

Associate Professor "B"**Bioinformatics Lab, Biotechnology Unit****Yucatan Center for Scientific Research [Centro de Investigación Científica de Yucatán, A.C.]**

jhramirez@cicy.mx

<https://orcid.org/0000-0003-2780-5223>

Jorge H. Ramírez-Prado, Ph. D. in Plant Biotechnology. Tenured Associate Professor since 2008 in the Biotechnology Unit at the Centro de Investigación Científica de Yucatán CICY (Yucatan Center for Scientific Research), in Mérida, Yucatán, México. He did a postdoctoral fellowship at the Plant Pathology department of North Carolina State University (Raleigh, NC, USA) where he specialized in bioinformatics applied to phylogenetics and comparative genomics of fungi. His research interests are on Fungal Genomes Evolution (orthology and paralogy), genomic data mining, and development of bioinformatics tools for education and research. Currently his work is focused on the evolution of fungal Secondary Metabolism gene clusters and Cell Wall biogenesis. Although his research is centered on fungi, he is an active collaborator on projects involving the sequencing and analysis of bacteria, viruses, and plants.

☂ **Research interests.**

- Comparative Genomics: Orthology, paralogy, synteny, and chromosomal rearrangements on fungal genomes.
- Bioinformatics methods applied to the study of molecular evolution of genomes
- Development of bioinformatics software for education/research.
- Assembling and annotation of genomes (Sanger and NGS).

☂ **Current held position.**

- Associate Professor "B" 01/01/2016–to date.
Biotechnology Unit, Yucatan Center for Scientific Research

☂ **Mexico's CONACYT National Research System fellowship.**

- Level I 01/01/2017-31/12/2020
01/01/2014-31/12/2016
01/01/2010-31/12/2012

☂ **Academic degrees.**

- **Ph.D. in plant Biotechnology**, CINVESTAV U. Irapuato, México, 2004
Genetic Engineering department
- **B.Sc. in Chemistry Sciences**, Guanajuato University, México, 1998

☂ **Research experience.**

- **Sabbatical** 01/02/2016-31/08/2016
School of Life Sciences, Division of Computational Biology, Barton Group, University of Dundee, Scotland, UK
- **Associate Professor A** 25/05/2011-31/12/2015.
Biotechnology Unit, Yucatan Center for Scientific Research
- **Assistant Professor** 01/01/2008-25/05/2011.
Biotechnology Unit, Yucatan Center for Scientific Research
- **Research stay**, 04/06/2010-04/09/2010
Bioinformatics center, Institute for chemical research, Kyoto University
- **Postdoctoral fellow**, 01/10/2005-31/03/2008
North Carolina State University, Plant pathology department, CIFR
- **Research stay**, 2004-2005
North Carolina State University, Biochemistry department

📄 **Peer-reviewed publications.**

§ As invited coauthor expert on bioinformatics analysis, comparative genomics, and/or molecular evolution.

† As director or advisor of a grad student thesis.

‡ As corresponding author or thesis director of a corresponding student author.

- **29†‡.** Góngora-Castillo E, López-Ochoa LA, Apolinar-Hernández MM, Caamal-Pech AM, Contreras-de la Rosa PA, Quiroz-Moreno A, **Ramírez-Prado JH***, O'Connor-Sánchez A*. Data mining of metagenomes to find novel enzymes: a non-computationally intensive method. *3 Biotech.* 2020;10(2):78. doi:10.1007/s13205-019-2044-6
- **§†28.** Cancino-García VJ, **Ramírez-Prado JH**, De-la-Peña C. Auxin perception in Agave is dependent on the species' Auxin Response Factors. *Sci Rep.* 2020;10(1):3860. Published 2020 Mar 2. doi:10.1038/s41598-020-60865-y
- **†‡27.** Escobar-Turriza P, Hernandez-Guerrero R, Poot-Hernández AC, Rodríguez-Vázquez K, **Ramírez-Prado J**, Pérez-Rueda E. Identification of functional signatures in the metabolism of the three cellular domains of life. *PLoS One.* 2019;14(5):e0217083. Published 2019 May 28. doi:10.1371/journal.pone.0217083
- **§†26.** Torres-Herrera SI, Romero-Osorio A, Moreno-Valenzuela O, Pastor-Palacios G, Cardenas-Conejo Y, **Ramírez-Prado JH**, Riego-Ruiz L, Minero-García Y, Ambriz-Granados S, Argüello-Astorga GR. A Lineage of Begomoviruses Encode Rep and AC4 Proteins of Enigmatic Ancestry: Hints on the Evolution of Geminiviruses in the New World. *Viruses.* 2019;11(7):644. Published 2019 Jul 13. doi:10.3390/v11070644
- **§†25.** Pereira-Patrón A, Solís-Pereira S, Lizama-Uc G, **Ramírez-Prado JH**, Pérez-Brito D, Tapia-Tussell R. Molecular characterization of laccase genes from the basidiomycete *Trametes hirsuta* Bm-2 and analysis of the 5' untranslated region(5'UTR). *3 Biotech.* 2019 Apr;9(4):160. doi: 10.1007/s13205-019-1691-y.
- **§24.** Henriques Ferreira, B.*; **Ramírez-Prado, J. H.***; Neves G. W. P.; Torrado, E.; Sampaio, P.; Felipe, M. S. S.; Vasconcelos, A. T.; Goldman, G.H.; Carvalho, A. C.; Lopes-Bezerra, C. L. M.; Rodrigues, F., Ploidy determination in the pathogenic fungus *Sporothrix* spp. *Front.Microbiol.* **2019**, doi: 10.3389/fmicb.2019.00284. ***equal contributors**
- **§23.** Hernández-Navarro, E.; Gutiérrez A.; Ramírez-Prado, J. H.; Sánchez-Teyer, F.; Esqueda, M., *Tulostoma rufescens* sp. nov. from Sonora, Mexico. *Mycotaxon* **2018**, 133 (3), 459-471.
- **§22.** Youssef, M.; Alhammadi, A. S.; **Ramirez-Prado, J. H.**; Sanchez-Teyer, L. F.; Escobedo-GraciaMedrano, R. M., Remarks on genetic diversity and relationship of *Punica protopunica* and *P-granatum* assessed by molecular analyses. *Genet Resour Crop Ev* **2018**, 65 (2), 577-590.
- **§†21.** Leal-Alvarado, D. A.; Estrella-Maldonado, H.; Saenz-Carbonell, L.; **Ramirez-Prado, J. H.**; Zapata-Perez, O.; Santamaria, J. M., Genes coding for transporters showed a rapid and sharp increase in their expression in response to lead, in the aquatic fern (*Salvinia minima* Baker). *Ecotoxicol Environ Saf* **2018**, 147, 1056-1064.
- **§20.** Conde-Ferraez, L.; Pacheco-Arjona, R.; Novelo Canul, C.; Gomez-Carballo, J.; **Ramirez-Prado, J. H.**; Ayora-Talavera, G.; Gonzalez-Losa, M. D. R., Genetic Variability in E6 and E7 Oncogenes from Human Papillomavirus Type 58 in Mexican Women. *Intervirology* **2018**, 60, 235-246.
- **§†19.** Quiroz-Ramirez, J. J.; Sanchez-Ramirez, E.; Hernandez, S.; **Ramirez-Prado, J. H.**; Segovia-Hernandez, J. G., Multiobjective Stochastic Optimization Approach Applied to a Hybrid Process Production-Separation in the Production of Biobutanol. *Ind Eng Chem Res* **2017**, 56 (7), 1823-1833.
- **§†18.** Leal-Alvarado, D. A.; Martinez-Hernandez, A.; Calderon-Vazquez, C. L.; Uh-Ramos, D.; Fuentes, G.; **Ramirez-Prado, J. H.**; Saenz-Carbonell, L.; Santamaria, J. M., Identification of up-regulated genes from the metal-hyperaccumulator aquatic fern *Salvinia minima* Baker, in response to lead exposure. *Aquat Toxicol* **2017**, 193, 86-96.
- **§17.** Kottom, T. J.; Hebrink, D. M.; Jenson, P. E.; **Ramirez-Prado, J. H.**; Limper, A. H., Characterization of N-Acetylglucosamine Biosynthesis in *Pneumocystis* species. A New Potential Target for Therapy. *Am J Respir Cell Mol Biol* **2017**, 56 (2), 213-222.
- **†‡16.** Chan-Leon, A. C.; Estrella-Maldonado, H.; Dube, P.; Fuentes Ortiz, G.; Espadas-Gil, F.; Talavera May, C.; **Ramirez Prado, J.**; Desjardins, Y.; Santamaria, J. M., The high content of beta-carotene present in orange-pulp fruits of *Carica papaya* L. is not correlated with a high expression of the CpLCY-beta2 gene. *Food Res Int* **2017**, 100 (Pt 2), 45-56.
- **§15.** Canche-Pech, J. R.; Conde-Ferraez, L.; Puerto-Solis, M.; Gonzalez-Losa, R.; Granja-Perez, P.; Villanueva-Jorge, S.; Chan-Gasca, M.; Gomez-Carballo, J.; Lopez-Ochoa, L.; Jimenez-Delgado, B.; Rodriguez-Sanchez, I.; **Ramirez-Prado, J.**; Ayora-Talavera, G., Temporal distribution and genetic variants in influenza A(H1N1)pdm09 virus circulating in Mexico, seasons 2012 and 2013. *PLoS One* **2017**, 12 (12), e0189363.
- **§†14.** Marfil-Santana, M. D.; O'Connor-Sanchez, A.; **Ramirez-Prado, J. H.**; De Los Santos-Briones, C.; Lopez, A.; Lluvia, K.; Rojas-Herrera, R.; Lago-Leston, A.; Prieto-Davo, A., A computationally simplistic poly-phasic approach to explore microbial communities from the Yucatan aquifer as a potential sources of novel natural products. *J Microbiol* **2016**, 54 (11), 774-781.
- **†13.** Zamudio-Moreno, E.; **Ramirez-Prado, J. H.**; Moreno-Valenzuela, O. A.; Lopez-Ochoa, L. A., Early diagnosis of a Mexican variant of Papaya meleira virus (PMeV-Mx) by RT-PCR. *Genet Mol Res* **2015**, 14 (1), 1145-54.

- †‡12. Pacheco-Arjona, J. R.; **Ramirez-Prado, J. H.**, Large-scale phylogenetic classification of fungal chitin synthases and identification of a putative cell-wall metabolism gene cluster in *Aspergillus* genomes. *PLoS One* **2014**, *9* (8), e104920.
- ‡11. Moreno-Enríquez, A.; Minero-García, Y.; **Ramírez-Prado, J. H.**; Loeza-Kuk, E.; Uc-Varguez, A.; Moreno-Valenzuela, O. A., Comparative analysis of 16S ribosomal RNA of 'Candidatus *Liberibacter asiaticus*' associated with Huanglongbing disease of Persian lime and Mexican lime reveals a major haplotype with worldwide distribution. *African Journal of Microbiology Research* **2014**, *8* (30), 2861-2873.
- †10. Mahendhiran, M.; **Ramirez-Prado, J. H.**; Medrano, R. M. E. G.; Canto-Canche, B.; Tzec-Sima, M.; Grijalva-Arango, R.; James-Kay, A., Single nucleotide polymorphisms in partial sequences of the gene encoding the large sub-units of ADP-glucose pyrophosphorylase within a representative collection of 10 *Musa* genotypes. *Electron J Biotechnol* **2014**, *17* (3), 137-147.
- ‡9. Kantun-Moreno, N.; Vazquez-Euan, R.; Tzec-Sima, M.; Peraza-Echeverria, L.; Grijalva-Arango, R.; Rodriguez-Garcia, C.; James, A. C.; **Ramirez-Prado, J.**; Islas-Flores, I.; Canto-Canche, B., Genome-wide in silico identification of GPI proteins in *Mycosphaerella fijiensis* and transcriptional analysis of two GPI-anchored beta-1,3-glucanotransferases. *Mycologia* **2013**, *105* (2), 285-96.
- †‡8. Santiago-Sotelo, P.; **Ramirez-Prado, J. H.**, prfectBLAST: a platform-independent portable front end for the command terminal BLAST+ stand-alone suite. *BioTechniques* **2012**, *53* (5), 299-300.
- 7. Horn, B. W.; **Ramirez-Prado, J. H.**; Carbone, I., Sexual reproduction and recombination in the aflatoxin-producing fungus *Aspergillus parasiticus*. *Fungal Genet Biol* **2009**, *46* (2), 169-75.
- 6. Horn, B. W.; **Ramirez-Prado, J. H.**; Carbone, I., The sexual state of *Aspergillus parasiticus*. *Mycologia* **2009**, *101* (2), 275-80.
- 5. **Ramirez-Prado, J. H.**; Moore, G. G.; Horn, B. W.; Carbone, I., Characterization and population analysis of the mating-type genes in *Aspergillus flavus* and *Aspergillus parasiticus*. *Fungal Genet Biol* **2008**, *45* (9), 1292-9.
- 4. Carbone, I.*; **Ramirez-Prado, J. H.***; Jakobek, J. L.; Horn, B. W., Gene duplication, modularity and adaptation in the evolution of the aflatoxin gene cluster. *BMC Evol Biol* **2007**, *7*, 111. ***equal contributors**
- 3. Carbone, I.; Jakobek, J. L.; **Ramirez-Prado, J. H.**; Horn, B. W., Recombination, balancing selection and adaptive evolution in the aflatoxin gene cluster of *Aspergillus parasiticus*. *Mol Ecol* **2007**, *16* (20), 4401-17.
- 2. **Ramirez-Prado, J. H.**; Martinez-Marquez, E. I.; Olmedo-Alvarez, G., cry1Aa lacks stability elements at its 5'-UTR but integrity of its transcription terminator is critical to prevent decay of its transcript. *Curr Microbiol* **2006**, *53* (1), 23-9.
- 1. Lopez-Ochoa, L.; **Ramirez-Prado, J.**; Hanley-Bowdoin, L., Peptide aptamers that bind to a geminivirus replication protein interfere with viral replication in plant cells. *J Virol* **2006**, *80* (12), 5841-53.

📖 Book chapters.

- 2. Andrew C. James, Mahdi Arzanlou, Blondy Canto Canche, **Jorge Humberto Ramirez**, Laura Conde Ferraez and Santy Peraza Echeverria, 2010, "Fungal diseases", In: "Bananas: Nutrition, Diseases and Trade Issues", Edited by Frank Columbus, Nova publishers, NY, USA.
- 1. Lopez-Ochoa, L., Nash, T.E., **Ramirez-Prado, J.** and Hanley-Bowdoin, L., 2009, "Isolation of peptide aptamers to target protein function", In: "Nucleic Acid and Peptide Aptamers", Edited by Günter Mayer, Humana Press, 415p.

📖 Academic software.

- 2. **Registered Software:** *prfectBLAST*, Ramírez Prado J.H., Santiago Sotelo P., Registered at Mexico's **INDAUTOR 03-2012-020913201400-01**, February 22nd, 2012.
- 1. **Software:** *Interfaz gráfica y buscador para base de datos de genes ortólogos*, Ramírez Prado J.H., Hernández Bautista C., February 2nd, 2010.

➤ Human resources formation (Undergrad, Masters, and Ph.D. Thesis advisor).

- **Yucatan Center for Scientific Research**, Biotechnology Unit

- **Ph. D.**

M.Sc. Arianna Christine Chan León.

"Analysis of the expression of genes and enzymatic activity of the enzymes involved in the biosynthesis of carotenoids during postharvest ripening in papaya fruits (*Carica papaya* L.)"

Aug 2013-Aug 2018

Graduated on August 24th, 2018.

- **Ph. D.**
M.C. José Ramón Pacheco Arjona.
"Computational genomics of the distribution and organization of chitin-synthases in fungi".
Aug 2008-Jul 2014.
Graduated on July 17th, 2014.
- **Ph. D.**
M.C. Muhilan Mahendhiran.
"Development of a set of Conserved Orthologous Sequence (COS) markers for starch metabolic traits for Musa germplasm".
Feb 2009-Jul 2014
Graduated on July 11th, 2014.
- **M. Sc.**
Chem. Eng. Ana Gabriela Romero García.
"Optimization of the reaction zone in the furfural production process from biomass".
Jan 2017-Jan 2019.
Graduated on May 13th, 2014
- **M. Sc.**
BioChemical Eng. Lilia Pérez Oyosa.
"Molecular characterization of the Chitin Synthase genes expression in *Mycosphaerella fijiensis*".
Aug 2011-May 2014.
Graduated on May 13th, 2014
- **Undergrad thesis.**
C. Candelaria Hernández Bautista.
"Graphical interface and browser for database of orthologous and paralogs genes of phytopathogenic fungi".
Memorias de residencia profesional como opción de titulación.
Graduated on July 7th, 2010.
- **Undergrad thesis.**
C. Perfecto Santiago Sotelo.
"Annotation of genetic regions by automated BLAST report analysis".
Jan 2011-Aug 2013.
(Social Service: Aug-Dec 2009; Professional Residence: Feb-Jun 2010)

➤ **Grants and fellowships awarded.**

As principal investigator of the project.

- "Modularity of fungal secondary metabolism gene clusters" Mexico's CONACYT Sabbatical fellowships 2015-2. Feb-Aug 2016.
- "High performance bioinformatics computer cluster" Mexico's CONACYT Institutional Funds for National CONACYT RESEARCH CENTERS, 2013. Jul-Dec, (MXN \$5'000,000.00)
- "Saprophytes vs. Pathogens: Computational genomics of the distribution and organization of chitin-synthases in fungi and their relationship with pathogenesis" Mexico's SEP-CONACYT Basic Science Grants, 2008. 2010-2012. (MXN \$996,000.00)
- "Orthology and paralogy in biosynthetic gene clusters of pathogenic fungi", Matsumae International Foundation Fellowship. Jun-Aug 2010. (JPY ¥820,000.00)
- "Bioinformatic analysis applied to the phylogenetic and phylogeographic study of *Mycosphaerella fijiensis*", submitted in the proposal "Repatriation of Dr. Jorge Humberto Ramírez Prado to the Biotechnology Unit of the Scientific Research Center of Yucatan A.C." in the 2008 call for "Supplementary support for the institutional consolidation of research groups" of CONACYT. Nov 2008- Oct 2009. (MXN \$400,000.00)

➤ **Guest speaker.**

- **"The search for a L-rhamnosyl transferase on the *Sporothrix schenckii* genome: probabilistic models of diverging domains"**, 5th Latin American Congress of Glycobiology, Latin American Society of Glycobiology, Mexico City, 02/10/2019
- **"Bioinformatics predictive power"**, Invited talk at 7º Congreso de Biotecnología Quorum, Instituto Tecnológico de Monterrey, Campus Querétaro, México, 02/03/2018.
- **"The search for a L-rhamnosyl transferase on the *Sporothrix schenckii* genome: probabilistic models of diverging domains"**, Workshop "Glycans in the study of the immune response and infectious diseases", Latin American Society of Glycobiology, National Autonomous University of Mexico, Mexico City, 03/10/2016.
- **"Modularity of fungal secondary metabolism gene clusters"**, Talk at Division of Computational Biology, School of Life Sciences, University of Dundee, Dundee, Scotland, UK, 19/02/2016.
- **"Predictions in fungal Computational Genomics"**, Talk for students at National Autonomous University of Mexico campus León, Guanajuato, México. 23/11/2015.
- **"Computational fungal genomics: a predictive approach."**, Plenary speaker at, XI National Congress of Molecular and Cellular Biology of Fungi, Puebla, México, 28/10/2015.
- **"Computational genomics for the analysis of the distribution of fungal CHS genes"**, Invited talk of the guest-speakers series at the Biology Graduate program, DCNE, University of Guanajuato, 24/10/2014.
- **"Bioinformatics and Chemical Engineering"**, Opening talk of the guest-speakers series at the Chemical Engineering Graduate program, University of Guanajuato, 11/01/2011.
- **"Fungal gene clusters and phytopathogens phylogenetics"**, Invited talk at Kanehisa laboratory, Bioinformatics center, Kyoto University, 28/06/2010.
- **"Fungal gene clusters and phytopathogens phylogenetics"**, Invited talk at Mamitsuka laboratory, Bioinformatics center, Kyoto University, 06/08/2010.

➤ **Lecturer at graduate courses.**

- **Yucatan Center for Scientific Research (I: Spring semester; II: Fall semester).**
 - Biochemistry I (8 hours/semester)
2008-I, 2009-I, 2010-I, 2011-I, 2011-II, 2012-I, 2012-II, 2013-I, 2013-II, 2014-I, 2014-II, 2015-I, 2016-II, 2017-I, 2018-I, 2018-II, 2019-I, 2019-II, 2020-I, 2020-II
 - Bioinformatics (44 hours/semester and course designer)
2009-II, 2011-II, 2013-II, 2017-II, 2018-II, 2020-II
 - Advanced Cell and Molecular Biology (6 hours/semester)
2008-II, 2010-II, 2012-II
 - Selected Topics: Genomics (8 hours/semester)
2009-II, 2011-II, 2012-II, 2014-II, 2016-II, 2019-I
 - Selected Topics: Epigenetics (4 hours/semester)
2010-II
 - Biochemistry (4 hours/semester)
2009-I, 2009-II, 2010-I, 2010-II, 2011-I, 2011-II, 2012-I, 2012-II, 2013-I, 2013-II, 2014-I, 2014-II, 2015-I
 - Plant's Genetic Engineering (4 hours/semester)
2009-I, 2010-II, 2011-II
 - Biostatistics (6 hours/semester)
2010-II