



**Canadian  
Environmental  
Law  
Research  
Foundation**

CIELAP Shelf:  
Canadian Environmental Law Research  
Foundation  
Biotechnology Policy Development  
RN 27314

**BIOTECHNOLOGY POLICY DEVELOPMENT**

A Research Proposal submitted to  
the Research Management Office,  
Ontario Ministry of the Environment

Canadian Environmental Law  
Research Foundation

May, 1986

TABLE OF CONTENTS

	<u>Page</u>
1. Introduction. . . . .	1
2. The need for policy development . . . . .	3
3. The Ontario Ministry of the Environment and the Canadian regulatory context.. . . .	5
4. Objectives. . . . .	6
5. Workplan. . . . .	7
6. Budget. . . . .	9
7. Timeline. . . . .	10
8. Staffing. . . . .	11
9. The Canadian Environmental Law Research Foundation. . . . .	12

Appendix A - Curricula Vitae

1. INTRODUCTION

Commercial application of recombinant DNA techniques for altering genetic structures of living organisms offers a wide variety of potential benefits to Canadian agriculture, pulp and paper, mining, and fishing industries. Examples of such benefits include increased crop yields, more effective pest control and improved treatment of toxic waste products. At the same time, the release of genetically altered organisms to the environment inevitably carries with it certain potential risks of environmental damage.

For two reasons, there is an immediate need in Canada to develop and implement policy for environmental regulation of biotechnology. These are:

- (a) to ensure environmental protection before the first release to the open environment is made
- (b) to provide the predictable and stable regulatory framework which is essential for industrial development.

The project proposed here is intended to assist the Ontario Ministry of the Environment in that policy development process. It forms one part of the Canadian Environmental Law Research

Foundation biotechnology policy programme which is intended to culminate in a major conference on the subject to be held in the spring of 1987.

2. THE NEED FOR POLICY DEVELOPMENT

The draft OECD report titled "Safety and Regulations in Biotechnology", December, 1985 states that "the development of appropriate practices and control measures has enabled biotechnology to be generally regarded as a safe industry."

Despite this, speaker after speaker at the 1986 Washington International Conference on Biotechnology, April 21-22, 1986, stated that as a result of public fears concerning environmental risks associated with biotechnology, regulation and policy development in the United States was in a "state of disarray". During recent months, both the U. S. Environmental Protection Agency and Department of Agriculture have approved environmental releases of genetically altered organisms and subsequently withdrawn those approvals. The administration is working to develop an approach to biotechnology regulation, as are EPA and USDA while two bills have been introduced into Congress. Although the Food and Drug Administration has approved applications, agricultural and environmental applications have been stalled by the inability of the American political system to clarify its regulatory approach.

This is not surprising. After Love Canal, Three Mile Island, Bhopal, and the melt-down of a Soviet nuclear reactor

public trust of new technology is at an all-time low. The biotechnology industry must suffer now for the earlier failures of the regulatory approach in other new industries.

Industrial development in Canada has not progressed to the point of the first release of a genetically altered organism to the environment. When it does, public concern and fear will inevitably crystallize, particularly in the immediate area surrounding the proposed release. This public concern is completely natural and understandable and can only be met by implementation of a carefully planned and comprehensive regulatory system prior to such a release.

By the same token, concern for environmental protection dictates that such a regulatory system be implemented as soon as possible. It is essential that methods be provided for assessing and guarding against potential ecological destruction associated with biotechnology initiatives.

3. THE ONTARIO MINISTRY OF THE ENVIRONMENT  
AND THE CANADIAN REGULATORY CONTEXT

At the Canadian and Ontario levels, biotechnology regulation is currently under consideration by the following government bodies:

- . National Biotechnology Advisory Committee
- . Federal Inter-Departmental Committee
- . Working Group on the Safety and Regulatory Aspects of Biotechnology (Federal)
- . Ontario Inter-Departmental Committee

At the federal level, the co-ordinating role for industrial development and regulation is played by the Ministry for Science and Technology. Given Canadian constitutional and political realities, however, it is inevitable that the Ontario Ministry of the Environment will play a major role in regulation of the biotechnology industry. This responsibility will be shared, however, with both provincial agencies such as the Ministry of Labour and Agriculture and federal agencies such as Environment and Agriculture.

There is need for MOE to determine how it will work in concert with such other agencies to fulfil its environmental responsibilities in this area.



4. OBJECTIVES

Objectives of the programme proposed here are:

- (1) to undertake research and consultation which will provide the foundation for development and implementation of biotechnology policy in Ontario and Canada.
- (2) more specifically, to determine the consensus which exists in Canada on: (a) environmental effects which regulation must guard against, (b) policy issues which must be addressed during design of a regulatory system.
- (3) to provide a report to the Ontario Ministry of the Environment which will assist in determining how best the Ministry can fulfil its responsibility for environmental protection with respect to biotechnology.

5. WORKPLAN

(a) Environmental Effects

CELRF will undertake the following tasks:

- . research, by means of literature review and interviews
- . draft report on environmental effects
- . convene a seminar of scientific authorities to discuss the draft report
- . finalize the report in light of discussion at that seminar

(b) Policy Issues

CELRF will undertake the following tasks:

- . research, by means of literature review and interviews, policy issues such as federal/provincial jurisdiction, inter-agency jurisdiction, definition of the activity to be regulated, et cetera

- . draft a report setting forth, in order of priority, the policy issues identified
- . convene a seminar of public and private-sector policy officials to discuss the draft report
- . finalize the report in light of that seminar discussion.

(c) Report to MOE

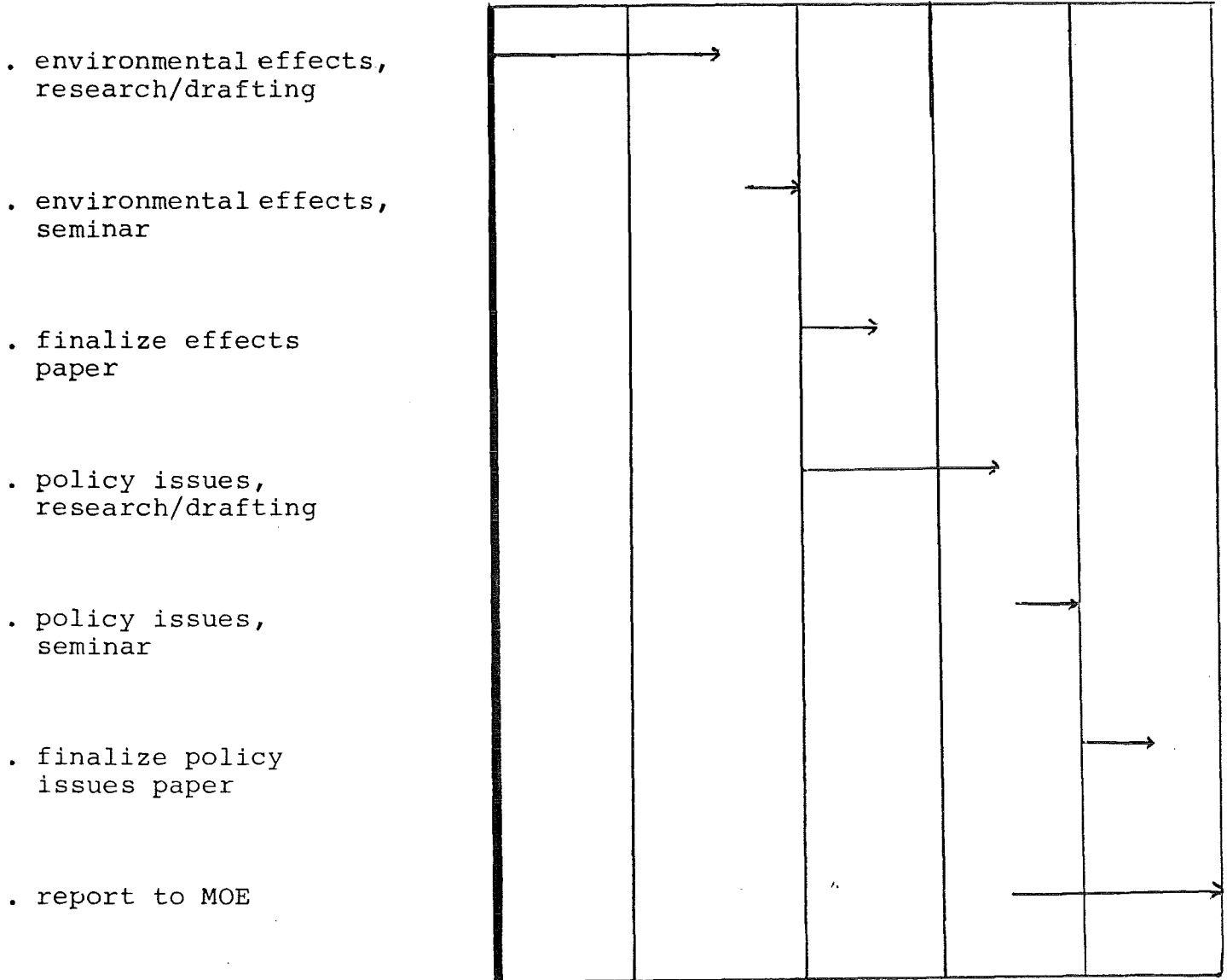
CELRF will prepare a report to the Ministry providing the findings of the preceding two stages outlined above and providing suggestions for the next stages of the policy development process.

6. BUDGET

Environmental effects, research and drafting	\$15,000
Seminar	5,000
Policy issues, research and drafting	15,000
Seminar	5,000
Report to MOE	<u>8,000</u>
TOTAL	\$48,000

7. TIMELINE

June 1    July 1    August 1    Sept. 1    Oct. 1    Nov. 1



8. STAFFING

Administrative management of the project will be done by Mr. Doug Macdonald, Executive Director of the Foundation. Ms. Marcia Valiante, Director of Research of the Foundation will act as Project Director. Environmental effects research will be done under the supervision of Dr. Bernard Glick, University of Waterloo and policy research will be done under the direction of Ms. Irene Courage, McMillan, Binch. Research assistance for both components will be provided by Ms. Yvonne Skoff.

Curricula vitae follow as Appendix A.

THE CANADIAN ENVIRONMENTAL LAW RESEARCH FOUNDATION

The Canadian Environmental Law Research Foundation is a registered charitable organization, founded in 1970. The Foundation shares office space and works in close partnership with its sister organization, the Canadian Environmental Law Association.

The primary substantive focus of the Foundation's research activities is toxic chemical contamination of the environment. With respect to procedural matters, attention is centred upon such things as the interface between science and environmental law, the problem posed by political and administrative jurisdictional diversity for integrated, holistic environmental protection and the environmental assessment process. The Foundation carries out research in environmental law and policy areas related to these and other issues and disseminates the products of that research by means of its publishing and conference programs.

The Foundation's best known publication is Environment on Trial (C.E.L.R.F., 1978) a comprehensive guide to Ontario environmental law. Others include Poisons in Public (Lorimer, 1980), Acid Rain: The North American Forecast (Anansi, 1980), Environmental Rights in Canada (Butterworths, 1981), and,

most recently, Canadian Occupational Health and Safety Law Handbook (CCH, 1983). The Foundation is also publisher of the Canadian Environmental Law Reports, the only environmental law reporter in Canada.

In April, 1984, the Foundation published jointly with the Pollution Probe Foundation Breaking the Barriers which is a study of select action which might be taken by governments at all levels to facilitate increased recycling and reduction of industrial waste.

In June of that year, the Foundation, working under contract for Environment Canada, completed an analysis of potential elements which might be included in an environmental bill of rights to be introduced at the federal level.

Since April of 1984, the Foundation has carried out a study of legal reforms required to facilitate citizen intervention across the U.S. - Canada border in transboundary pollution cases. The study, carried out with financial assistance from the Joyce Foundation of Chicago, will be completed and published by Carswell Legal Publications in March, 1986. The Foundation intends to do further work in the transboundary area by initiating in 1986 a study of potential application of the concept of uniformity of law in the Great Lakes basin.



In October of 1983, working with the Environmental Law Institute of Washington, D.C., with financial assistance provided by the Donner Canadian Foundation and American sources, the Research Foundation initiated a study of legal reforms required to better regulate local and long-range transport of toxic and oxidant air pollutants. That study will be published in February, 1986 by CCH Canadian Ltd. and distributed in both Canada and the United States.

Other current research includes:

- . an examination of the environmental assessment process in Ontario
- . a study of news media reporting of toxic contamination cases
- . a study of waste management legislation in Ontario, done under contract to the Ontario Waste Management Corporation

Recent conferences and seminars hosted by the Foundation include:

- . October 9, 1984: a one-day conference on the regulation of biotechnology
- . October 31, 1984: a one-day workshop on toxic and oxidant air pollution
- . February 27, 1985: a roundtable discussion of pesticides law and policy, hosted jointly with the Law Reform Commission of Canada
- . February 28, 1985: a one-day workshop on the Ontario Environmental Assessment Act
- . May 6, 1985: a one-day workshop on jurisdictional barriers to environmental protection in the Great Lakes basin
- . November 1, 1985: with staff of Dartmouth College, New Hampshire, discussion of a proposed bilateral network for transboundary pollution issues

The Foundation has done work on biotechnology policy since the spring of 1984. The Foundation prepared a research paper on biotechnology regulation which was advanced for public discussion at a one-day conference held on October 9, 1984. That paper has since been further developed and will be published in the Osgoode Hall Law Journal.

During the past year Foundation staff have attended a variety of events concerned with biotechnology policy and have developed plans for the biotechnology policy program of which this proposal forms a part.

Appendix A - Curricula Vitae

DOUGLAS CHARLES MACDONALD

Born: June 23, 1947

Office: 977-2410  
Home: 465-1231

100 Bain Ave.,  
#8 The Lindens  
Toronto, Ontario

WORK EXPERIENCE

Oct. 1982 - present:	Executive Director Canadian Environmental Law Research Foundation
Sept. 1980 - Oct. 1982:	Special Assistant to Mayor Lastman Mayor of the City of North York
Oct. 1978 - Oct. 1980:	Secretary The Agora Foundation
July 1976 - July 1977:	Executive Assistant to Mayor Lastman
May 1974 - June 1976:	Research Assistant to Mayor Lastman

EDUCATION

M.A., Canadian History, University of Toronto

Completed first year of Phd. program, Canadian History, U. of T.

VOLUNTEER ACTIVITIES

- . three terms a member of the Board of Directors of the Bain Apartments Co-operative, a 260 unit housing co-operative
- . member Board of Directors and Board of Governors, Canadian Coalition on Acid Rain
- . member Board of Directors, Canadian Environmental Law Association

## PUBLICATIONS

- . AGORA, the newsletter of the Agora Foundation: No. I, Vols. I - IV
- . "Shutdowns"; Perception Magazine, periodical of the Canadian Council on Social Development, Jan./Feb., 1981
- . "Where Does the Buck Stop?" Policy Options, periodical of the Institute for Research on Public Policy, Nov./Dec., 1981
- . "Out from Under"; Quest Magazine, November, 1982
- . "Toronto Drinking Water: Is it Safe?": radio program broadcast on CJRT-FM, October 7, 1984
- . "The Ethos of Environmental Protection", with Marcia Valiante: a paper submitted to the symposium on environmental regulation, Ontario Ministry of the Environment, November 1 - 2, 1984
- . Managing Editor, Canadian Environmental Law Reports

MARCIA ANNE VALIANTE

Address: 103 Dewson Street  
Toronto, Ontario  
M6H 1H4

Telephone: (416) 537-3046 (home)  
(416) 977-2410 (office)

Date of birth: 10 November 1953

EDUCATION

September 1985 - date LAW SOCIETY OF UPPER CANADA, Toronto, Ontario.  
Bar Admission Course.

1979 - 1982 OSGOODE HALL LAW SCHOOL, Toronto.  
Degree: LL.B.  
Honours: Kenneth Gibson Morden Memorial Prize in  
Evidence

1973 - 1977 UNIVERSITY OF NEW HAMPSHIRE, Durham, New Hampshire.  
Degrees: B.Sc.  
B.A.  
Honours: Magna Cum Laude  
Member, National Social Science Honour Society  
Member, National Political Science Honour  
Society

EXPERIENCE

1983 - date CANADIAN ENVIRONMENTAL LAW RESEARCH FOUNDATION,  
Toronto.  
Director of Research.  
Duties include:

- ° research and writing on scientific, legal and policy  
issues for Foundation projects on
  - Toxic and Oxidant Air Pollution
  - Legal Mechanisms for Control of Toxic Contamination
  - Trends in Ontario Industrial Waste Legislation
  - Canadian Law and Policy on Great Lakes Diversions
  - Toxic Substances in the Media
  - Environmental and Legal Issues Respecting  
Canadian Aid
  - Federal Environmental Bill of Rights

- supervision of research and writing on other Foundation projects
- with the Executive Director, writing project proposals and planning conferences and seminars
- preparation of briefs to government.

1982 - 1983

CANADIAN ENVIRONMENTAL LAW ASSOCIATION, Toronto.  
Articling Student.

Duties included legal research, preparation of legal memoranda and documents, preparation for and attendance before the Environmental Assessment Board, Ontario Municipal Board and Joint Board.

### PUBLICATIONS

Canadian Environmental Law Reports, Editor.

The Regulation of Toxic and Oxidant Air Pollution in North America, with S. Garrod, L. Ritts and M. Mellon, CCH Canadian Limited (forthcoming - February 1986).

"Biotechnology and the Environment: A Regulatory Proposal", with P. Muldoon, Osgoode Hall Law Journal (forthcoming - Spring 1986).

"An Overview of Canadian Law and Policy Governing Great Lakes Water Quantity Management", with P. Muldoon and D.P. Emond, International Law Journal (forthcoming).

"Energy in Canadian-American Relations" and "Of Oil and Gas: A Primer on the Role of Oil and Gas in Canadian-American Relations", both in Journal of Natural Resource Management and Interdisciplinary Studies, Vol. III, No. 1 (March 1978).

### BRIEFS/SPEECHES - on behalf of the Canadian Environmental Law Research Foundation

Brief to Environment Canada and Health and Welfare Canada on amendments to the Environmental Contaminants Act, July 1985 (joint submission).

Speech to FACE Conference on Toxics and the Environment, June 1985.

Brief to the Inquiry on Federal Water Policy, November 1984.

Submission to the Ontario Ministry of the Environment symposium on environmental regulation, November 1984.

Brief to Transport Canada on motor vehicle emission standards, September 1984 (joint submission).



Speech to CELRF conference on the Regulation of Biotechnology, October 1984.

Speech to Northland College conference on "Superior: State of the Lake", September 1984.

Brief to the House of Commons Subcommittee on Acid Rain on "Nitrogen Oxides Emissions from Motor Vehicles as a Contributor of Oxidant Air Pollution", March 1984.

Brief to the Royal Commission on the Economic Union and Development Prospects for Canada, November 1983.

## CURRICULUM VITAE

Bernard R. Glick

February 1986

Date of Birth: April 9, 1945

## Degrees:

<u>Degree</u>	<u>Institution</u>	<u>Year</u>
B.Sc.	The City College of New York	1969
M.Sc.	University of Waterloo	1972
Ph.D.	University of Waterloo	1974

## Experience since graduating (in chronological order):

<u>Year</u>	<u>Position or rank</u>	<u>Institution</u>
1974-1978	Post-Doctoral Fellow and Research Associate	University of Toronto
1978-1979	Research Associate	National Research Council
1979-1982	Group Leader, Molecular Genetics & Biochemistry Group	BIO LOGICALS, Inc. Toronto, Ontario
1982-present	Associate Professor	University of Waterloo

## 1. Grants and Contracts held during the past 5 years.

	<u>Amount</u>	<u>Tenure</u>
NSERC strategic with C. Robinson (P.I.), M. Moo-Young, J. Heikkila & J. Pasternak	27,000	1985-1987
NSERC strategic equipment with C. Robinson (P.I.), M. Moo-Young, J. Heikkila & J. Pasternak	50,000	1985-1987
NSERC equipment with J. Heikkila (P.I.), N. Lem & J. Pasternak	20,000	1985
NSERC equipment with J. Pasternak (P.I.), J. Heikkila & N. Lem	8,400	1985
NSERC strategic with C. Robinson (P.I.), M. Moo-Young, J. Heikkila & J. Pasternak	67,000	1984-1987
NSERC strategic equipment with C. Robinson (P.I.), M. Moo-Young, J. Heikkila & J. Pasternak	40,000	1984

## Grants, continued...

	<u>Amount</u>	<u>Tenure</u>
NSERC strategic with W. Inniss (P.I.), C. Robinson & C.I. Mayfield	50,000	1984-1987
NSERC operating	24,000	1984-1987
NSERC strategic with J. Pasternak	55,500	1983-1986
NSERC operating	21,200	1983-1984
NSERC equipment with J. Pasternak and N. Bols	45,000	1983
NSERC equipment with G. Dixon (P.I.)	15,000	1983
Canada Manpower Summer Student Programme	3,000	1983

## 2. Graduate students currently being supervised:

D. Penrose	M.Sc.	1983
F. Marcoux	Ph.D.	1983
E. Abergel	M.Sc.	1984
B. Wolff	Ph.D.	1984 (with J. Pasternak)
T. Harrington	M.Sc.	1984
G. Whitney	M.Sc.	1985 (with C. Robinson)
D. Wood	M.Sc.	1985 (with C. Robinson)

## 3. Graduate students supervised who have graduated during the past five years:

A. Gianetto	M.Sc.	1984 (with A. Kempton)
-------------	-------	------------------------

## 4. Conferences attended and papers read during the past five years:

- 1) Glick, B.R., Brooks, H.E. and Pasternak, J.J. Transformation of Azotobacter vinelandii by Plasmid DNA. Can. Soc. Microbiol. 34th Mtg., Abstract #GM9, 1984.
- \*2) Glick, B.R. and Pasternak, J.J. Genetic Engineering and the Cellulose Problem. Biomass Conversion Technology Symposium, Waterloo, Ontario, 1984.
- \*3) Glick, B.R., Pasternak, J.J. and Brooks, H.E. The Development of Azotobacter as a Bacterial Fertilizer by the Introduction of Exogenous Cellulase Genes. N.R.C. Bioenergy Specialists Mtg., 1984.

- 4) Robinson, C.W., Glick, B.R., Pasternak, J.J. and Moo-Young, M. Continuous Process for Production, Recovery and Purification of rDNA Products. First International Mtg. on Downstream Processing, Toulouse, France, 1985.
- 5) Lem, N.W., Penrose, D.M. and Glick, B.R. Isolation and Preliminary Characterization of PEP Carboxylase from Anabaena Variabilis. Amer. Soc. Plant Physiol., 1985.
- 6) Gruber, M.Y., Glick, B.R., Thompson, J.E. and Gendel, S.M. In vitro Expression of a Cyanobacterial Plasmid. Amer. Soc. Plant Physiol., 1985.
- \*7) Glick, B.R., Wolff, B.R., Akalehiyot, T. and Pasternak, J.J. The Development of Cellulolytic Azotobacter. First Canadian Plant Molecular Biology Workshop. Guelph, 1985.
- 8) Gruber, M.Y., Glick, B.R., Thompson, J.E. and Gendel, S.M. Transformation of Anacystis nidulans with a Plasmid Containing the E. coli Mn-Superoxide Dismutase Gene. First Internat. Cong. of Plant Molec. Biol., Savannah, 1985.
- 9) Whitney, G.K., Glick, B.R., Robinson, C.W., Moo-Young, M., Heikkila, J.J. and Pasternak, J.J. Large-Scale Production of T4 DNA Ligase from a Recombinant Microorganism: Induction of T4 Ligase Expression. Eighth Symposium on Biotechnology for Fuels and Chemicals, Gatlinburg, 1986.
- 10) Whitney, G.K., Glick, B.R., Curran, G.A., Robinson, C.W., Heikkila, J.J., Moo-Young, M. and Pasternak, J.J. Scale-Up of the Production of T4 DNA Ligase from a Recombinant Microorganism: Induction of Gene Expression and Purification of the Gene Product. Can. Soc. Microbiol., 1986.

\*invited papers.

#### 5. Teaching Responsibilities 1985/1986:

Biol 342	Microbial Biotechnology	all-2x
Biol 480	Biotechnology	1/2
Biol 642	Current Topics in Biotechnology	all
Biol 499	Senior Honours Project (2 students)	
Sci 263	Science and Society	1/6
Biol 680	Special Topics (5 students)	all

#### 6. Teaching responsibilities 1984/85:

Biol 342	Microbial Biotechnology	all-2x
Biol 480	Biotechnology	1/2
Biol 669	Plant Molecular Biology	1/2
Supervisor of 2 Integrated Studies students		

## 7. Departmental responsibilities 1985/86:

- 1) Graduate Officer
- 2) Committee member for:
 

M. Gruber	Ph.D.	S. Ghosh	Ph.D.
K. Savage	M.Sc.	M. Fobel	M.Sc.
T. Warren	M.Sc.	R. Kolenc	M.Sc.
C. Duxbury	Ph.D.	D. McCormac	M.Sc.
A. Gianetto	Ph.D.		
- 3) Member Executive Committee of Microbial Biotechnology Centre of Guelph/Waterloo Biotech.

## 8. Departmental responsibilities 1984/85:

- 1) Member Guelph-Waterloo Biotechnology Planning Committee
- 2) Graduate Officer
- 3) Committee member for:
 

M. Gruber	M.Sc., Ph.D.	A. Gianetto	Ph.D.
J. Moon	M.Sc.	R. Kolenc	M.Sc.
C. Duxbury	Ph.D.		
M. Fobel	M.Sc.		
- 4) Liaison between the Biology Department and the industrial community.
- 5) Member of U.R.F. Selection Committee

## 9. Invited lectures:

- 1) Conrad Grebel College, "Biotechnology: its impact on our way of life", February 1983.
- 2) Canadian Manufacturers Association, "Biotechnology", March 1983.
- 3) Science 219, "Biotechnology", October 1983.
- 4) The Molson Companies, "Opportunities in Biotechnology", November 1983.
- 5) Aurora District High School Science Teachers, "Biotechnology", April 1984.
- 6) Waterloo Unitarian Fellowship, "The Promise of Biotechnology", February 1985.
- 7) Colloquium for the Critical Approach, Science and Philosophy, "Cloning and Manipulating Cellulase Genes", University of Guelph, March 1985.
- 8) Wilfrid Laurier University, "Biotechnology", January 1986.
- 9) Beth Jacob Synagogue, Kitchener, "Biological Ethics and Biotechnology", January 1986.
- 10) Ontario Ministry of Agriculture and Food, "Biotechnology and Agriculture", Elora, Ontario, February 1986.

## 10. Professional service:

- 1) Associate Editor of "Biotechnology Advances"
- 2) Referee for Canadian Journal of Biochemistry
- 3) Referee for Canadian Journal of Microbiology
- 4) Referee for the Cell Biology and Genetics Committee of NSERC
- 5) External examiner for an M.Sc. thesis from the University of Moncton, Fall 1982.
- 6) Consultant to the Ontario Science Centre on Biotechnology, Fall 1982.
- 7) Judge at Bruce County Science Fair, Spring 1983.
- 8) Hosted a visiting scientist from NRC (Ottawa), for a one-week period, as part of a collaborative project, Spring 1983.
- 9) Consultant to Southam Publications on Biotechnology, Fall 1983.
- 10) Referee for Biotechnology Letters
- 11) Referee for the Connaught Committee
- 12) Referee for the Ontario M.N.R. Rabies Committee
- 13) Hosted a visiting scientist from the University of Puerto Rico during his sabbatical year, Nov. 1984-May 1985.
- 14) Referee for Biotechnology Strategic Grants Panel of NSERC.
- 15) Referee for Medical Research Council of Canada.
- 16) Executive member of the Canadian Society for Plant Molecular Biology.

## Publications:

## A) Refereed Journals

- 1) Brubacher, L.J. and Glick, B.R. 1974. The Inhibition of Papain by N-Ethylmaleimide. *Biochemistry* 13, 915.
- 2) Glick, B.R. and Brubacher, L.J. 1974. Evidence for Non-Productive Binding Subsites Within the Active Site of Papain. *Can. J. Biochem.* 52, 877.
- 3) Glick, B.R. and Brubacher, L.J. 1975. The Reaction Between N-Ethylmaleimide and Ribosomes. A Re-examination of Some Common Assumptions. *J. Mol. Biol.* 93, 319.
- 4) Glick, B.R. and Ganoza, M.C. 1975. Identification of a Soluble Protein that Stimulates Peptide Bond Synthesis. *Proc. Natl. Acad. Sci. U.S.A.* 72, 4257.
- 5) Glick, B.R. and Leggett, D.J. 1976. A Method for Determination of the pKa of  $\alpha$ -N-Benzoyl L-Arginine in the Presence of an Impurity. *Anal. Biochem.* 70, 563.
- 6) Glick, B.R. and Brubacher, L.J. 1976. An Examination of the Rate Assay to Determine the Active Site Normality of Papain. *Anal. Biochem.* 73, 419.
- 7) Glick, B.R. and Ganoza, M.C. 1976. Characterization and Site of Action of a Soluble Protein that Stimulates Peptide Bond Synthesis. *Eur. J. Biochem.* 71, 483.
- 8) Glick, B.R. 1977. The Role of *E. coli* Ribosomal Proteins L7 and L12 in Peptide Chain Propagation. *FEBS Lett.* 73, 1.
- 9) Glick, B.R. and Brubacher, L.J. 1977. The Chemical and Kinetic Consequences of the Modification of Papain by N-Bromosuccinimide. *Can. J. Biochem.* 55, 424.
- 10) Glick, B.R., Brubacher, L.J. and Leggett, D.J. 1978. A Graphical Method for Extracting Rate Constants from Reactions not Monitored to Completion. *Can. J. Biochem.* 56, 1055.
- 11) Glick, B.R., Chladek, S. and Ganoza, M.C. 1979. Peptide Bond Synthesis with Different Aminoacyl Acceptors is Stimulated Differentially by Elongation Factor EF-P. *Eur. J. Biochem.* 97, 23.
- 12) Glick, B.R., Green, R.M. and Ganoza, M.C. 1979. Purification of Factor EF-P, a Protein that Stimulates Peptide Bond Synthesis with Certain Aminoacyl-tRNA Analogues. *Can. J. Biochem.* 57, 749.
- 13) Glick, B.R., Martin, W.G., Giroux, J.J. and Williams, R.E. 1979. The Interaction of Polymeric Viologens with Hydrogenases from *Desulfovibrio desulfuricans* and *Clostridium pasteurianum*. *Can. J. Biochem.* 57, 1093.

- 14) Glick, B.R. 1980. A Molecular Model of Peptide Chain Propagation. *J. Thr. Biol.* 82, 149.
- 15) Glick, B.R., Wang, P.Y., Schneider, H. and Martin, W.G. 1980. Identification and Partial Characterization of an *E. coli* Mutant with Altered Hydrogenase Activity. *Can. J. Biochem.* 58, 361.
- 16) Martin, S.M., Glick, B.R. and Martin, W.G. 1980. Factors Affecting the Production of Hydrogenase by *Desulfovibrio desulfuricans*. *Can. J. Micro.* 26, 1209.
- 17) Glick, B.R., Martin, W.G. and Martin, S.M. 1980. Purification and Properties of the Periplasmic Hydrogenase from *Desulfovibrio desulfuricans*. *Can. J. Micro.* 26, 1214.
- 18) An, G., Glick, B.R., Friesen, J.D. and Ganoza, M.C. 1980. Identification and Quantification of Elongation Factor EF-P in *E. coli* Cell-Free Extracts. *Can. J. Biochem.* 58, 1312.
- 19) Glick, B.R. 1980. The Chemical Modification of *E. coli* Ribosomes with Methyl p-Nitrobenzenesulfonate. Evidence for the Involvement of a Histidine Residue in the Functioning of the Ribosomal Peptidyl Transferase. *Can. J. Biochem.* 58, 1345.
- 20) Glick, B.R., Zeisler, J., Banaszuk, A.M., Friesen, J.D. and Martin, W.G. 1981. The Identification and Characterization of a Plasmid Containing the Gene for the Membrane-Associated Hydrogenase from *E. coli*. *Gene*, 15, 201.
- 21) See, Y.P. and Glick, B.R. 1982. Analysis of the Expression of Cloned Genes Using an *E. coli* Cell-Free System. *Can. J. Biochem.* 60, 1095.
- 22) Banaszuk, A.M., Deugau, K.V., Sherwood, J., Michalak, M. and Glick, B.R. 1983. An Efficient Method for the Sequence Analysis of Oligodeoxyribonucleotides. *Anal. Biochem.* 128, 281.
- 23) Pulleyblank, D., Michalak, M., Daisley, St. L. and Glick, B.R. 1983. A Method for the Purification of *E. coli* DNA by Homogeneous Lysis and Polyethylene Glycol Precipitation. *Molec. Biol. Rpts.* 9, 191-196.
- 24) Pasternak, J.J., Gruber, M.Y., Thompson, J.E. and Glick, B.R. 1983. Development of DNA-Mediated Transformation Systems for Plants. *Biotech. Adv.* 1, 1-15.
- 25) Wolff, B.R., Glick, B.R. and Bols, N.C. 1984. Effect of 12-O-Tetradecanoylphorbol-13-acetate (TPA) on Cell-Surface Glycosaminoglycans (GAGs) in Human Diploid Fibroblasts. *Can. J. Biochem. Cell Biol.* 62, 1354-1357.
- 26) Glick, B.R., Brooks, H.E. and Pasternak, J.J. 1985. Transformation of *Azotobacter vinelandii* with Plasmid DNA. *J. Bacteriol.* 162, 276-279.



- 27) Glick, B.R., Pasternak, J.J. and Brooks, H.E. 1985. The Development of Azotobacter as a Bacterial Fertilizer by the Introduction of Exogenous Cellulase Genes. First Bioenergy Specialists Meeting on Biotechnology, eds. S. Hasnain, J. Lamptey and M. Moo-Young, pp. 180-193.
- 28) Green, R.M., Glick, B.R. and Ganoza, M.C. 1985. Requirements for in vitro Reconstruction of Protein Synthesis. Biochem. Biophys. Res. Commun. 126, 792-798.
- 29) Gianetto, A., Berruti, F., Glick, B.R. and Kempton, A.G. 1986. The Production of Ethanol from Lactose in a Tubular Reactor by Kluyveromyces fragilis Immobilized on Charcoal or Woodchips. App. Microbiol. Biotech. in press.
- 30) Pasternak, J.J. and Glick, B.R. 1986. Cloning of Cellulase Genes: Genetic Engineering and the Cellulose Problem. Current Perspectives in Biomass Conversion, in press.
- 31) Lem, N.W. and Glick, B.R. 1986. Biotechnological Uses of Cyanobacteria. Biotech. Adv. 3, 195-208.
- 32) Glick, B.R., Brooks, H.E. and Pasternak, J.J. 1986. Physiological Effects of the Transformation of Azotobacter vinelandii by Plasmid DNA. Can. J. Microbiol. in press.
- 33) Lem, N.W., Penrose, D.M. and Glick, B.R. 1986. Partial Purification and Characterization of Phosphoenolpyruvate Carboxylase from the Cyanobacterium, Anabaena Variabilis. Can. J. Biochem. Cell Biol., in press.
- 34) Wolff, B.R., Mudry, T.A., Glick, B.R. and Pasternak, J.J. 1986. Isolation of endoglucanase genes from Pseudomonas fluorescens subsp. cellulosa and Pseudomonas sp. App. Environ. Microbiol., in press.

Submitted for publication:

- 1) Harrington, T.R., Glick, B.R. and Lem, N.W. 1986. Molecular cloning of the phosphoenolpyruvate carboxylase gene from Anabaena variabilis.
- 2) Wolff, B.R., Glick, B.R. and Pasternak, J.J. 1986. A computer program for establishing and maintaining a database for laboratory culture collections.
- 3) Gruber, M.Y., Glick, B.R., Thompson, J.E. and Gendel, S.M. 1986. In vitro expression of a cyanobacterial plasmid.
- 4) Penrose, D.M. and Glick, B.R. 1986. Organ-specific expression of PEP carboxylase in sorghum.

B) Book Reviews:

- 1) Glick, B.R. 1986. "Biotechnology and the Environment". In Risk Abstracts.

RESUME

RECEIVED APR 3 0 1986

Name: IRENE HENRIETTE VAN LIER COURAGE  
Born: February 13, 1955  
Address: Home  
16 Shields Avenue  
Toronto, Ontario  
M5N 2K2  
(416) 488-7801  
Business  
(416) 865-7033

EMPLOYMENT EXPERIENCE

April 1985-present: Associate lawyer at McMillan, Binch practising in the corporate-commercial area with an emphasis on international trade (including customs, sales taxes, anti-dumping and countertrade) and environmental issues.

June 1983- August 1984: Student at law at McMillan, Binch. Exposure to commercial litigation, real estate law, taxation, corporate commercial law, environmental law, anti-dumping law, banking law and legal research.

September 1982-March 1983: Part-time legal research assistant at McMillan, Binch, mainly in the area of customs law.

August 1981-August 1982: Legal research assistant at McMillan, Binch mainly in the areas of customs, anti-dumping, sales tax and environmental law.

September 1978-July 1979: Part-time research and teaching assistant to Dr. P. van Dijk, Professor in the Law of International Institutions, at Utrecht University, the Netherlands.

September 1976-August 1979: Part-time private instructor in economics to undergraduate law students in Utrecht, the Netherlands.

LANGUAGES

Fluent in English and Dutch; working knowledge of French; Rudimentary knowledge of German.

EDUCATION

Legal:

April 1985: Call to the Ontario Bar.

June 1983: Certificate of Qualification, equivalent to Canadian LL.B. degree, University of Toronto.

Academic Performance: B average.

June 1981: LL.M., Harvard Law School.  
Academic Performance: B+ average.  
July 1980: LL.M., Dalhousie Law School.  
Academic Performance: A for all courses.  
July 1979: Masters degree in Dutch and International  
Law, and Qualification to teach economics in a high  
school, Utrecht University.  
Academic Performance: top 5% of class.  
February 1975: B.A. (Kandidaats) in Law, Utrecht  
University.  
Academic Performance: one of two students receiving  
honours out of a class of 400.

Preparatory:

June 1973: Stedelijk gymnasium beta (science and  
languages), Utrecht.

Other:

1975 and 1977: Two one month courses in French  
language and civilization in Montpellier and  
LaRochelle, France.

MAJOR PUBLICATIONS

1984: Chapter on GATT in "Supervisory Mechanisms in  
International Economic Organizations", P. van Dijk  
(General Editor) Kluwer, Deventer/Boston 169 pages in  
English (based on 1979 publication in Dutch).  
1981: Paper on Acid Rain and International Law  
published in: Proceedings of an International  
Symposium on Acidic Precipitation and Fishery Impacts  
in North America, Cornell University, American  
Fisheries Society, Bethesda, Maryland, U.S.A., 10  
pages.  
1981: Acid Rain and International Law, Bunsel  
Environmental Consultants, Toronto and Sijthoff and  
Noordhoff, Alphen aan den Rijn, 200 pages.  
1979: Mechanisms of Supervision in GATT, Utrecht  
University Press, 179 pages in Dutch.  
1974-1977: Several articles in Students Law Review  
"Iust", Utrecht.

OTHER ACTIVITIES

1981-present: Editor CCIL (Canadian Council on  
International Law) Bulletin.  
1982-present: Associate Editor Canadian Environmental  
Law reports.  
1978-1979: Member of Board of Directors of Utrecht  
University Newspaper.

1977-1979: Member of Governing Council of the Department of International Legal Studies, Utrecht University.

1976-1978: Co-editor of students law review "Iust".

1976-1977: President of female student sports association.

#### AWARDS

1981: Scholarships from Dutch International Law Society and Harvard University for one year of studies at Harvard.

1980: J.P.A. Francois award of the Dutch branch of the International Law Association for the best thesis in the field of International Law written in 1979.

1979-1980: Killam Scholarship, Dalhousie University.

1975: J.P. Koster award for the best publication in the Utrecht Students Law Review "Iust".

#### REFERENCES

- Available on request.

References

- David I. Matheson, McMillan, Binch, Box 38, South Tower, Royal Bank Plaza, Toronto, Ontario, M5J 2J7, Tel. (416) 865-7081
- Professor Louis B. Sohn, School of Law, University of Georgia, Athens, Georgia 30602, U.S.A. Tel. (404) 542-7940
- Professor R. St. John Macdonald, Dalhousie Law School, Halifax, Nova Scotia B3H 4H9 Canada, Tel. (902) 424-3521
- Dr. P. van Dijk, Europa Instituut, Janskerkhof 36, 3512 BK Utrecht, Netherlands, Tel. 011-31-30-322428

**YVONNE CAROL SKOF**

21 Astley Avenue  
Toronto, Ontario  
M4W 3B3  
(416) 924-5154

**EMPLOYMENT**

**LAW:**

1985                   **Masella & Skof, Toronto.**  
**Partner** in the law firm of Masella & Skof.  
Controlled all of the firm's Real Estate, Corporate,  
and Commercial files, as well as a significant portion  
of the Civil Litigation and Estates files.  
Responsible for all financial aspects of Law Office  
Management.

1984-85               **Haber & Haber, Burlington.**  
**Junior Lawyer.**  
Prepared files and represented clients in the areas of  
Civil Litigation, Real Estate, and Business Law.  
Worked as Duty Counsel in Provincial Court (Family  
Division) and Provincial Court (Criminal Division), as  
well as staffing an evening legal clinic.

1982-83               **Sanderson, Cochrane & Gastmeier, Toronto.**  
**Articling Student.**  
Civil Litigation: researched issues, drafted  
documents, argued motions, and conducted trials.  
Real Estate: handled all aspects of purchase and sale  
files.  
Corporate/Commercial Law: assisted senior partner  
with incorporations, security agreements, bankruptcy  
issues, and power of sale proceedings.  
Criminal, Estates and Family Law: these files were  
also undertaken.

**COMPUTER:**

1977                   **Ontario Hydro, Toronto. Summer Employment.**  
Programming: Created Input/Output Routine for  
Utilization Reports (FORTRAN language).  
1978 & 79             Analysis: Analysed graphic records and digital  
computer records for billing purposes.  
1980                   Prepared Computer Utilization Reports, and tested  
Budget/Accounting Program for ease of use.  
1981                   Mechanics: Responsible for loading tape drives.

YVONNE CAROL SKOF

**EDUCATION**

- 1985 **University of Toronto.**  
Presently enrolled in the part-time M.B.A. program.  
Specializing in Natural Resource Management.
- 1984 **Bar Admission Course, Osgoode Hall, Toronto.**  
Above average standing.
- 1982 **University of Western Ontario, London.**  
Bachelor of Laws.  
Outstanding academic performance.
- Courses included Environmental & Administrative Law. Studies involved examination of the following Statutes:
- Statutory Powers Procedure Act
  - Judicial Review Procedure Act
  - The Environmental Protection Act
  - The Ontario Water Resources Act
  - Planning Act
  - Nuclear Liability Act
- 1981 **Western-Laval Exchange Program (Faculty of Law).**  
Studied Civil Law (in French) for four months at Laval University.  
"A" Average.
- 1979 **University of Toronto.**  
Bachelor of Science in Zoology (Genetics).  
Graduated with distinction.
- Courses chosen reflected my interest in environmental studies: all the basic sciences, Organic Chemistry, Biochemistry, Ecology, Statistics, and Genetics.
- Participated in the environmental testing of waterways, and conducted chemical analyses.
- Analyzed collected data, using both univariate and multivariate statistical methods.
- French Summer Language Bursary Program.**
- 1984 Universite du Quebec a Chicoutimi.  
1982 Trois Pistoles (University of Western Ontario).  
1981 College de Riviere-du-Loup.  
1974 Universite du Quebec a Montreal.



**YVONNE CAROL SKOF**

**LAW RELATED  
ACTIVITIES**

- 1980-81      **Student Legal Aid**, University of Western Ontario.  
Represented clients on summary conviction offences,  
Highway Traffic Act violations, and landlord and  
tenant problems.
- 1980      **Consumer Complaint Bureau**, University of Western  
Ontario.  
Mediated consumer complaints.

**POSITIONS HELD**

- 1980-81      Elected to the **Legal Society Executive and Faculty  
Council**, Faculty of Law, University of Western  
Ontario.
- 1980-81      Appointed to the **Faculty Council Review Committee**,  
composed of three professors and three students.
- 1978-79      Elected to the **Students' Administrative Council Board  
of Directors**, University of Toronto.  
(Education and Services Commissions).
- 1976-79      Elected as Senator to the **St. Michael's College  
Students' Union**, University of Toronto.  
Actively participated in the following commissions:  
Finance, Social, Education, Governmental Affairs,  
Information, Cultural Affairs, and Summer Steering.
- 1976-79      Orientation Group Leader.

**PERSONAL  
INTERESTS**

Politics, Drama, Dance, Sports, Camping, Orienteering,  
Photography, and Computers.

**MEMBERSHIPS**

Member of the Environmental Law and Natural Resources  
& Energy sections of the Canadian Bar Association.

**REFERENCES**

To be supplied upon request.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100