

Maria de la Paz Celorio-Mancera

Curriculum vitae

Researcher
Department of Zoology
Stockholm University
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Education

Doctor of Philosophy, Plant Biology, June 13, 2008, University of California, Davis (UCD), USA.

Bachelor of Science, Biology, May 24, 2001, National Autonomous University of Mexico (UNAM), Mexico.

Research experience

Researcher, Stockholm University, Department of Zoology, Ecology, Plant-Insect Interactions Group. October 2012 – to date (maternity leave: June 2013-January 2014)

Postdoctorate, Stockholm University, Department of Zoology, Ecology, Plant-Insect Interactions Group. Stockholm, Sweden, October 2010-September 2012

Postdoctorate, Max Planck Institute of Chemical Ecology (MPICE), Department of Entomology, Host-Plant Adaptation Group. Jena, Germany, August 2008-August 2010

Doctoral Research, UCD, September 2002-May 2008

Research Assistant, International Exchange Program. Plant Sciences Department, UCD, June 2001-September 2002.

Practical Training, Pomology Department, UCD, January 2000-December 2000.

Acquired technical skills and methods:

- **Molecular Biology:** PCR, degenerate primer design, rapid amplification of cDNA ends, gene cloning, Northern and Western blot analysis, quantitative RT-PCR, microarray profiling, RNA and DNA extraction and quality analysis, 1D/2D gel electrophoresis.
- **Biochemistry:** Protein purification (precipitation, molecular sieving, anion and cation exchange and affinity chromatography), enzymatic assays for plant cell wall-degrading enzymes, microsome isolation for enzymatic analysis, .
- **Functional analysis:** insect cell culture for heterologous protein expression, transformation of insect cells (via transfection reagent).
- **Chemistry:** HPLC analysis of plant cell wall enzymatic products.
- **Rearing techniques and ecology-related assays:** Insect rearing, plant breeding basics, lepidopteran herbivory assays.

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- **Bioinformatics:** web-based applications (BLAST, Blast2go, Swiss-Prot), microarray analysis (GeneSpring, GeneSifter), gene analysis software (Sequencher), analysis of RNA-sequencing data (R, CLC Genomics), statistics (R, SAS) and MS software.

Teaching experience

Guest Lecturer, Genome Evolution & Functional Genomics, Stockholm University, Molecular Ecology Course, Master's level. 2011 and 2012. **(contact course organizer Dr. Karin Noren: karin.noren@zoology.su.se)**.

Teaching Assistant, Plant Genetics and Biotechnology Laboratory (**PLB 161B-evaluation attached**), UCD, April 2007-June 2007

Teaching Assistant, Introduction to Plant Biology (**BIS1C-evaluation attached**), UCD, January 2006-March 2006

Guest Lecturer, Applied Statistics for Agricultural Sciences, UCD, November 28 and November 30, 2005

Lecturer, Zhejiang University Agriculture and Academic Orientation Program, UCD Extension. Presentation entitled "Comparison between Organic and Conventional Agriculture and the Place for Biotechnology". UCD, August 29, 2005 (**attached**).

Student intern, Agricultural Management and Range Resources, Preparatory for field work in Environmental and Agricultural Education, UCD, January-June, 2005.

Teaching Assistant, Applied Statistics for Agricultural Sciences, UCD, October 2005-December 2005; October 2004-December 2004; October 2003-December 2003; October 2002-December 2002;

Teaching Assistant, Cellular and Molecular Biology of Plants (**PLB 112D-evaluation attached**). UCD, April 2004-June 2004.

Academic service

Graduate Student Representative for the Plant Biology Graduate Group, 2007 UCD

Panelist, 2007 Northern California Western Nevada Junior Science and Humanities Symposium, recognized by The United States Army, Navy, and Air Force.

Panelist, June 20-23, 2006; June 21-24, 2005; June 22-25, 2004. Women around the World Panel, Capitol Focus Programs, Sacramento, CA.

President, Mexican Graduate Student Association at UC Davis, 2003-2004

Secretary, Mexican Graduate Student Association at UC Davis, 2002-2003

Languages

Spanish (mother language); English (fluent); German (intermediate).

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Swedish for Immigrants approved current level: Swedish as Second Language and Swedish for International Students and Researchers at Stockholm University, level 3).

List of Publications

Celorio-Mancera, M. P., Wheat C. W, Vogel, H., Söderlind, L., N. Janz and Nylin, S. 2013. Mechanisms of macroevolution: polyphagous plasticity in butterfly larvae revealed by RNA-Seq. *Molecular Ecology* 22 (19): 4884-4895

Celorio-Mancera, M. P., Sundmalm, S. M., Janz, N., Vogel, H., Rutishauser, D., Ytterberg, J., and R. A. Zubarev. 2012b. Chemosensory proteins, major salivary factors in caterpillar mandibular glands. *Insect Biochemistry and Molecular Biology* 42 (10): 796-805

Celorio-Mancera, M. P., Heckel, D., and H. Vogel. 2012a. Transcriptional analysis of physiological pathways in a generalist herbivore: responses to different host plants and plant structures by the cotton bollworm *Helicoverpa armigera*. 14th International Symposium on Insect-Plant Interactions. *Entomologia Experimentalis et Applicata* 144 (S1):123-133

Celorio-Mancera, M. P., Ahn, S. J., Vogel, H. and D. G. Heckel. 2011b. Transcriptional responses underlying the hormetic and detrimental effects of the plant secondary metabolite gossypol on the generalist herbivore *Helicoverpa armigera*. *BMC Genomics* 12:575

Celorio-Mancera, M. P., Courtiade, J., Muck, A., Heckel, D. G., Musser, R. O. and H. Vogel. 2011a. Sialome of a generalist lepidopteran herbivore: identification of transcripts and proteins from *Helicoverpa armigera* labial salivary glands. *PLoS ONE* 6(10): e26676. doi:10.1371/journal.pone.0026676

Celorio-Mancera, M. P., Greve, C. L., Teuber, L. R. and J. M. Labavitch. 2009. Identification of endo- and exo-polygalacturonase activity in *Lygus hesperus* (Knight) salivary glands. *Archives of Insect Biochemistry and Physiology* 70(2): 122–135

Celorio-Mancera, M. P., Allen, M. L., Powell, A. L., Phinney, B. S., Salemi, M. R., Ahmadi, H., Shackel, K. A., Greve, C. L., Teuber, L. R. and J. M. Labavitch. 2008. Polygalacturonase causes lygus-like damage on plants: Cloning and identification of western tarnished plant bug (*Lygus hesperus*) polygalacturonases secreted during feeding. *Arthropod-Plant Interactions* 2:215–225.

Shackel, K. A., **Celorio-Mancera, M. P.**, Ahmadi, H., Greve, L. C., Teuber, L. R., Backus, E. A. and J. M. Labavitch. 2005. Micro-injection of Lygus Salivary Gland Proteins to Simulate Feeding Damage in Alfalfa and Cotton Flowers. *Archives of Insect Biochemistry and Physiology* 58(2): 69-33

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Books and book chapters

Vogel, H., Musser, R.O., **Celorio-Mancera, M.P.** 2014. Transcriptome responses in herbivorous insects towards host plant and toxin feeding, in Annual Plant Reviews Volume 47: Insect-Plant Interactions (eds C. Voelckel and G. Jander), John Wiley & Sons, Ltd., Chichester, West Sussex, UK. 432 pp.

Peer-reviewed conference contributions

Celorio-Mancera, M. P., Greve, C. L., Ahmadi, H., Teuber, L. R., Shackel, K. A., Allen, M. L. and J. M. Labavitch. 2008. *Lygus hesperus* polygalacturonase characterization and role in plant damage. Abstract. Second International Lygus Bug Symposium - Pacific Grove, California, April 15-17, 2007. 2008. *Journal of Insect Science* 8(49): 6

Celorio-Mancera, M. P., Allen, M. L., Greve, C. L., and J. M. Labavitch. 2008. Polygalacturonase isozymes in *Lygus hesperus* salivary glands. Abstract. Second International Lygus Bug Symposium - Pacific Grove, California, April 15-17, 2007. 2008. *Journal of Insect Science* 8(49): 7

Oral presentations

7th International Symposium on Molecular Insect Science. Amsterdam, The Netherlands. July, 2014

Seminar at the Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden. September, 2012.

“Blodbadet”. Tovetorp Research Station. Stockholm University. Department of Zoology. Oral presentations in November 2010, 2011 and 2012.

Genome Center and Plant Genomics Research Symposium. UCD campus, Davis, CA, June 2007.

Second International Lygus Bug Symposium, two oral presentations. Pacific Grove, CA, USA, April 2007. **Abstracts published:** Goodell PB, Ellsworth PC. 2008. Second International Lygus Symposium Asilomar. 27pp. *Journal of Insect Science* 8:49

University of California Institute for Mexico and the United States. Seminar Series 2006-2007 “Plants, pests and pathogens”. UC Riverside, December 2006.

International Symposium Ecology and Management of *Lygus* plant bugs. Ottawa, Canada, January 2005.

Pioneer Hi-Bred International Scholarship Conference. Des Moines, IA, USA, July 2003.

Alfalfa Improvement Conference. Sacramento, CA, July 2001.

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Posters

7th International Symposium on Molecular Insect Science. Amsterdam, The Netherlands, July 2014.

SciLifeLab-Day. SciLifeLab Uppsala, Uppsala University Hospital, Sweden. August, 2012.

Insect Science Symposium. Stockholm University, Stockholm, Sweden. November, 2011.

4th Annual Arthropod Genomics Symposium. Kansas City, MO, USA, June 2010.

8th International Workshop on the Molecular Biology and Genetics of Lepidoptera. Kolympari, Crete, Greece, August 2009.

Western Section of the American Society of Plant Biologists Conference (WS-ASPB). UCD campus, Davis, CA, 2007 Winter Meeting.

Plant Biology ASPB Conference. Orlando, FL, July 2004.

Genomics WS-ASPB Conference. UCD, CA. November 2003.

DISTINCTIONS

DEPARTMENTAL GRADUATE STUDENT RESEARCHER AWARD UCD 2005-2007

JASTRO SHIELDS RESEARCH SCHOLARSHIP AWARD UCD 2005-2007

UC MEXUS Scholarship, University of California (USA)-Mexico 2005

CONACyT Scholarship, Mexico 2002

PIONEER Hi-Bred International Scholarship, USA 2002

UNAM Foundation Undergraduate Abroad Program Scholarship, Mexico 1999

TELMEX Foundation Undergraduate Scholarship, Mexico 1998

Previous research

Ph. D. research project

The research activities during my Ph. D. involved deciphering the molecular and biochemical complexity of an enzyme produced by the western tarnished plant bug (WTPB). This enzymatic activity degrades the plant cell-wall damaging the reproductive structures of different crops (e. g. alfalfa and cotton). I also implemented a conventional breeding program with the purpose of increasing cotton resistance towards WTPB screening cotton germplasm with high inhibitory levels of the insect's cell-wall degrading enzyme.

An accurate description of the latest results during my Ph. D. project (Celorio Mancera et al., 2008) is accessible at this link:

http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=231392

First post-doctorate

The main goal of my post-doctoral stay at the Max Planck Institute of Chemical Ecology in Jena, Germany, was to identify genes and proteins from a lepidopteran pest mediating the relationship between insect and plant during phytophagy.

My research contributed to: 1) establish global gene expression methods (microarrays); 2) apply proteomics for the identification of proteins in the salivary glands of lepidopteran larvae; 3) inspect the phenomenon of hormesis (beneficial effect in an organism of a potentially toxic compound at low doses) at the transcriptional level. In addition, I identified organ-specific (gut or salivary glands) genes from *Helicoverpa armigera* (cotton bollworm) in response towards: 1) gossypol, a secondary metabolite in plants of the cotton family; 2) different host plants and plant organs.

Second post-doctorate

During my postdoctorate at the Department of Zoology, Stockholm University, I focused my efforts to generate the molecular tools that will facilitate the understanding of phenotypic plasticity in butterflies. Specifically, I have obtained the cDNA libraries for four butterfly species, : *Vanessa cardui*, *V. atalanta*, *Polygonia c-album* and *Aglais urticae*. After the establishment of a butterfly colony of the species *V. cardui* in the laboratory, I contacted the the Genomics Platform at SciLifeLab to sequence the tissue and host-specific transcriptome I obtained from the species *V. cardui*.

Since I am interested in the role of salivary proteins in insect-plant communication, I noticed that the comparison of the different salivary glands in caterpillars deserved more attention. Since the cDNA sequences were already available, I started a collaboration with Dr. Zubarev (SciLifeLab, Proteomics Platform) to discover the identity of the main protein in mandibular glands in *Vanessa* spp caterpillars (Celorio-Mancera et al., 2012b). This discovery had important implications in the realm of insect-plant communication since the main protein was identified as a chemosensory protein.

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During this post-doctoral period I analyzed transcriptome of *Polygonia c-album* caterpillars, an “ecological” model species, in response to a novel host in its diet repertoire and question whether the gene expression patterns observed coincide with observations in other polyphagous species. We were also able to test whether the response to a particular host-plant is dependent on larval developmental stage. Our conclusion regarding these questions have been recently published in the journal of Molecular Ecology (Celorio-Mancera et al., 2013)

Employed as a researcher at the Department of Zoology, SU, I continued with the interpretation of the results obtained during my previous post-doctoral stay at this same institution and preparation of manuscripts. I continued my collaboration with Dr. Heiko Vogel with whom I co-authored a book chapter on global gene expression analyses in insects towards host-plants and toxic compounds. I also supervised, for 2 months, an exchange Ph. D. student from the Université Laval, Canada on a project on gene expression plasticity using semi-quantitation of cDNA.

Current research interests

My ongoing research aims at dissecting the mechanistic basis of phytophagy by comparing generalist and specialist butterfly transcriptomics with the ultimate goal of identifying genetic modules for host plant adaptation. I attempt to continue integrating genomics and ecology to understand biological adaptations. I consider myself a pioneer on the integration of genomics, proteomics and ecology of non-model insect species with a particular focus on insect-host plant interactions, namely detection, digestion and detoxification of plant defensive compounds in insects.

I pursue answers to four lines of investigation within the area of plant-insect interactions: 1) plant chemical defense against herbivory; 2) mechanisms of chemical communication between phytophagous caterpillars and their environment; 3) insect tissue-specific transcriptional signatures in response to plant feeding and 4) insect evolutionary transcriptomics of host-plant use.

These are the specific hypotheses I am currently challenging:

1. Plant chemicals interfere with insect cuticle components.
2. Chemosensory proteins produced in the salivary glands of caterpillars are involved in chemical recognition of bacteria.
3. Transcriptional plasticity at the tissue level is a feature in an extreme polyphagous insect species.
4. Different insect species within tribe and even subfamily display similar transcriptional signatures when feeding an ancestral host-plant. Ancestral host-plant is a host commonly used across the butterfly phylogeny.

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REFERENCES

Dr. Sören Nylin

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Dr. Nylin has employed me as a researcher working on his project entitled "Insect life cycle genomics and adaptation in the wild" which goal is to understand plant utilization by nymphalid butterflies integrating phylogenetics, ecology and genomics.

Dr. Niklas Janz

Dept. of Zoology, Stockholm University

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I have worked with Dr. Janz as part of his Insect Host Plant Interactions Group taking responsibility of our ongoing effort to understand insect-host plant dynamics using genomic and proteomic tools. Dr. Janz has observed my performance as both researcher and Master's thesis supervisor.

Dr. Heiko Vogel

Dept. of Entomology, Max Planck Institute of Chemical Ecology

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*Dr. Heiko Vogel was my supervisor at the MPICE in Jena, Germany where I conducted research on the cotton bollworm (*Helicoverpa armigera*) during a 2-year postdoctoral fellowship. The main objective of my postdoctoral research was to identify genes and proteins involved in phytophagy and detoxification of plant chemicals.*