ANNUAL REPORT OF THE DIRECTOR

ATLANTIC RESEARCH CENTRE FOR MENTAL RETARDATION

June 29, 1970

It is a pleasure to report that the past year has been one of important growth and development for the ARCMR. First, the family of principal investigators carrying out their research within the laboratories of the Centre has increased significantly. During the year, we have been joined by Dr. Margaret Corey in Cytogenetics and Dr. Matthew W. Spence, who will be directing the development of a multidisciplinary research team in neurochemistry. Prior to coming to Dalhousie, both Drs. Spence and Corey were holders of Medical Research Council Scholarships. According to the regulations of the Medical Research Council of Canada, both these investigators were obliged to resign their scholarships on transferring from one university to another. However, I am pleased to report that reapplication resulted in both these scientists having their scholarships reinstated at Dalhousie.

Dr. Spence's research is of a very fundamental nature, involving the study of the fats which are essential components to cell membranes. The composition of these membranes in cells such as those of the brain plays a crucial role in the function of these cells in health and disease. Dr. Spence is also involved in a study of a disease which, though rare, occurs with particular frequency in one area of Nova Scotia, and produces mental retardation, degeneration of the brain and early death. This

investigation has the purpose of trying to define more specifically the exact chemical nature of the disturbance in these individuals. It is only with such understanding that one may have real expectation of discovering some form of therapy for the disease.

Our population geneticist Dr. Richard Shaw continues to study, with the aid of the computer, the complex question of statistical analysis of problems in the population genetics. Dr. Shaw is completing studies of muscular dystrophy (a condition sometimes associated with some degree of mental retardation) which he had begun in Virginia, with the assistant of a special grant from the Muscular Dystrophy Association of Canada. These studies have led to improvement in the accuracy with which one may predict whether an individual child in an affected family is likely to become affected with the disease.

Dr. Shaw, with the collaboration of his computer programmer assistant Mr. A.P. Smith, is also studying the relationship between infant mortality and strontium 90 levels from radioactive fallout in Canada. The results of these studies will be published in the near future. Dr. Shaw has received from the Department of National Health and Welfare a 3 year grant for approximately $27,000. per year to continue his major research interest, the development of mathematical and computer methods in population genetics. The essence of this study may be summarized by

stating that if the inheritance of a particular disease and its effect on human reproduction and survival are known, then mathematical calculations can be done to show whether the disease is increasing or declining in the population. The rate of such a change can also be determined as well as the ultimate level of the disease in the population. The other main application of the computerized mathematical approach is to decide the manner in which certain diseases are inherited. This may be of special value in diseases where methods previously used have given ambiguous results.

Dr. J. Philip Welch and his associates have continued to extend their studies in various inherited disorders during the past year. During that period, over 200 chromosome analyses have been carried out in the course of various studies. One of the most interesting of these investigations has been a search for chromosome abnormalities in individuals of unusually tall or unusually short stature. As part of this research, Dr. Welch and his coworkers have conducted a survey of 11,000 Halifax School Children, measuring height and weight, and carrying out chromosome analyses on individuals at both extremes of the scale. Dr. Welch has also been carrying out a study of chromosome abnormalities in inmates of the Dorchester Penitentiary, as a means of evaluating the proposition that some types of asocial or criminal behaviour are associated with certain chromosome abnormalities. Dr. Welch is also collaborating

with Dr. Spence in the study of so called "Nova Scotia Niemann-Pick Disease".

With the opening of the new Izaak Walton Killam Hospital for Children, it has been possible to enlarge the activities of the Atlantic Research Centre in accordance with the provisions of its establishment, i.e. that the Centre should occupy laboratories both in the Sir Charles Tupper Medical Building and the I.W.K. Hospital for Children. Dr. Margaret DeWolfe has now moved into new laboratories in the Clinical Investigation Unit of the I.W.K. Hospital, and much of the biochemical work involved in the investigation and therapeutic control of children with certain types of inherited metabolic disorders causing mental retardation will be carried on here. During the past year Dr. DeWolfe has supervised the examination of blood and urine samples from mentally retarded patients for amino acid abnormalities. During this period 148 analyses have been carried out for either suspected or proven cases of phenylketonuria (PKU). We are presently following 21 such patients, including 4 new cases from Nova Scotia, New Brunswick and P.E.I.

During the same period of time a large number of other biochemical tests have been carried out to screen patients for inherited metabolic disorders, mostly those associated with mental retardation. The following list gives some idea of the volume of work carried out:

395	1-dimensional amino acid chromatogram of urine
135	" " " " of blood
144	2-dimensional " " " of urine
139	paper chromatograms for sugars in urine
425	screening tests for mucopolysaccharides in urine
4	tryptophan loading tests for pyridoxine deficiency
40	urine fractionations for mucopolysaccharides in urine.

Dr. Margaret Corey and her three research associates have been studying the breakage and repair of chromosomes in human cells grown in the laboratory. It has been recognized for a long time that broken chromosomes tend to rejoin broken ends of other chromosomes in the cell. Dr. Corey has been exploring ways of identifying such repaired chromosomes by radioactive labelling. Dr. Corey has received considerable recognition for her studies of the effects of various agents (including LSD) on chromosomes.

I am very sorry to have to report that at the end of this month Dr. Corey will be leaving the Atlantic Research Centre Laboratories to take up a new agricultural way of life at her family home in New Brunswick. Her retirement from her research career is a real loss to the scientific community, but we are grateful for the time she has spent with us and wish her great success and happiness in the future.

I believe that the accomplishments recorded above are ones of which we can be justifiably proud, particularly in view of the

relatively short time the Atlantic Research Centre has been in existence. Two other measures of the achievements of this group of scientists may be appreciated from the attached lists which detail the publications and presentations by members of the ARCMR during the past year, as well as the sources and amounts of additional research grant support that these investigators have been able to attract for the sustenance of their research projects.

You will understand, therefore, why we take considerable pride in the accomplishments of the Atlantic Research Centre over the past three years. It seems reasonable to hope for even greater productivity in the future.

Respectfully submitted,

PUBLICATIONS AND PRESENTATIONS

Shaw, R.F. and A.P. Smith. 1969, Is Tay-Sachs Disease Increasing? Nature 224: 1214-1215.

Shaw, R.F. 1970, Population Genetics and Health, Nova Scotia Medical Bulletin, April.

Welch, J.P., (1969) The XYY Syndrome - A Genetic Determinant of Behaviour. First Conference on Clinical Delineation of Birth Defects, Birth Defects Original Article Series 5(5): 10-15.

Welch, J.P., McNeill, L.K., Roy, D.L. and Lee, L.Y., Cytologic Investigations in Females with Coarctation of the Aorta. Can. Soc. Clin. Invest. Abs. Annual Meeting, 1969.

Welch, J.P. Behavioural and Cognitive Aspects of the XYY Condition. Invitational presentation at Howard University, Washington, D.C. Post Graduate Seminar series - the Genetic, Metabolis and Developmental Aspects of Mental Retardation. March 1969.

Welch, J.P., Mackintosh, S.M. and Laws, G. Sex Chromosome Anomalies in Selected Samples of Normal Children. Presented at the Third International Conference on Congenital Malformations, The Hague, The Netherlands, 7-13, September 1969.

Welch, J.P. Mentation and behaviour of the XYY syndrome. Presented at the Annual Meeting of the American Society of Human Genetics, San Francisco. October 1-4, 1969.

Corey, M., Andrews, McLeod, MacLean and Wilby. Chromosome Studies on Patients (in vivo) and Cells (in vitro) Treated with Lysergic Acid and Diethylamide, New England Journal of Medicine, Vol. 282, P. 939-943, 1970.

Spence, M.W. Studies on the extractability of Brain Gangliosides, Can. Journal of Biochemistry. 47, 735, 1969.

Spence, M.W. Monounsaturated Fatty Acid Isomers in Adult and Newborn Rat Brain. Proc. 2nd International Meeting of International Meeting of Neurochemists. Milan, 1969, P. 376.

ADDITIONAL RESEARCH GRANT SUPPORT

OBTAINED BY MEMBERS OF THE ATLANTIC RESEARCH CENTRE FOR MENTAL RETARDATION, 1969-70

PRINCIPAL INVESTIGATOR	TITLE OF RESEARCH	GRANTING AGENCY	ANNUAL VALUE OF GRANT
J.P. Welch	General Cytogenetic Studies	MRC (MA-3346)	20,000
J.P. Welch	Halifax School Child Survey	N.H. & W. (602-7-131)	15,000
R.F. Shaw	Muscular Dystrophy in Children	Muscular Dystrophy Assoc. Can.	3,000
R.F. Shaw	Computer methods in population genetics.	N.H. & W.	27,000
M.W. Spence	Studies on brain lipids	MRC (MA-2188)	14,950
M.W. Spence	Studies on cis-vaccemic acid in brain	Multiple Scherosis Soc. Can.	8,200
M.W. Spence	Medical Res. Council Scholarship	MRC	15,300
M. Corey	Medical Res. Council Scholarship	MRC	13,000*
M. Corey	Experimental cytogenetics	MRC (MA-2807)	24,000
M. Corey & J.P. Welch	Major equipment grant (photomicroscope)	MRC (ME-3947)	7,420
		Total	147,870

Atlantic Research Centre for Mental Retardation

Dalhousie University

Statement of Revenues and Expenditures

For the Year Ending March 31, 1970

	Dept. of National Health & Welfare 635-2-4 (X-20)	Provincial Support (X-20-1)		
Balances - April 1, 1969				
Debit	$ 9,694.49			
Credit		$32,087.57		
Net				$22,393.08
Revenues				
Dept. of National Health & Welfare	38,846.82			
Province of N.S. (8/4/69)		18,000.00		
Province of N.B. (26/5/69)		13,950.00		
	$38,846.82	$31,950.00		70,796.82
				$93,189.90
Expenditures				
Salaries	$40,308.84	$30,918.26	$71,227.10	
Travel	--	296.92	296.92	
Supplies and Material	(24.86)	2,441.90	2,417.04	
Computer Service	--	252.75	252.75	
	$40,283.98	$33,909.83	$74,193.81	74,193.81
Balances - March 31, 1970				
Debit	$11,131.65			
Credit		$30,127.74		
Net				$18,996.09

6/5/70
GRG/mjr