performance and the reputation among their peers of the principal researchers of the centres. Consequently one of the

practical ways to decide whether a given research centre is also the centre of excellence in its field of research is to inquire as to whether its principal researchers include those recognized as outstanding. Such recognition is usually shown by the allocation of resources to the research they are associated with and the distinctions, awards and honours bestowed upon them by the scientific community, including their election to the Fellowship of the Royal Society of Canada.

4. Among the environmental factors considered of significance to the conduct of research is its concentration as found in:

*the distribution of research effort among various research centres shown either by the number of researchers involved (preferably in terms of full time equivalents) or the amount of funds committed.*

The usual measures of concentration include concentration ratios showing the percentage distributions of researchers (or funds) among various research centres ranked in order of their "share" of the total and various indexes indicating the degree of departure from equal distribution of researchers or funds among the pertinent centres. One such measure of the latter category is the Herfindahl index shown in Tables 2.1 and discussed in part B following.

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B. Structure and Organization of University Research - available information and some identified dimensions.

University listed research centres.

5. Certain information pertaining to organization of university research in Canada may be found in the listing of research centres and institutes provided by the universities themselves. Indeed the recent review<sup>1)</sup> estimates that there were some 234 university based research institutes (including those supported by IT&C) in 1976.

The number of such centres is certainly surprising considering that the dominant mode of financing university research is by way of projects rather than programs of institutional grants. With some exceptions, there is no information concerning the research activities of the listed institutes so that it is impossible to determine what role they play in university research or to what extent they portray real "environmental" conditions.

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1) Such a review was prepared by the Science and Technology Resources Division in 1973 and recently updated by the University Branch.

Even in the twenty-nine cases in which the Branch was able to obtain annual reports, the amount of information concerning such factors as the number of research personnel, size of the budget or program objectives is often insufficient to decide whether a given institute can in fact be considered an operational research centre (as defined in Section 1).

The published listing of research centres and institutes is hardly representative of the prevailing arrangements for the conduct of university research in Canada. Nevertheless, even if only as an indication of the universities' aspirations or of developmental potentialities, their existence should not be ignored. Their research specialization is usually indicated in the listing descriptions. It may also be identified by reference to the research classification schemes relevant to the purposes for which such information is required. Should it be the field of research applications one example of such classification may be found in the Branch's review of university research institutes presented in Appendix 1, part iv.

#### Councils' supported research

6. Another set of information pertaining to the identification of centres of specialization, concentration and excellence in university research may be obtained

from the records of such of its founders as the Medical Research Council and until recently the National Research Council and the Canada Council.

It should, of course, be pointed out that such information encompasses university research supported by the Councils only and does not extend to research activities financed by others including the universities themselves. Furthermore it only refers to selected items of the Councils' expenditures and not the total amount of Councils' funds spent in support of university research. Lastly, the research centres explicitly mentioned in the tabulations are universities rather than "the smallest identifiable units" as called for in the operational definition above (Section 1). This is merely to improve the clarity of the presented overview. The reviewed disbursements of the Councils consist of funds provided to principal researchers and thus can be traced to "the smallest identifiable research unit". The listed feature of the available information is particularly helpful in identification of centres of excellence as it is shown in Appendix II and III.

It should also be remembered that whether in terms of funds provided or in other respects, the Councils are a major influence on the conduct of university research.

Hence the findings based on their contribution, although not comprehensive enough or fully representative, are bound to identify many significant features of the situation.



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R  
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Aggregate concentration in Council supported research

7. One of the environmental features of university research which usually attracts policy attention is its concentration. Hence the extent to which university research funded by the Councils is dominated by large institutions is shown in Tables 1.1 to 1.3.

According to the presented data, the dominant university whether in terms of the number of researchers supported or the amount of relevant funds received, was in the case of all three Councils, the University of Toronto. The ranking of other universities differed from Council to Council. The aggregate concentration ratios for universities ranked by the number of principal researchers receiving Councils' funds indicate that more than 80% of their number is accounted for by less than 20 universities.

Most concentrated appears to be the research funded by the Medical Research Council (Table 1.2). It should be noted however that although the data presented refers to the MRC research funded at the sixteen Medical Schools only, it accounts for 96.0 percent of the total number of researchers supported.

It is interesting to note that the degree of concentration is lower in the case of research in humanities and social sciences (Table 1.3) supported by the Canada Council (i.e. first 20 universities account for 77.4 percent of the annual average of research grants awarded) than in the case of natural sciences and engineering (Table 1.1) supported by the National Research Council (i.e. first 20 universities account for 81.6 percent of supported researchers and 88.9 percent of expenditures on operating events).

In the case of all three groupings, that is, medical, natural and social sciences and humanities the degree of concentration of outstanding researchers as identified by their election to become Fellows of the Royal Society of Canada is much greater than that found in the distribution of researchers supported by the Councils. In fact the first 20 universities which accounted for 81.6 percent of researchers funded by NRC included also 94.5 percent of the university-active Fellows of the Royal Society identified as belonging to the natural sciences. The corresponding percentages for recipients of the Canada Council research grants at the first 20 universities and Fellows of the Royal Society in social sciences and humanities associated with the same universities were 77.4 percent and 93.6 percent respectively.

Hardly surprising all university active Fellows of the Royal Society identified as belonging to the medical sciences were in medical schools shown in Table 1.2. The distribution of the Fellows of the Royal Society by fields of science is shown in Table 1.4.

(See Tables 1.1 to 1.4 which follow)

Concentration of University Research Funded by the  
Granting Councils and of Fellows of the  
Royal Society of Canada

1976-77

Funding Institutions:		National Research Council					The Royal Soc. Canada	
Universities	Researchers			Expenditures <sup>1</sup>			Fellows Natural Sci.	
	Rank	No	% of Total	Rank	\$'000	% of Total	No	% of Total
Toronto	1	495	9.47	1	6207	12.03	50	
U.B.C.	2	405	7.67	2	4907	9.51	35	
Alberta	3	334	6.39	3	3676	7.12	21	
Waterloo	4	334	6.39	4	3365	6.52	7	
McGill	5	275	5.26	5	3108	6.02	20	
First 5		1839	35.18		21263	41.21	133	55.9
Guelph	6	230	4.40	8	2117	4.10	1	
McMaster	7	216	4.13	7	2990	5.79	12	
Manitoba	8	214	4.09	10	1963	3.80	14	
Calgary	9	195	3.73	12	1908	3.70	3	
Western	10	183	3.50	9	2052	3.98	7	
First 10		2877	55.03		32293	62.58	170	71.4
Laval	11	181	3.46	6	3108	6.02	6	
Queen's	12	179	3.42	11	1692	3.80	12	
Montreal	13	159	3.04	14	1399	2.71	5	
Saskatchewan	14	148	2.83	13	1495	2.90	9	
Quebec	15	129	2.47	20	716	1.39	1	
First 15		3673	70.26		40703	78.88	203	85.3
Memorial	16	128	2.45	18	952	1.84	2	
Carleton	17	121	2.31	16	1088	2.11	3	
Dalhousie	18	121	2.31	15	1134	2.20	9	
Ottawa	19	113	2.16	17	1087	2.11	5	
New Brunswick	20	111	2.12	19	931	1.80	3	
First 20		4267	81.62		45894	88.90	225	94.5
York								
Victoria								
Simon Fraser								
Cumulative Total		5228	100.00		51599	100.00	238	100.0

<sup>1</sup>Operating Grants Only.

SOURCE: University Branch - based on data supplied by the Office of Grants and Scholarships, National Research Council, May 1978.

Table 1.2  
 Concentration of University Research Funded by the  
 Granting Councils and of Fellows of the  
 Royal Society of Canada  
 1977-78

Funding Institutions:	Medical Research Council <sup>a)</sup>						The Royal Society of Canada <sup>b)</sup>	
	Researchers			Expenditures <sup>1</sup>			Fellows Medical Sciences	
	Rank	No.	% of Total	Rank	\$'000	% of Total	No.	% of Total
Universities								
Toronto	1	303		1	8101		11	
McGill	2	223		2	6664		13	
U.B.C.	3	108		3	2794		5	
Montreal	4	100		4	2408		6	
Manitoba	5	86		5	2374		2	
First 5		820	56.13		22,341	60.26	37	77.08
Western	6	86		6	2203		3	
McMaster	7	73		7	1927		2	
Alberta	8	68		8	1656		--	
Laval	9	67		12	1142		2	
Queen's	10	66		9	1546		--	
First 10		1180	80.77		30,815	83.11	44	91.67
Dalhousie	11	66		10	1,333		--	
Ottawa	12	53		11	1,220		2	
Saskatchewan	13	50		15	978		1	
Sherbrooke	14	47		13	1,132		--	
Calgary	15	36		14	1,000		--	
Memorial	16	29		16	599		--	
Other							1	
Cumulative Total		1461	100.00		37,077	100.00	48	100.00

<sup>1</sup> Fiscal Year 1975/76.

SOURCE: University Branch - based on data contained in  
 a) Medical Research Council of Canada, Special Tabulations  
 b) The Royal Society of Canada, Calendar, 1977/78

Table 1.3

Concentration of University Research funded by the  
Granting Councils and of Fellows of the  
Royal Society of Canada  
1976-77

Funding Institutions:	The Canada Council 2, (a)						The Royal Society (b) of Canada Fellows Social Science & Humanities	
	Grants			Expenditures (1)			Number	Percent of Total
Universities	Rank	Number	Percent of Total	Rank	\$ Value	Percent of Total		
Toronto	1	92	13.2	1	612,852	12.1	53	
British Columbia	2	48	6.9	4	321,466	6.4	13	
Western	3	33	4.7	7	185,115	3.7	9	
York	4	32	4.6	5	223,892	4.4	4	
Montreal	5	31	4.5	3	478,208	9.4	13	
First 5		236	33.9		1,821,533	36.0	92	
Laval	6	30	4.3	2	497,685	9.8	22	
Carleton	7	30	4.3	11	158,113	3.1	6	
McGill	8	30	4.3	8	173,784	3.4	19	
Waterloo	9	27	3.9	6	188,887	3.7	--	
Alberta	10	24	3.4	10	158,665	3.1	1	
First 10		377	54.2		2,998,567	59.2	140	
Ottawa	11	20	2.9	13	118,252	2.3	5	
Queen's	12	20	2.9	19	75,033	1.5	10	
McMaster	13	18	2.6	9	165,569	3.3	6	
Calgary	14	17	2.4	15	108,800	2.1	1	
Memorial	15	17	2.4	12	128,398	2.5	--	
First 15		469	67.4		3,594,719	71.0	162	
Manitoba	16	16	2.3	17	78,359	1.5	4	
Dalhousie	17	15	2.2	20	72,331	1.4	6	
Simon Fraser	18	14	2.0	14	113,868	2.2	--	
Victoria	19	13	1.9	16	80,695	1.6	2	
New Brunswick	20	12	1.7	18	75,871	1.5	1	
First 20		539	77.4		4,015,843	79.3	175	
All other universities		157	22.6		1,045,600	20.7	12	
Total		696	100.0		5,061,443	100.0	187	

1. Total for Research Grants.

2. Social Sciences and Humanities Program.

Source: University Branch - based on

(a) Canada Council, Annual Reports, 1972-73 to 1976-77

(b) The Royal Society of Canada, Calendar, 1977-78

Fellows of the Royal Society of Canada

(Number at Universities)

1977-1978

Discipline <sup>1</sup>	University																			Total			
	Toronto	U.B.C.	Alberta	Waterloo	McGill	Guelph	McMaster	Manitoba	Calgary	Western	Laval	Queens	Montreal	Saskatoon	Quebec	Memorial	Dalhousie	Ottawa	New Bruns.	Other	No.	% of Total	% of Total
<b>NATURAL SCIENCES &amp; ENGINEERING</b>																							
Mathematics	9	4	1	3	1		1	2	1			1				1	1		2		28	11.8	
Chemistry	3	3	4	2	6		5	3	1	3	1	2	2			1	1	2	2		44	18.5	
Physics	7	6	2		3		3	1			1	2	3			1			3		33	13.9	
Applied Sciences	8	2		1			1		1		1							1			15	6.3	
Earth Sciences	5	7	6		4	1	2	4	1			2		1	1	2	2		1		40	16.8	
Animal Biology	6	5	1	1	4			1			4	1		1				1			30	12.6	
Plant Biology	1	4	5					2				2		3							18	7.5	
Microbiology & Biochemistry		2	2		1			1		2						1					9	3.8	
Interdisciplinary	11	2			1				1		1					3					21	8.8	
<b>Total</b>	<b>50</b>	<b>35</b>	<b>21</b>	<b>7</b>	<b>20</b>	<b>1</b>	<b>12</b>	<b>14</b>	<b>3</b>	<b>7</b>	<b>6</b>	<b>12</b>	<b>4</b>	<b>10</b>	<b>1</b>	<b>2</b>	<b>9</b>	<b>5</b>	<b>3</b>	<b>16</b>	<b>238</b>		<b>50.3</b>
Percentage of Total	21.0	14.7	8.8		8.4		5.0	5.9				5.0		4.2			3.8			6.7		100.0	
<b>MEDICAL SCIENCES</b>																							
<b>Total</b>	<b>11</b>	<b>5</b>			<b>13</b>		<b>2</b>	<b>2</b>		<b>3</b>	<b>2</b>		<b>6</b>	<b>1</b>				<b>2</b>		<b>1</b>	<b>48</b>		<b>10.2</b>
Percentage of Totals	22.9	10.4			27.1		4.2	4.2		6.2	4.2		12.5	2.1						4.2	2.1		100.0
<b>SOCIAL SCIENCES &amp; HUMANITIES</b>																							
Education											1		1								2		
Anthropology		2			2						2										6	3.2	
Economics	4	3	1		2		2	1	1	1	3					1	1				20	10.7	
Business Administration													1								1		
Industrial Relations													1								1		
Geography					1				1		2										4	2.1	
Law					1						1	1							1		5	2.7	
Linguistics											1										3		
Political Science <sup>2</sup>	12	1			3			1			1	1	1	1		1	1				26	13.9	
Psychology					4																5	2.7	
Sociology	2				1						1										7	3.7	
Criminology																					1		
Demography																					2		
Language & Literature:																							
Classics	1						1	1			1										5	2.7	
French	5	1			1		1						2					1			14	7.5	
English	6	4			1		1		2		3		1			2					24	12.8	
German	2	1																			4	2.1	
Other	8																				10	5.4	
History	9	1			1			1		3	1	2	1			1		1			25	13.4	
Philosophy	4				2				1				2					1			14	7.5	
Religious Studies							1									1					2		
Fine Arts										1	1		1								6	3.2	
<b>Total</b>	<b>53</b>	<b>13</b>	<b>1</b>		<b>19</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>9</b>	<b>14</b>	<b>10</b>	<b>13</b>	<b>2</b>		<b>6</b>	<b>5</b>	<b>1</b>	<b>29</b>	<b>187</b>		<b>39.5</b>	
Percentage of Total	28.3	7.0			10.2		3.2			4.8	7.5	5.4	7.0			3.2	2.7		15.5		100.0		
<b>GRAND TOTAL</b>																							
<b>PERCENTAGE OF GRAND TOTAL</b>	<b>24.1</b>	<b>11.2</b>	<b>4.7</b>		<b>11.0</b>		<b>4.2</b>	<b>4.2</b>		<b>4.0</b>	<b>4.7</b>	<b>4.7</b>	<b>4.9</b>	<b>2.7</b>		<b>3.2</b>	<b>2.5</b>		<b>9.7</b>	<b>473</b>		<b>100.0</b>	

1. As listed in the calendar.

2. Political Science and Political Economy.



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Centres of concentration and excellence in particular fields of research at universities.

a) Natural sciences and engineering supported by the National Research Council.

8. The question as to what extent research in the particular field supported by the NRC is dominated by one or more universities is dealt with in Tables 2.1 to 3.17.

The seventeen fields of research selected (one may say specialization) are those for which there are separate Grants Committees and the readily available separate statistics. Not shown in separate tabulations are the grants of such committees as the Global Atmospheric Research Program, Interdisciplinary Research, Intermediate Energy Physics, High Energy Physics and Scientific Publications.

The degree of concentration among the selected fields of research is shown in Tables 2.1 to 2.3. Whether in terms of the Herfindahl Index (Table 2.1), concentration ratios for the number of researchers (Table 2.2) or amounts of funds involved (Table 2.3), the highest concentration is found in Nuclear Physics and the lowest in research in Physics other than nuclear. The largest number of researchers (Table 2.1) is found in mathematics (719

principal researchers) with the widest dispersion of researchers among universities shown in chemistry (41 universities).

The twenty dominant universities (in terms of NRC supported researchers) in each of the selected fields of research are identified in Tables 3.1 to 3.17. The dominant universities listed for the selected fields of research are often different from one group to the other. In cases in which they are the same they are ranked differently as the perusal of the pertinent tables may indicate.

Accompanying the tables are also the Charts 3.1 to 3.17 of concentration ratios which indicate how many universities are involved (horizontal axis) in total and in accounting for the 50 percent and 80 percent of the NRC funded researchers in each of the selected fields. The universities identified in the tables and referred to in the charts are ranked in the descending order by the number of researchers funded by the NRC operating grants. Unlike those shown on the charts, concentration ratios included in the tabulations refer to the proportion of NRC funded researchers in selected fields accounted for by the first 5, 10, 15, and 20 universities involved.

In cases in which such data is available the tables also show the distribution of the researcher with

the twenty-five largest operating grants and of Fellows of the Royal Society of Canada. Such supplementary information is intended to indicate which of the identified centres of concentration represents one or more centres of excellence.

The assumption that the MRC supported researchers with the largest operating grants are those who are also recognized as outstanding by their peers appears well founded, i.e. most of those shown for chemistry were recipients of various awards and/or Fellows of the Royal Society. Such verification of the assumption used in the case of the NRC supported research does not, however, dispose of the question of identification of centres of excellence.

What for example would be the practical way to distinguish between good and excellent research, i.e. using the procedure in which "excellent" research was confined to that done by the recipients of the 25 largest grants (as used in the tabulations) or extended to that performed by all those receiving \$30,000 or more (as shown in the list for chemistry, attached as Appendix III). What would be the readily recognized or readily acquired evidence of excellence in research?

The tabulations assume that centres of excellence in NRC supported university research are indicated by the presence of one or more of the twenty-five researchers with the largest operating grants and/or of Fellows of the Royal Society of Canada. In order to determine their specialization at the level of detail below that used for grouping the tabulated statistics, one may examine the qualifications of the principal researchers involved. Such procedure was applied to NRC funding of university research in some fields of physics including nuclear, astronomy and chemistry. The results are indicated in Appendix II and III.

(See Tables 2.1 to 3.17 and Charts 3.1 to 3.17 which follow)

Degree of Concentration in University Research Supported by  
Operating Grants Awarded by the Listed Grants Committees  
National Research Council Office of Grants and Scholarships  
1976-77

Grants Committees	Degree of Concentration		No of Grantees	No. of Universities	Total Operating Grants \$ th
	Value of Herfindahl Rank Index <sup>1,2</sup>				
Nuclear Physics	158340	1	29	13	462
Industrial Engineering	097846	2	64	19	422
Animal Biology	080437	3	310	32	3183
Space and Astronomy	078319	4	148	24	1910
Plant Biology	078034	5	240	33	2653
Computer Science	076925	6	225	30	1873
Chemical and Metallurgical Eng.	067187	7	315	27	3493
Mechanical Engineering	059921	8	270	26	2903
Psychology	056828	9	238	32	2359
Civil Engineering	056664	10	242	27	2247
Electrical Engineering	055214	11	315	25	3167
Population Biology	054073	12	360	38	3125
Earth Sciences	048164	13	434	36	4242
Cell Biology	046026	14	322	34	3968
Mathematics	044301	15	719	40	2926
Chemistry	042212	16	546	41	7892
Physics (other than Nuclear)	039016	17	428	38	4526
TOTAL			5205		51351
GRAND TOTAL			5228		51599

<sup>1</sup> Herfindahl Index :

$$H = \sum_{i=1}^N s_i^2$$

where "s<sub>i</sub>" is the share of the Total of the "i"th university; the "total" refers to the number of grants' recipients.

<sup>2</sup> Its numerical value declines with increases in the number of research centres, increases with the inequality among any given number of research centres and equals 1-0 in the case where all researchers are in one centre.

SOURCE: University Branch (NOSST) - Computations based on data supplied by the Office of Grants and Scholarships of the National Research Council, May 1978.

Table 2.2  
 Concentration of Researchers Financed By The NRC<sup>1</sup>  
 At 20 Universities With The Largest Number of  
 Researchers in Selected Fields<sup>2</sup>

Selected Fields

1976-1977

Rank of Universities	Nuclear Physics		Industrial Engineering		Animal Biology		Space & Astronomy		Plant Biology		Computer/Information Science		Chemical & Metallurgical Engineering		Mechanical Engineering		Psychology		Civil Engineering		Electrical Engineering		Population Biology		Earth Sciences		Cell Biology (Pure & Applied)		Mathematics		Chemistry (Excl. Nuclear)		Physics (Excl. Nuclear)	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.		
First 5	72.4		60.9		52.0		50.0		55.0		49.3		49.5		41.1		39.1		39.7		36.8		40.8		35.7		35.7		34.1		33.2		31.0	
First 10	89.7		85.9		71.9		61.1		75.8		72.0		76.5		65.6		63.9		63.6		61.0		62.0		58.3		59.6		57.2		53.9		51.6	
First 15	*		93.2		84.8		82.6		84.6		86.7		81.7		84.4		82.4		83.0		82.3		77.2		75.1		78.0		72.7		69.0		67.1	
First 20			**		92.3		87.3		91.3		93.8		93.7		97.4		92.0		94.6		96.1		84.7		87.3		89.4		84.3		81.3		78.3	
Total	100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0		100.0	
No.	29		64		310		148		240		235		315		270		288		242		315		360		434		322		719		540		428	

Note: 1) Grants-in-Aid & Scholarship Program

\* Only 13 universities involved

2) By Grants Committees

\*\* Only 19 universities involved

SOURCE: University Branch (MOSS2) - based on

a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.

b) The Royal Society of Canada, Calendar 1977-78.

Table 2.3  
 Generation of Expenditures by the NRC<sup>1</sup>  
 20 Universities With The Largest Number  
 of Researchers in Selected Fields  
 \$ ('000)  
 Selected Fields  
 1973-1977

Rank of Universities	Nuclear Physics	Industrial Engineering	Animal Biology	Space & Astronomy	Plant Biology	Computer / Information Science	Chemical / Metallurgical Engineering	Mechanical Engineering	Psychology	Civil Engineering	Electrical Engineering	Population Biology	Earth Sciences	Cell Biology	Mathematics (Pure & Applied)	Chemistry	Physics (Excl. Nuclear)
First 5	81.2	67.5	56.7	55.6	57.9	59.5	59.1	46.3	48.9	44.4	43.4	44.5	41.8	34.3	42.3	43.1	37.8
First 10	95.2	82.5	73.6	88.3	77.7	81.1	78.9	72.2	73.1	65.9	70.9	66.4	63.9	66.9	70.2	63.3	62.8
First 15	*	90.1	85.3	95.7	87.7	91.8	81.7	89.0	81.8	81.3	86.5	80.2	78.8	75.5	94.9	77.0	79.0
First 20		**	86.2	97.9	92.9	96.2	97.5	90.4	85.2	84.0	97.5	87.7	90.0	87.0	94.1	85.4	88.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	462	432	3083	1910	2653	1273	3483	2973	2259	2247	3167	3125	4242	3562	2926	7892	4526

Note : 1) Grants-in-aid and Scholarship Program  
 2) By Grants Committees

\* only 13 universities involved  
 \*\* only 19 universities involved

SOURCE : University Branch (NOSST) - based on a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar 1977-78.



Table 3.1 - Nuclear Physics.

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada - 20 Universities Ranked by the Number of Recipients of NRC Funds 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	McMaster	8		185	
2	Toronto	7		126	
3	Guelph	2		21	
4	Manitoba	2		22	
5	Ottawa	2		21	
First 5 (as % of Total)		21 (72.4)		375 (81.2)	
6	Victoria	1		2	
7	Regina	1		9	
8	Winnipeg	1		20	
9	Queen's	1		27	
10	Trent	1		7	
First 10 (as % of Total)		26 (89.7)		440 (95.2)	
11	Windsor	1		2	
12	McGill	1		5	
13	Western	1		15	
14					
15					
Cumulative Total P e r c e n t		29 (100.0)		462 (100.0)	

SOURCE: University Branch (MOSST) - based on

a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.

b) The Royal Society of Canada, Calendar 1977-1978.

Table 3.2 - Industrial Engineering

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committee and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total (a)	University Listed
		Number		\$'000	
1	Toronto	11	4	103	
2	Waterloo	10	7	85	
3	Ecole Poly.	8	3	47	
4	McMaster	5		23	
5	Quebec	5	3	27	
First 5 (as % of Total)		39 (60.9)	17 (68.0)	285 (67.5)	
6	B.C.	4	1	20	
7	Windsor	4	1	20	
8	N.S. Tech	4		4	
9	N.B.	2		11	
10	McGill	2	1	8	
First 10 (as % of Total)		55 (89.9)	20 (80.0)	348 (82.5)	
11	Alberta	1		5	
12	Concordia	1		7	
13	Dalhousie	1		4	
14	Lakehead	1		4	
15	Montreal	1	2	25	
First 15 (as % of Total)		60 (93.0)	22 (88.0)	393 (93.1)	
16	Memorial	1	1	10	
17	Queen's	1		5	
18	Victoria	1	1	8	
19	York	1		6	
20	"				
First 20 (as % of Total)		64 (100.0)	24 (96.0)	422 (100.0)	
	Moncton others		1		
Cumulative Total Percent		64 (100.0)	25 (100.0)	422 (100.0)	

SOURCE : University Branch (MOSST) - based on  
a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978  
b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.3 - Animal Biology

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Guelph	64	4	634	
2	McGill	26	1	276	4
3	B.C.	26	6	373	5
4	Toronto	24	2	270	6
5	Alberta	21	2	251	1
First 5 (as % of Total)		161 (52.0)	15 (60.0)	1804 (56.7)	16 (53.3)
6	Sask.	15	1	147	1
7	Manitoba	13	-	122	1
8	Waterloo	12	-	79	1
9	Laval	11	-	90	4
10	Memorial	11	1	101	2
First 10 (as % of Total)		223 (71.9)	17 (68.0)	2343 (73.6)	25 (83.3)
11	Simon Fraser	10	-	91	
12	Montreal	9	2	102	
13	Dalhousie	7	2	61	
14	Western	7	-	49	
15	Calgary	7	-	70	
First 15 (as % of Total)		263 (84.8)	21 (84.0)	2716 (85.3)	
16	Victoria	6	1	74	
17	Queen's	6	1	68	1
18	Ottawa	4	-	37	1
19	New Bruns.	4	-	30	
20	Carleton	3	-	136	
First 20 (as % of Total)		286 (92.3)	23 (94.0)	3061 (96.2)	27 (90.0)
	McMaster		1	37	
	York		1	62	
	other		-	23	3
Cumulative Total P e r c e n t		310 (100.0)	25 (100.0)	3103 (100.0)	30 (100.0)

SOURCE : University Branch (MOSST) - based on  
a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.  
b) The Royal Society of Canada, Calendar 1977-78.

Table 3.4 - Space Astronomy  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Toronto	24	6	363	
2	Western	13	2	154	
3	Quebec	13		141	
4	B.C.	12	2	166	
5	York	12	4	238	
First 5 (as % of Total)		74 (50.0)	14 (56.0)	1062 (55.6)	
6	Montreal	11		111	
7	Alberta	10	1	124	
8	Calgary	10	2	181	
9	Sask.	8	4	150	
10	Victoria	7	1	59	
First 10 (as % of Total)		120 (81.1)	22 (88.0)	1687 (88.3)	
11	Queen's	5	2	73	
12	Manitoba	4		21	
13	Laval	3		19	
14	Waterloo	3		22	
15	Laurentian	2		5	
First 15 (as % of Total)		137 (92.6)	24 (96.0)	1827 (95.7)	
16	McGill	2		14	
17	St. Mary's	2		15	
18	Acadia	1		5	
19	Brandon	1		4	
20	Carleton	1		4	
First 20 (as % of Total)		144 (97.3)		1869 (97.9)	
	Simon Fraser others		1	29 12	
Cumulative Total Percent		148 (100.0)	25 (100.0)	1910 (100.0)	

SOURCE : University Branch (NOSST) - based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.5 - Plant Biology

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Guelph	38	2	400	2
2	Manitoba	26	2	274	2
3	Alberta	25	3	297	5
4	B.C.	22	5	316	4
5	Sask.	21	4	249	3
First 5 (as % of Total)		132 (55.0)	16 (64.0)	1536 (57.9)	14 (77.8)
6	Toronto	20	2	202	1
7	McGill	12	1	122	
8	Simon Fraser	7	1	85	
9	Laval	6		48	
10	Carleton	5		68	
First 10 (as % of Total)		182 (75.8)	20 (80.0)	2061 (77.7)	15 (83.3)
11	Lakehead	5		28	
12	Victoria	4		35	
13	Calgary	4	1	78	
14	Queen's	4	1	73	2
15	Waterloo	4	1	52	
First 15 (as % of Total)		203 (84.6)	23 (92.0)	2327 (87.7)	17 (94.4)
16	Montreal	4		23	
17	Brock	3		119	
18	Laurentian	3		24	
19	McMaster	3	1	51	
20	Concordia	3		20	
First 20 (as % of Total)		219 (91.3)	24 (96.0)	2464 (92.9)	
	N.B. others		1	40 149	1
Cumulative Total Percent		240 (100.0)	25 (100.0)	2653 (100.0)	18 (100.0)

SOURCE : University Branch (MOSST) - based on  
a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978  
b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.6 - Computer/Information Science  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Waterloo	41	8	402	
2	Toronto	28	8	358	
3	Montreal	17		158	
4	Alberta	13	2	104	
5	B.C.	12		92	
First 5 (as % of Total)		111 (49.3)	18 (72.0)	1114 (59.5)	
6	Calgary	12	1	80	
7	Manitoba	12	3	142	
8	Concordia	10	1	59	
9	Western	9	1	82	
10	Queen's	8		42	
First 10 (as % of Total)		162 (72.0)	24 (96.0)	1519 (81.1)	
11	Ottawa	8		43	
12	Sask.	8		42	
13	McGill	7	1	56	
14	McMaster	6		30	
15	Carleton	4		22	
First 15 (as % of Total)		195 (86.7)	25 (100.0)	1720 (91.8)	
16	N.B.	4		13	
17	Victoria	3		28	
18	Regina	3		14	
19	Laval	3		12	
20	Ecole Poly.	3		15	
First 20 (as % of Total)		211 (93.8)		1802 (96.2)	
others				71	
Cumulative Total Percent		225 (100.0)	25 (100.0)	1873 (100.0)	

SOURCE : University Branch (MOSST) - based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar 1977-78.

Table 3.7 - Chem/Metal Engineering  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants (a)	Total <sup>a)</sup>	University Listed
		Number		\$'000	
1	Toronto	49		603	
2	Waterloo	29		391	
3	B.C.	27		385	
4	McMaster	27		417	
5	McGill	24		270	
First 5 (as % of Total)		156 (49.5)		2066 (59.1)	
6	Ecole Poly.	21		149	
7	Alberta	20		184	
8	Laval	17		159	
9	Queen's	14		118	
10	Quebec	13		81	
First 10 (as % of Total)		241 (76.5)		2757 (78.9)	
11	Calgary	12		98	
12	Ottawa	11		125	
13	Sherbrooke	10		54	
14	Western	8		118	
15	Sask.	7		51	
First 15 (as % of Total)		289 (91.7)		3203 (91.7)	
16	New Bruns.	6		76	
17	Windsor	5		37	
18	Manitoba	4		49	
19	M.S.Tech.	4		24	
20	Guelph	3		16	
First 20 (as % of Total)		311 (98.7)		3405 (97.5)	
	Others			88	
Cumulative Total Percent		315 (100.0)		3493 (100.0)	

SOURCE : University Branch (NOSST) - based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978  
 b) The Royal Society of Canada, Calendar 1977-78.

Table 3.B - Mechanical Engineering  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Toronto	32	7	451	
2	Waterloo	28	2	349	
3	B.C.	19	2	247	
4	Laval	16	1	143	
5	Ecole Poly.	16	1	154	
First 5 (as % of Total)		111 (41.1)	13 (52.0)	1344 (46.3)	
6	Alberta	14	1	154	
7	Calgary	14		107	
8	McGill	14	3	190	
9	McMaster	12	3	164	
10	Concordia	12	2	135	
First 10 (as % of Total)		177 (65.6)	22 (88.0)	2094 (72.1)	
11	Memorial	12		82	
12	Sask.	11	2	166	
13	Carleton	11		104	
14	Manitoba	9		73	
15	Queen's	8	1	66	
First 15 (as % of Total)		228 (84.4)	25 (100.0)	2585 (89.0)	
16	Western	8		69	
17	Windsor	8		61	
18	N.B.	7		57	
19	Ottawa	6		55	
20	Sherbrooke	6		30	
First 20 (as % of Total)		263 (97.4)		2857 (98.4)	
	Others			46	
Cumulative Total Percent		270 (100.0)	25 (100.0)	2903 (100.0)	

SOURCE : University Branch (MOSST) -- based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar 1977-78.



Table 3.9 - Psychology

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Toronto	29	5	387	
2	McMaster	20	5	311	
3	Dalhousie	16	5	242	
4	Memorial	15	1	126	
5	Waterloo	13		88	
First 5 (as % of Total)		93 (39.1)	16 (64.0)	1154 (48.9)	
6	Western	13	4	195	
7	York	12		123	
8	McGill	12	4	178	4
9	Alberta	11		66	
10	Queen's	11	1	127	
First 10 (as % of Total)		152 (63.9)	25 (100.0)	1843 (78.1)	4
11	B.C.	10		103	
12	Concordia	10		68	
13	Carleton	9		59	
14	Montreal	9		55	1
15	Manitoba	6		37	
First 15 (as % of Total)		196 (82.4)		2165 (91.8)	5
16	Quebec	6		17	
17	Guelph	5		22	
18	St. Francis	5		18	
19	Trent	4		17	
20	Calgary	3		21	
First 20 (as % of Total)		219 (92.0)		2260 (95.8)	5
others				99	
Cumulative Total Percent		238 (100.0)	25 (100.0)	2359 (100.0)	5

SOURCE: University Branch (HOSST) - based on

a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.

b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.10 - Civil Engineering  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Waterloo	28	8	332	
2	Toronto	24	1	197	
3	Calgary	16	4	181	
4	B.C.	15	1	116	
5	Alberta	13	2	171	
First 5 (as % of Total)		96 (39.7)	16 (64.0)	997 (44.4)	
6	Laval	13	1	101	
7	Windsor	12	1	131	
8	Ecole Poly.	12		83	
9	McGill	11		91	
10	Queen's	10		77	
First 10 (as % of Total)		154 (63.6)	18 (72.0)	1480 (65.9)	
11	Concordia	9		66	
12	Sask.	8		65	
13	McMaster	8	2	96	
14	Ottawa	8		69	
15	Quebec	8		58	
First 15 (as % of Total)		195 (80.6)	20 (80.0)	1834 (81.6)	
16	Carleton	7		47	
17	Manitoba	7		43	
18	N.B.	7	1	58	
19	Sherbrooke	7	1	63	
20	N.S.Tech.	6	1	67	
First 20 (as % of Total)		229 (94.6)	23 (92.0)	2112 (94.0)	
	Western others		2	79 56	
Cumulative Total P e r c e n t		242 (100.0)	25 (100.0)	2247 (100.0)	

SOURCE : University Branch (MOSST) - based on

- a) Special Tabulation provided by the Office of Grants and Scholarships of the National Research Council, May 1978.
- b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.11 - Electrical Engineering

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Toronto	33	6	472	
2	Waterloo	31	3	340	
3	Laval	18	1	179	
4	McGill	17	2	209	
5	Alberta	16	1	176	
First 5 (as % of Total)		115 (36.5)	13 (52.0)	1376 (43.4)	
6	Calgary	16		187	
7	Manitoba	16	2	152	
8	McMaster	16	4	214	
9	Carleton	15	1	130	
10	B.C.	14	2	185	
First 10 (as % of Total)		192 (61.0)	22 (88.0)	2244 (70.9)	
11	Ecole Poly.	14	1	98	
12	N.B.	14	1	131	
13	Sherbrooke	14		64	
14	Quebec	13		58	
15	Sask.	12	1	146	
First 15 (as % of Total)		259 (82.2)	25 (100.0)	2741 (86.5)	
16	Queens	12		86	
17	Concordia	11		99	
18	Windsor	8		68	
19	Ottawa	7		53	
20	N.S.Tech	6		41	
First 20 (as % of Total)		303 (96.2)		3088 (97.5)	
	others			79	
Cumulative Total Percent		315 (100.0)	25 (100.0)	3167 (100.0)	

SOURCE : University Branch (NOSST) - based on  
a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.  
b) The Royal Society of Canada, Calendar 1977-78.

Table 3.12 - Population Biology  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	B.C.	45	5	459	
2	Toronto	33	3	333	
3	Guelph	28		215	
4	Alberta	22	2	213	
5	McGill	19	2	171	
First 5 (as % of Total)		147 (40.8)	12 (48.0)	1391 (44.5)	
6	Manitoba	18	2	180	
7	Laval	18		115	
8	Memorial	18	2	174	
9	Quebec	15		80	
10	Dalhousie	14	2	134	
First 10 (as % of Total)		230 (63.9)	18 (72.0)	2074 (66.4)	
11	Western	11	1	110	
12	Simon Fraser	10	1	93	
13	Calgary	9	1	86	
14	Sask.	9		66	
15	Montreal	9		77	
First 15 (as % of Total)		278 (77.2)	21 (84.0)	2506 (80.2)	
16	Carleton	6		58	
17	New Brun.	6		46	
18	Ottawa	5	1	36	
19	Queen's	5		53	
20	Victoria	5		41	
First 20 (as % of Total)		305 (84.7)	22 (88.0)	2740 (87.7)	
	Waterloo		1	94	
	McMaster		1	42	
	Windsor		1	39	
	others			210	
Cumulative Total P e r c e n t		360 (100.0)	25 (100.0)	3125 (100.0)	

SOURCE : University Branch (MOSSST) - based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar 1977-78

Table 3.13 - Earth Sciences  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	Toronto	41	3	489	5
2	Alberta	36	3	402	6
3	B.C.	32	6	443	7
4	Queen's	23	1	201	2
5	McGill	23	1	240	4
First 5 (as % of Total)		155 (35.7)	14 (56.0)	1775 (41.8)	24 (60.0)
6	Western	22	1	263	
7	Calgary	21	1	144	1
8	Memorial	20	1	197	
9	McMaster	19	3	250	2
10	Quebec	16		80	1
First 10 (as % of Total)		253 (58.3)	20 (80.0)	2709 (63.9)	28 (70.0)
11	Dalhousie	16	1	192	2
12	Sask.	15		144	1
13	Ottawa	15		98	
14	N.B.	15		96	1
15	Waterloo	12		103	
First 15 (as % of Total)		326 (75.0)	21 (84.0)	3342 (78.8)	32 (80.0)
16	Carleton	11		84	
17	Ecole Poly.	11	1	125	
18	Laval	11	2	122	
19	Montreal	11		107	
20	Guelph	9		72	1
First 20 (as % of Total)		379 (87.3)	24 (96.0)	3852 (90.8)	33 (82.5)
	York		1	44	
	Manitoba			114	4
	others			232	3
Cumulative Total Percent		434 (100.0)	25 (100.0)	4242 (100.0)	40 (100.0)

SOURCE : University Branch (MOSST) -- based on  
 a) Special Tabulations provided by the Office of Grants and  
 Scholarships of the National Research Council, May 1978.  
 b) The Royal Society of Canada, Calendar 1977-78

Table 3.14 - Cell Biology

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total (a)	University Listed
		Number		\$'000	
1	B.C.	29	2	401	
2	Toronto	23	2	282	
3	Guelph	23	1	210	
4	Alberta	20		214	
5	Manitoba	20	1	246	
First 5 (as % of Total)		115 (35.7)	6 (24.0)	1361 (34.3)	
6	McGill	18	1	245	
7	York	16	1	256	
8	Western	15	2	130	
9	McMaster	14	3	194	
10	Calgary	14	3	228	
First 10 (as % of Total)		192 (59.6)	16 (64.0)	2414 (60.8)	
11	Laval	14		154	
12	Montreal	13		125	
13	Saskatoon	13	1	110	
14	Queen's	10	1	105	
15	Waterloo	9		88	
First 15 (as % of Total)		251 (78.0)	18 (72.0)	2996 (75.5)	
16	Windsor	9		77	
17	Carleton	8	3	136	
18	Dalhousie	8		105	
19	Brock	6	2	84	
20	Sherbrooke	6		56	
First 20 (as % of Total)		288 (89.4)	23 (92.0)	3454 (87.0)	
	Ottawa		1	112	
	New Bruns.		1	70	
				332	
Cumulative Total Percent		322 (100.0)	25 (100.0)	3968 (100.0)	

SOURCE : University Branch (MOSST) - based on

- a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978
- b) The Royal Society of Canada, Calendar 1977-78

Table 3.15 - Mathematics (Pure & Applied)  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada --- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds  
 1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	B.C.	59	2	304	4
2	Toronto	49	2	289	9
3	Alberta	48		212	1
4	Waterloo	48	4	271	3
5	Manitoba	41	2	162	2
First 5 (as % of Total)		245 (34.1)	10 (40.0)	1238 (42.3)	19 (67.9)
6	McGill	40	3	229	1
7	Montreal	39	1	204	1
8	Queen's	31	1	134	1
9	Calgary	30	2	141	1
10	Western	26	1	108	
First 10 (as % of Total)		411 (57.2)	18 (72.0)	2054 (70.2)	23 (82.1)
11	Concordia	25		50	
12	McMaster	25	1	125	1
13	Carleton	22	3	142	
14	Dalhousie	21	2	68	1
15	Victoria	19		46	
First 15 (as % of Total)		523 (72.7)	24 (96.0)	2485 (84.9)	25 (89.3)
16	Ottawa	17		43	1
17	Simon Fraser	17		79	
18	York	17	1	76	
19	Guelph	16		26	
20	Laval	16		42	
First 20 (as % of Total)		606 (84.3)	25 (100.0)	2751 (94.0)	26 (92.9)
others				175	2
Cumulative Total Percent		719 (100.0)	25 (100.0)	2926 (100.0)	28 (100.0)

SOURCE: University Branch (MOSST) - based on

a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May 1978.

b) The Royal Society of Canada, Calendar, 1977-78.

Table 3.16 - Chemistry

Concentration of Recipients of NRC Operating Grants Grouped by Grants' Committees and of Fellows of the Royal Society of Canada -- 20 Universities Ranked by the Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants <sup>(a)</sup>	Total <sup>(a)</sup>	University Listed
		Number		\$'000	
1	B.C.	47	2	841	3
2	Toronto	41	5	761	3
3	Alberta	39	6	794	4
4	McGill	28	1	497	6
5	McMaster	26	2	508	5
First 5 (as % of Total)		181 (33.2)	16 (64.0)	3401 (43.1)	21 (47.7)
6	Waterloo	24		354	2
7	Western	24	2	494	3
8	Guelph	23	2	294	
9	Montreal	21	2	298	2
10	Dalhousie	21		195	1
First 10 (as % of Total)		294 (53.8)	22 (88.0)	5036 (63.8)	29 (65.9)
11	Calgary	20		265	1
12	Queen's	17		234	2
13	Simon Fraser	16		185	
14	Manitoba	15		154	3
15	York	15	1	202	
First 15 (as % of Total)		377 (69.0)	23 (92.0)	6076 (77.0)	35 (79.5)
16	Ottawa	15		279	2
17	Victoria	14		114	
18	Memorial	13		126	
19	Windsor	13		140	
20	Laval	12		7	1
First 20 (as % of Total)		444 (81.3)		6742 (85.4)	38 (86.4)
	New Bruns.	12	1	190	2
	Sherbrooke	12	1	166	
	Sask.			3	2
	others			791	2
Cumulative Total P e r c e n t		546 (100.0)	25 (100.0)	7892 (100.0)	44 (100.0)

SOURCE : University Branch (MOSST) - based on

a) Special Tabulation provided by the Office of Grants and Scholarships of the National Research Council, May 1978.



Table 3.17 - Physics (Excl. Nuclear)  
 Concentration of Recipients of NRC Operating Grants Grouped by  
 Grants' Committees and of Fellows of the  
 Royal Society of Canada -- 20 Universities Ranked by the  
 Number of Recipients of NRC Funds

1976-77

Rank	University	Recipients of Funds		Amount of Funds	Fellows of the Royal Society of Canada <sup>b)</sup>
		Total <sup>a)</sup>	25 Largest Grants (a)	Total <sup>a)</sup>	University Listed
		Number		\$'000	
1	Toronto	33	4	517	7
2	Waterloo	32		292	
3	B.C.	25	4	392	6
4	Alberta	24		298	2
5	Laval	22	1	211	1
First 5 (as % of Total)		136 (31.8)	9 (36.0)	1710 (37.8)	16 (48.5)
6	McMaster	20	1	320	3
7	Western	17	1	136	
8	McGill	17	2	235	3
9	Windsor	16	2	222	
10	Simon Fraser	15	2	218	
First 10 (as % of Total)		221 (51.6)	17 (68.0)	2841 (62.8)	22 (66.7)
11	Guelph	15	1	174	
12	Queen's	14	2	203	2
13	Manitoba	13	1	165	1
14	York	12		106	
15	Dalhousie	12		85	1
First 15 (as % of Total)		287 (67.1)	21 (84.0)	3574 (79.0)	26 (78.8)
16	Montreal	11		96	2
17	New Bruns.	11		79	
18	Ecole Poly.	9		63	
19	Memorial	9		71	
20	Ottawa	8	1	105	
First 20 (as % of Total)		335 (78.3)	22 (88.0)	3988 (88.1)	28 (84.9)
	Sask		1	18	2
	Quebec		2	23	
	others			497	3
Cumulative Total		428	25	4526	33
Percent		(100.0)	(100.0)	(100.0)	(100.0)

<sup>1</sup>All Physics in the case of Fellows of the Royal Society.

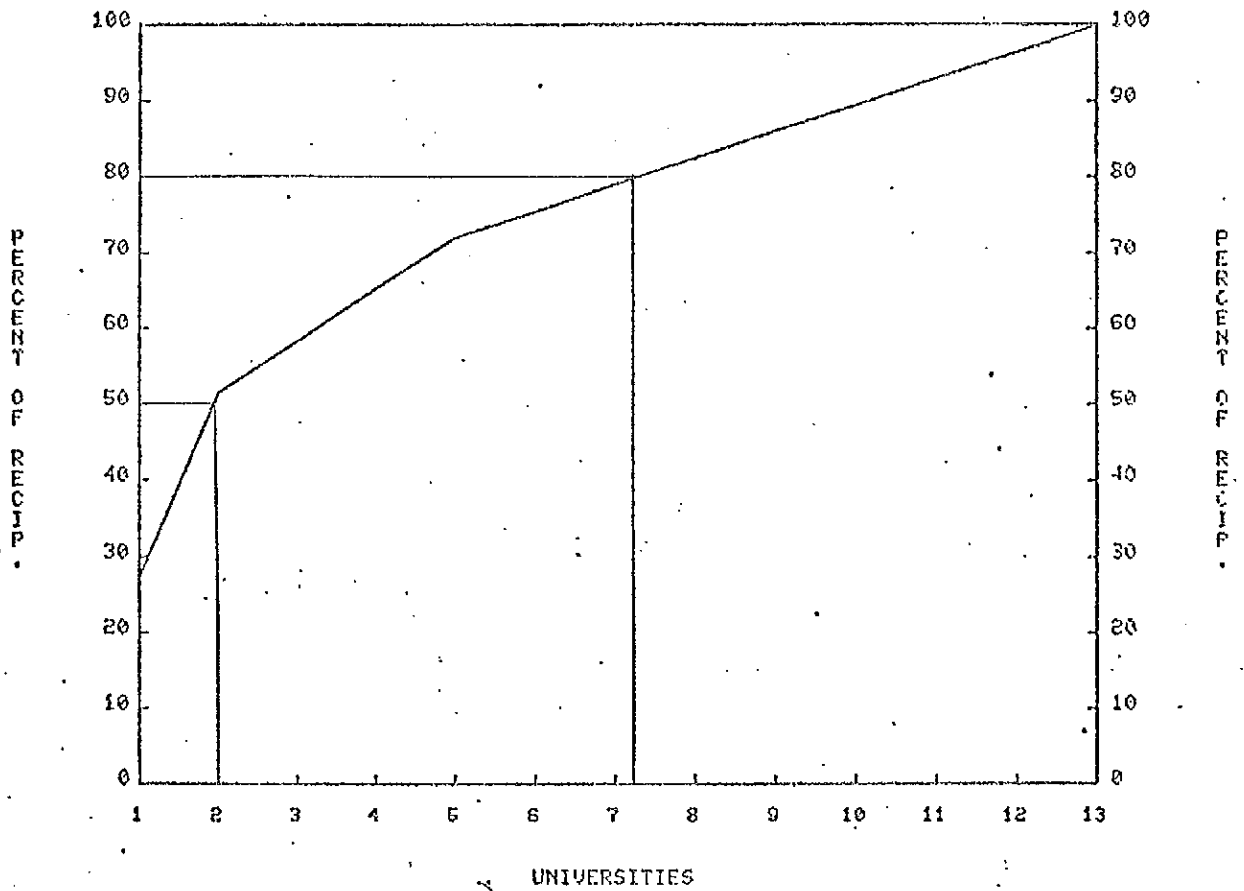
SOURCE : University Branch(MOSST) - based on

- a) Special Tabulations provided by the Office of Grants and Scholarships of the National Research Council, May, 1978.
- b) The Royal Society of Canada, Calendar 1977-78.

Chart 3.1

Nuclear Physics

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

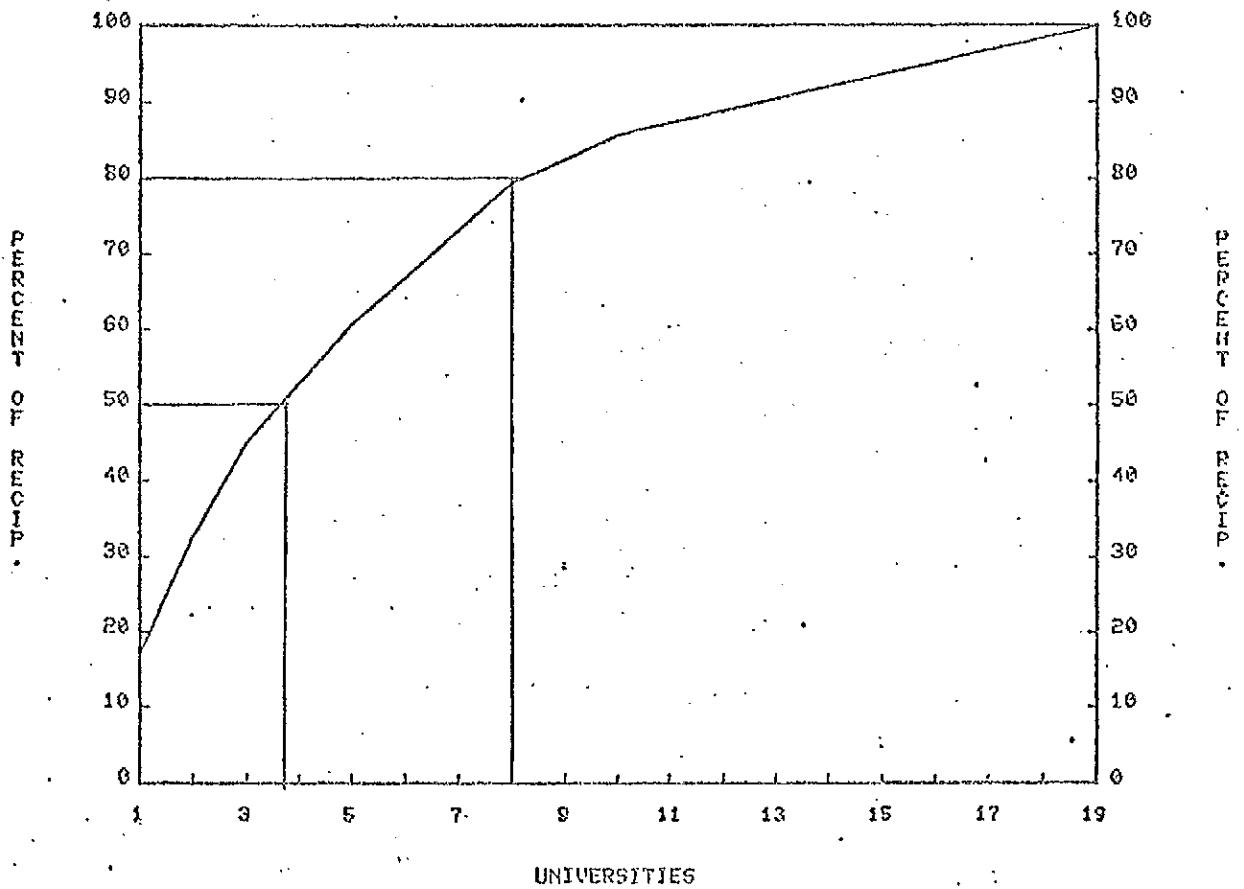


SOURCE : NSERC

Chart 3.2

Industrial Engineering

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

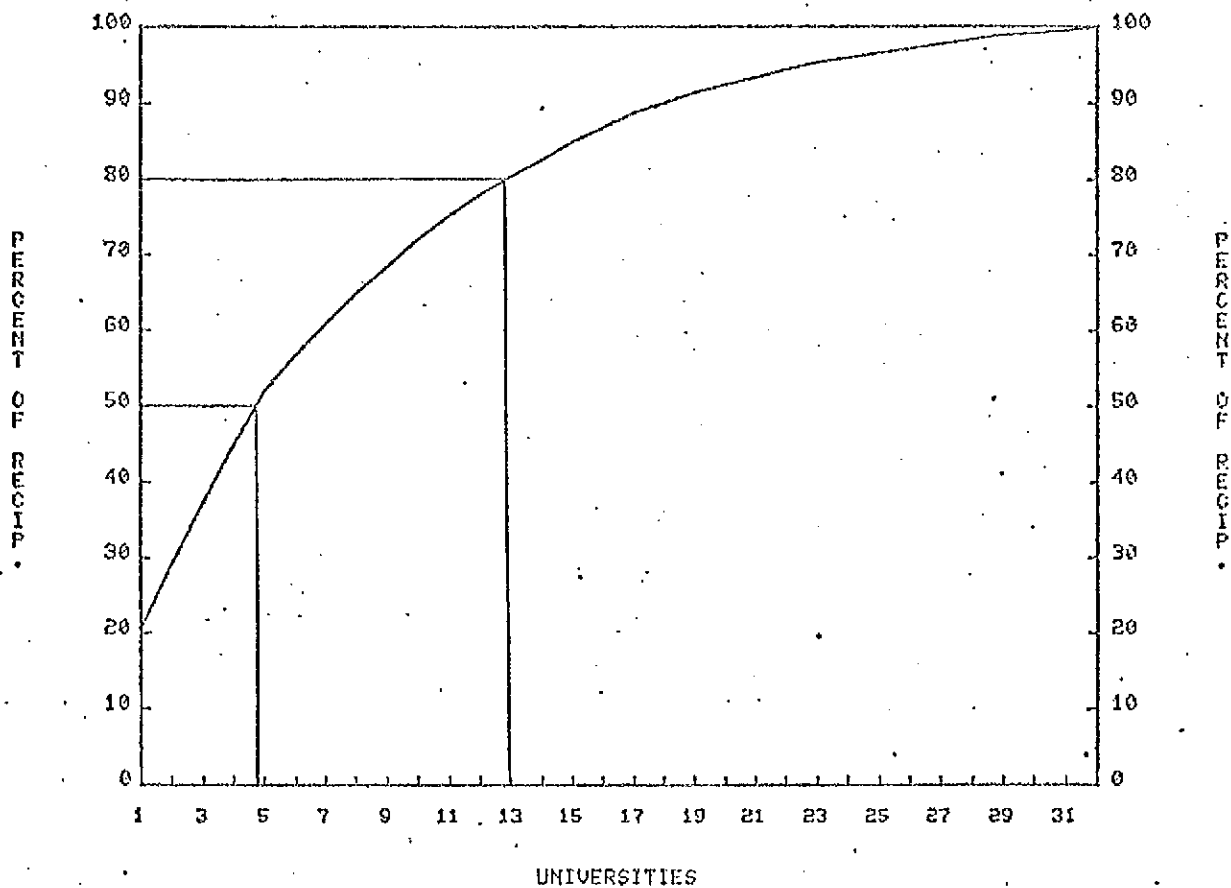


SOURCE : NSERC

Chart 3.3

Animal Biology

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

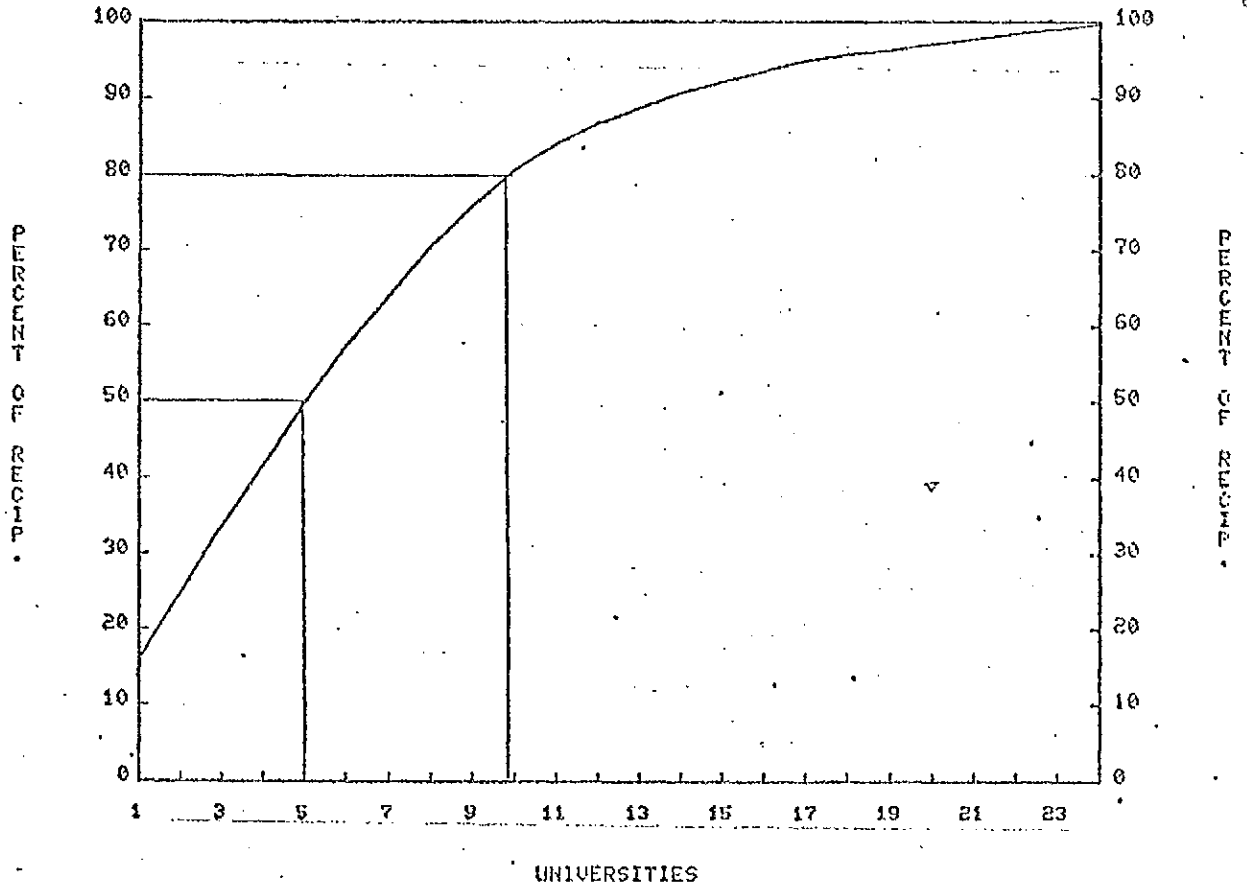


SOURCE : NSERC

Chart 3.4

Space and Astronomy

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

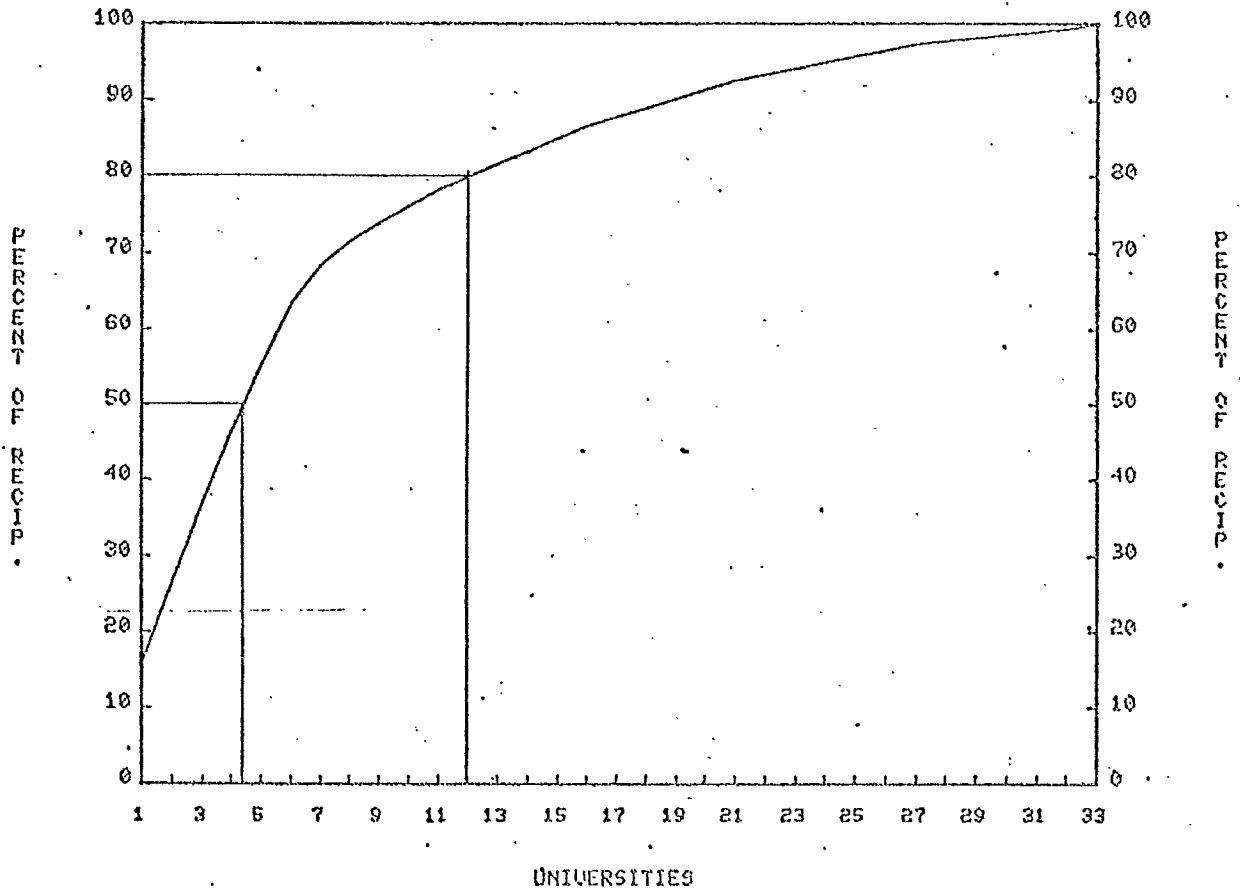


SOURCE : NSERC

Chart 3.5

Plant Biology

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

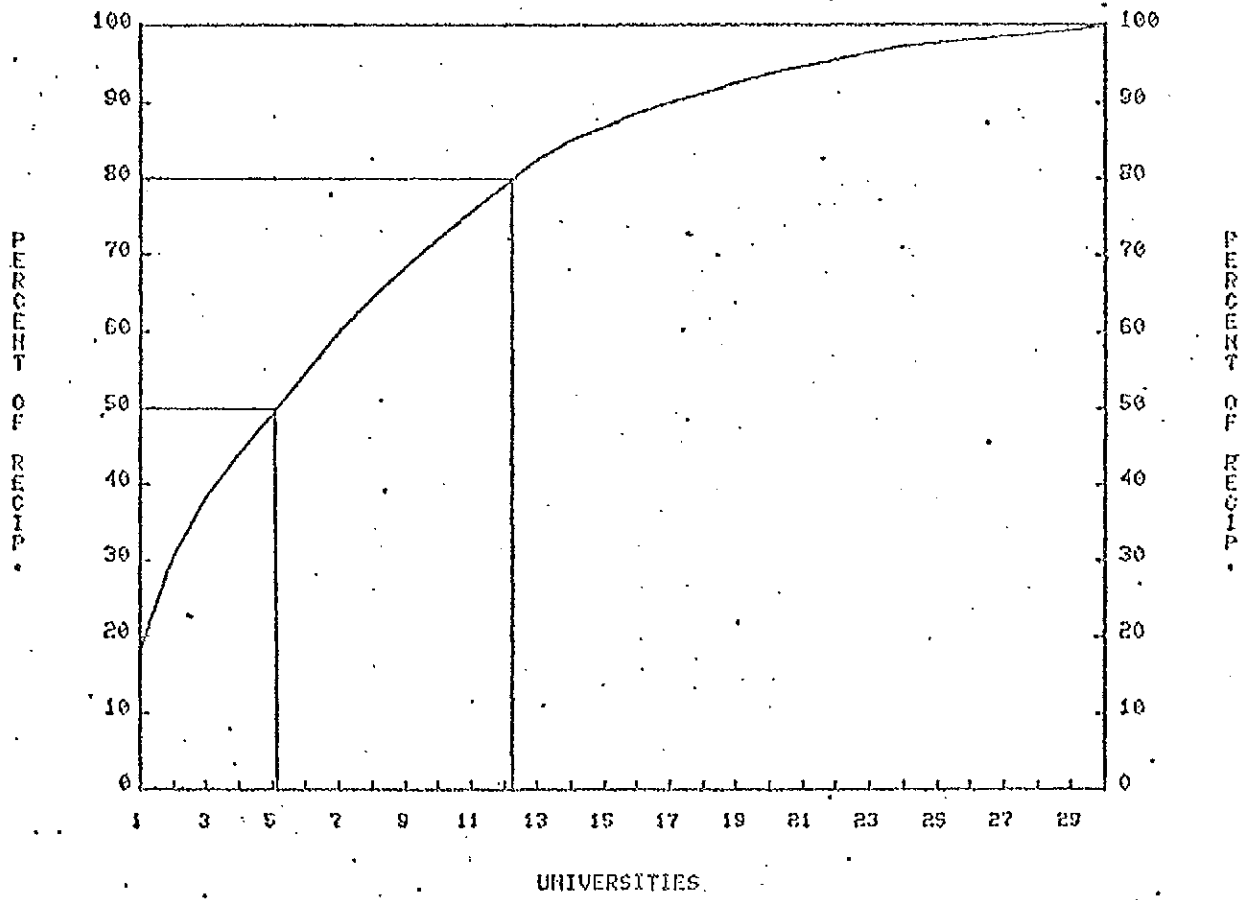


SOURCE : NSERC

Chart 3.6.

Computer/Information Science

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

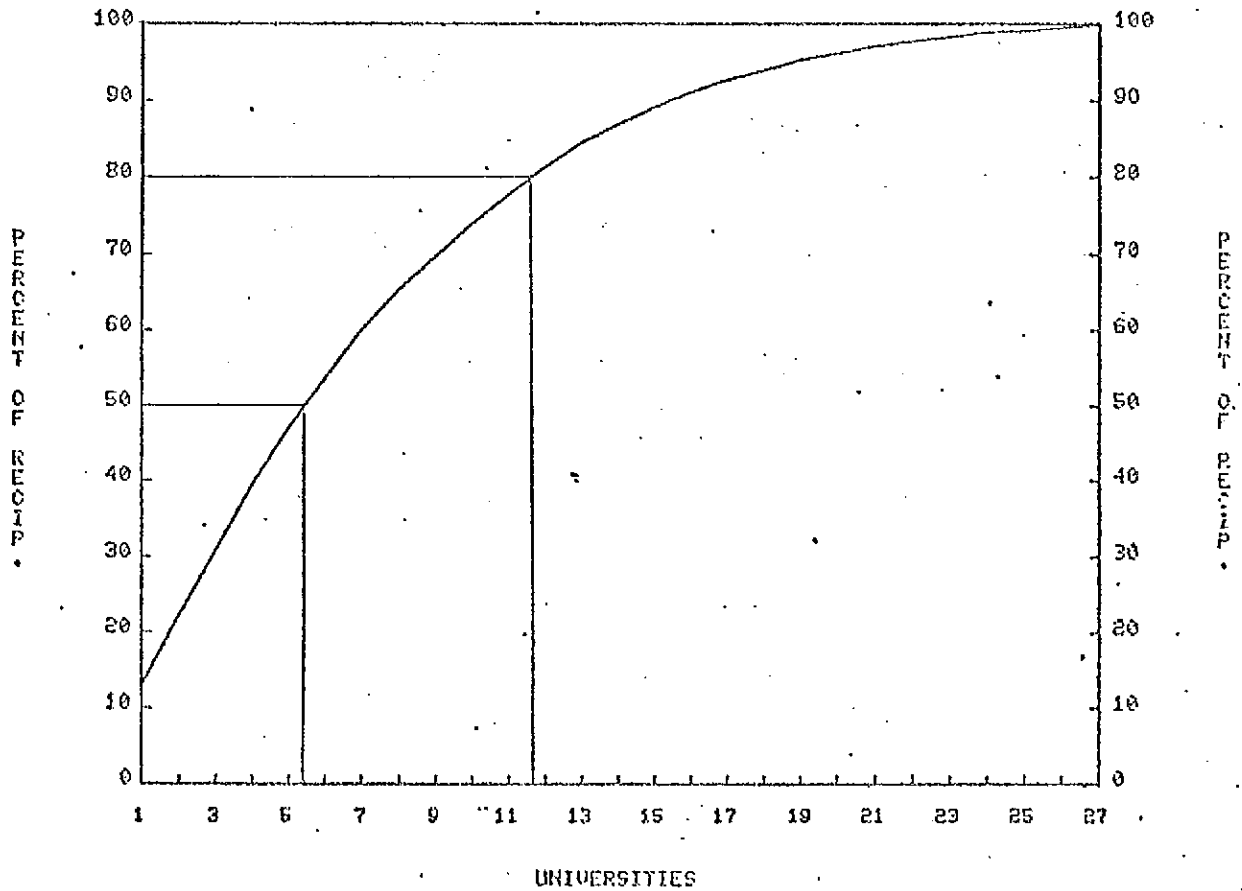


SOURCE : NSERC

Chart 3.7

Chemical and Metallurgical Engineering

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)



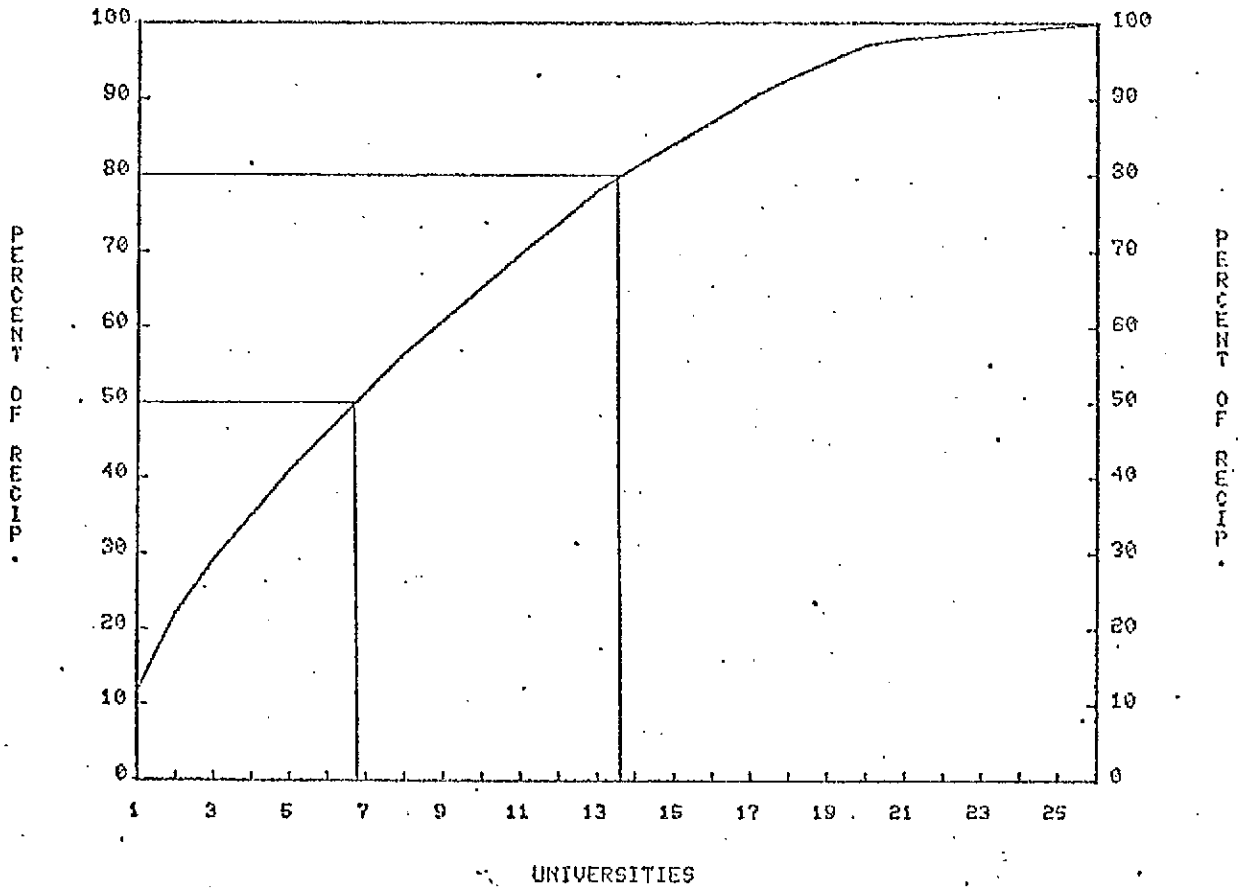
SOURCE : NSERC



Chart 3.8

Mechanical Engineering

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

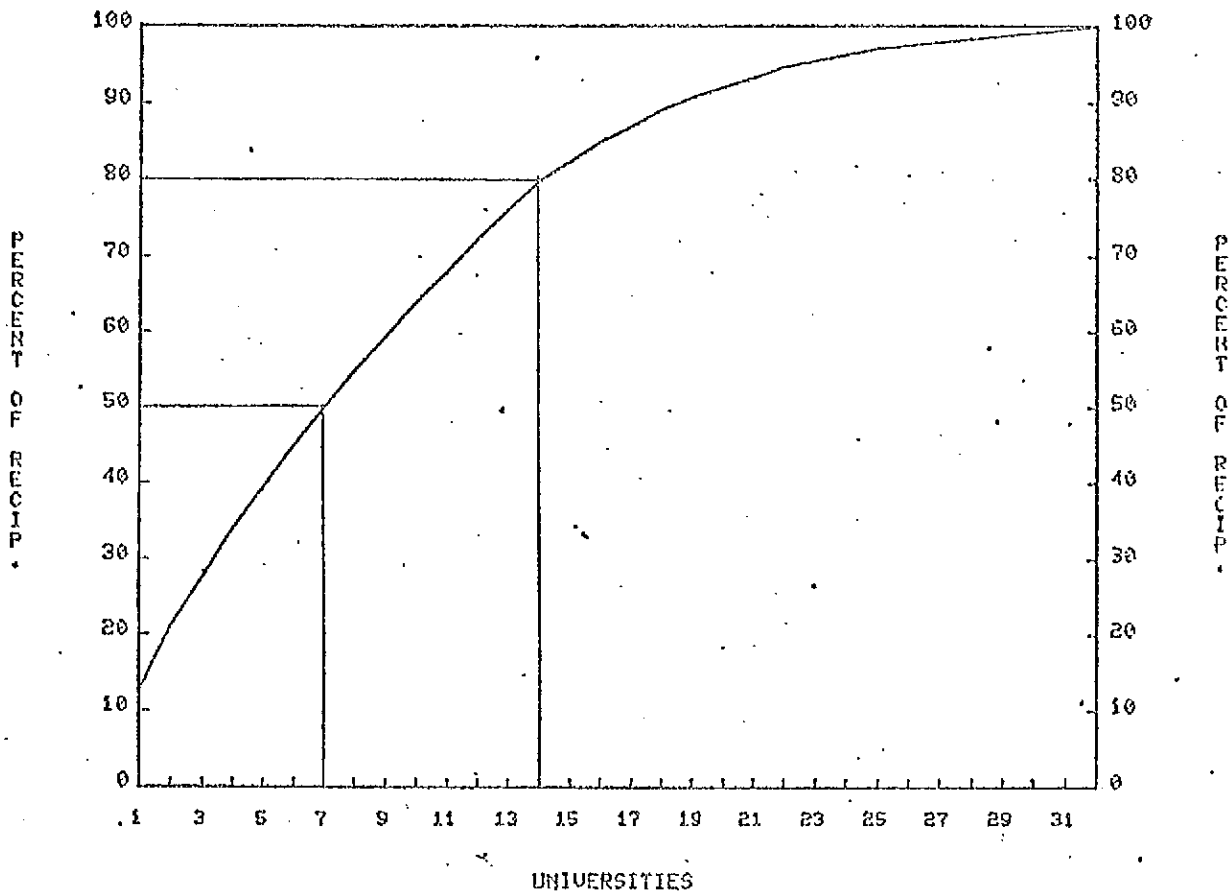


SOURCE : NSERC

Chart 3.9

Psychology

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

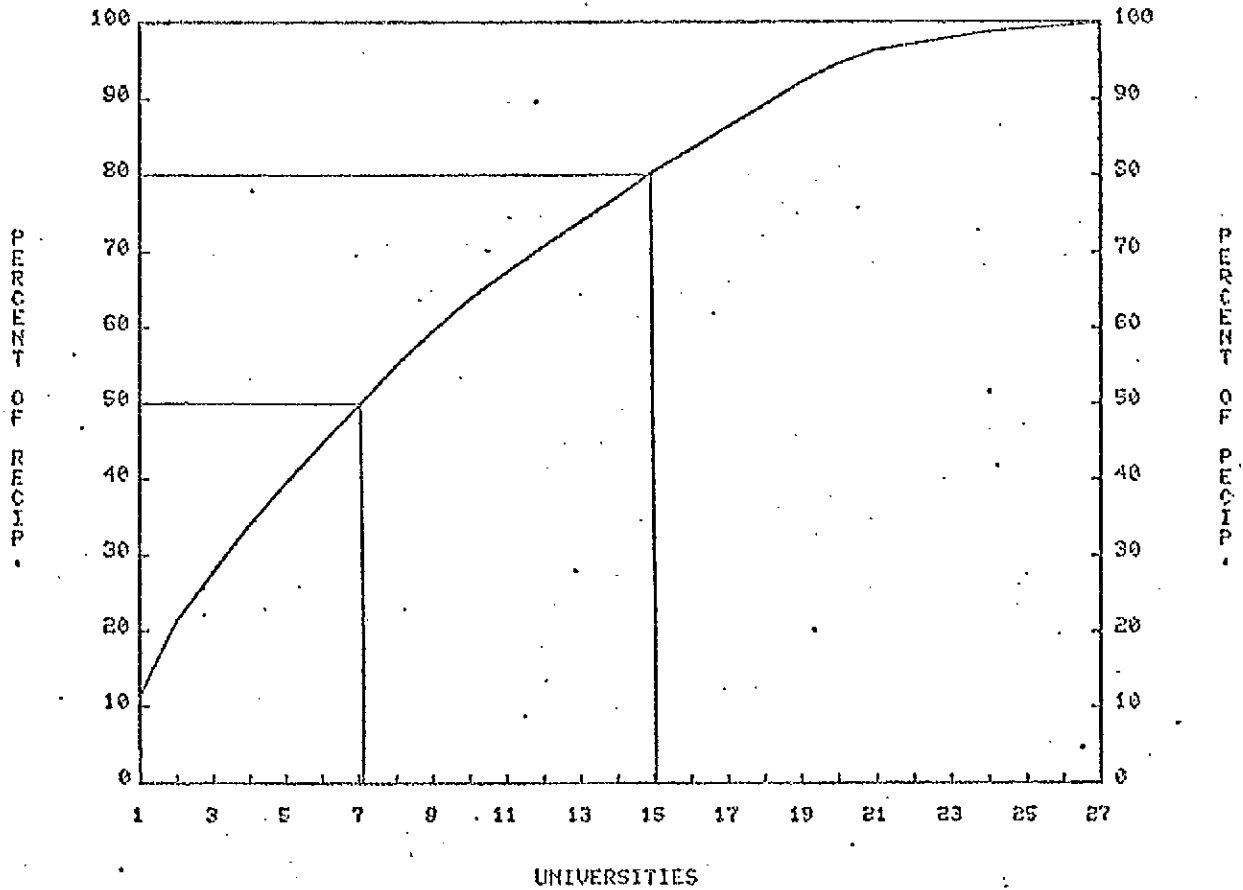


SOURCE : NSERC

Chart 3.10

Civil Engineering

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

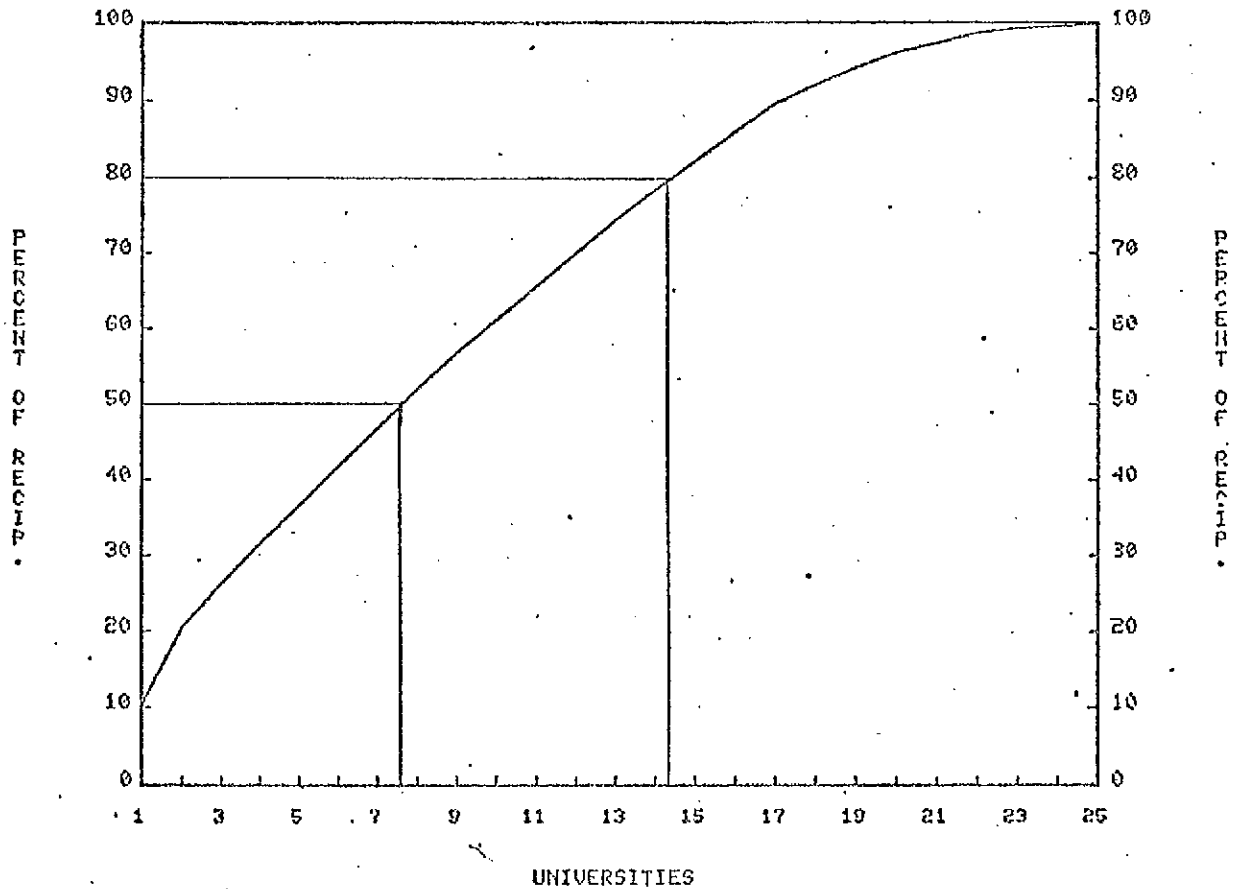


SOURCE : NSERC

Chart 3.11.

Electrical Engineering

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

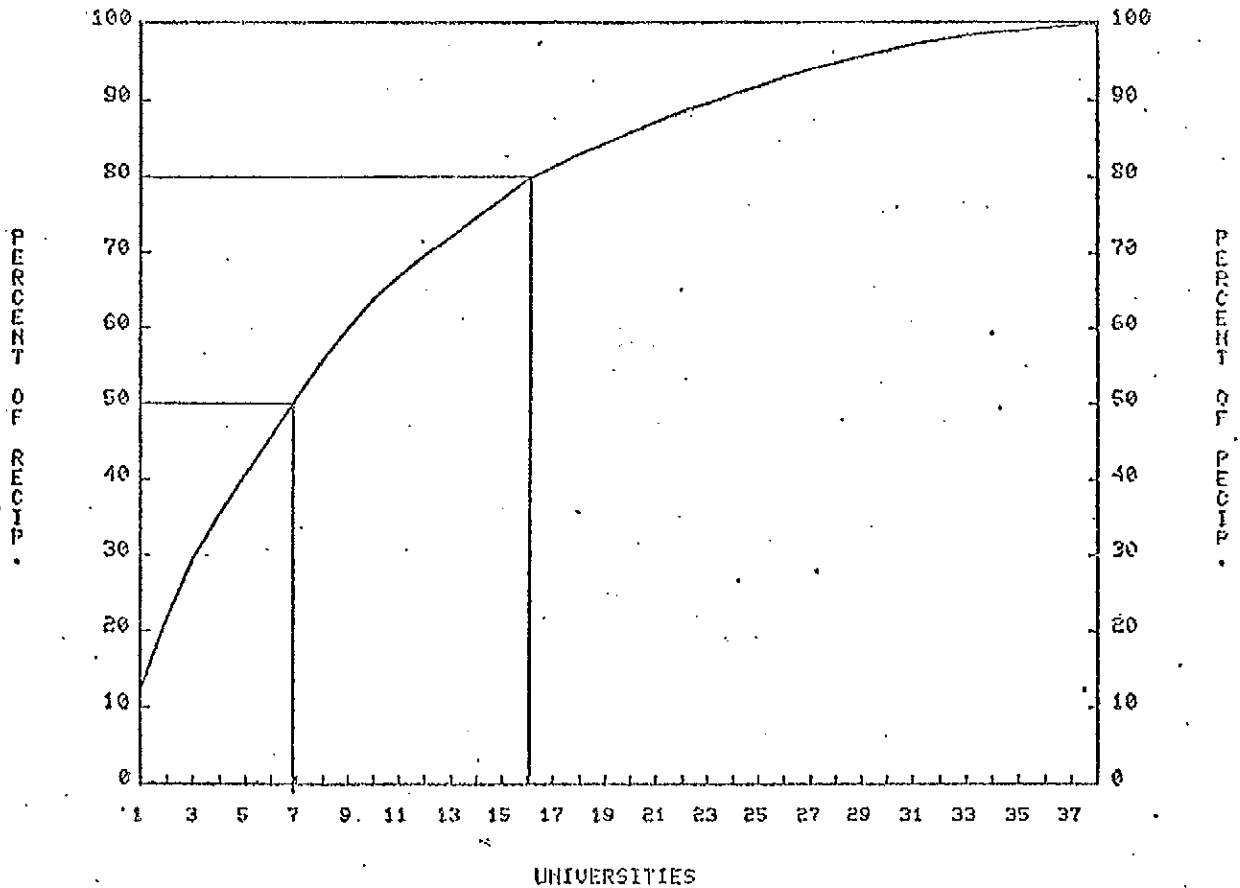


SOURCE : NSERC

Chart 3.12

Population Biology

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

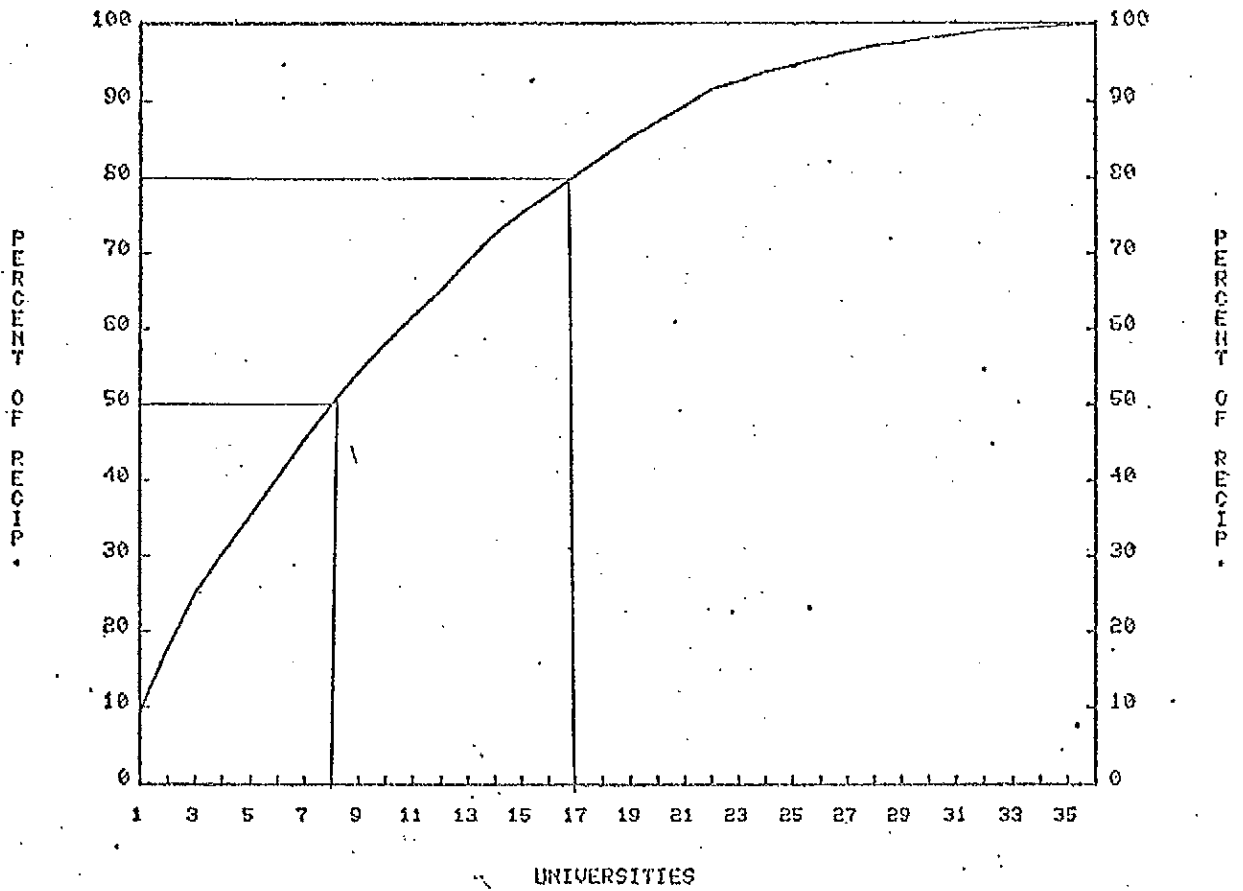


SOURCE : NSERC

Chart 3.13

Earth Sciences

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

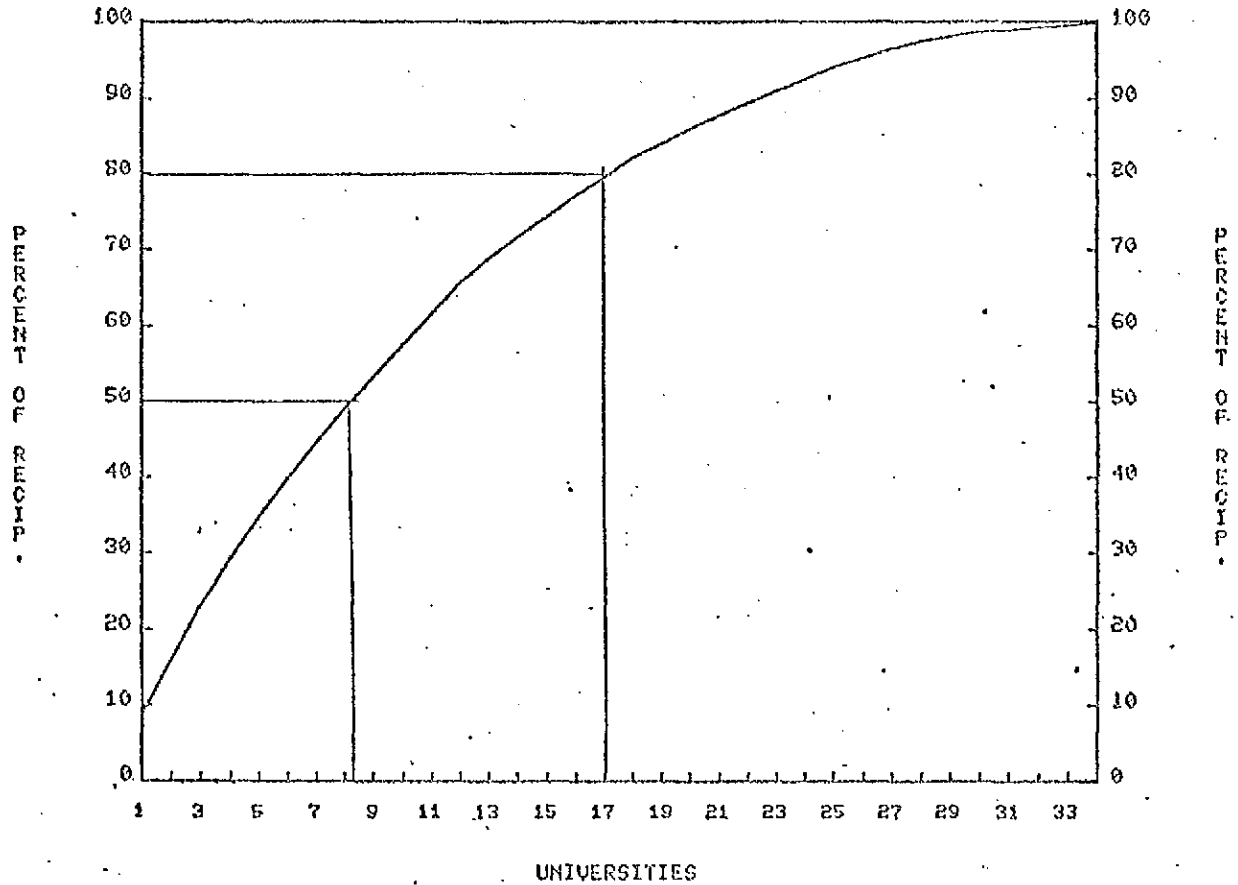


SOURCE : NSERC

Chart 3.14

Cell Biology

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)

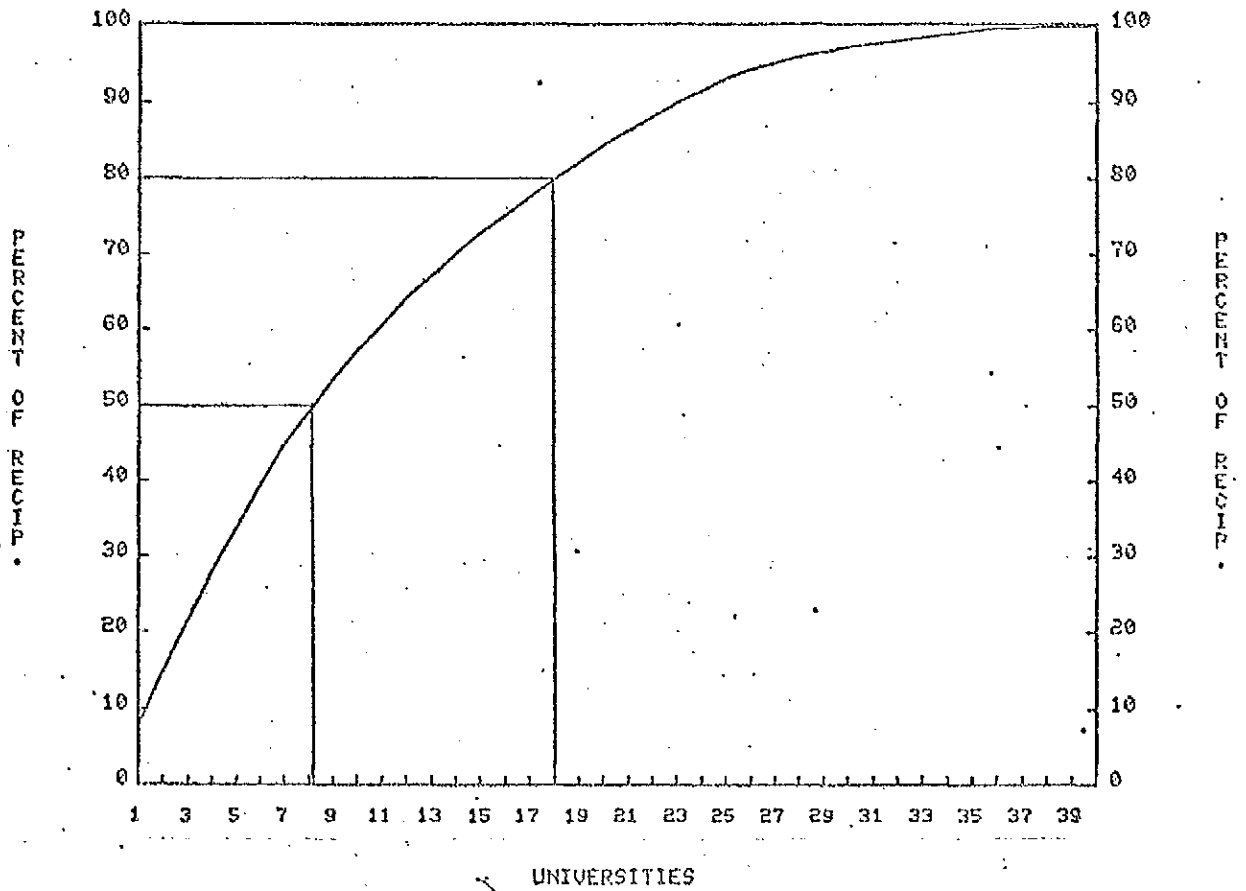


SOURCE : NSERC

Chart 3.15

Mathematics

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)



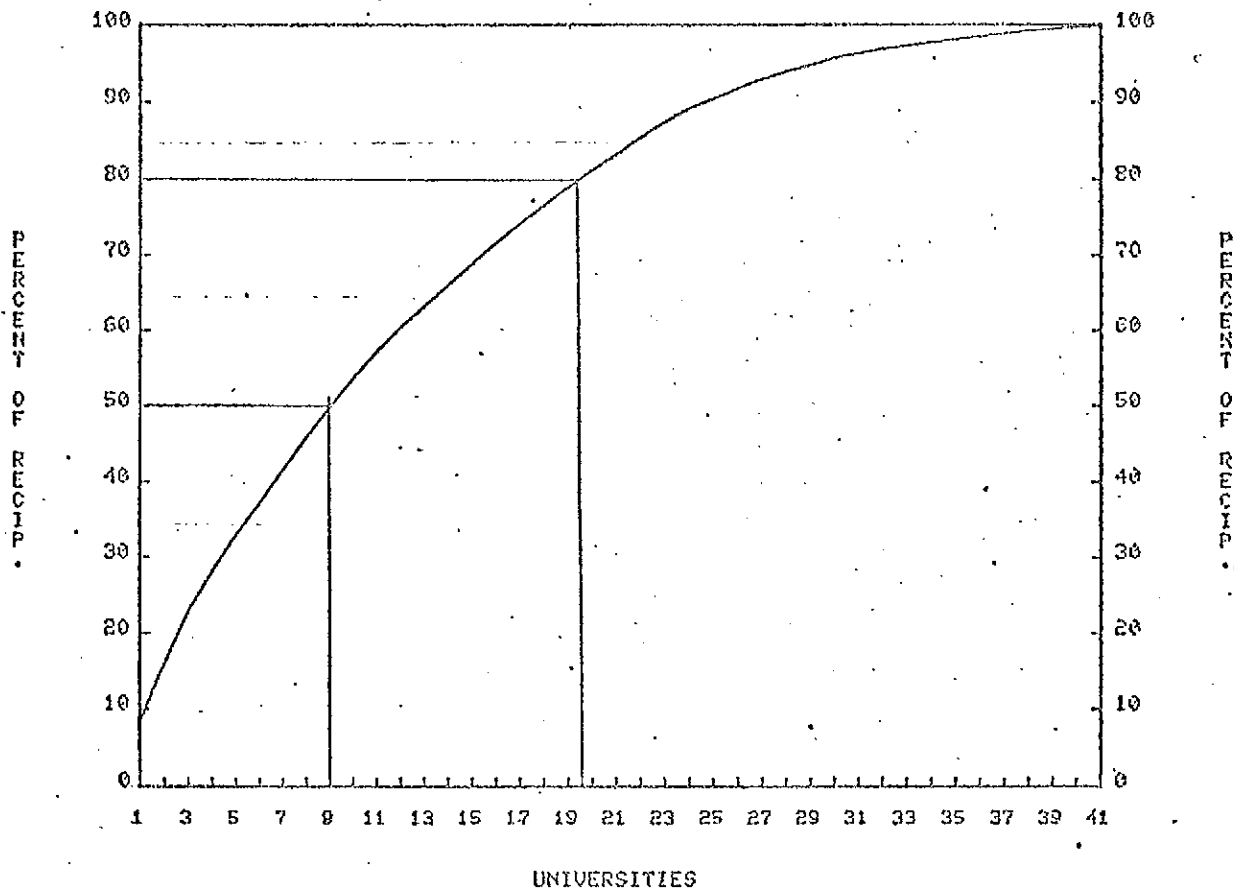
SOURCE : NSERC



Chart 3.16

Chemistry

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE (1976-77)

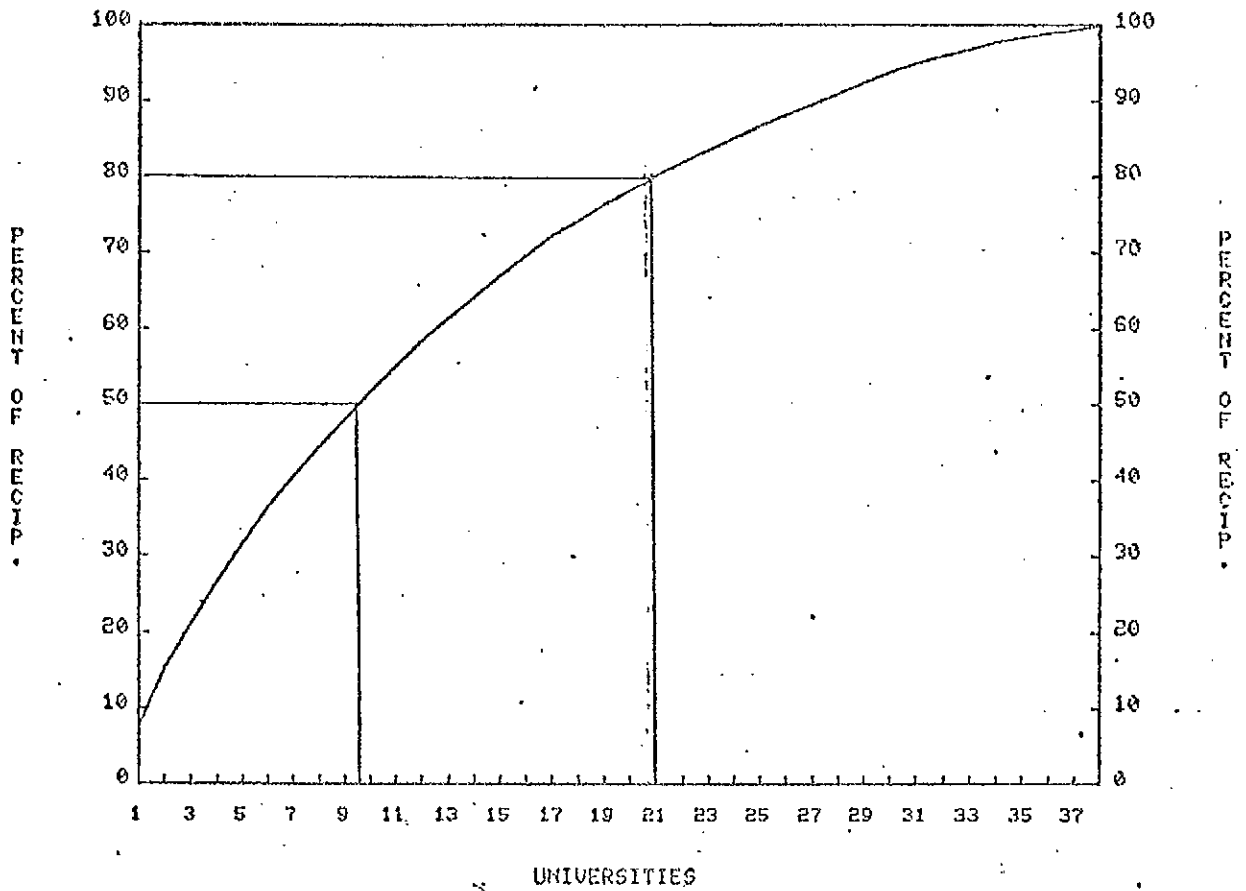


SOURCE : NSERC

Chart 3.17

Physics (Other than Nuclear)

DISTRIBUTION OF RECIPIENTS OF NRC OPERATING GRANTS AMONG UNIVERSITIES  
GROUPED BY GRANTS COMMITTEE(1976-77)



SOURCE : NSERC



Centres of concentration and excellence in particular fields of research at universities.

b) Medical sciences supported by the Medical Research Council.

9. Of the three Councils, least known is the research supported by the Medical Research Council. Moreover, the MRC appears quite reluctant either to identify its nature, priorities and orientation or to suggest appropriate conceptual frameworks whereby its content could be accurately described both to the scientific community and to the policy makers. The review of the MRC supported research is therefore confined to its grouping by the organizational affiliation of the principal researchers (Tables 5.1 to 6.28). Certain other analytical frameworks for viewing medical research such as its fields of application (i.e. cancer), body systems it is concerned with (i.e. cardiology) or medical fields and specialities are indicated in the listings in Appendix IV. The review is confined to research by personnel of medical schools and affiliated institutions and the presented information is derived from published descriptions and complimentary data concerning the MRC funded projects and research groups.

Grouped by departments of medical schools, the MRC supported researchers were most numerous in departments of medicine and biochemistry (Table 4.1) and hardly any in public health. The percentage distribution of funds differed somewhat from that of researchers.

The extent to which research carried out by members of particular teaching departments is dominated by one or more of the medical schools is indicated by the concentration ratios shown in Table 5.1 concerning researchers and Table 5.2 pertaining to expenditures. Both tables are confined to departmental groupings of researchers belonging to ten or more medical schools. They indicate that in terms of the number of medical schools involved, the most concentrated was the research in departments of pediatrics, obstetrics and gynecology in which the first five dominant schools accounted for 83.3 percent and 72.2 percent of researchers respectively (Table 5.1). They also accounted for 86.8 percent and 80.6 percent of the respective funds. Least concentrated appears to have been research in the departments of biochemistry in which the first five schools accounted for less than half (48.8 percent) of the number of researchers and 54.6 percent of funds involved.

The dominant medical schools both in terms of principal researchers involved and funds received for research in teaching departments listed in Table 4.1 are identified in Tables 6.1 to 6.28.

Available also are the results of the "Review of Health Science Research in Canadian Universities 1975-76" prepared by Dr. L. Slotin. They are summarized in Table 1 of Appendix IV which shows leading universities in the listed fields of medical research Table 2 of the Appendix indicates specialization of the MRC funded research groups and Table 3 an "impressionistic" listing of some leading researchers in medical sciences.

(See Tables 4.1 to 6.28 which follow)

Table 4.1

Distribution of Research Support Provided under the  
Medical Research Council Grants-in-Aid to  
Medical Schools and Affiliated Departments  
1977-1978

DEPARTMENTS *	No. of Researchers	Percent	No. of Universities**	Grants (\$'000)	Percent of Total Grants
Medicine	230	15.7	16	5,362	14.5
Biochemistry	170	11.6	16	5,549	15.0
Laboratory (Hospital)	135	9.2	4	3,346	9.0
Physiology	133	9.1	14	3,710	10.0
Pathology	96	6.1	14	2,395	6.5
Pharmacology	88	6.0	14	2,110	5.7
Microbiology	87	6.0	14	1,880	5.1
Medical Research (Institutes)	82	5.6	3	2,327	6.3
Anatomy	78	5.3	15	2,072	5.6
Surgery	60	4.1	13	1,022	2.8
Paediatrics	36	2.5	10	1,082	2.9
Psychiatry	34	2.3	9	860	2.3
Medical Biophysics	32	2.2	4	959	2.6
Pharmaceutical Sciences	30	2.1	7	531	1.4
Obstetrics and Gynecology	29	2.0	10	828	2.2
Dentistry	28	1.9	5	584	1.6
Psychology	24	1.6	9	320	0.9
Nuclear Medicine	20	1.4	5	273	0.7
Genetics	17	1.2	4	724	2.0
Immunology	11	0.8	4	311	0.8
Anaesthesia	9	0.6	4	245	0.7
Otolaryngology	9	0.6	2	96	0.3
Veterinary Sciences	9	0.6	1	107	0.3
Neurological Sciences	4	0.3	2	171	0.5
Ophthalmology	4	0.3	3	122	0.3
Biomedical Engineering	3	0.2	3	38	0.1
Histology and Embryology	1	0.1	1	10	0.0
Public Health	1	0.1	1	23	0.1
<b>T O T A L</b>	<b>1461</b>	<b>100.0</b>		<b>37,077</b>	<b>100.0</b>
TOTAL SUPPORT by MRC in Grants-in-Aid***				<b>39,123</b>	

\*The classification system by departments of medical sciences at Canadian universities and their affiliates is the system currently employed by the MRC in their publication "Reference List of Health Sciences Research in Canada 1977-78".

\*\*There are sixteen medical schools in Canada.

\*\*\*Includes Grants-in-Aid to non-medical science departments of Canadian universities.

Note: Percent columns may not add up to 100 percent due to rounding.

SOURCE - Medical Research Council, Report of the President, 1977-78.

Table 5.1  
 Concentration of MRC supported Researchers<sup>1</sup>  
 at Medical Schools grouped by schools' departments<sup>2</sup>  
 1977-1978

SELECTED FIELDS<sup>3</sup>

Rank/No. of Universities	Anatomy		Biochemistry		Medicine		Microbiology		Obstetrics & Gynaecology		Paediatrics		Pathology		Pharmacology		Physiology		Surgery	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
First 5	51.28		48.82		60.43		57.95		72.41		83.33		64.58		59.09		51.88		71.67	
First 10	83.33		78.32		86.96		88.64		100.00		100.00		91.67		87.50		87.22		93.23	
First 15	100.00		96.24		99.57		*		**		**		*		*		*		***	
First 20	100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00	
No.	75	170	230	87	29	36	96	88	133	60										

\* only 14 universities involved  
 \*\* only 10 universities involved  
 \*\*\* only 13 universities involved

Note : 1) M.C. Grants-in-Aid  
 2) As per Reference List of Health Science Research in Canada, 1977-78.  
 3) Not shown in this tabulation are the statistics pertaining to Anaesthesia, Biomedical Engineering, Dentistry, Genetics, Histology & Embryology, Immunology, Laboratory (Hospital), Medical Biophysics, Medical Research, Neurological Sciences, Nuclear Medicine, Ophthalmology, Otolaryngology, Pharmaceutical Science, Psychiatry, Psychology, Public Health and Veterinary Medicine. The details for the excluded departments of medical sciences are given in the relevant tables that follow. The excluded departments accounted for 454 researchers or 31.67% of the 1977-78 total of 1461.

SOURCE : Medical Research Council, Report of the President, 1977-78.



Table 5.2  
 Concentration of MRC Expenditures<sup>1</sup>  
 in support of research at Medical Schools  
 grouped by schools' departments<sup>2</sup>  
 (\$'000)  
 1977-1978  
 SELECTED FIELDS<sup>3</sup>

Ranked Universities	Anatomy		Biochemistry		Medicine		Microbiology		Obstetrics & Gynaecology		Paediatrics		Pathology		Pharmacology		Physiology		Surgery	
	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$
First 5	53.59		54.84		63.14		56.70		80.56		86.78		70.19		60.76		56.12		73.63	
First 10	85.12		81.91		93.35		91.91		100.00		100.00		90.86		91.26		88.17		95.50	
First 15	100.00		98.95		99.51		*		**		**		*		*		*		***	
Total %	100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00	
\$		2072		5529		5382		1380		828		1082		2395		2110		3710		1922

\* only 14 universities involved  
 \*\* only 10 universities involved  
 \*\*\* only 12 universities involved

Note : 1) MRC Grants-in-Aid  
 2) As per Reference List of Health Science Research in Canada, 1977-78  
 3) Not shown in this tabulation are the statistics pertaining to Anesthesia, Biomedical Engineering, Dentistry, Genetics, Histology & Embryology, Immunology, Laboratory (Hospital), Medical Biophysics, Medical Research, Neurological Sciences, Nuclear Medicine, Ophthalmology, Otolaryngology, Pharmaceutical Science, Psychiatry, Psychology, Public Health and Veterinary Medicine. The details for the excluded departments of medical science are given in the relevant tables that follow. The excluded departments accounted for \$11,047 or 29.79% of the 1977-78 total of 37077.

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.1

MEDICINE \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	49	21.3	1,170	21.7
McGill	33	14.4	1,246	23.2
Laval	20	8.7	267	5.0
Western Ont.	19	8.3	375	7.0
U.B.C.	18	7.8	340	6.3
Queens	16	7.0	366	6.8
McMaster	14	6.1	363	6.7
Manitoba	11	4.8	260	4.8
Alberta	10	4.4	222	4.1
Ottawa	10	4.4	187	3.5
Calgary	8	3.5	228	4.2
Sherbrooke	7	3.0	128	2.4
Memorial	6	2.6	79	1.5
Dalhousie	5	2.2	62	1.2
Saskatchewan	3	1.3	63	1.2
Montreal	1	0.4	26	0.5
TOTAL	230	100.0	5,382	100.0

\* Includes Dermatology, Experimental Medicine and Therapeutics

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.2

BIOCHEMISTRY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	25	14.7	896	16.1
Alberta	16	9.4	656	11.8
Memorial	15	8.8	417	7.5
McGill	14	8.2	599	10.8
Western Ontario	13	7.7	464	8.4
Ottawa	13	7.7	410	7.4
U.B.C.	11	6.5	370	6.7
Dalhousie	10	5.9	261	4.7
McMaster	9	5.3	253	4.6
Sherbrooke	8	4.7	219	3.9
Queens	8	4.7	213	3.8
Laval	8	4.7	129	2.3
Saskatchewan	7	4.1	144	2.6
Manitoba	6	3.5	239	4.3
Calgary	4	2.4	193	3.5
Montreal	3	1.8	86	1.6
TOTAL	170	100.0	5,549	100.0

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78

Table 6.3

LABORATORY (HOSPITAL)

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School Affiliate *	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	77	57.0	1772	53.0
McGill	30	22.2	841	25.1
Montreal	27	20.0	704	21.0
Manitoba	1	0.8	29	0.9
TOTAL	135	100.0	3,346	100.0

\* Affiliates for

- Toronto : Hospital for Sick Children  
Toronto Western Hospital  
Mt. Sinai Hospital
- Montreal : Hôtel Dieu  
Hôpital Ste-Justine  
Hôpital Notre-Dame  
Hôpital Sacre Coeur
- McGill : Hôpital Maisonneuve-Rosemount  
Hôpital St. Jean de Dieu  
Montreal Children's Hospital  
Jewish General Hospital
- Manitoba : Deer Lodge Hospital

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.4

PHYSIOLOGY \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Montreal	16	12.0	418	11.3
Manitoba	14	10.5	482	13.0
McGill	14	10.5	476	12.8
Dalhousie	13	9.8	339	9.1
U.B.C.	12	9.0	367	9.9
Laval	12	9.0	257	6.9
Ottawa	10	7.5	199	5.4
Toronto	9	6.8	251	6.8
Saskatchewan	9	6.8	199	5.4
Queens	7	5.3	283	7.6
Calgary	5	3.8	147	4.0
Western Ont.	5	3.8	120	3.2
Alberta	5	3.8	81	2.2
Sherbrooke	2	1.5	91	2.5
TOTAL	133	100.0	3,710	100.0

\* Includes Neurophysiology

Note: Percentages may not add to 100% due to rounding.

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.5

PATHOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Manitoba	24	25.0	715	29.9
Toronto	12	12.5	380	15.9
Queens	9	9.4	223	9.3
Montreal	9	9.4	183	7.6
U.B.C.	8	8.3	180	7.5
Dalhousie	7	7.3	42	1.8
McGill	6	6.3	171	7.1
Manitoba	6	6.3	142	5.9
Laval	4	4.2	38	1.6
Ottawa	3	3.1	102	4.3
Western Ont.	3	3.1	80	3.3
Saskatchewan	2	2.1	53	2.2
Alberta	2	2.1	25	1.0
Sherbrooke	1	1.0	61	2.6
<b>TOTAL</b>	<b>96</b>	<b>100.0</b>	<b>2,395</b>	<b>100.0</b>

Note: Percentages may not add to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.



Table 6.6

PHARMACOLOGY \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	19	21.6	515	24.4
Toronto	13	14.8	233	11.0
Montreal	7	8.0	169	8.0
Alberta	7	8.0	133	6.3
Manitoba	6	6.8	232	11.0
U.B.C.	6	6.8	194	9.2
Dalhousie	6	6.8	105	5.0
Ottawa	5	5.7	43	2.0
Calgary	4	4.6	174	8.3
Queens	4	4.6	128	6.1
Laval	4	4.6	104	4.9
Memorial	4	4.6	27	1.3
Saskatchewan	2	2.3	34	1.6
Western Ont.	1	1.1	19	0.9
TOTAL	88	100.0	2,110	100.0

\* Includes Therapeutics

Note: Percentages may not add to 100% due to rounding.

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.7

MICROBIOLOGY \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Western Ont.	13	14.8	401	21.3
Toronto	11	12.5	190	10.1
Montreal	10	11.4	197	10.5
McGill	9	10.2	138	7.3
Dalhousie	8	9.1	140	7.5
Queens	7	8.0	166	8.8
Manitoba	6	6.8	84	4.5
Sherbrooke	5	5.7	175	9.3
U.B.C.	5	5.7	148	7.9
Alberta	4	4.6	81	4.3
Laval	4	4.6	42	2.2
Saskatchewan	3	3.4	59	3.1
Ottawa	2	2.3	42	2.2
Memorial	1	1.1	17	0.9
TOTAL	88	100.0	1,880	100.0

\* Includes combined depts. of Microbiology and Immunology, and Bacteriology.

Note: Percentages may not add to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.



Table 6.8

MEDICAL RESEARCH \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School Affiliate **	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	52	63.4	1318	56.6
Montreal	16	19.5	386	16.6
Toronto	14	17.1	623	26.8
TOTAL	82	100.0	2327	100.0

\* Includes depts. under words Institute, Laboratory

\*\* Affiliates for :

McGill : Montreal General Hospital Research Institute  
Montreal Neurological Institute

Montreal : Institute de Cardiologie  
Institute de recherches chimiques de Montréal

Toronto : Banting and Best Dept. of Medical Research

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.9

ANATOMY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	10	12.8	450	21.7
Laval	8	10.3	221	10.7
Ottawa	8	10.3	207	10.0
Western Ontario	8	10.3	169	8.2
Saskatchewan	7	9.0	167	8.1
Toronto	6	7.7	175	8.5
U.B.C.	5	6.4	130	6.3
Sherbrooke	5	6.4	81	3.9
Montreal	4	5.1	121	5.8
Calgary	4	5.1	106	5.1
Dalhousie	4	5.1	74	3.6
Manitoba	3	3.9	60	2.9
Queens	3	3.9	24	1.2
McMaster	2	2.6	58	2.8
Alberta	1	1.3	29	1.4
TOTAL	78	100.0	2072	100.0

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.10-

SURGERY \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	14	23.3	287	28.1
Toronto	11	18.3	208	20.4
Western Ont.	8	13.3	69	6.8
Alberta	6	10.0	71	7.0
U.B.C.	4	6.7	118	11.6
Sherbrooke	3	5.0	75	7.3
Montreal	3	5.0	67	6.6
Queens	3	5.0	14	1.4
Manitoba	2	3.3	35	3.4
Laval	2	3.3	32	3.1
Calgary	2	3.3	21	2.1
Saskatchewan	1	1.7	16	1.6
McMaster	1	1.7	9	0.9
TOTAL	60	100.0	1,022	100.0

\*. Includes Experimental Surgery

Note: Percentages may not add to 100% due to rounding.

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.11

PAEDIATRICS

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Manitoba	11	30.6	376	34.8
McMaster	6	16.7	235	21.7
U.B.C.	5	13.9	103	9.5
Dalhousie	4	11.1	146	13.5
McGill	4	11.1	79	7.3
Queens	2	5.6	48	4.4
Calgary	1	2.8	38	3.5
Alberta	1	2.8	27	3.4
Saskatchewan	1	2.8	14	1.3
Sherbrooke	1	2.8	6	0.6
<b>TOTAL</b>	<b>36</b>	<b>100.0</b>	<b>1,082</b>	<b>100.0</b>

Note: Percentages may not add to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.12

PSYCHIATRY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	8	23.5	163	19.0
McGill	7	20.6	201	23.4
U.B.C.	6	17.7	279	32.4
McMaster	6	17.7	61	7.1
Saskatchewan	2	5.9	97	11.3
Western Ont.	2	5.9	21	2.4
Ottawa	1	2.9	20	2.3
Alberta	1	2.9	12	1.4
Sherbrooke	1	2.9	6	0.7
TOTAL	34	100.0	860	100.0

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.13

MEDICAL BIOPHYSICS

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	23	71.9	788	82.2
Sherbrooke	5	15.6	91	9.5
Western Ontario	2	6.3	46	4.8
Calgary	2	6.3	34	3.6
TOTAL	32	100.0	959	100.0

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.14

PHARMACEUTICAL SCIENCES \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	7	23.3	139	26.2
U.B.C.	6	20.0	150	28.3
Alberta	4	13.3	94	17.7
Saskatchewan	4	13.3	25	4.7
Dalhousie	3	10.0	53	10.0
Montreal	3	10.0	44	8.3
Manitoba	3	10.0	26	4.9
TOTAL	30	100.0	531	100.0

\* Including Schools of Pharmacy

Note: Percentages may not add to 100% due to rounding

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.15

OBSTETRICS AND GYNAECOLOGY  
Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Western Ont.	6	20.7	226	27.3
Toronto	6	20.7	163	19.7
McGill	4	13.8	205	24.8
Laval	3	10.3	29	3.5
Dalhousie	2	6.9	44	5.3
U.B.C.	2	6.9	36	4.4
Queens	2	6.9	24	2.9
Calgary	2	6.9	23	2.8
Sherbrooke	1	3.5	40	4.8
McMaster	1	3.5	38	4.6
TOTAL	29	100.0	828	100.0

Note: Percentages may not add to 100% due to rounding.

Source : Medical Research Council, Report of the President, 1977-78.



Table 6.16.

DENTISTRY\*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Manitoba	8	28.6	175	30.0
Toronto	8	28.6	165	28.3
U.B.C.	7	25.0	136	23.3
Alberta	4	14.3	101	17.3
Montreal	1	3.6	.7	1.2
TOTAL	28	100.0	584	100.0

\* Involving Dental Schools

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.17

PSYCHOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Dalhousie	4	16.7	67	20.9
Queens	4	16.7	33	10.3
U.B.C.	3	12.5	66	20.6
Manitoba	3	12.5	42	13.1
Alberta	3	12.5	26	8.1
Western Ont.	2	8.3	38	11.9
McMaster	2	8.3	23	7.2
Toronto	2	8.3	22	6.9
McGill	1	4.2	3	0.9
TOTAL	24	100.0	320	100.0

Note: Percentages may not add to 100% due to rounding.

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.18

NUCLEAR MEDICINE \*

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Sherbrooke	8	40.0	159	58.2
McMaster	4	20.0	54	19.8
U.B.C.	4	20.0	23	8.4
Calgary	3	15.0	13	4.8
Queens	1	5.0	24	8.8
TOTAL	20	100.0	273	100.0

SOURCE : Medical Research Council, Report of the President, 1977-78.

Table 6.19

GENETICS

Concentration of the Recipients of MRC Grants-in-aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	11	64.7	599	82.7
U.B.C.	4	23.5	83	11.5
Memorial	1	5.9	32	4.4
Laval	1	5.9	10	1.4
TOTAL	17	100.0	724	100.0

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.20

IMMUNOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Manitoba	5	45.5	187	60.1
Alberta	3	27.3	84	27.0
Memorial	2	18.2	27	8.7
Laval	1	9.0	13	4.2
TOTAL	11	100.0	311	100.0

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.21

ANAESTHESIA

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	4	44.4	107	43.7
McMaster	3	33.3	97	39.6
Toronto	1	11.1	36	14.7
Manitoba	1	11.1	5	2.0
TOTAL	9	100.0	245	100.0

Note: Percentages may not add to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.22

OTOLARYNGOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School.	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Toronto	8	88.9	91	94.8
McGill	1	11.1	5	5.2
TOTAL	9	100.0	96	100.0

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.23

VETERINARY SCIENCES

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School*	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Saskatchewan	9	100.0	107	100.0
TOTAL	9	100.0	107	100.0

\* Includes Schools of Veterinary Medicine

SOURCE : Medical Research Council, Report of the President, 1977-78.



Table 6.24

NEUROLOGICAL SCIENCES

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Western Ont.	3	75.0	150	87.7
McMaster	1	25.0	21	12.3
TOTAL	4	100.0	171	100.0

Note: Percentages may not add to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.25

OPHTHALMOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
U.B.C.	2	50.0	71	58.2
Toronto	1	25.0	26	21.3
Western Ont.	1	25.0	25	20.5
TOTAL	4	100.0	122	100.0

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.26

BIOMEDICAL ENGINEERING

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
McGill	1	33.3	23	60.6
Toronto	1	33.3	11	28.9
Alberta	1	33.3	4	10.5
TOTAL	3	100.0	38	100.0

Note: Percentages may not add up to 100% due to rounding.

SOURCE: Medical Research Council, Report of the President, 1977-78

Table 6.27

HISTOLOGY & EMBRYOLOGY

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Ottawa	1	100.0	10	100.0
TOTAL	1	100.0	10	100.0

SOURCE: Medical Research Council, Report of the President, 1977-78.

Table 6.28

PUBLIC HEALTH

Concentration of the Recipients of MRC Grants-in-Aid in  
Canadian Medical Schools and Affiliated Departments  
1977-78

University Medical School	No. of Researchers	Percent of Total Researchers	Grants (\$'000)	Percent of Total Grants
Calgary	1	100.0	23	100.0
TOTAL	1	100.0	23	100.0

SOURCE : Medical Research Council, Report of the President, 1977-78.

CANADA  
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Centres of concentration and excellence in particular fields of research at universities.

- c) Social sciences and humanities supported by the Canada Council.

10. The Council's data discussed in this review refers to research grants which on average amounted to some 50 percent of the total provided to support R&D. Except in one instance, (number of universities in Table 7.1), the tabulations present annual averages for the five year period ending in 1977 and not the annual totals for a single year as in the case of the other two Councils. The scientific content of the Council supported research is indicated by grouping the grants into disciplinary categories shown in the tabulation. Of the 19 categories listed in Table 7.1, three pertaining to Languages and Literature could for some purposes be considered as one class. Although some of the Council's research grants are given to researchers who are not on staff of the universities, they are nevertheless included in all presented tabulations. In Tables 8.1 to 8.18, research grants given to non-university researchers are included in "all other universities" category.

Were it considered as one class, most numerous were the Council supported researchers in languages and literature.

According to the presentation given in Table 7.1, however, the largest single group was that of researchers in history with the smallest numbers found in religious studies and law.

The five year total of universities employing the researchers involved (Table 7.1) and concentration ratios for the number of grants (Table 7.2) and relevant expenditures (Table 7.3) indicate that least concentrated or most dispersed, were researchers in history. In the case of history the first twenty universities accounted for 68.8 percent of the number of grants and 64.9 percent of total expenditures for research in this field as compared to, say, psychology in which the relevant percentages were 91.0 percent and 91.8 percent respectively. More concentrated than in psychology was the Council supported research in French Language and Literature with 88.9 percent of grants accounted for by the first fifteen universities and in Fine Arts in which 92.9 percent of grants were awarded to researchers in the first ten universities. Of all the listed categories most concentrated was the Council supported research pertaining to Law with 72.7 percent of grants and 81.4 percent of expenditures accounted for by the first five universities.



The dominant universities in the eighteen selected fields of research supported by the Council's research grants are identified in Tables 8.1 to 8.18. It is interesting to note that in half of the listed disciplines is not the University of Toronto which is the foremost beneficiary of the Canada Council research grants. In the case of law and linguistics it is Laval, in religion and political science most numerous are researchers from Carleton University. In economics and anthropology most prominent is the University of British Columbia and in geography, fine arts and administrative studies it is Western, Queen's and York respectively.

The only data thought to be relevant to the identification of Centres of Excellence is confined (as it is in the case of the Medical Research Council) to that pertaining to the Fellowships of the Royal Society. Such data, however, refers to the institutional association of the Fellows and not their scholarship in terms of scientific disciplines or specialities. It may, of course, provide a starting point for a more detailed examination. Although not attached in the form of an appendix, available also in the Branch is the detailed listing of researchers as derived from the description of projects given by the Canada Council.

(See Tables 7.1 to 8.18 which follow)

Number of Research Grant Recipients  
 Social Sciences and Humanities Program of the Canada Council  
 1972-73 to 1976-77 Annual Averages

Field of Study	NUMBER OF GRANTS	% OF TOTAL	\$ VALUE	% OF TOTAL	Number of Universities 5 Year Total
HISTORY	133	19.8	792,815	13.9	51
PSYCHOLOGY	87	9.6	647,351	12.2	41
OTHER LANGUAGE AND LITERATURE	63	9.0	346,143	6.3	37
ENGLISH LANGUAGE AND LITERATURE	52	7.5	199,627	3.9	33
ECONOMICS	41	5.9	291,377	5.8	32
POLITICAL SCIENCE	39	5.6	353,797	7.0	33
ARCHEOLOGY	34	4.9	337,916	6.7	29
SOCIOLOGY	32	4.6	322,035	7.5	32
ANTHROPOLOGY	31	4.4	279,726	5.5	31
LINGUISTICS	29	4.2	433,156	8.6	31
FRENCH LANGUAGE AND LITERATURE	27	3.9	99,572	2.0	22
GEOGRAPHY	26	3.7	160,254	3.2	29
PHILOSOPHY	20	2.9	82,400	1.6	29
EDUCATION	15	2.2	142,872	2.8	24
FINE ARTS	13	1.9	54,875	1.1	15
ADMINISTRATIVE STUDIES	11	1.6	66,727	1.3	20
LAU	11	1.6	89,502	1.8	15
RELIGIOUS STUDIES	8	1.1	31,787	0.5	19
ALL OTHER FIELDS OF STUDY	40	5.7	359,295	7.1	26
TOTAL	697	100.0	5,061,444	100.0	54

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Table 7.1

SOURCE: CANADA COUNCIL ANNUAL REPORTS

Table 7.2  
 Concentration of Recipients <sup>1)</sup> of Research Grants Provided Under  
 Social Sciences & Humanities Program of the Canada Council  
 Selected fields <sup>2)</sup>  
 1972-73 to 1976-77 Annual Average

Field	History		Psychology		Other Languages & Literature		English Languages & Literature		Economics		Political Science		Archaeology		Sociology		Anthropology		Linguistics		French Language & Literature		Geography		Philosophy		Education		Fine Arts		Administration Studies		Law		Other	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.		
1972-73	31.2	46.3	50.0	39.5	46.3	41.0	50.2	50.0	48.4	44.8	51.9	38.5	50.0	46.7	57.1	54.5	72.7	62.8																		
1973-74	47.1	71.5	67.2	59.5	59.0	52.9	71.9	64.5	65.5	70.4	57.7	75.0	--	52.9	--	--	--	--																		
1974-75	55.0	83.5	79.7	71.2	80.5	71.8	67.6	97.5	80.6	--	80.9	76.9	--	--	--	--	--	--																		
1975-76	57.5	81.0	87.5	80.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--																		
Total	100.0	133	100.0	67	100.0	54	100.0	52	100.0	41	100.0	39	100.0	32	100.0	31	100.0	29	100.0	27	100.0	26	100.0	20	100.0	15	100.0	14	100.0	11	100.0	11	100.0	10	100.0	

1) The number of recipients is equal or higher than the number of research grants.

2) As per the data provided in Table 7.1.

3) The number of universities is less than the number of recipients in some fields.

Source: Canada Council Annual Reports 1972-73 to 1976-77.

Table 7.3  
 Concentration of Research Grants Expenditures Provided Under the  
 Social Sciences & Humanities Program of the Canada Council  
 Selected fields<sup>1)</sup>  
 1972-73 to 1976-77 Annual Average

Discipline Universities	History		Psychology		Other Languages & Literature		English Languages & Literature		Economics		Political Science		Archaeology		Sociology		Anthropology		Linguistics		French Language & Literature		Geography		Philosophy		Education		Fine Arts		Administration Studies		Law		Religion	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.		
First five	25.3	54.9	35.5	40.2	66.0	52.4	39.1	63.3	62.9	64.1	37.3	38.1	54.5	59.1	40.0	59.0	81.4	52.8																		
First ten	41.6	79.1	63.8	66.7	83.0	66.9	58.4	86.3	76.4	78.8	56.5	55.8	73.0	--	75.6	--	--	--																		
First fifteen	52.2	85.5	77.4	78.7	90.3	88.3	68.7	91.6	83.3	--	90.5	69.9	--	--	--	--	--	--																		
First twenty	64.9	91.8	85.2	89.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--																		
Total Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
	702,816	647,349	345,148	198,631	291,377	353,799	377,916	382,034	279,725	433,154	99,572	160,855	82,401	142,887	54,874	69,509	66,729	31,796																		

<sup>1)</sup> Listed in the same order as Table 7.1  
 Source: Canada Council Annual Reports 1972-73 to 1976-77

-- Data not available (because the number of universities involved is less than the number shown in the row) or not significant.

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - HISTORY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	17	12.3	65,841	9.4
York	7	5.1	38,615	5.3
Western	7	5.1	18,584	2.6
British Columbia	6	4.3	23,691	3.4
Dalhousie	6	4.3	31,026	4.4
FIRST FIVE	43	31.2	177,757	25.3
Carleton	5	3.6	24,384	3.5
Saskatchewan	5	3.6	14,522	2.1
Laval	4	2.9	41,141	5.9
Ottawa	4	2.9	25,122	3.6
Queen's	4	2.9	9,509	1.4
FIRST TEN	65	47.1	292,435	41.6
Victoria	3	2.2	11,053	1.6
Montreal	3	2.2	26,888	3.8
Alberta	3	2.2	14,197	2.0
Waterloo	3	2.2	12,448	1.8
Manitoba	3	2.2	9,612	1.4
FIRST FIFTEEN	80	58.0	366,623	52.2
Concordia	3	2.2	37,892	5.4
Brock	3	2.2	7,457	1.1
New Brunswick	3	2.2	30,549	4.3
McGill	3	2.2	7,756	1.1
Memorial	3	2.2	6,060	0.9
FIRST TWENTY	95	68.8	456,337	64.9
ALL OTHER UNIVERSITIES	43	31.2	246,479	35.1
TOTAL	138	100.0	702,916	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - PSYCHOLOGY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$-Value	Percent of Total
Toronto	9	13.4	96,510	14.9
British Columbia	6	9.0	79,113	12.2
McGill	6	9.0	60,709	9.4
York	5	7.5	60,991	9.4
Western	5	7.5	58,365	9.0
FIRST FIVE	31	46.3	355,688	54.9
Waterloo	5	7.5	46,848	7.2
Alberta	4	6.0	42,039	6.5
Memorial	4	6.0	35,646	5.5
Calgary	2	3.0	21,213	3.3
Guelph	2	3.0	10,929	1.7
FIRST TEN	48	71.6	512,363	79.1
Montreal	2	3.0	18,245	2.8
Brock	2	3.0	4,733	0.7
Manitoba	2	3.0	9,268	1.4
McMaster	1	1.5	9,253	1.4
Concordia	1	1.5	5,867	0.9
FIRST FIFTEEN	56	83.6	559,729	86.5
Carleton	1	1.5	10,370	1.6
St. Francis Xavier	1	1.5	2,972	0.5
Simon Fraser	1	1.5	4,494	0.7
Independent	1	1.5	9,356	1.4
Queen's	1	1.5	7,236	1.1
FIRST TWENTY	61	91.0	594,157	91.8
ALL OTHER UNIVERSITIES	6	9.0	53,192	8.2
TOTAL	67	100.0	647,349	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - OTHER LANGUAGES AND LITERATURE

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	14	21.9	55,572	16.1
British Columbia	7	10.9	28,613	8.3
McGill	5	7.8	13,358	3.9
Waterloo	3	4.7	8,743	2.5
Montreal	3	4.7	16,661	4.8
FIRST FIVE	32	50.0	122,947	35.5
Laval	3	4.7	70,886	20.5
Carleton	2	3.1	7,457	2.1
Alberta	2	3.1	12,794	3.7
Queen's	2	3.1	3,059	0.9
York	2	3.1	3,892	1.1
FIRST TEN	45	67.2	221,015	63.8
Western	2	3.1	4,829	1.4
Ottawa	2	3.1	11,035	3.2
New Brunswick	2	3.1	19,330	5.6
Calgary	1	1.6	3,934	1.1
Simon Fraser	1	1.6	7,877	2.3
FIRST FIFTEEN	51	79.7	268,030	77.4
Victoria	1	1.6	6,733	1.9
Concordia	1	1.6	12,133	3.5
Dalhousie	1	1.6	4,339	1.3
Regina	1	1.6	1,224	0.4
Manitoba	1	1.6	2,486	0.7
FIRST TWENTY	56	87.5	294,935	85.2
ALL OTHER UNIVERSITIES	8	12.5	51,213	14.8
TOTAL	64	100.0	346,148	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - ENGLISH LANGUAGE AND LITERATURE

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	8	15.4	40,825	20.6
Dalhousie	3	5.8	6,991	3.5
York	3	5.8	8,244	4.2
Western	3	5.8	10,539	5.3
British Columbia	3	5.8	13,294	6.7
FIRST FIVE	20	38.5	79,943	40.2
McMaster	3	5.8	13,970	7.0
Carleton	2	3.8	11,718	5.9
Alberta	2	3.8	6,095	3.1
Memorial	2	3.8	16,544	8.3
New Brunswick	2	3.8	4,260	2.1
FIRST TEN	31	59.6	132,530	66.7
McGill	2	3.8	8,670	4.4
Acadia	1	1.9	6,354	3.2
Manitoba	1	1.9	2,768	1.4
Waterloo	1	1.9	3,300	1.7
Simon Fraser	1	1.9	2,699	1.4
FIRST FIFTEEN	37	71.2	156,321	78.7
Laval	1	1.9	5,489	2.8
Queen's	1	1.9	2,528	1.3
Concordia	1	1.9	8,680	4.4
Saskatchewan	1	1.9	2,388	1.2
Mount St. Vincent	1	1.9	1,396	0.7
FIRST TWENTY	42	80.8	176,902	89.0
ALL OTHER UNIVERSITIES	10	19.2	21,829	11.0
TOTAL	52	100.0	198,631	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS



CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - ECONOMICS

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
British Columbia	5	12.2	27,704	9.5
Toronto	5	12.2	45,156	15.5
Western	4	9.8	32,831	11.3
Montreal	3	7.3	66,960	23.0
Carleton	3	7.3	19,791	6.8
FIRST FIVE	20	48.8	192,442	66.0
Queen's	3	7.3	11,347	3.9
Guelph	2	4.9	19,097	6.6
York	1	2.4	5,964	2.0
Simon Fraser	1	2.4	5,724	2.0
Ottawa	1	2.4	7,363	2.5
FIRST TEN	28	68.3	241,937	83.0
Windsor	1	2.4	5,707	2.0
Calgary	1	2.4	4,068	1.4
Waterloo	1	2.4	3,489	1.2
McGill	1	2.4	5,107	1.8
Manitoba	1	2.4	2,794	1.0
FIRST FIFTEEN	33	80.5	263,102	90.3
ALL OTHER UNIVERSITIES	8	19.5	28,275	9.7
TOTAL	41	100.0	291,377	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - POLITICAL SCIENCE

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES.	Number of Grants	Percent of Total	\$ Value	Percent of Total	
Carleton	5	12.8	58,081	10.2	
Toronto	4	10.3	14,170	4.0	
York	3	7.7	32,749	9.3	
Laval	2	5.1	78,514	22.2	
McGill	2	5.1	21,860	6.2	
FIRST FIVE	-	16	41.0	185,354	52.4
British Columbia	2	5.1	20,088	5.7	
Calgary	2	5.1	5,982	1.7	
Waterloo	1	2.6	5,655	1.6	
Guelph	1	2.6	3,925	1.1	
Ottawa	1	2.6	15,620	4.4	
FIRST TEN	-	23	59.0	236,624	66.9
Queen's	1	2.6	5,316	1.5	
Windsor	1	2.6	52,658	14.9	
Québec à Montréal	1	2.6	4,850	1.4	
McMaster	1	2.6	3,429	1.0	
Montreal	1	2.6	9,676	2.7	
FIRST FIFTEEN	-	28	71.8	312,553	88.3
ALL OTHER UNIVERSITIES	-	11	28.2	41,246	11.7
TOTAL	-	39	100.0	353,799	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - ARCHEOLOGY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	5	14.7	39,269	11.6
Alberta	2	5.9	23,918	7.1
British Columbia	2	5.9	18,460	5.5
Calgary	2	5.9	37,895	11.2
Laval	2	5.9	12,576	3.7
FIRST FIVE	13	38.2	132,118	39.1
Simon Fraser	1	2.9	20,688	6.1
Memorial	1	2.9	6,572	1.9
Other Post-secondary	1	2.9	12,911	3.8
Carleton	1	2.9	10,291	3.0
Trent	1	2.9	14,668	4.3
FIRST TEN	18	52.9	197,248	58.4
Waterloo	1	2.9	14,569	4.3
Western	1	2.9	6,601	2.0
Ottawa	1	2.9	1,746	0.5
Saskatchewan	1	2.9	7,285	2.2
Montreal	1	2.9	4,540	1.3
FIRST FIFTEEN	23	67.6	231,989	68.7
ALL OTHER UNIVERSITIES	11	32.4	105,927	31.3
TOTAL	34	100.0	337,916	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - SOCIOLOGY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	5	15.6	87,342	22.9
York	3	9.4	25,492	6.7
McMaster	3	9.4	79,331	20.8
Waterloo	3	9.4	32,537	8.5
Montreal	2	6.3	17,297	4.5
FIRST FIVE	16	50.0	241,999	63.3
Western Ontario	2	6.3	11,801	3.1
Nova Scotia Technical	2	6.3	42,707	11.2
Carleton	1	3.1	7,042	1.8
British Columbia	1	3.1	16,935	4.4
Alberta	1	3.1	9,188	2.4
FIRST TEN	23	71.9	329,672	86.3
Ottawa	1	3.1	7,506	2.0
Concordia	1	3.1	4,279	1.1
McGill	1	3.1	3,310	0.9
Calgary	1	3.1	2,900	0.8
Victoria (B.C.)	1	3.1	1,901	0.5
FIRST FIFTEEN	28	87.5	349,568	91.5
ALL OTHER UNIVERSITIES	4	12.5	32,466	8.5
TOTAL	32	100.0	382,034	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

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Table 8.8

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - ANTHROPOLOGY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
British Columbia	5	16.1	36,748	13.1
Laval	4	12.9	84,189	30.1
Toronto	2	6.5	27,699	9.9
Montreal	2	6.5	19,608	7.0
Calgary	2	6.5	7,614	2.7
FIRST FIVE	15	48.4	175,858	62.9
Western	1	3.2	6,476	2.3
Memorial	1	3.2	10,840	3.9
McMaster	1	3.2	8,004	2.9
Carleton	1	3.2	5,095	1.8
Alberta	1	3.2	7,345	2.6
FIRST TEN	20	64.5	213,618	76.4
Waterloo	1	3.2	1,981	0.7
York	1	3.2	7,898	2.8
Manitoba	1	3.2	3,158	1.1
Dalhousie	1	3.2	3,375	1.2
McGill	1	3.2	2,842	1.0
FIRST FIFTEEN	25	80.6	232,872	83.3
ALL OTHER UNIVERSITIES	6	19.4	46,853	16.7
TOTAL	31	100.0	279,725	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - LINGUISTICS

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Laval	4	13.8	105,332	24.3
Montreal	3	10.3	131,060	30.3
Ottawa	2	6.9	14,392	3.3
Memorial	2	6.9	22,199	5.1
New Brunswick	2	6.9	4,779	1.1
FIRST FIVE	13	44.8	277,762	64.1
Toronto	2	6.9	14,737	3.4
British Columbia	1	3.4	5,503	1.3
U.Q. Chicoutimi	1	3.4	33,265	7.7
Alberta	1	3.4	5,630	1.3
Simon Fraser	1	3.4	4,285	1.0
FIRST TEN	19	65.5	341,182	78.8
ALL OTHER UNIVERSITIES	10	34.5	91,972	21.2
TOTAL	29	100.0	433,154	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

Table 8.10

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CONCENTRATION OF RECIPIENTS - CANADA COUNCIL RESEARCH GRANTS  
 GROUPED BY FIELD OF STUDY - FRENCH LANGUAGE AND LITERATURE

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total	
Toronto	5	18.5	14,909	15.0	
Carleton	3	11.1	5,068	5.1	
Ottawa	2	7.4	4,168	4.2	
Laval	2	7.4	9,220	9.3	
McGill	2	7.4	3,761	3.8	
FIRST FIVE	-	14	51.9	37,126	37.3
Waterloo	1	3.7	5,853	5.9	
British Columbia	1	3.7	2,758	2.8	
Western	1	3.7	3,057	3.1	
Victoria (B.C.)	1	3.7	3,704	3.7	
Dalhousie	1	3.7	3,792	3.8	
FIRST TEN	-	19	70.4	56,280	56.5
Montreal	1	3.7	4,412	4.4	
McMaster	1	3.7	9,716	9.8	
Sherbrooke	1	3.7	6,723	6.8	
Manitoba	1	3.7	12,304	12.4	
New Brunswick	1	3.7	661	0.7	
FIRST FIFTEEN	-	24	88.9	90,096	90.5
ALL OTHER UNIVERSITIES	-	3	11.1	9,476	9.5
TOTAL	-	27	100.0	99,572	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - GEOGRAPHY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Western	2	7.7	13,301	8.3
Waterloo	2	7.7	11,740	7.3
Simon Fraser	2	7.7	18,385	11.4
McMaster	2	7.7	11,599	7.2
Victoria (B.C.)	2	7.7	6,212	3.9
FIRST FIVE	10	38.5	61,237	38.1
McGill	1	3.8	4,848	3.0
Manitoba	1	3.8	3,129	1.9
Toronto	1	3.8	4,946	3.1
British Columbia	1	3.8	12,169	7.6
York	1	3.8	3,416	2.1
FIRST TEN	15	57.7	89,745	55.8
Guelph	1	3.8	2,498	1.6
Queen's	1	3.8	3,022	1.9
Carleton	1	3.8	6,598	4.1
Memorial	1	3.8	4,184	2.6
Calgary	1	3.8	6,393	4.0
FIRST FIFTEEN	20	76.9	112,440	69.9
ALL OTHER UNIVERSITIES	6	23.1	48,415	30.1
TOTAL	26	100.0	160,855	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS



CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - PHILOSOPHY

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	4	20.0	11,257	13.7
McGill	2	10.0	13,091	15.9
Montreal	2	10.0	11,120	13.5
Waterloo	1	5.0	3,805	4.6
Western	1	5.0	5,638	6.8
FIRST FIVE	10	50.0	44,911	54.5
Laval	1	5.0	1,057	1.3
Ottawa	1	5.0	2,343	2.8
Victoria (B.C.)	1	5.0	8,384	10.2
Guelph	1	5.0	3,059	3.7
McMaster	1	5.0	418	0.5
FIRST TEN	15	75.0	60,172	73.0
ALL OTHER UNIVERSITIES	5	25.0	22,229	27.0
TOTAL	20	100.0	82,401	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - EDUCATION

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Toronto	2	13.3	16,289	11.4
Alberta	2	13.3	14,739	10.3
Memorial	1	6.7	21,883	15.3
I.N.R.S.*	1	6.7	17,164	12.0
U.Q. Montréal	1	6.7	14,432	10.1
FIRST FIVE	7	46.7	84,507	59.1
ALL OTHER UNIVERSITIES	8	53.3	58,374	40.9
TOTAL	15	100.0	142,881	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

\*I.N.R.S. - Institut national de la recherche scientifique

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - FINE ARTS

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
Queen's	2	14.3	5,063	9.2
Toronto	2	14.3	6,493	11.8
Independent	2	14.3	3,582	6.5
British Columbia	1	7.1	3,549	6.5
Laval	1	7.1	3,236	5.9
FIRST FIVE	8	57.1	21,923	40.0
Carleton	1	7.1	1,792	3.3
U.Q. Montréal	1	7.1	10,308	18.8
McGill	1	7.1	2,525	4.6
York	1	7.1	3,459	6.3
McMaster	1	7.1	1,468	2.7
FIRST TEN	13	92.9	41,475	75.6
ALL OTHER UNIVERSITIES	1	7.1	13,399	24.4
TOTAL	14	100.0	54,874	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
 GROUPED BY FIELD OF STUDY - ADMINISTRATIVE STUDIES

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES	Number of Grants	Percent of Total	\$ Value	Percent of Total
York	2	18.2	9,806	11.0
British Columbia	1	9.1	11,608	13.0
Waterloo	1	9.1	12,476	13.9
Toronto	1	9.1	3,893	4.3
Ottawa	1	9.1	15,000	16.8
FIRST FIVE	6	54.5	52,783	59.0
ALL OTHER UNIVERSITIES	5	45.5	36,726	41.0
TOTAL	11	100.0	89,509	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
GROUPED BY FIELD OF STUDY - LAW

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES		Number of Grants	Percent of Total	\$ Value	Percent of Total
Laval		2	18.2	20,493	30.7
York		2	18.2	11,136	16.7
Toronto		2	18.2	3,821	5.7
British Columbia		1	9.1	7,460	11.2
Montreal		1	9.1	11,398	17.1
FIRST FIVE	-	8	72.7	54,308	81.4
ALL OTHER UNIVERSITIES	-	3	27.3	12,421	18.6
TOTAL	-	11	100.0	66,729	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS

CONCENTRATION OF RECIPIENTS OF CANADA COUNCIL RESEARCH GRANTS  
 GROUPED BY FIELD OF STUDY - RELIGIOUS STUDIES

1972/73 - 1976/77 ANNUAL AVERAGES

UNIVERSITIES		Number of Grants	Percent of Total	\$ Value	Percent of Total
Carleton		1	12.5	4,740	14.9
Toronto		1	12.5	6,762	21.3
British Columbia		1	12.5	2,461	7.7
Independent		1	12.5	1,559	4.9
Concordia		1	12.5	1,247	3.9
FIRST FIVE	-	5	62.5	16,769	52.8
ALL OTHER UNIVERSITIES	-	3	37.5	15,017	47.2
TOTAL	-	8	100.0	31,786	100.0

SOURCE: CANADA COUNCIL ANNUAL REPORTS



APPENDIX I

University Research Institutes

C. Lafrance

August 1978



## PART I

### University Research Institutes<sup>1</sup>

A study of existing research institutes at Canadian universities reveals some important findings concerning technology transfer and the kinds of research being carried out.

In 1973 there were 202 research centres at Canadian universities shown in the "Index of Canadian research Institutes, 1973, MOSST". This index was updated and by 1976 there were 234 research centres, or a net increase of 32. This updated list is attached as Part II of the Appendix.

Table 1 shows the number of research institutes by region. Of particular interest is the percentage distribution of research institutes. Quebec has the highest percentage or 44.1 per cent, followed by Ontario with 26 per cent, the West 19 per cent and the Atlantic with 11.0 per cent.

Table 2 shows the number of Research Centres by purpose. Definitions of purpose are shown in Part III of the Appendix.

There are only two centres concerned with energy. Eleven centres has as a designated purpose, manufacturing and industry, while fourteen centres are concerned with foreign studies. There are thirty-eight centres concerned with medicine, hygiene and nutrition but only six centres have as their purpose agriculture. Nine centres are concerned with Northern development.

Table 3 depicts the number of research centres by region and purpose. This table shows that research centres in the Western provinces are most concerned with Northern development, followed by agriculture, water, natural resources, medicine and space. In Ontario the highest concentration is on medicine, followed by foreign studies, space, transportation and telecommunications. Quebec institutes have their highest concentration on health, followed by education and foreign studies. The Atlantic region, with the smallest number of institutes, has the highest concentration on community service followed by health and foreign studies.

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<sup>1</sup>The review was undertaken as part of the study concerning University-Industry Technology Transfer mechanisms with some findings shown in the Background Paper for IRIC Program.

AUCC was able to provide Annual Reports for only twenty-nine of the two hundred and thirty-four institutes. The reports were analyzed for an indication of size and only fifteen reports of the twenty-nine were useful. A list of these reports is contained in Part IV, attached. It should be noted here that the Annual Reports, in general, did not indicate the size of the budget.

TABLE 1

RESEARCH CENTRES ASSOCIATED WITH CANADIAN UNIVERSITIES

<u>PURPOSE</u>	<u>ACTIVITY</u>	<u>WESTERN</u>	<u>ONTARIO</u>	<u>QUEBEC</u>	<u>ATLANTIC</u>	<u>TOTAL</u>
Economic Development	Economic	-	2	2	-	4
Urban Development	Urban	-	2	2	1	5
Northern Development	Northern	5	-	4	-	9
Developing Countries	Developing	-	-	1	-	1
Foreign Studies	Foreign	1	4	6	3	14
International Relations	International	1	2	-	-	3
Public Admin.	Public	-	2	1	1	4
Industrial Relations & Mgt.	Management	1	2	2	-	5
Language & Communication	Language	-	2	3	1	6
Education	Education	1	3	7	1	12
Behaviour & Mental Retardation	Behaviour	2	1	2	-	5
Community Service	Community	2	-	1	5	8
Cdn. Ethnic & Regional Studies	Regional	1	1	1	2	5
Culture, Sport & Recreation	Culture	-	1	5	-	6
Law	Law	2	1	5	-	8
Historical Studies	History	1	3	2	-	6
Administrative or Organizational Service	Organization	-	3	-	2	5
Agriculture	Agriculture	4	-	2	-	6
Forestry	Forestry	1	-	3	1	5
Oceanographic and Marine Fisheries	Ocean	1	-	4	2	7
Water Resources and Inland Fisheries	Water	3	-	4	-	7
Energy	Energy	1	-	1	-	2
Mineral Location and Extraction	Mineral	1	2	2	-	5
Other unspecified Natural Resources	Natural	3	1	-	-	4
Mfg. and Other Industry	Industry	1	7	2	1	11
Transportation and Telecommunications	Transtel	2	6	3	-	11
Environmental Studies and Pollution	Environment	2	3	5	1	11
Medicine, Hygiene & Nutrition	Medicine	3	7	24	4	38
Computing and Other Services	Computing	-	3	2	-	5
Space	Space	3	4	-	-	7
Other	Other	6	7	14	3	30
TOTAL		48	69	110	28	255

NOTE: There are about 255 centres, some centres may be counted more than once, due to the multiplicity of functions performed.

SOURCE: Statistics Canada, Universities and Colleges of Canada, Cat. No. 81-230, Annual, 1976 and Department of Industry, Trade and Commerce, Office of Science and Technology Annual Reports

TABLE 2

NO. OF RESEARCH CENTRES ASSOCIATED WITH  
CANADIAN UNIVERSITIES BY MAJOR RESEARCH ACTIVITY

Agriculture	6	Environment	11	Ocean	7
Forestry	5	Northern	9	Water	7
Industry	11	Energy	2	Space	7
Mineral	5	Natural	4		
Community	8	Management	5	Foreign	14
Urban	5	Organization	5	Culture	6
Regional	5	Economic	4	Development	1
International	3	Public	4	History	6
Transtel	11	Law	8		
Language	6	Education	12		
Computing	5	Medicine	38		
Other	30	Behaviour	5		

NOTE: Some centres may be counted more than once

SOURCE: Statistics Canada, Universities and Colleges of Canada, Cat. No. 81-230, Annual, 1976 and Department of Industry, Trade and Commerce, Office of Science and Technology, Annual Reports

TABLE

RESEARCH CENTRES ASSOCIATED WITH  
CANADIAN UNIVERSITIES BY REGION (1976)

<u>REGION</u>	<u>NO.</u>	<u>%</u>
Western	48	18.8
Ontario	69	27.1
Quebec	110	43.1
Atlantic	<u>28</u>	<u>11.0</u>
Canada	255	100.0

SOURCE: Statistics Canada, Universities and Colleges of Canada, Cat. No. 81-230, Annual, 1976, and Department of Industry, Trade and Commerce, Office of Science and Technology, Annual Reports

Note: Some centres may be counted more than once.

PART II

RESEARCH INSTITUTES BY PROVINCE AND UNIVERSITY

BRITISH COLUMBIA

University of British Columbia

Research Institute

Purpose

Institute of Animal Resource Ecology

Natural

Institute of Applied Mathematics and Statistics

Other

Institute of Asian and Slavonic Research

Foreign

Arctic and Alpine Research

Northern  
Environment

Institute of Astronomy and Space Science

Space

Institute of Industrial Relations

Management

Institute of International Relations

International

Institute of Oceanography

Ocean

Simon Fraser University

Pestology Centre

Agriculture  
Forestry

ALBERTA

University of Alberta

Research Institute

Purpose

The Boreal Institute for Northern Studies

Northern

Cancer Research Unit

Medicine

Institute of Law Research and Reform

Law

Centre for the Study of Mental Retardation

Behaviour

Nuclear Research Centre

Other

ALBERTA (Cont'd)

Surgical-Medical Research Institute	Medicine
Institute of Theoretical Physics	Other
Centre for Advanced Study in Theoretical Psychology	Behaviour

University of Calgary

Environmental Sciences Centre	Environment
Petroleum Recovery Research Institute	Mineral Energy
Institute of Transportation Studies	Transtell
Research Centre for Canadian Ethnic Studies	Community

SASKATCHEWAN

University of Saskatchewan

<u>Research Institute</u>	<u>Purpose</u>
Institute for Child Guidance	Education
Institute for Northern Studies	Northern
Institute for Space and Atmospheric Studies	Space
Matador Project	Other
Space Engineering Division	Space
Institute of Pedology	Agriculture

University of Regina

Canadian Plains Area Centre	Regional
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MANITOBA

University of Manitoba

<u>Research Institute</u>	<u>Purpose</u>
Agassiz Centre for Water Studies	Water
* Office of Industrial Research	Industry

MANITOBA (Cont'd)

Aquatic Biology Research Unit	Water
Canada Department of Agriculture Research Station	Agriculture
Centre for Settlement Studies	Northern
Centre for Transportation Studies	Transport
Delta Waterfowl Research Station	Natural
Glenlea Research Station	Agriculture
Legal Research Institute	Law
Limnological Station	Water
Manitoba Institute of Cell Biology	Medicine
Medieval and Renaissance Guild	History
Natural Resource Institute	Natural
Northern Studies Committee	Northern
University Field Station (Delta Marsh)	Other
University Field Station (Star Lake)	Other

University of Winnipeg

Institute of Urban Studies	Community
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ONTARIO

University of Guelph

<u>Research Institute</u>	<u>Purpose</u>
Centre for Educational Disabilities	Education
Centre for International Programs	International
Centre for Resources Development	Natural
Institute of Computing Science	Computing



ONTARIO (Cont'd)

Laurentian University of Sudbury

The Institute of Astronomy . . . . . Space

McMaster University

\* Centre for Applied Research & Engineering Design . . . . . Industry

Institute for Materials Research . . . . . Other

Communications Research Lab. . . . . Transtel  
Shell Canada Centre . . . . . Education

\* Canadian Institute of Metal Working . . . . . Industry

Queen's University

Centre for French Area Studies . . . . . Regional

Institute of Commonwealth & Comparative Studies . . . . . Foreign

Institute of Local Government . . . . . Public

Institute for Economic Research . . . . . Economic

Institute of Intergovernmental Relations . . . . . International  
Public

The Industrial Relations Centre . . . . . Management

Canadian Institute of Guided Ground Transportation . . . . . Transtel

Centre for Metal and Mineral Technology . . . . . Mineral  
Industry

The Centre for Resource Studies . . . . . Industry

Carbohydrate Research Institute . . . . . Mineral  
Industry

Saint Paul University

Research Centre . . . . . Organization

Canadian Research Centre for Anthropology . . . . . Other

Research Centre in Religious History of Canada . . . . . History

University of Toronto

The Banting and Best Department of Medical Research . . . . . Medicine

Centre for Culture and Technology . . . . . Language

\*Systems Building Centre . . . . . Transtel

\*Biomedical Instrumentation Development Unit . . . . . Medicine

ONTARIO (Cont'd)

Centre for Industrial Relations	Management
Centre for Linguistic Studies	Language
Centre for Medieval Studies	History
Centre for Russian and East European Studies	Foreign
Centre for the Study of the Drama	Culture
Centre for Urban and Community Studies	Urban
Centre of Criminology	Law
Centre for Religious Studies	Other
Connaught Medical Research Laboratories	Medicine
David Dunlap Observatory	Space
Institute for Aerospace Studies	Space Transtel
Institute for Environmental Studies	Environment
Institute for the History and Philosophy of Science and Technology	Other History
Institute for Policy Analysis	Economic
Institute of Applied Statistics	Other Computing
The Ontario Institute for Studies in Education	Education
Institute of Bio Medical Electronics	Medicine
Institute of Environmental Science & Engineering	Environment
Institute of Immunology	Medicine
Institute of Medical Science	Medicine
International Studies Program	Foreign

University of Waterloo

* The University of Waterloo Research Institute	Organization Industry
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ONTARIO (Cont'd)

The Office of Human Research	Organization
<u>The University of Western Ontario</u>	
Cancer Research Laboratory	Medicine
Centre for Radio Science	Other
Inter-American Studies Group	Foreign
Inter-University Consortium for Political Research	Other
Urban and Regional Development Studies	Urban
*Systems Analysis, Control & Design Activity	Transtel
<u>University of Windsor</u>	
* The Industrial Research Institute	Industry
<u>York University</u>	
Centre for Research in Experimental Space Science	Space
Centre for Research on Environmental Quality	Environment
Institute for Behavioural Research	Behaviour
Transport Centre	Transtel
York/Ryerson Computing Centre	Computing

QUEBEC

Université Laval

<u>Research Institute</u>	<u>Purpose</u>
Centre de recherches en aménagement et en développement	Other
Centre de recherches en bionique	Medicine
Centre de recherches en nutrition	Medicine
Centre de recherches en sociologie religieuse	Other
Centre de recherches sur l'eau	Water
Centre de recherches de l'état solide	

QUEBEC Cont'd)

Centre de recherches sur les atomes et les molécules	Other
Centre d'études nordiques	Northern
Centre international de recherches sur les bilinguisme	Language
Institut supérieur des sciences humaines	Other

McGill University

Allan Memorial Institute of Psychiatry	Behaviour
Anaesthesia Research Department	Medicine
Anthropology of Development Program	Economics
McGill Sub-Artic Research Lab.	Environment
Aviation Medical Research Unit	Medicine Transtel
Bellairs Research Institute	Other
Biomedical Engineering Unit	Medicine
Brace Research Institute	Other
Centre for Developing Area Studies	Northern Developing
Centre for Continuing Medical Education	Education
Centre for East Asian Studies	Foreign
Centre for Learning and Development	Education
Computing Centre	Computing
Dairy Herd Analysis Service	Agriculture
Foster Radiation Laboratory	Other
French Canada Studies Program	Regional
Gastrointestinal Research Institute	Medicine
Gault Estate (Mount St Hilaire)	Other

QUEBEC (Cont'd)

Industrial Relations Centre	Management
Institute for Mineral Industry Research	Mineral
Institute of Air and Space Law	Law
Institute of Comparative Law	Law
Institute of Islamic Studies	Foreign History
Institute of Parasitology	Medicine
Management Institute	Management
Marine Sciences Centre	Ocean
McGill Cancer Research Unit	Medicine
McGill Magnet Laboratory	Computing
McGill Centre for Northern Studies & Research	Northern
McGill Montreal Children Hospital Learning Centre	Medicine Education
McGill University Project for Deaf Children	Medicine Education
Montreal Neurological Hospital and Institute	Medicine
Morgan Arboretum	Forestry
Phonetics Research Laboratory	Language
Pulp and Paper Research Institute of Canada	Industry Forestry
School of Human Communication Disorders	Language
Shastri Indo-Canadian Institute	Foreign
Social Sciences Statistics Laboratory	Other
Soil Mechanics Research Laboratory	Environment

Université de Montréal

Centre de recherche en développement économique	Economics
Centre de recherche en droit public	Law

QUEBEC (Cont'd)

Centre de recherche en reproduction animale	Agriculture
Centre de recherche en sciences neurologiques	Medicine
Centre de recherches sur la croissance humaine	Medicine
Centre de recherche sur les transports	Transtel
Centre de recherches caraibes	Foreign
Centre de recherches écologiques de Montréal (participation avec l'U. du Québec)	Urban
Centre de recherches et d'innovations urbaines	Culture
Centre de recherches mathématiques	Other
Centre de sondage	Mineral
Centre international de criminologie comparée	Law
Centre d'études et de documentation européennes (CEDE)	Foreign
Centre de recherches sur l'eau	Water
Groupe de recherche en toxicologie médicamenteuse (GRTM)	Medicine
Groupe de recherche en traduction automatique (TAUM)	Other
Groupe de recherche sur l'indaptation juvénile (GRID)	Other
Groupe interuniversitaire de recherche en anthropologie médicale et en éthopsychiatrie (GIRAME)	Medicine
Groupe interuniversitaire de recherches océanographi- ques du Québec (GIROQ)	Ocean
Service de documentation juridique datum (SEDOJ)	Law

Université du Québec

Institut Armand-Frappier

Centre de recherche en bactériologie	Medicine
Centre de recherche en épidémiologie	Medicine

QUEBEC Cont'd)

Centre de recherche en immunologie	Medicine
Centre de recherche en médecine vétérinaire	Medicine
Centre de recherche en virologie	Medicine

Institut Nationale de la Recherche Scientifique

INRS eau (Ste-Foy)	Water
INRS énergie (Varences)	Energy
INRS urbanization (Montréal)	Urban
INRS santé (l'hôpital St-Jean-de-Dieu, Montréal)	Medicine
INRS télécommunications (created jointly with Bell Northern Research)	Transtel
INRS éducation (Québec)	Education
INRS océanologie (Rimouski)	Ocean
INRS pétrole (Québec)	Industry
Centre documentaire en civilisation traditionnelle	Culture
Groupe de recherche biophysique (Trois-Rivières)	Medicine
Groupe de recherche sur la démoustication (Trois-Rivières)	Environment
Groupe de recherche en fonctionnement de la personne (Trois-Rivières)	Behaviour
Groupe de recherche pates et papiers (Trois-Rivières)	Forestry
Groupe de recherche thermopol (Trois-Rivières)	Other
Centre de développement en environnement scolaire (Trois-Rivières)	Education
Centre de documentation en théâtre et littérature québécois	Culture
Centre d'études universitaires de Rimouski	Ocean
Ecole nationale d'administration publique	Public

QUEBEC (Cont'd)

Centre de recherche du moyen-nord (Chicoutimi)	Northern
Centre de recherche en didactique (Montréal)	Education
* Centre de recherche en sciences appliquées à l'alimentation (Montréal)	Medicine
Centre de recherche en sciences de l'environnement de Montréal	Environment
Centre interuniversitaire d'études européennes (Montréal)	Foreign
Centre de recherche des sciences de la santé (Trois-Rivières)	Medicine
Centre d'études en loisirs (Trois-Rivières)	Culture
Consortium de recherche sur l'eau	Water

Université de Sherbrooke

Le Centre d'étude des littératures d'expression française	Culture
Le Centre d'études de la Renaissance	History
Le Centre de recherches en aménagement régionale	Community
*Centre de technologie de l'environnement	Environment

NEW BRUNSWICK

Université de Moncton

<u>Research Institute</u>	<u>Purpose</u>
Conseil de recherches	Organization

University of New Brunswick

The Bio-Engineering Institute	Medicine
Fire Science Centre	Forestry



NOVA SCOTIA

Acadia University

Research Institute

Acadia University Institute

Purpose

Community

Dalhousie University

The Trace Analysis Research Centre

Other

The Clinical Research Centre

Medicine

The Institute of Public Affairs

Regional  
Urban

The Atlantic Research Centre for Mental Retardation

Medicine

The Institute of Environmental Studies

Environment

The Government Studies Program

Public

The Institute of Oceanography

Ocean

The Centre for African Studies

Foreign

The Centre for International Business Studies

Foreign

The Centre for Foreign Policy Studies

Foreign

College of Cape Breton

Human Technical Institute

Community

The Beaton Institute of Cape Breton Studies

Community

Bras d'Or Institute

Community

University of King's College

Institute of Pastoral Training

Other

Nova Scotia Technical College

\* The Atlantic Industrial Research Institute

Industry

Atlantic Institute of Education (Halifax)

AIE

Education

NEWFOUNDLAND

Memorial University of Newfoundland

Research Institute

Purpose

The Institute of Social & Economic Research

Organization

The Institute of Research in Human Abilities

Other

The Marine Sciences Research Laboratory

Ocean

The Folklore and Language Archive

Language  
Regional

Centre for Community Development

Community

Research Unit on Vector Pathology

Medicine

\* Industrial Research Institutes  
(Program of Industry, Trade & Commerce)

PART III

Boreal Institute for Northern Studies - Annual Report 75-76  
Staff - Director, 9 full-time employees and several part-time employees and varying numbers of Research Associates and Assistants.

Institute of Law Research and Reform - Annual Report 76-77  
Staff - Director, 6 Lawyers and other Office Staff.

Bio-Engineering Institute - Progress Report - July 76  
3 full-time Professionals, 4 Professionals principally in the Institute, 4 Professionals principally in University, 7 part-time Professionals, 4 technical and clerical, 1 graduate student, 1 undergraduate.

Institute of Oceanography - Annual Report 1976  
Staff of 25, 26 courses offered, 303 students.

Institute for Northern Studies - Annual Report 1972  
only changes to staff shown.

Center for Settlement Studies - Annual Report 1972  
9 academic staff members together with graduate students and assistants were actively involved in research. Fifteen other staff members finalized reports on research previously funded.

Institute for Aerospace Studies - Annual Report 1972  
Staff of Director, 2 Assistant Directors, 4 Professors, 6 associate professors, 3 assistant professors, 1 research associate, 7 lecturers, 3 post-doctoral fellows, 12 professional engineering officers, 2 consultants, 1 librarian, 76 research assistants, 66 students.

Centre for Learning and Development - McGill - Annual Report 75-76  
Staff of 7 professionals, 2 research assistants, 1 librarian 4 project assistants and 4 others. There were eight students. Students pursue coursework in home departments but engage in active apprenticeship at the centre which includes research seminar presentations, evaluating, consulting, etc.

Brace Research Institute - McGill - Annual Report 1977  
Full-time staff of 5 plus 3 part-time. Does not give courses for credits. The major activity regarding students is the supervision of student projects in the Faculties of Engineering and Agriculture. The institute does, however, offer training services.

Bellairs Research Institute - McGill University - Report of the Council 1974.

This institute had over 50 students working during the year, was visited by 26 investigators from other institutes. Faculty members and students keep research activity at a high level.

Institute for Material Research - Annual Report - July 1977  
Staff of 41 professionals (8 on Sabbatical Leave) (1 part-time) 3 professors part-time from Industry, 13 other staff, several graduate and post-doctoral fellows.

The McGill University - Montreal Children's Hospital Research Institute - Annual Report 1970  
Staff of 58 which includes director, unit directors research scientists, research assistants and professional assistants, 40 students, fellows, graduates, and post-doctorals, 3 summer students, 24 technicians and 19 other personnel.

Marine Sciences Centre - McGill - Annual Report 1976  
Staff of 18 professionals, 5 other, 36 students.

French Canadian Studies Programme - McGill - Annual Report 65-66  
Staff consisted of a director, 8 senior research fellows, 2 senior fellows, 1 senior research assistant, 5 special lecturers 1 visiting lecturer, and 28 students served as research assistants of a part-time basis.

The Center for Advanced Study in Theoretical Psychology - Annual Report 1970  
Plans for more involvement of graduate students.

PART IV

DEFINITIONS

Human and Natural Sciences

Human science, as differentiated from natural science, deals with human actions and conditions as well as the social, economic and institutional mechanisms affecting them. Natural science, on the other hand, deals with the physical world; and with humans only insofar as they are part of it. The division between human natural sciences is largely artificial and it is recommended that users consult entries under both when trying to obtain a complete listing and restrict themselves to one only when it is desirable to keep the list of selected institutes short.

HUMAN SCIENCES

Economic Development

CODEWORD : Economic

Institutes in this category concern themselves with the spectrum of research in economics, from economic and social policy to studies of market behaviour.

Urban Development

CODEWORD : Urban

Institutes in this category study cities and their development in general.

Northern Development

CODEWORD : Northern (H)

Institutes in this category study the sociological factors involved in northern development and particularly those affecting the development of communities in the north. Northern Development is also listed under natural sciences.

Developing Countries

CODEWORD : Developing

This category includes institutes which study the effect of development on the social and economic structure of developing countries and related problems. Some of these institutes also carry out research on developing technology suited to developing countries. See also Others under Natural Sciences.

Foreign Studies

CODEWORD : Foreign

This category includes the study of some geographical areas of the world, their economy, social structure and related problems. History is also studied, but only secondarily, the prime effort being towards the study of the current situation. In addition to geographical areas, the limits of the study are or can be expressed in terms of religion or ethnic origin.

International Relations

CODEWORD : International

Institutes in this category are concerned with research and study in such areas as the relations between states, their organizations and laws, and the social, political and cultural conditions affecting those relations, organizations and laws.

Public Administration

CODEWORD : Public

Institutes in this category study the administration of government at all levels and the socio-economic factors which affect such administration.

Industrial Relations and Management

CODEWORD : Management

Institutes in this category study the techniques and developments in the management of industries and in particular in relations between management and labour.

Language and Communication

CODEWORD : Language

Institutes in this category study the sociological, psychological and linguistic aspects of communication between people. In this category are such things as language preservation institutes, information centres and centres for the study of linguistics.

Education . . . CODEWORD : Education

Institutes in this category study education as a discipline and the use of education in human development often with particular reference to learning disabilities.

Behaviour and Mental Retardation . . . CODEWORD : Behaviour

Institutes in this category are concerned with the study of psychology, psychiatry and mental retardation as well as behaviour in general. See also Medicine, Hygiene and Nutrition.

Community Service . . . CODEWORD : Community

Institutes in this category focus resources of the university or other interested parties toward a solution of community problems in any field of endeavour.

Canadian Ethnic and Regional Studies . . . CODEWORD : Regional

Institutes in this category specialize in multi-disciplinary studies related to either geographical regions in Canada or Ethnic groups. There is some overlap between Foreign Studies and this category, particularly with Ethnic Studies.

Law . . . CODEWORD : Law

Institutes in this category study various aspects of law and law reform.

Historical Studies . . . CODEWORD : History

This category includes those institutes which concern themselves primarily with the study of history. The majority of institutions fall into one of two types: those concerned with studies of historical periods and those concerned with studies of the development of particular topics or geographical areas. See also Canadian Ethnic and Regional Studies, Foreign Studies and International Relations.

Administrative or Organizational Service      CODEWORD : Organization (H)

The purpose of institutes in this category is to coordinate and encourage research at the university. Often they provide a channel through which funds from R&D clients are forwarded.

Other      CODEWORD : Other (H)

Institutes are classed as Other either because their description was too general to identify a specialization or because they did not fit in any of the above categories and it was not worth while to create additional categories.

#### NATURAL SCIENCES

Agriculture      CODEWORD : Agriculture

In this category are institutes which are concerned with the growing of food crops and the husbandry of domesticated food animals.

Forestry      CODEWORD : Forestry

Institutes in this category are concerned with the development of forestry and related industries through such things as pest control and forestry products development.

Oceanography and marine Fisheries      CODEWORD : Ocean

Institutes in this category are primarily concerned with research relating to understanding the ocean and improving Canadian fisheries.

Water Resources and Inland Fisheries      CODEWORD : Water

In this category are institutes which study aspects of water resources including water quality, limnology and fisheries.



Energy

CODEWORD : Energy

Institutes in this category concern themselves with the development of new forms of energy or with improvements in the location and utilization of existing forms.

Mineral Location and Extraction

CODEWORD : Mineral

Institutes in this category study all aspects of the mining environment as well as mineral location and extraction techniques.

Other or Unspecified Natural Resources CODEWORD : Natural

Institutes in this category either study natural resources not covered in the above categories, such as wildlife, or do not identify the specific resource areas studied.

Manufacturing and other Industry

CODEWORD : Industry

Institutes in this category undertake research of specific interest to industry. They usually either are set up in conjunction with industry or accept contracts from industry.

Transportation and Telecommunications CODEWORD : Transtel

Institutes in this category study problems associated with transportation or telecommunications. While the primary thrust of most of the institutes listed is in the natural sciences, some also consider factors relevant to such topics as geography and economics.

Environmental Studies and Pollution

CODEWORD : Environment

Institutes in this category study various aspects of our environment. Biological studies are the main tool used in these studies, but not the only one. Also included in this category are institutes which specialize in pollution studies. However, many of the institutes listed under Manufacturing

and Other Industry or one of the resource development categories also studying pollution. There are additional institutes concerned with environment listed under Northern Development.

Northern Development

CODEWORD : Northern (N)

Institutes in this category study the North and its development. The primary interest of most institutes is in studies of the northern environment.

Medicine, Hygiene and Nutrition

CODEWORD : Medicine

Institutes in this category study topics which range over the whole field of medicine as well as those of hygiene and nutrition. All institutes which study health problems are placed in this category, including those which might be thought to be primarily involved in human science.

Space

CODEWORD : Space

Topics covered by institutes range from astronomy to rocket design.

Computing and Other Services

CODEWORD : Computing

Institutes in this category either run computing and similar services or provide physical facilities for research but do not carry out any.

Administrative and Organizational  
Services

CODEWORD : Organization (N)

Institutes in this category provide a working liason between the university and outside organizations in contract research and development.

Other

CODEWORD : Other (N)

In this category are institutes for which it was inappropriate to create additional categories. The majority of the institutes in this category are conducting oriented basic research of some sort with no apparent immediate practical application.

APPENDIX II

Physicists in Canada

J.M.R. Stone  
August 1978

## PHYSICISTS IN CANADA

We will first deal with two rather special fields: High energy and nuclear physics, and Astronomy and space physics.

NRC had special grants selection committees for these fields. (NSERC may decide to reorganize the physics committee). These fields are characterised by the need for large, expensive equipment and facilities, and often teams of researchers. These characteristics are not unique to these fields; plasma physics is another example.

Nuclear and High Energy Physics

Below is a list of the universities in Canada which are involved in nuclear and high energy physics. The list has been compiled from information contained in NRC's Annual Report for 1976-77 and from the Report of the ad-hoc Advisory Committee on Nuclear Physics Priorities written by Prof. G.M.Volkoff. Some researchers are not attached to any of the universities mentioned in this list, these researchers usually are associated with the "Institute of Particle Physics" and receive funding from the NRC for research projects carried out at facilities outside of Canada (i.e. Stanford Linear Accelerator Laboratory).

The number of small and often out-dated university facilities scattered across the country is surprising. With the increasing costs of research in these areas, NSERC is attempting to concentrate its support in a few centres.

The largest facilities are;

McMaster University - because of its Tandem Accelerator

McGill University - because of its 100 MeV Synchrocyclotron

U. of Saskatchewan - because of the excellent Linear

Accelerator

TRIUMF - one of any two meson facilities in the world.

1) McMaster University

- . Tandem Accelerator Laboratory receives Nuclear Physics Grant from NRC (\$436,000 in 1976-77) - Kueher JA, Dept. of Physics
- . Nuclear Reactor receives Institute Grant from NRC - according to Volkoff report this support may be removed (\$314,000 in 1976-77) - Thode HG, Department of Chemistry Operating since 1939 - small reactor
- . Researchers receiving individual grants from the nuclear physics committee include :

Burke DG	- heavy deformed nuclei
Cameron JA	- hyperfine interactions and nuclear structure
Johns MW	- B & Y ray spectroscopy
Kennett JA	- light nuclei
Prestwill WV	- neutron and proton interactions
Summers-Gill RG	- nuclear spectroscopy
Waddington JC	- X rays from accelerators

These are all from the Dept. of Physics and presumably work on Tandem Accelerator.

- . Other researchers receiving over \$25 thousand from NRC include:
  - Brockhouse BN, Dept. of Physics - Neutron diffraction and spectroscopy
  - Datars WR, Dept. of Physics - Cyclotron resonance in solids
  - Thode HG, Dept. of Chemistry - Radiochemistry

2) McGill University

- . Foster Radiation Laboratory receives Nuclear Physics Grant from NRC (\$435,000 in 1976-77) - Mark S.K. Dent, of Physics - 100 MeV synchrocyclotron presently being upgraded
  - . Researchers receiving High Energy Physics Grants from NRC for projects on facilities outside Canada, often in collaboration with researchers from other universities, coordinated by the Institute for Particle Physics
    - Patel PM, Dept. of Physics
    - Stauss DG, Dept. of Physics
  - . Individual researchers receiving more than \$25 thousand from NRC committees
    - Margolis B., Dept. of Physics - Theoretical Studies
    - Robson JM\*, Dept. of Physics - Ultra Cold neutrons
- \* Received CAP medal in 1978-79.

3) University of Saskatchewan

- . Linear Electron Accelerator Laboratory receives Nuclear Physics Grant from NRC (\$445,000 in 1976-77) Shin, YM - Dept. of Physics 200 MeV excellent machine
- . Plasma Physics group supported through large grant of \$146,300 in 1976-77 - Skarsgard HM - Dept. of Physics



4) TRIUMF

- . Involves universities of Victoria, British Columbia, Simon Fraser and Alberta
- . Funded by universities and through NRC laboratories
- . Also receives funds from intermediate Energy Physics Grants of NRC (\$983,800 in 1976-77)

5) University of Toronto

- . Linear Accelerator receives Nuclear Physics Grant from NRC (\$170,000 in 1976-77) - Armstrong RL, Dept. of Physics.  
Expected to close down in March 1977
- . Van de Graaff facility receives Nuclear Physics Grant from NRC (\$30,000 in 1976-77) - Litherland A.E., Dept. of Physics.  
Modest accelerator compared to McMaster's Tandem Accelerator
- . Slowpoke reactor receives Institute Grant from NRC (\$35,000 in 1976-77) - Jervais R.E., Dept. of Engineering
- . Researchers receiving High Energy Physics Grants for projects on facilities outside Canada, often in collaboration with researchers from other universities in Canada, co-ordinated the Institute for Particle Physics, include :

Yoon TS, Dept. of Physics

Key AW, Dept. of Physics

Luste, AS, Dept. of Physics

Prentice JD, Dept. of Physics

- . Researchers receiving individual grants from NRC's nuclear physics committee include :

Azuma RE, Dept. of Physics - nuclear spectroscopy studies

Drake TE, " - electro disintegration and photofission

King JD, " - nuclear cross-sections of astrophysical interest

Litherland AE, "

McNeill KG, " - photo disintegration

Taylor HW, " - nuclear spectroscopy

6) Queen's University

- . Van de Graaff facility receives Nuclear Physics Grant from NRC (\$192,000 in 1976-77) - Ewan HG, Dept. of Physics.

Modest compared with McMaster's Tandem Accelerator

- . Researcher receiving over \$25 thousand from NRC

Ewan GT\* - Dept. of Physics - Nuclear structure and solid state studies

\* Received grant from nuclear physics committee

7) Université de Montreal

- . Nuclear Physics Laboratory receives Nuclear Physics Grant from NRC (\$584,000 in 1976-77) Depommier P - Dept. of nuclear physics - Van de Graaff machines
- . Intermediate Energy Physics Grant (\$53,000 - 1976-77) awarded to Depommier - rare processes involving pions and muons.

8) Université de Laval

- . Van de Graaff facility receives Nuclear Physics Grant from NRC (\$333,000 in 1976-77) St. Pierre C - Dept. of Physics

9) University of Manitoba

- . Cyclotron facility receives Nuclear Physics Grant from NRC (\$412,000 in 1976-77) McKee JSC - Dept. of Physics only 48 MeV
- . Intermediate Energy Physics Grant awarded to
  - Jovonich JJ - for experiments on TRIUMF
  - Van Oers - interactions of protons with light nuclei
- . Researchers awarded nuclear physics grants include:
  - Barber RC, Dept. of Physics - Mass Spectroscopy
  - Connor RD, Dept. of Physics - ray spectroscopy

10) University of Alberta

- . Nuclear Research Centre Van de Graaff receives Nuclear Physics Grant from NRC (\$364,000 in 1976-77) - Neilson GC Dept. of Physics - much activity now directed to TRIUMF

Notes

- . Slowpoke reactors also operated and supported at:
  - L'Ecole Polytechnique
  - Dalhousie University - Trace Analysis Research Centre
- . Planned facilities include:
  - Saskatchewan - pulse stretcher storage rays - turned down by NRC
  - Toronto - superconductivity electron LINAC - turned down by NRC
  - Quebec - heavy ion facility - provincial decision required

## Astronomy

Below is a list of the major centres of university research activity in Astronomy and Space Sciences. This list has been compiled from information contained in NRC's Annual Report for 1976-77, and from the report of the Associate Committee of NRC on Astronomy entitled "The Future of Ground and Space Based Astronomy in Canada".

1) University of British Columbia

Researchers awarded over \$25 thousand in 1976-77

- . Walker GHA, Dept. of Geophysics and Astronomy - Electronic Instrumentation and sensor development
- . Gush H., Dept. of Physics - Far vacuum u.v. spectroscopy  
I.R. cosmic background radiation

Notes

- . Founding member of the Canadian Corporation for University Space Science Researchers.
- . How well do these departments cooperate?

2) University of Calgary

Researchers awarded over \$25 thousand in 1976-77

Anger CD, Dept. of Physics - Auroral phenomena

Venketesan D, Dept. of Physics - Upper atmosphere physics

Notes

- . Founding member of Canadian Corporation for University Space Science
- . Received Core Grant for Operation of Cosmic ray stations on Sulphur Mountain and at Univ. of Calgary
- . Collaborated on Pioneer Venus project

3) University of Alberta

Researchers awarded over \$25 thousand in 1976-77

Rostoker G, Dept. of Physics - Geomagnetic activity in auroral zone

Notes

- . Institute of Earth and Planetary Physics associated with Dept. of Physics
- . Awarded Negotiated Development Grant

4) University of Saskatchewan

Researchers awarded over \$25 thousand in 1976-77

Llewellyn EJ, Dept. of Physics - Atmospheric photochemistry

Manson AH, Dept. of Physics - Atmospheric studies to 110 km.

Gregory JB, Dept. of Physics - Atmospheric studies below 100 km.

Notes

- . Founding member of Canadian Corporation for University Space Science
- . Negotiated Development Grant awarded to Manson AH.
- . Institute for Space and Atmospheric Studies part of Dept. of Physics, received Coop Grant
- . Collaborated on Pioneer Venus Project

5) University of Western Ontario

Researchers awarded over \$25 thousand in 1976-77

Forsyth PA, Dept. of Physics - Ionospheric irregularities  
(now with NRC)

Notes

- . Centre for Radio Science part of Dept. of Physics, awarded Negotiated Development Grant

- . Founding member of Canadian Coporation for University Space Science

6) University of Toronto

Researchers awarded more than \$25 thousand in 1976-77

French JB, Institute for Aerospace Studies - Space Simulation

List R, Dept. of Physics - Climate and Atmospheric studies

VandenBergh S, Dept. of Astronomy - Galactic and extragalactic investigations

Notes

- . Founding member of Canadian Corporation for University Space Science
- . David Dunlap Observatory attached to Dept. of Astronomy awarded Core Grant
- . Optical telescope at Las Campanas, Chile operated by Dept. of Astronomy awarded Core Grant
- . Negotiated Development Grant awarded to R. List
- . Institute for Aerospace Studies did laboratory work in support of Viking Mars project
- . Institute for Aerospace Studies receives Institute Grant from NRC

7) York University

Researchers awarded over \$25 thousand in 1976-77

Nicholls RW, Dept. of Physics - Laboratory astrophysics

Shepherd GG, Dept. of Physics - Optical studies of aurora and airglow

Notes

- . Centre for Research in Experimental Space Science, attached to Dept. of Physics, received Negotiated Development Grant
- . Coexperimenters in a number of NASA projects including Skylab
- . founding member of Canadian Corporation for University Space Science

8) University of Laval

Notes

- . Astronomical Observatory of Quebec, opened 1978.



We have dealt previously with researchers involved in nuclear or high energy physics and astronomy and space, we shall deal now with physicists in the remaining fields.

Researchers receiving more than \$25 thousand 1976-1977\*

University of Toronto (5)

Daniels JM	Oriented Nuclei and Magnetic properties of solids
Fawcett E	Superconductivity
Stoicheff BP	Laser spectroscopes
VonKronendon RJ	Theoretic molecules and solid state shades
Welsh HL	Molecular spectroscopes

All these researchers are in the Department of Physics  
Outstanding physicists associated with other departments include:

Carver JP	Medical Genetics (2200 MHz NMR Faculty)
John HE	Ontario Cancer Institute (developed first Cobalt 60 Unit)

University of British Columbia (3)

Bloom M	Magnetic Resources
Gold AV	Electronic Structure of Metals
Haering RR	Solid State Physics
Nowdwell RA <sup>3)</sup>	Plasma Physics

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\* Note that the level for including researchers is here taken to be \$25 thousand compared with \$30 thousand in the field of chemistry. The number of researchers receiving over \$30 thousand is about half.

Simon Fraser University (2)

Arrott AS                      Shades of Co-operative Phenomena

Cockrane SF                    Surface impedance of Metals

Queens University (2)

Daunt JG                      Low temperature physics

Stewart AT                    Electron structure by position

University of McGill (2)

Hedgcock FT                  Electronic studies of Metals and alloys

Wallace PR                    Semimetals in intense magnetic fields

Magnet Laboratory also supported through NRC

Institute Grant (\$30,000 in 1975-77)

University of Windsor (2)

Krause L                      Atomic and Molecular collisions

McConkey JW                  Electron and photo collision phenomena

University of Guelph

Egelstett PA                  Structure and dynamics of simple liquids

University of Manitoba

Morrish AH                    Solid State Physics -

CAP medal for Achievement (1977)

University of Alberta

Woods SB                      Metals at low temperatures

University of Ottawa

Woolley JC            Alloy semiconductors

University of Regina

Papini G <sup>1)</sup>            Gravitational reductions

University of Western Ontario

McGowen JW <sup>2)</sup>        Chemical Physics

University of Saskatchewan

Skarsgard HM <sup>3)</sup>        Plasma Physics

INRS <sup>4)</sup>

Gregory BC            Electromagnetic confinement of plasma

Johnson TW            Laser and plasma physics

- 1)            Through a NRC Co-op Grant (\$60,000 in 1976-77)
- 2)            Also supported through Negotiated Development Grant.  
              (\$110,000 in 1976-77)
- 3)            Receiver plasma physics grant
- 4)            INRS does not receive NRC plasma physics grants.

## The University of Alberta

Edmonton, Alberta  
T6G 2E1

### Institute of Earth and Planetary Sciences

The Institute of Earth and Planetary Sciences has been engaged in making ground-based measurements of magnetic-field perturbances caused by magnetosphere-ionosphere current systems. Research efforts have been directed towards an understanding of the source-current systems and the conductivity-structure of the earth by inference from perturbations associated with currents induced in the earth by variations in the source-current systems. As a contribution to the International Magnetospheric Study, a set of 25 inexpensive three-component magnetometers has been built and techniques have been developed for using them in large two-dimensional arrays. The Institute has co-operated with some countries in combined array studies involving up to 46 stations recording simultaneously over areas in the order of one million km<sup>2</sup>, and in studies of solid-earth conductive structures in North America, Australia, South Africa and Britain.

The Institute has pioneered the development of data-link hardware and software for the transmission of data over long distances and its subsequent preprocessing and recording. The data link at present connects the University Observatory with the data-processing centre at the Institute. Magnetic and magnetotelluric data can be received directly at the centre. Video-output capability permits rapid evaluation of magnetospheric activity.

Members of the Institute have collaborated in recent years with colleagues at the University of Texas at Dallas; the University of Utah; the California Institute of Technology; NOAA, Boulder, Colorado; the University of Alaska; the Applied Physics Laboratory of Johns Hopkins University; Lockheed Palo Alto Research Laboratories; TRW Laboratories, Los Angeles, California, in the U.S.; the National Physical Research Laboratory of South Africa; the Australian National University; and the University of Edinburgh, Scotland.

## The University of Calgary

2920 24th Avenue North West  
Calgary, Alberta  
T2N 1N4

### Aeronomy

Research efforts are broadly concerned with electromagnetic emissions in the upper atmosphere as a means of studying the chemistry and physics of the upper atmosphere itself. Observational techniques include optical sensing of auroral or airglow emissions, using specially designed spectro-photometers and counters from platforms on the ground, on balloons and rockets, and on satellites. The Aeronomy Group pioneered the development of high-speed all-sky photometers and published the first pictures of the aurora and airglow as seen from above.

The Group's experiment in the ISIS program is a unique photometer providing global coverage of two prominent optical emissions, 5577Å and 3914Å. The instrument utilizes the combination of orbital motion, satellite spin and internal scan to achieve television-like coverage at a resolution equivalent to about 10 km on the earth. Auroral pictures are studied to determine the spatial distribution, dynamic behaviour and physical cause of the diffuse aurora, and to elucidate the causes and effects of auroral substorms.

For other studies, a scanning photometer has been flown on rockets launched by the space research facilities branch of the National Research Council of Canada which is capable of providing excellent spatial and temporal resolution of auroral optical emissions at two wavelengths. A high-speed, high-resolution aurora-imaging device, using an image-intensifier TV system, has been developed and used to record the rapidly fluctuating features of auroras. Theoretical and experimental studies are made of the Bremsstrahlung X-rays produced in the atmosphere by electron precipitation, for which it is important to make simultaneous observations of primary electrons at the top of the atmosphere and of x-ray incidence at above balloon altitudes. The latter are obtained by using rockets carrying x-ray detectors to a height of 60-70 km and then deploying a parachute which allows the detector to float down gradually making

measurements at altitudes above those normally reached by balloons. Simultaneous multi-balloon observations of auroral x-rays are also used to investigate the morphology of auroral electron precipitation.

### Astronomy and Astrophysics

Research activity ranges from theoretical work on stellar evolution and solar physics to observations of the visible infra-red and the ultra-violet on the sun and stars, particularly variable stars and extra-galactic objects. Facilities include the Rothney Astro-physical Observatory at Priddis, Alberta, which has a 406-mm telescope equipped with photoelectric photometry and image tube.

### Atmospheric Physics

A research program is being undertaken to study the physics of the lower atmosphere and features such as clear-air turbulence, stratifications, inversions, and wind and temperature profiles, which are all pertinent to air pollution problems. The novel techniques being tested, including remote sensing by acoustic radar and lidar devices, are expected to facilitate the regular monitoring and understanding of the atmospheric conditions that promote the heavy build-up of pollutants.

### Cosmic Rays and Solar-Planetary Relations

Cosmic ray studies are conducted at the Sulphur Mountain Cosmic Ray Laboratory in Banff, Alberta, using monitors at Sulphur Mountain and Calgary. Data that are valuable in the determination of the energy spectra of cosmic ray intensity variations are being used by cosmic ray scientists all over the world.

## Laurentian University

Ramsey Lake Road  
Sudbury, Ontario  
P3E 2C6

The University has facilities for monitoring radio beacons from the ISIS satellites at a radio site 32 km from Sudbury, Ontario. A<sub>3</sub>-type absorption is routinely recorded using CHU signals on 3.33 megahertz. Three spaced receiver stations were in operation to record meteor scatter signals from CW transmitters at Winnipeg, maintained and operated with the support of the University of Western Ontario. The facilities were also used for one year to track the high-altitude meteorological balloons flown by the United Kingdom Meteorological Service across the Atlantic and the northern parts of Canada.

## McMaster University

Hamilton, Ontario  
L8S 4K1

The Department of Chemistry is continuing its lunar research program. Sulphur concentrations and isotope-abundance ratios are determined in grain-size fractions of selected samples of lunar dust. Variations of the measured parameters in relation to dust-particle size provide information on the processes of fragmentation, comminution and mixing, and on the micrometeorite impact experienced by the particles.

## The University of Saskatchewan

Saskatoon, Saskatchewan  
S7N 0W0

The University of Saskatchewan was a pioneer among Canadian universities in space research when, in 1939, a joint program with the University of Chicago was undertaken to study cosmic rays in the upper atmosphere, using balloons. Rocket experiments began in the late 1940s in collaboration with the Defence Research Telecommunications Establishment (DRTE), and space research, in one form or another, has continued ever since.

## Institute of Space and Atmospheric Studies

The Institute of Space and Atmospheric Studies is a component of the Physics Department, but has been involved in many projects that extend beyond the physics of the atmosphere alone. Dynamical studies of the mesosphere and lower thermosphere have continued. Measurements and analyses of

wind data, obtained from a partial-reflection radiowave system by using the drifts technique, have permitted an assessment of the relative importance of gravity, planetary waves and tidal waves as perturbations to the mean flow in the 60- to 110-km altitude range. A study of the major stratospheric warming in December 1974 and January 1975 has revealed the presence of associated planetary waves to altitudes of at least 100 km, and the data will soon be published. An assessment has been made of coupling events between the stratosphere, ionosphere and magnetosphere at mid-latitudes in the Southern Hemisphere from 1969 to 1974, which complements a long-term study by colleagues in New Zealand.

As part of the International Magnetospheric Study, work has continued on electron precipitation, using ground-based optical and riometer techniques, but the use of partial-reflection techniques is being investigated through special recordings of the ratio of polarized waves reflected at 2.2 megahertz. A multi-channel scanning photometer is being used, and arrangements are being made for the construction of a broad-band log-periodic polarized antenna and additional electronic equipment to transmit and receive pulsed signals. This will permit temporal and spatial variations in aurora and airglow to be related to ionization and atmospheric motions under quiet and disturbed conditions.

Continuing analysis of data from rocket and balloon flights provides new information about zone distribution up to 100 km from the ground at high latitudes. A new form of optical sonde is being developed to extend the present synoptic observations of ozone-height profiles.

## Simon Fraser University

Burnaby, British Columbia  
V5A 1S6

The Department of Physics has been engaged in x-ray astronomical research since 1964. Until recently, these studies were concentrated upon the cosmic x-ray diffuse background in the two to 10 kilo-electron-volts region. Since 1970, the emphasis has been shifted to the development of instrumentation to extend measurement capability to lower energies and higher sensitivity.

## The University of Toronto

The David Dunlap  
Observatory

Richmond Hill, Ontario  
L4C 4Y6

An important area of research provides ground-based x-ray observations which are indispensable for the interpretation of observations from orbiting satellites. A program of research in astronomical infra-red spectroscopy began in 1976 and it is likely that this can lead to projects related to the NASA Space Shuttle program. Two experiments have been developed for the International Ultra-violet Explorer satellite, launched in 1977. The satellite will be used to test models by means of data on the ultra-violet spectra of quasars, and the ultra-violet spectra of some 2,000 stars will be used for purposes of low-dispersion classification.

## The Institute of Aerospace Studies

4925 Dufferin Street  
Toronto, Ontario  
M3H 5T6

A rocket is scheduled for launch in 1977 as part of studies of the atmospheric densities of  $\text{N}_2\text{O}_2$  and atomic oxygen above 85 km. The Institute made an important contribution to the instrumentation used by the VIKING probe through the Martian atmosphere. In collaboration with the University of Minnesota, a mass spectrometer was calibrated to permit an inference of the chemical constituents of the atmosphere. Work has begun on the dynamics and control of remote manipulator systems in space.

## The University of Victoria

P.O. Box 1700  
Victoria, British Columbia  
V8W 2Y2

The Department of Physics has made observations of enhanced twilight lithium airglow emissions following rocket releases of atomic-lithium vapour trails into the upper atmosphere at Poker Flat, Alaska, in March 1976.



## The University of Western Ontario

London, Ontario  
N6A 3K7

### The Centre for Radio Science (CRS)

Since the establishment of the CRS in 1967, the Upper Atmosphere Physics Group has undertaken some 70 projects. Much of the research has been on the use of the RF spectrum as a diagnostic tool for investigation of the upper atmosphere. Ionospheric studies have used data from ground-based observations, rockets and satellites.

### The Department of Engineering and Medicine

The Engineering and Medicine faculties have collaborated in the preparation of an experiment using HERMES for the provision of remote-access medical consulting services.

A doctor at Moose Factory, Ontario, consults with specialists at the University of Western Ontario Hospital at London, Ontario.

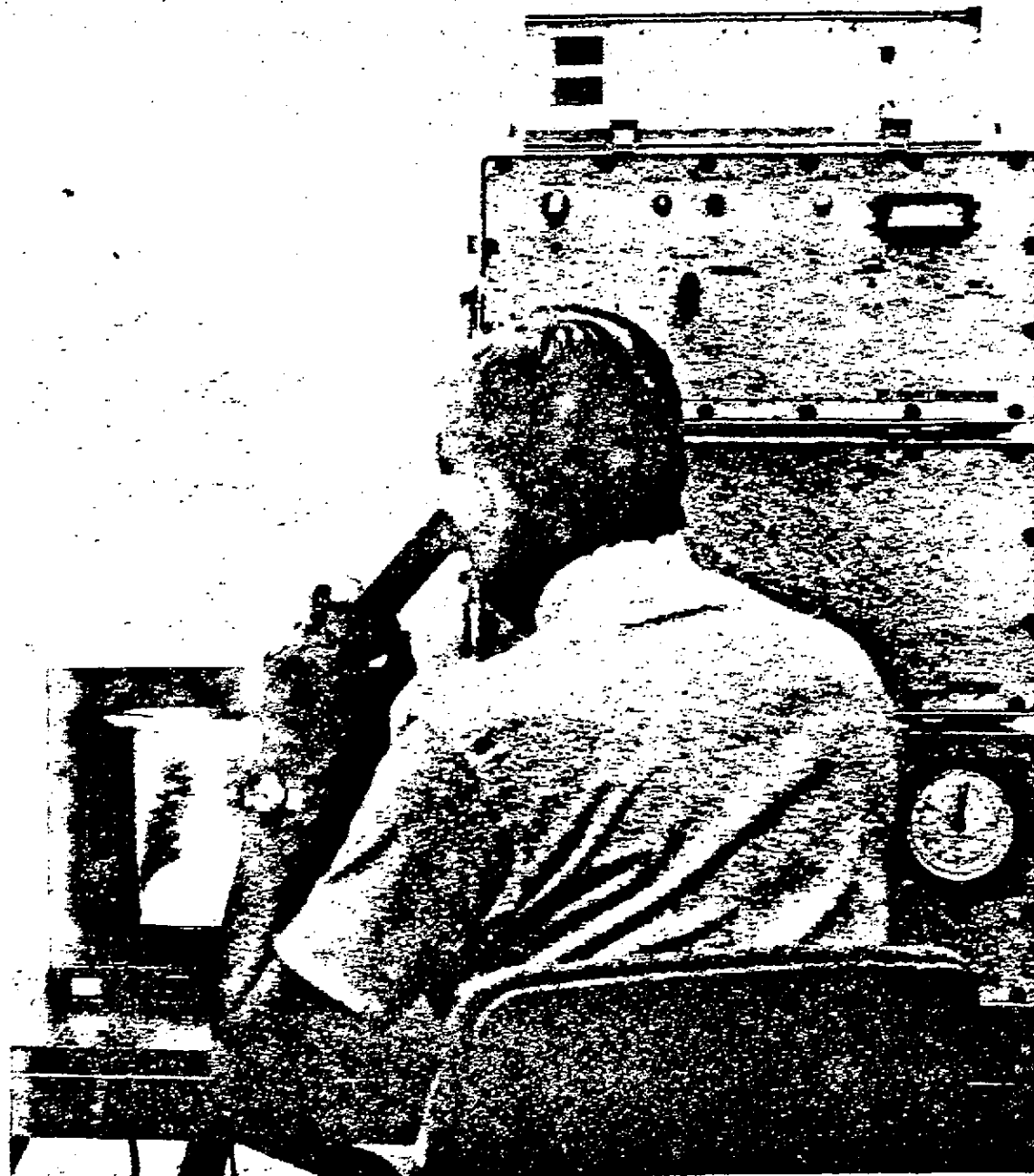


## York University

4700 Keele Street  
Downsview, Ontario  
M3J 1P3

The Centre for Research in Experimental Space Science (CRESS) is a component of the Science Faculty and engages in observational, laboratory and theoretical activities in astronomy and astrophysics, aeronomy, atmospheric science, earth science and chemical physics. Laboratory research projects in astrophysics include intensity measurements on molecular spectra and the calculation and theory of realistic high-resolution synthetic emission and absorption spectra. Data are also obtained from balloons, rockets and the ISIS II satellite.

Typical telemedicine scene where a specialist in a large hospital in London, Ontario, is consulting with a base doctor and nurses in a small northern community hospital in Moose Factory, Ontario.



APPENDIX III

Chemists in Canada

J.M.R. Stone

August 1978

CHEMISTRY

Grantees receiving more than \$30 Thousand in 1976-77

- |  |  |   |   |
|--|--|---|---|
| 1. Alberta (9)   | Ayer, W.A.<br>Crawford, R.J.<br>Freeman, G.R.<br>Graham, W.A.G.<br>Gunning, H.E.<br>Kebarle, P.<br>Lemieux, R.U.<br>Masumuna, S.<br>*Strausz, O.P. | Natural Products<br>Stereochemistry of Radicals<br>Radiation chemistry<br>Organometallic chemistry<br>Photochemistry<br>Gaseous ion chemistry<br>Biochemistry<br>Organic synthesis<br>Photochemistry and Kinetics | Merck, Sharp & Dohne Award<br><br>Noranda Lecture Award<br>CIC Medal<br><br>CIC Medal/Merck, Sharp & Dohne Award            |
| *Negotiated Development Grant for Hydrocarbon Research.                              |  |   |   |
| 2. Toronto (7)   | Brook, A.G.<br>Guillet, J.E.<br>Harrison, A.G.<br>Nyberg, S.C.<br>Polanyi, J.C.<br>Yates, K.<br>Yates, P.  | Organosilicon chemistry<br>Polymer chemistry<br>Mass Spectrometry<br>X-ray Spectroscopy<br>Chemical Kinetics<br>Physical Organic chemistry<br>Organic chemistry   | CIC Medal/Noranda Lecture Award<br><br>Merck, Sharp & Dohne Award   |
| 3. U.B.C. (6)  | *Cullen, W.R.<br>Frost, D.C.<br>Hall, L.D.<br>Kutney, J.P.<br>McDowell, C.A.<br>Trotter, J.  | Coordination chemistry<br>Photoelectron spectroscopy<br>Heteronuclear NMR spectroscopy<br>Natural Products<br>Chemical Physics<br>X-ray diffraction   | Noranda Lecture Award<br><br>Merck, Sharp & Dohne Award<br>Merck, Sharp & Dohne Award<br>CIC Medal<br>Noranda Lecture Award |
| *Negotiation Development Grant for Metal dependant biological red-ox processes.      |  |   |   |
| 4. Western (6)   | *Bolton, J.R.<br>Brand, J.C.D.<br>DeMayo, P.<br>Jacobs, P.W.M.<br>Stothers, J.B.<br>Warnhoff, E.W.   | Photochemistry<br>Electronic spectroscopy<br>Organic chemistry<br>Solid State Physical chemistry<br>NMR Spectroscopy<br>Organic Reaction Mechanisms   | Noranda Lecture Award<br><br>Merck, Sharp & Dohne Award<br>Merck, Sharp & Dohne Award<br>Merck, Sharp & Dohne Award         |
| *Negotiated Development Grant for Chemical Physics Research awarded to McGowan, J.W. |  |   |   |
| 5. McMaster (5)  | Gillespie, R.J.<br>King, G.W.<br>McLean, D.B.<br>Spenser, I.D.<br>Thode, H.G.  | Inorganic Chemistry<br>Spectroscopy<br>Natural Products<br>Natural Products<br>Radiochemistry   | CIC Medal/Noranda Lecture Award   |
| 6. McGill (4)  | Belleau, B.<br>Just, G.<br>Mason, S.G.<br>Perlin, A.J.   | Biochemistry<br>Natural Products<br>Colloidal chemistry<br>Carbohydrates  | Merck, Sharp & Dohne Award<br><br>CIC Medal<br>Merck, Sharp & Dohne Award   |
| 7. Montreal (2)  | Marchessault, P.H.<br>Sandorffy, C.  | Macromolecular Solids<br>Spectroscopy   |   |
| 8. Waterloo (2)  | Reeves, L.W.<br>Scoles, G.   | NMR Spectroscopy<br>Chemical Physics  | Noranda Lecture Award   |
| 9. U.N.B.  | Valenta, Z.<br>Wiesner, K.   | Organic Synthesis<br>Natural Product Synthesis  | Merck, Sharp & Dohne Award<br>CIC Medal   |
| 10. Ottawa (2)   | Conway, B.C.<br>Kates, M.  | Electrochemistry<br>Biochemistry  | CIC Medal/Noranda Lecture Award   |
| 11. Guelph (1)   | Ferguson, G.   | X-ray Studies   |   |
| 12. Saskatchewan (1)   | Lee, C.C.  | Organic Reaction Mechanisms   |   |
| 13. Sherbrooke (1)   | Deslongchamps, P.  | Organic Synthesis   | Merck, Sharp & Dohne Award  |
| 14. York (1)   | Scheff, H.   | Chemical Kinetics   |   |

OTHER "EXCELLENT" CHEMISTS MISSED IN THIS APPROACH

Calgary	Hyne, J.B.	Sulphur Research	(National Development Grant)
Waterloo	Fraser-Ried, B.O.	Carbohydrate chemistry	Merck, Sharp & Dohne Award
Western	King, J.K.	Organic Sulphur chemistry	Merck, Sharp & Dohne Award
Montreal	Hanessian, S.	Biochemistry	Merck, Sharp & Dohne Award
Carleton	ApSimon, J.W.	Natural Products	Merck, Sharp & Dohne Award
Queens	Wolfe, S.	Organic chemistry	Merck, Sharp & Dohne Award
Ottawa	Laidler, K.J.	Chemical Kinetics	CIC Medal
U.B.C.	Brion, C.E.		Noranda Lecture Award
U.B.C.	Jones, B.R.	Catalysis	Noranda Lecture Award
Manitoba	Schaefer, T.P.	Magnetic Resonance Studies	Noranda Lecture Award
McMaster	Morrison, J.A.	Chemical Physics	CIC Medal
Guelph	Clark, H.C.	Organometallic Chemistry	Noranda Lecture Award

APPENDIX IV

Research and Researchers  
in Health Sciences

Lewis A. Slotin  
August 1978

## CENTERS OF CONCENTRATION OF RESOURCES

Table 1

<u>Field or Subject</u>	<u>Top University Performer of Research In Terms of</u>		
	<u>\$</u>	<u>Grantees</u>	<u>No. of Grants</u>
Cancer	Toronto	Toronto	Toronto
Food Technology	U.B.C.	Toronto/Guelph	Guelph
Environmental Health Hazards	Waterloo	Toronto	Toronto
Hormone	Toronto	Laval	Toronto
Virology	Toronto	McMaster	McMaster/Montreal
Bacteriology	Toronto	Toronto/U.B.C.	Toronto
Cardiology	Montreal	Toronto	Montreal/Manitoba
Physical Fitness	Toronto	Toronto	Toronto/McMaster
Neurology	McGill	McGill	McGill
Physiology	Toronto	Toronto	Toronto
Ophthalmology	U.B.C.	U.B.C.	U.B.C.
Brain	U.B.C.	Toronto	Toronto
Respiration	Toronto	Toronto	Toronto
Dentistry	Toronto	Toronto	Toronto
Pharmacology	Toronto	Toronto	Toronto
Metabolism	Toronto	McGill	McGill
Pathology	McGill	Toronto	McGill/Toronto
Gerontology	Toronto	Toronto	Toronto
Biomed. Eng.	McGill	<del>Toronto</del>	Toronto
Psychology	McGill	McGill	McGill/Toronto
Genetics	Toronto	Toronto	Toronto
Immunology	Toronto	Toronto	Toronto
Cytology	Toronto	Toronto	Toronto
Biochemistry	Toronto	Toronto	Toronto
Surgery	McGill	McGill	McGill
Clinical	Toronto	Toronto	Toronto
Pathogen	Toronto	Toronto	Toronto
Drug Treatment	McMaster	McMaster/ Montreal/U.B.C.	Montreal/U.B.C.
Instrumental Analysis	McGill	McGill	McGill
Health Care Admin.	Toronto	McMaster	McMaster
Health Surveys	Montreal	Toronto	Toronto

MRC GROUPS AND OTHER NOTABLE  
CENTERS OF SPECIALIZATION

<u>Group Specialization</u>	<u>U n i v e r s i t y</u>	<u>D i r e c t o r</u>
Neurological Sciences	Montreal	Y. Lamarre
Transplantation Research	Alberta	J.B. Dossetor & E. Diener
Drug Toxicology	Montreal	G.L. Plaa
Developmental Neurobiology	McMaster	J. Diamond
Medical Genetics	McGill	F. Clarke Fraser & C. Sriver*
Hypertension	Clinical Research Institute (Montreal)	J. Genest*
Allergy Research	Manitoba	A. Schon*
Periodontal Physiology	Toronto	A.H. Melcher
Molecular Endocrinology	Laval	F. Labrie
Protein Structure, Function	Alberta	C.M. Kay*
Immunoregulation	Alberta	E. Diener
Respiratory Disease	Manitoba	D.H. Bourdon, I.Y.R. Adamson, R.M. Cherniak & V. Chernick
Gerontology	Toronto	Hastings*
Cancer	McGill	P. Gold*
Pharmacology	Quebec	INRS - Santé L. Tétreault

---

\*Identified in Table 3.

## CANADIAN HEALTH SCIENCE RESEARCHERS

Table 3

<u>Name</u>	<u>University</u>	
A.C. Bryan	Hospital for Sick Children (Toronto)	Lung Physiology
R.P. Orange	Hospital for Sick Children (Toronto)	Immunogenic Hypersensitivity
K. Dorrington	Toronto	Immunoglobulin Structure
B. Cinader	Toronto	Immunochemistry Immunogenetics
J. Hastings	Toronto	Community Health
C. Hollenberg	Toronto	Endocrinology & Lipid Metabolism
H.E. Johns	Toronto	Radiotherapy
R.B. Salter	Toronto	Articular Cartilage Degeneration
L. Siminovitch	Toronto	Cell Differentiation
A.A. Axelrad	Toronto	Blood Cell Evolution
C. Scriver	McGill	Pediatric Medicine-Genetics
B. Collier	McGill	Neurological Transport
C.P. Leblond	McGill	Radioautography
F. Gold	McGill	Tumor Immunology
D.T. Denhardt	McGill	Cell Replication
B. Milner	McGill	Neurological Disorders
J. Genest	Clinical Research Institute (Montreal)	Arterial Hypertension
Y. Lamarre	Montreal	Neuroanatomy & Central Control
A. Chapdelaine	Montreal	Molecular Endocrinology
A. Sehon	Manitoba	Immunology of Allergic Response
H.G. Friesen	Manitoba	Growth Hormones
R.T. Coutts	Alberta	Pharmaceutical Metabolism
C.M. Kay	Alberta	Membrane Proteins
D.L. Bourgaux-Ramoisy	Sherbrooke	Viral Replication
J.F. Mustard	McMaster	Blood and Vascular Disease
N. Kaufman	Queen's	Molecular Pathology
S. Rowlands	Calgary	Cytological Biophysics
D.S. Layne	Ottawa	Steroid Glycosides



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