

GUY A. CARDINEAU, Ph.D.

EDUCATION:

- 1977 - 1983 Ph.D., Molecular and Cellular Biology, (Dr. Roy Curtiss, III), Department of Microbiology of the Graduate and Medical Schools, University of Alabama, Birmingham. Ph.D. Dissertation: Characterization of the *Streptococcus mutans* gene for Aspartate β -Semiaaldehyde Dehydrogenase: identification of sequences involved in gene expression and their use in vector construction.
- 1975 - 1977 B.S., Microbiology, School of Agriculture, Auburn University.
- 1968 - 1972 A.B., American Civilization (Major: American Literature; Minor: American History), Lafayette College.
- Executive Education: Certificate in "Managerial Issues in the Global Enterprise", Thunderbird, The American Graduate School of International Management, May 1-12, 2000

EXPERIENCE:

- January 2003 - Present Research Professor, the Biodesign Institute at ASU, the School of Life Sciences and the College of Law, Arizona State University.
- Co-Founder of proVacs (Production of Vaccines from Applied Crop Science) as part of the Center for Infectious Diseases and Vaccinology of the Biodesign Institute and Fellow, The Center for the Study of Law, Science and Technology, the Sandra Day O'Connor College of Law, Arizona State University. In addition to research and teaching responsibilities, served on the Design Teams for the Biodesign Institute Building A and the Interdisciplinary Science and Technology Building 3, the latter of which involves the design of a GMP plant-made pharmaceutical pilot processing facility, along with more standard laboratory space. Also instrumental in the establishment of the Technology Ventures Clinic, providing a transactional experience in technology transfer to students from Law, Business and Science curriculums. Served on a team empanelled by the President of ASU to develop a conceptual center for entrepreneurship, which resulted in a proposal to create an "Innovation Institute." Serve on the Advisory Board of ASU Technopolis. Represent the Biodesign Institute in the establishment of a collaborative interaction between Biodesign and Tec de Monterrey, Monterrey, Mexico, another initiative sponsored by the President of ASU. Faculty Affiliation
- School of Life Sciences: Bioscience and Biotechnology; Molecular and Cellular Biology; Human Dimensions. Program Affiliation: Consortium for Science Policy Outcomes; Program in Bioethics; Center for the Study of Religion and Conflict.
- October 2002 – Present Scientific Consultant
- November 2001– September 2002 Global Leader for Science and Technology and Subject Matter Expert, R&D Discovery, Dow AgroSciences, LLC, San Diego, CA and Indianapolis, IN
- Chairman of Science and Technology Strategy Committee responsible for cross-functional scientific and technical capabilities identification and development across all Discovery Research functions. Serve as Scientific Expert for Biotechnology Programs in Input and Output Agriculture research

areas and related Intellectual Property activities. Maintain participation in

DAS and Dow teams listed below and the Research Management Committee of the Animal Health Program.

April, 2000 –
September 2002

San Diego Site Leader, Dow AgroSciences, LLC, San Diego, CA

Responsible for the operation of the San Diego Research Facility, which includes a four building campus encompassing about 120,000 square feet of research laboratory and office space. The San Diego Site houses both Dow AgroSciences and Dow Chemical Company Biotechnology Research Groups and Dow's New Businesses Group for Biotechnology. Also serve as Responsible Care Leader for both Dow AgroSciences and the Dow Chemical Company, and as contact for a variety of San Diego organizations such as The Chamber of Commerce.

November, 1998 –
November, 2001

Global Leader, Research & Development, Output Agriculture, Gene Discovery, Dow AgroSciences, LLC, San Diego, CA

One of four senior research leaders for Dow AgroSciences Plant Genetics and Biotechnology Platform. Responsibilities include the conception, implementation and development of all R&D activities directed at Output Traits in plants. This encompasses nutrition, oils, fibers, starch, high value proteins, biopharma applications and any biological or functional molecule that could be produced via expression in a plant. Responsible for assembling a new, multi-disciplinary research staff and planning and reviewing the construction of new laboratory facilities in San Diego. Serve on a number of teams involved in strategic planning and direction including Licensing, Intellectual Property, Value Added Grains, Cross Functional Oils Team, Dow AgroSciences R&D Biotechnology Management Team, Animal Health R&D Advisory Committee, Biotechnology Safety Assessment Science Team and The Dow Chemical Company's Technology Advisory Board for Biotechnology. Also serves as DAS senior science representative on the Research Management Committees of four external research collaborations. Initiate, develop and maintain collaborative interactions with both academic and corporate entities. Continue to support Intellectual Property Litigation activities.

May, 1996 –
October 1998

Director, Technology Development, Mycogen Corporation, San Diego, CA

Provide technical guidance to the President of Mycogen and both internal and external Legal Counsel relating to Intellectual Property matters. Partner with Chief Patent Counsel in strategic planning regarding Intellectual Property including review and analyses of competitive positions, litigation strategy involving infringement, interference and opposition strategy in the US PTO and the EPO. Additional responsibilities include participation in the identification, evaluation and acquisition of technology directed toward future product development.

September, 1993 -
April, 1996

Director, Molecular Biology, Mycogen and Mycogen Plant Sciences, San Diego, CA

Responsible for all aspects of Molecular Biology research in support of Mycogen's business units. This eventually included all Biochemistry programs, as well, with a group of about 30 including 9 Ph.D. level scientists. Represent Mycogen Molecular Biology in discussions and collaborative interactions with academic, business and investment communities. Support Intellectual Property activities, both foreign and domestic. Support Licensing activities, both in- and out-license.

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- January 1993 - August 1993 Director, Molecular Biology, Agrigenetics, L.P., Madison, WI.
In addition to responsibilities listed below, coordinate and serve to implement interaction between Agrigenetics' and Mycogen's laboratory research groups.
- August 1989 - December, 1992 Senior Scientist and Manager, Molecular Biology, Agrigenetics Company, Madison, WI.
Coordinate and implement the activities of the Molecular Biology Group. Bt Program Leader. Core Technology Program Leader. Alfalfa Project Leader. Quality Management Trainer and Coach. Assist in development and licensing of patent portfolio. Represent Molecular Biology in discussions and collaborative interactions with academic, business and investment communities.
- November, 1986 - October, 1987 Manager of Market Development, Sungene Technologies Corporation, San Jose, CA.
- September 1983 - July, 1989 Scientist, Molecular Biology, Sungene Technologies Corp., San Jose, CA.
Corn project leader in molecular biology group. Involved in development of vectors and systems for transformation of both dicot and monocotyledonous species and studies of 5' DNA regulatory sequences in soybean. Soybean transformation project leader. Senior member construction group, Bt Project.

HONORS & AWARDS

Alpha Zeta (77); Gamma Sigma Delta (77); Dean's Fellow (77-80); Sigma Xi Research Award (82); Sigma Xi (82); Who's Who in California (89); Men and Women of Science, 1994 - present; Who's Who Worldwide, 1995; Mycogen President's Award, 1996 and 1998; Dow AgroScience Inventors' Award, 1998, 1999, 2000, 2001, 2002; Strathmore's Who's Who, 1998-present.

PROFESSIONAL SOCIETIES/ORGANIZATIONS:

American Society for Microbiology
International Society for Plant Molecular Biology
American Society for Biochemistry and Molecular Biology
Licensing Executives Society
American Association for the Advancement of Science
BIOCOM /san diego (currently serve on the IP Committee and as Chairman of the Agricultural Biotechnology Committee)
BIO (Communications and Food & Ag organizing committees and Section Chair "Agricultural Biotechnology: From Farm to Pharm", BIO2001; Food & Ag organizing committee, BIO2002)
San Diego Center for Molecular Agriculture

TEACHING:

Invited Lecturer: Santa Clara University, Department of Biology, 1986
Invited Lecturer: University of Georgia, Athens, for joint Biochemistry and Molecular Biology course entitled "Biotechnology", yearly 1998-present.
Invited Lecturer: University of California San Diego Extension, 2001 and 2002
Invited Lecturer: Capstones in Biotechnology, School of Life Sciences, Arizona State University, 2003.
Invited Lecturer: Law, Science and Technology, College of Law, Arizona State University, 2003

Courses at Arizona State University:

College of Law:

Law 691, Intellectual Property Portfolio Management

Law 691, Intellectual Property Commercialization, Technology Transfer and Licensing

Law 691, Biotechnology: Law, Science and Policy

School of Life Sciences:

MBB 484, Molecular Bioscience and Biotechnology Internship

MBB 484, Technology Ventures Clinic Internship, Undergraduate Students

MBB 490, Molecular Bioscience and Biotechnology Capstone: The Business of
Biotechnology (Fall Semesters)

MBB 490, Molecular Bioscience and Biotechnology Capstone: Issues in
Biotechnology (Spring Semesters)

PLB 499, Plant Biology Independent Study

BIO 784, Technology Ventures Clinic, Graduate Students

Students:

Undergraduate Research: Heidi Pinyerd, Jason Crisantes, Peter Whitney,

Federico Martin, Vonda Avery, Marc Steigers, Jilliane Miller, Laura Bell

Michael Ewing, Brian Webb, Michael Ewing, Angela Rojas, Sachie Dale,

Deborah Pauley, Amber Gustin

Graduate Interns: Damien Salamone

Graduate Students: Dwayne Kirk (PhD 2005), Karin Doerr (MS 2006)

Law, Science & Technology Advisees: Timothy Kwok, Evan Dushman, Andrew Marcy,

Jeffrey Jackson, Paul Coble, Sara Dirvianskis

Biotechnology, Genomics and the Law, LL.M. Advisees: Alamu Manickam,

Cindy Strickland

SCIENTIFIC AND COMMUNITY SERVICE:

Mentor Scientist, Mentor/Teacher Program, University of California, Davis, 1987-88

Mentor Scientist, Mentor Partnership Program, University of California, San
Francisco, 1989

Life Sciences Technology Review Panel, Wisconsin Department of Development, 1991

Volunteer, Poway Unified School District, 1998-2003 (visit science classes, serve as
Science Fair Judge)

Science Advisory Board, County of San Diego Board of Supervisors, State of California,
September 2001-2003

Invited Biotechnology Expert, Office of Science and Technology, Organization of
American States, 2003-present.

USDA CREES SBIR Grants Review Panel, 2004-present

Junior Varsity Head Coach, Mountain Pointe Pride Lacrosse, 2004-present

Arizona Town Hall, 2005-present

BioAgriculture Research & Technology Platform Committee, Flinn Foundation, Arizona

Biotechnology Roadmap, 2006

PUBLICATIONS:

Curtiss, R. III, Jagusztyn-Krynicka, E.K., Hansen, J.B., Smorawinska, M., Abiko, Y., and Cardineau, G.A.
1982. Expression of *Streptococcus mutans* plasmid and chromosomal gene in *Escherichia coli* K-12. In: Microbial
Drug resistance, S. Mitsuhashi (ed.), Japan Scientific Societies Press, Tokyo and University Park press, Baltimore,
Vol. 3, pp. 15-27.

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Murchison, H.H., Barrett, J.F., Cardineau, G.A., and Curtiss III, R. 1986. Transformation of *Streptococcus mutans* with chromosomal and shuttle plasmid (pYA629) DNA's. *Infection and Immunity* 54: 273-282.

Cardineau, G.A. and Curtiss III, R. 1987. Nucleotide sequence of the *asd* gene of *Streptococcus mutans*: identification of the promoter region and evidence for attenuator like sequences preceding the structural gene. *J. Biol. Chem.* 262: 3344-3353.

Adang, M.J., Brody, M., Cardineau, G.A., Eagan, N., Roush, R.T., Shewmaker, C.K., Jones, A., Oakes, J.V., and McBride, K.E. 1993. The construction and expression of a *Bacillus thuringiensis cryIIIA* gene in protoplasts and potato plants. *Plant Mol. Biol.* 21: 1131-1145

Stewart, C. Neal, Jr., Adang, Michael J., All, John N., Boerma, Roger, Cardineau, Guy A., Tucker, Donna and Parrot, Wayne A. 1996. Genetic transformation, recovery and characterization of fertile soybean transgenic for a synthetic *Bacillus thuringiensis cryIA(c)* gene. *Plant Physiology* 112:121-129

Singsit, C., Adang, M.J., Lynch, R.E., Anderson, W.F., Wang, A., Cardineau, G.A. and Ozias-Akins, P. 1997. Expression of a *Bacillus thuringiensis cryIA(c)* gene in transgenic peanut plants and its efficacy against lesser cornstalk borer. *Transgenic Research* 6:169-176.

Ellis, R. Tracy, Stockhoff, Brian A., Stamp, Lisa, Schnepf, H. Ernest, Schwab, George E., Knuth, Mark, Russell, Josh, Cardineau, Guy A. and Narva, Kenneth E. 2002. Novel *Bacillus thuringiensis* Binary Insecticidal Crystal Proteins Active on Western Corn Rootworm, *Diabrotica virgifera virgifera* LeCompte. *Applied and Environmental Microbiology* 68:1137-1145.

Mor, Tsafirir S., Mason, Hugh S., Kirk, Dwayne D., Arntzen, Charles J. and Cardineau, Guy A., Plants as a Production and Delivery Vehicle for Orally Delivered Subunit Vaccines. In: Levine, M.M., Woodrow, G.C., Kaper, J.B., Cobon, G.S., eds. *New Generation vaccines*, Third Edition, New York: Marcel Dekker, January 2004.

Alvarez, M. Lucrecia, Pinyerd, Heidi, Crisantes, Iason, Mason, Hugh S. and Cardineau, Guy A. Production in tomato of edible vaccines for pneumonic and bubonic plague. In: *Proceedings of the REDBIO Congress*, June 21-24, 2004, Santo Domingo, the Dominican Republic.

Mihaliak, Charles A., Steven Webb, Timothy Miller, Matt Fanton, Dwayne. Kirk, Guy Cardineau, Hugh Mason, Amanda Walmsley, Charles Arntzen, Joyce Van Eck. Development of Plant Cell Produced Vaccines for Animal Health Applications. In: *Proceedings of the 108th Annual Meeting of the U.S. Animal Health Association* (October 21-27, 2004, Greensboro, NC), Richmond, VA, 2005.

Alvarez, M. Lucrecia, Heidi Pinyerd, Jason Crisantes, M. Manuela Rigano, Julia Pinkhasov, Amanda M. Walmsley, Hugh S. Mason, and Guy A. Cardineau. 2006. Plant-Made Subunit Vaccine against Pneumonic and Bubonic Plague is Orally Immunogenic in Mice. *Vaccine* 24:2477-2490

ABSTRACTS:

Cardineau, G.A., Jagusztyn-Krynicka, K.E., and Curtiss III, R. Location and sequence of the promoter region of the B-aspartic semialdehyde dehydrogenase gene from *Streptococcus mutans* cloned in *Escherichia coli*. Abstracts of the First International conference of Streptococcal Genetics, Sarasota, FL, November, 1981.

Cardineau, G.A., and Curtiss III, R. Identification of the regulatory region and the *asd* gene of *Streptococcus mutans*. Abstracts of the Summer Symposium in Molecular Biology, "Regulation of Gene Expression," The Pennsylvania State University, University Park, Pennsylvania, August, 1982.

Cardineau, G.A., Murchison, H.H., Perry, D., and Barrett, J.F. Transformation of *Streptococcus mutans*: comparison of "shuttle" plasmid versus chromosomal efficiency. Abstracts of the 83rd Annual Meeting of the American Society of Microbiology, New Orleans, Louisiana, March, 1983.

Zhu, Y-S, Brookes, A., Carlson, K., Cardineau, G., and Filner, P. 1988. An Improved Technique for Separation of Protein Crystals from Spores of *Bacillus thuringiensis* by Ludox Gradient Centrifugation. The Second International Congress of Plant Molecular Biology, Jerusalem, November 13-18, 1988.

Whitehorn, E.A., Zaitlin, D., Hoo, B., Frome, M., Cardineau, G.A., and Filner, P. Patterns of Inheritance in Maize: The use of PCR as an alternative to Southern blotting in RFLP analysis. UCLA Symposium on Molecular and Cellular Biology, the Polymerase Chain Reaction: Methodology and Applications, Keystone, CO, April 3-7, 1989. Abstract WH253, in J. Cell. Biochem. (1989), Supplement 13E, page 311.

Mehra-Palta, A., Graves, A., Craker, M., Cardineau, G., Poutre, C., Eagan, N., Sernyk, L. 1993. Field Trial of Transgenic Canola Containing a Phaseolin Gene. The Eighth Crucifer Genetics Workshop, Saskatoon, Saskatchewan, Canada.

Miller, T. J., Fanton, M., Cardineau, G., Mason, H., Arntzen, C. 2003. Clinical and Serological Response in Chickens Following the Administration of Plant Made Vaccine Against Newcastle Disease Virus. The 6th International Vaccine Conference, Arlington, VA, May 5-7, 2003.

Webb, SR., Kirk, D., Cardineau, G., Fanton, M., Mason, H., Van Eck, J., Miller, T., & Arntzen, C. (2003). Serological and clinical response in poultry following the administration of a plant-made vaccine against avian influenza. International Vaccine & Veterinary Diagnostic Conference, Guelph, ON, July, 2003.

INVITED TALKS:

The Development of Transgenic Plants: A New Approach to Plant Breeding. May 12, 1989. The Third Annual meeting of the California Society of Toxicology and Society for Risk Analysis, The Presidio of San Francisco, CA.

Engineering insect resistant canola expressing *Bt* toxin genes. July 23, 1993. The Eighth Crucifer Genetics Workshop, Saskatoon, Saskatchewan, Canada.

Molecular Biology of pesticidal toxins from *Bacillus thuringiensis* and their use in transgenic plants. March 9, 1994. The Center for Gene Research and Biotechnology Seminar Series, Oregon State University.

Partners, Patents and Licensing. September 10, 1998. Commercial Opportunities and Clinical Applications of Cloning and Transgenics, San Francisco, California.

Oral Immunization by Transgenic Plants: Development of a Concept (or Where Did You Get Such a Crazy Idea Anyway?). August 30, 1999. Advances in Plant Therapeutics Section, International Molecular Farming Conference 1999, London, Ontario, Canada.

Patent Strategy Considerations. October 14, 1999. Genetic Patenting and IP Challenges and Opportunities Section, BioTherapeutics '99, Washington, D.C.

Output Agriculture: The Future Is In What the Plant Can Produce. October 26, 1999. Agriculture and Plant Sciences – Opportunities and Needs Section, Cal BioSummit, San Diego, California.

Engineered Plants: "Ag Biotech 101". April 5, 2000. Plant-Derived Biologics for Human and Veterinary Applications (Sponsored by DHHS FDA CBER, USDA APHIS PPQ and CVB), Iowa State University, Ames, Iowa. Guy A. Cardineau, Ph.D.

Plant Based Production Systems for Orally Delivered Vaccines. September 14, 2000. Cornell-in-India Biotechnology Initiative: Biotechnology for Development, Madras, India.

Functional Genomics with Plant Viral Expression Systems. October 27, 2000. The San Diego Center for Molecular Agriculture Symposium “New Tools for Plant Biology”, Frederic de Hoffmann Auditorium of the Salk Institute, La Jolla, California.

Opportunities for Plant Produced Renewable Materials: Plant Derived Oral Vaccines. October 30, 2000. The Advance of BioAgriculture Products Into the 21st Century, CalBioSummit, San Diego, California.

Plant Based Production of Orally Delivered Vaccines. March 29, 2000. University of Georgia, Athens, Georgia.

Orally Delivered, Plant Based Vaccines: Rationale, Successes, Issues and Challenges. June 11, 2001. Plant Biotechnology – Better Products from Better Plants. The Phytochemical Society of Europe. 10-13 June 2001, Helsinki, Finland.

A Biotechnology Transition in Manufacturing from the Steel Plant to the Green Plant, Food and Ag Symposium “Agricultural Biotechnology: From Farm to Pharm”, June 27, 2001. BIO2001, San Diego, California.

Agricultural Biotechnology: Past, Present and Future. September 5, 2001. Keynote Address delivered at The U.S. Grains Council Asian Regional Biotechnology Information Conference, September 5-7, 2001, Singapore.

The Production of Vaccines in Transgenic Plants. November 14, 2001. Plenary Address, Health Program, Brazilian Biotechnology Society Congress “Fronteiras da Biologia”, The Maksoud Plaza, Sao Paulo, Brazil.

Oral Immunization Using Transgenic Plants: A New Delivery Vehicle for Vaccines. March 20, 2002. The Development of Second Generation Transgenic Crops, The National Institute of Agrobiological Sciences, Tsukuba, Japan.

Agricultural Biotechnology: the Past, the Present and the Promise of the Future. June 12, 2002. Great Lakes Forum on Agriculture, Pennsylvania State University, State College, Pennsylvania.

Agricultural Biotechnology: the Past, the Present and the Promise of the Future. June 24, 2002. Crop Functional Genomics Center, Seoul National University, Suwon, Korea.

Current Development, Production and Biosafety of Biotech Corn and Soybeans. June 24, 2002. National Agricultural Biotechnology Institute, Suwon, Korea.

Current Development, Production and Biosafety of Biotech Corn and Soybeans. June 25, 2002. Korean Food and Drug Administration, Seoul, Korea.

Current Development, Production and Biosafety of Biotech Corn and Soybeans. June 27, 2002. “Swine Feed, Feeding and Management Seminar”, National Pingtung University of Science and Technology, Ping Tung, Taiwan.

Current Development, Production and Biosafety of Biotech Corn and Soybeans. June 28, 2002. “Feed Manufacturing Short Course”, National Chung Hsing University, Taichung, Taiwan.

Current Development, Production and Biosafety of Biotech Corn and Soybeans. July 1, 2002. "Grains Symposium" (sponsored by the Taiwan Grains and Feeds Development Foundation), Forestry Research Institute, Taipei, Taiwan.

Plant Based Systems for the Production and Delivery of Vaccines: Rationale, Perspective, Issues and Challenges. September 15-18, 2002. Agricultural Biotechnology International Conference, "Agbiotech: Cultivating Convergence", Saskatoon, SK, Canada.

The Application of Agricultural Biotechnology to the Production and Delivery of Vaccines for Oral Immunization. November 4, 2002. BIOTEC Thailand, National Science and Technology Development Agency, Bangkok, Thailand.

Agricultural Biotechnology from Input to Output Traits. November 5, 2002. CropLife Asia Technology Conference, "More People, Less Land: Technology's Role in Sustainable Agriculture in Asia". Bangkok, Thailand.

Antigen Engineering or ... How Can We Improve the Production and Delivery of Vaccines for Oral Immunization. November 6-7, 2002. The proVacs Conference, the Flinn Foundation, Phoenix, Arizona.

Plant Based Production and Delivery of Vaccines for Oral Immunization: How Do We Make It a Reality. February 6-8, 2003. The GE³LS Winter Symposium 2003, Genome Canada, Montreal, Quebec, Canada.

Bio-Pharming: Agricultural Biotechnology from Input to Output (where we've been, where we are and where we're going). April 11, 2003. The Agri-Business Council of Arizona Annual Meeting and Agricultural Biotech Conference, Phoenix, AZ.

Plant Based Production of Vaccines in Food Crops. September 30, 2003. The 2003 American Association of Cereal Chemists Annual Meeting, Portland, Oregon.

Farms to Pharma: Plant Made Pharmaceuticals from Concept to Commercialization. December 8, 2003. Conference on Plant Made Pharmaceuticals, The Center for Business Intelligence, Sheraton National Arlington, Arlington, VA.

Applications of Plant Biotechnology. December 10, 2003. Organization of American States, Workshop on Hemispheric Policies on Scientific and Technological Development in the Americas, Quito, Ecuador.

Impact of Biotechnology on the Corn Industry: Past, Present and Future. US Grains Council Japan Tour: Value Enhanced Grains. February 16-20, 2004. Tokyo, Nagoya and Osaka, Japan

Plant Made Pharmaceuticals: Evolution of Plant-based Subunit Vaccines and Veterinary Applications. April 9, 2004. APHIS Veterinary Biologics Public Meeting, Iowa State University, Ames, IA

Farms to Pharma: Plant Made Pharmaceuticals and the Evolution of Plant-based Subunit Vaccines. October 21, 2004. Arizona Bioindustry Association Oktober BioFest, Phoenix, AZ.

Science Defiled - Or Politics as Usual? An Interactive Panel Discussion in Conjunction With the Third Presidential Debate. October 13, 2004, Armstrong Hall, College of Law, Arizona State University. (Panel Member along with Dr. Henry Miller, Hoover Institution, Stanford University; Dr. Roger Pielke, University of Colorado; and Shelley Fidler of Van Ness Feldman, Washington DC)

A Guide for Due Diligence for Technologies and Compounds. January 31, 2005. Conference on Plant Made Pharmaceuticals, Montreal, Canada.

Exactly what are Genetically Modified Foods anyway? October 7, 2005. Arizona Science Center, First Friday Lecture Series, Phoenix, AZ.

Plants as a Production System for Value Added Proteins and Molecules: With an emphasis on Vaccines. March 11, 2006. 1st International Symposium of Biotechnology, Tecnologico de Monterrey, Monterrey, Mexico.

Plants as a Production System for Value Added Proteins and Molecules: Plant Made Vaccines for Animal Health. April 18, 2006. 3rd Annual BIGMAP Symposium: Understanding and Communicating Issues in Agricultural Biotechnology, Gateway Center, Ames, IA.

PATENTS:

Inventor on over 50 patents and pending applications, US (17 issued, 9 published applications) and foreign filed including the first filed and issued patents on the production of vaccines in plants.

Selected Patents:

US 5,654,184; US 5,679,880; US 5,686,079 and pending: Oral Immunization by Transgenic Plants

US 6,218,188; US 6,673,990 and pending: Plant Optimized Genes Encoding Pesticidal Toxins

WO2004098533 pending: Vectors and Cells for Preparing Immunoprotective Compositions Derived from Transgenic Plants