Luis Rogelio Cruz Vera

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EDUCATION

B.S.	Chemistry	Autonomous University of Puebla, Mexico	1995
M.S.	Genetics and Molecular Biology	Center for Research and Advanced Studies (CINVESTAV-IPN) Mexico	1996
Ph.D.	Genetics and Molecular Biology	CINVESTAV-IPN, Mexico	2000

SCHOLARSHIPS

Graduate Fellowship	Mexican National Council of Science and Technology (CONACYT)	1993-1999
Postdoctoral Fellowship	Mexican National Council of Technology and Sciences (COSNET)	2000-2001

ACADEMIC AND RESEARCH APPOINTMENTS

Graduate Student	CINVESTAV-IPN, Mexico	1993-2000
Postdoctoral Researcher	CINVESTAV-IPN, Mexico	2000-2003
Postdoctoral Researcher	Stanford University, Stanford CA, USA	2003-2006
Research Assistant	Stanford University, Stanford CA, USA	2007
Assistant Professor	University of Alabama in Huntsville, Huntsville AL, USA	2007-2014
Associate Professor	University of Alabama in Huntsville, Huntsville AL, USA	2014 to date

RESEARCH INTEREST

My research has focused on studying regulation of gene expression, especially those mechanisms regulating the protein synthesis process.

RESERCH FUNDING

National Science Foundation, Genetic Mechanisms 08/01/12-07/31/15

$405,000. Title: "Role of the nascent TnaC peptide in the inhibition of the ribosome function by tryptophan"

The goal of this project was to understand how the combine action of a newly produced small protein and the amino acid tryptophan inhibit the reactions involved in the synthesis of proteins.

UAH Research Infrastructure Funds (RIF) 06/01/14-05/30/15

$63,200.00 "Differential Centrifugation: A Method to isolate cellular components for detail studies on gene expression and macromolecular structures "

UAHuntsville Research Infrastructure Investment (URII) 05/01/10-04/31/11

$35,000. Title: "Pth: the new generation of antimicrobial antibiotics"

The goal of this project was to isolated compounds from plant extracts that inhibit the *E. coli* Pth activity.

- **UAH Research Mini-Grant 08/01/08-07/31/09**
  $10,296.00. "Isolation and Functional Characterization of Enzymes Containing the Essential Peptidyl-tRNA Hydrolase Activity in *Saccharomyces cerevisea*"

DISTINCTIONS

2001-2004. Candidate to the Mexican National System of Researchers (SNI).

2009-2016. Member of the SNI.

PARTICIPATION IN INTERNATIONAL MEETINGS

1) Sengupta A., Gordon, E.R., and **Cruz-Vera, L. R.** RF2 *Interactions Maintain L-Trp-induced Arrested Ribosomes at their Functional Arresting Site Promoting tna Operon Expression.* **Virtual Translational Control Meeting,** Cold Spring Harbor, New York, September 1-5, 2020.
2) Coker, S.B., Boyett, C., Gallutia, K. and **Cruz-Vera, L. R.** *Escherichia coli lacking the tna operon display modified stationary phase growth and protein expression.* **American Society of Microbiology.** San Francisco, California, June , 2019
3) Franklin, E. A., Bryant, D. E., Ramsey, E. and **Cruz-Vera, L. R.** *Architecture*

of the Ribosome Exit Tunnel Controls Gene Expression. Poster presented at the **Ribosome 2019 meeting.** Merida, Yucatan Mexico. January 06-10, 2019.

4) Gordon, E. R., Sengupta, A., Martinez, A.W., Emmanuel, J. Klepacki, D., Mankin S. A., Sachs, M. S., Vazquez-Laslop, N. and **Cruz-Vera, L. R.** *Mechanism of RF2-mediate translation termination inhibition produced by a regulatory nascent peptide.* **Translational Control Meeting,** Cold Spring Harbor, New York, September 6-10, 2016.

5) **Cruz-Vera L. R.** *Look who's talking: lessons from decoding the communication between nascent peptides and the ribosome.* **IV Congreso de la rama de transduccion de señales de la Sociedad Mexicana de Bioquimica,** San Luis Potosi, San Luis Potosi, Mexico. November 10-13, 2013.

6) Gordon, E., and **Cruz-Vera, L. R.** *Inhibition of the ribosome function by L-tryptophan.* **Bacteria and Phage Meeting,** Madison-Wisconsin, Wisconsin, August 6-10, 2013.

7) Sengupta, A., Martinez, A., Vazquez-Laslop, N., Mankin S.A., Sachs, M. and **Cruz-Vera, L. R.** *The 23S rRNA A2058-9 nucleotides are involved in the recognition of the amino acid L-tryptophan by ribosomes synthesizing the regulatory nascent TnaC peptide.* **Translational Control Meeting,** Cold Spring Harbor, New York, September 4-8, 2012.

8) Shirole, N., Wakefield, A., Sachs, M. and **Cruz-Vera, L. R.** *Inhibition of the ribosome function by the joint action of the nascent TnaC peptide and L-tryptophan.* **Translational Control Meeting,** Cold Spring Harbor, New York, September 13-17, 2010.

9) **Cruz-Vera, L. R.,** Pérez-Zamorano, B., Hernández-Ramón E. and G. Guarneros. *The minigene codon composition in lethality and peptidyl-tRNA generation.* **The Sixth Annual Meeting of the RNA Society**, Banff, Alberta, Canada. May 29-June 3, 2001.

10) Guarneros G., Hernández J. and **Cruz-Vera L. R.** *The effect of peptidyl-tRNA hydrolase instability on the thermosensitivity of E. coli pth(Ts) mutant.* **Congress of The Ribosome: structure, function antibiotics and cellular interactions**, Helsingér-Denmark, June 13-17, 1999.

11) **Cruz-Vera L. R.,** Hernández J. and Guarneros G. *Role of peptidyl-tRNA hydrolase instability and specific activity on E. coli pth(Ts) thermosensitivity* **Meeting of Molecular Genetics of Bacterial and Phages** University of Wisconsin, Madison. August 3-8, 1999.

12) **Cruz-Vera L. R.** and Guarneros G. *Expression analysis of Escherichia coli peptidyl tRNA hydrolase.* . Presented at the **Meeting of Molecular Genetics of Bacterial and Phages,** Cold Spring Harbor, New York, August 20-25, 1996.

PUBLICATIONS

1) Emmanuel, J. S., Gordon, E. R., Sengupta, A., Noble, J.T., and **Cruz-Vera, L. R.** (2019). The regulatory TnaC nascent peptide preferentially inhibits release factor 2-mediated hydrolysis of peptidyl-tRNA. *J. Biol. Chem.* **294(50)**: 19224-19235**.**
2) Martinez, A. K., Gordon, E., Sengupta, A., Shirole, N. H., Klepacki, D., Martinez-Garriga B., Brown L.M., Benedik, M. J., Yanofsky, C., Mankin, A. S., Vazquez-Laslop, N., Sachs, M. S. and **Cruz-Vera, L.R.** (2014). Interactions of the TnaC nascent peptide with rRNA in the exit tunnel enable the ribosome to respond to free tryptophan. *Nucleic Acid Res.* **42(2):** 1245-1256
3) Mcfeeters H., Gilbert M.J., Thompson R.M., Setzer, W.N., **Cruz-Vera, L.R,** McFeeters, R.L. (2012). Inhibition of essential bacterial peptidyl-tRNA hydrolase activity by tropical plant extracts. *Nat. Prod. Commun.* **7(8):**1107-1110.
4) Martinez, A. K., Shirole, N. H., Murakami, S., Benedik, M. J., Sachs, M. S. and **Cruz-Vera, L.R.** (2012). Crucial elements that maintain the interactions between the regulatory TnaC peptide and the ribosome exit tunnel responsible for Trp inhibition of ribosome function. *Nucleic Acid Res.* **40(5):**2247-2257.
5) Harris S. M., McFeeters H., Ogungbe I. V., **Cruz-Vera L. R.**, Setzer W. N., Jackes B. R., and McFeeters R. L. (2011). Peptidyl-tRNA hydrolase screening combined with molecular docking reveals the antibiotic potential of *Syzygium johnsonii* bark extract. *Nat. Prod. Commun.* **6(10):**1421-1424.
6) **Cruz-Vera, L.R.,** Sachs, M.S., Squires, C.L. and Yanofsky, C .(2011). Nascent polypeptide sequences that influence ribosome function. *Curr. Opin. Microbiol.* **14(2):**160-166.
7) Shirole, N., Balasubramanian, S. and **Cruz-Vera, L. R.** (2011). *Isolation of translating ribosomes containing peptidyl-tRNAs for functional and structural analyses. J. Vis. Exp.* **DOI: 10.3791/2498.** URL: http://www.jove.com/index/Details.stp?ID=2498
8) **Cruz-Vera, L.R.**, Yang, R. and Yanofsky, C. (2009). *Tryptophan inhibits Proteus vulgaris TnaC leader peptide elongation, activating tna operon expression. J. Bacteriol.* **191:**7001-7006.
9) Yang, R., **Cruz-Vera, L.R.**, and Yanofsky, C. (2009). *23S rRNA nucleotides in the peptidyl transferase center are essential for tryptophanase operon induction. J. Bacteriol.* **191:**3445-3450.
10) **Cruz-Vera, L.R.** and Yanofsky, C. (2008). *Conserved residues Asp16 and Pro24 of TnaC-tRNAPro participate in tryptophan induction of Tna operon expression. J, Bacteriol.* **190:**4791-4797.

This publication was reviewed in: Stewart V. (2008). *The ribosome: a metabolite-responsive transcription regulator.* J. Bacteriol.**190:**4787-4790.

This publication was also highlighted in: Microbe Magazine **September 2008**, a monthly news magazine of the **American Society for Microbiology**.

11) **Cruz-Vera, L.R.,** Gong, M. and Yanofsky, C. (2008). *The physiological effects of AT protein activity and tRNA^{Trp} charging on trp operon expression in Bacillus subtilis. J. Bacteriol.* **190:** 1937-1945.

12) **Cruz-Vera, L.R.,** New, A., Squires, C. and Yanofsky, C. (2007). *Ribosomal features essential for tna operon induction: tryptophan binding at the peptidyl transferase center. J. Bacteriol.* **189:**3140-3146.

13) Gong, M., **Cruz-Vera, L.R.,** and Yanofsky, C. (2007). *RRF and RF3 action promotes TnaC-peptidyl-tRNA drop-off and relieves ribosome stalling during tryptophan induction of tna operon expression in E. coli. J. Bacteriol.* **189:**3147-3155.

14) Zamora-Romo, E., **Cruz-Vera, L.R**., Vivanco-Domínguez, S., Magos-Castro, M.A. and Guarneros, G (2007). *Efficient expression of gene variants that harbour AGA codons next to the initiation codon. Nucleic Acid Res.* **35:**5966-5974.

15) **Cruz-Vera, L.R.**, Gong M., and Yanofsky C. (2006). *Changes produced by bound tryptophan in the ribosome peptidyl transferase center in response to TnaC, a nascent leader peptide. Proc. Natl. Acad. Sci. U.S.A.* **103:** 3598-3603.

16) Vivanco-Dominguez, S., **Cruz-Vera, L.R.,** and Guarneros G. (2006). *Excess of charged tRNA^{Lys} maintains low levels of peptidyl-tRNA hydrolase in pth(Ts) mutants at a non-permissive temperature. Nucleic Acid Res.* **15:**1564-1570.

17) **Cruz-Vera, L.R.**, Rajagopal, S., Squires, C., and Yanofsky C. (2005). *Features of ribosome-peptidyl-tRNA interactions essential for tryptophan induction of tna operon expression. Mol. Cell.* **19:** 333-343.

This publication was reviewed in: Mankin, A. S. [2006] *Nascent peptide in the 'birth canal' of the ribosome. Trends Biochem. Sci.* **31:** 11-13.

18) **Cruz-Vera, L.R.**, Magos-Castro MA, Zamora-Romo E, and Guarneros G. (2004) *Ribosome stalling and peptidyl-tRNA drop-off during translational delay at AGA codons. Nucleic Acid Res.* **32:** 4462-4468.

19) **Cruz-Vera, L.R.**, Hernández-Ramón, E., Pérez-Zamorano., B. and Guarneros, G. (2003). *The rate of peptidyl-tRNA dissociation from the ribosome during minigene expression depends on the nature of the last decoding interaction. J. Biol. Chem.* **278:** 26065-26070.

20) Rosas-Sandoval, G., Ambrogelly, A., Rinehart, J., Wei, D., **Cruz-Vera, L. R**., Graham, D. E., Stetter, K. O., Guarneros, G. and Söll, D. (2002). Orthologs of a novel archaeal and of the bacterial peptidyl-tRNA hydrolase are nonessential in yeast. *Proc. Natl. Acad. Sci. U.S.A.* **99**: 16707-16712.

21) **Cruz-Vera, L. R.,** Galindo, J.M. and Guarneros, G. (2002). *Transcriptional analysis of peptidyl-tRNA hydrolase gene in Escherichia coli. Microbiol.* **148:** 3457-3466.

22) Moreno, J., **Cruz-Vera, L.R.,** García-Villegas, M.R. and Cereijido, M. (2002) Polarized expression of Shaker channels in epithelial cells. *J. Membr. Biol*. **190:**175-187.

23) **Cruz-Vera, L. R.**, Toledo I., Hernández-Sánchez, J. and Guarneros, G. (2000). *Molecular Basis for the Temperature Sensitivity of Escherichia coli pth(Ts). J. Bacteriol*. **182:**1523-1528.

Chapters in Edited Volumes:

1) **L. Rogelio Cruz-Vera** (2021). *Expression of the bacterial L-Trp regulon.* Encyclopedia of Biological Chemistry, 3rd Edition. Editorial Elsevier. **In edition.**

2) **L. Rogelio Cruz-Vera** and Charles Yanofsky (2014) *Instructing the Translating Ribosome to Sense L-Tryptophan During Synthesis of the TnaC Regulatory Nascent Peptide.* Regulatory Nascent Polypeptides. First edition. Editor, Koreaki Ito. Editorial Springer-Japan. Chapter 9, pp. 151-163.

3) Leland J. Cseke and **L. Rogelio Cruz-Vera.** (2011) *Preparation of Nucleic Acid Probes*. Handbook of Molecular and Cellular Methods in Biology and Medicine. Third edition. CRC press Boca Raton Florida, USA. pp. 57-76.

4) Soto E., Vladimir V., Alexandrov V., Alexandrova B., **Cruz R.** and Astakhova G. (2001). *Mathematical model of the cupula-endolymph system with morphological parameters for the axolotl (Ambystoma tigrinum) semicircular canals.* Mathematical modeling of complex information processing systems. Doger, E. and Sadovnichiy, V.A. (eds.) ISBN: 5-211-04539-4 Moscow State University Press. pp 5-14.

5) Gabriel Guarneros, Norma Oviedo, José Olivares, Bernardo Pérez-Zamorano and **L. Rogelio Cruz-Vera.** (2000) *Strategies to study distribution and function of minigenes in microorganisms*. Proceedings of the First Workshop on Biological Physics 2000. (Virulh Sa-yakanit, Leif Matsson and Hans Frauenfelder Editors) World Scientific. pp.197-213.

ACADEMIC ACTIVITIES

Advised Master Theses:

1) “Function of the L22 ribosomal protein in regulation of gene expression in *E. coli”,* presented by Ivayla E. Gyurova (2014).

2) “The role of the L4 ribosomal protein in the expression regulation of *E. coli* genes*”,* presented by Prativa Sharma (2014).

3) “L-tryptophan inhibits RF2 function preventing ribosome release from mRNA*”,* presented by Nandita Saha (2014).

4) “Role of the TnaC peptide residues in the regulation of the ribosome function by L-Trp in *E. coli*”, presented by Nitin H. Shirole (2011).

Advised Dissertations:

1) “Specific ribosome inactivation by L-tryptophan in *E. coli*”, presented by Arnab Sengupta (2015).

2) “Allosteric regulation of the ribosome by L-tryptophan”, presented by Emily Gordon (2015).

3) “Determination of the roles of non-conserved residues surrounding the GGQ motif of RF2 in translation arrest”, presented by Jerusha S. Emmanuel (2019)

Teaching Undergraduate and Graduate courses:

BYS119, Introduction of Biology
BYS219, Genetics and Evolution.
BYS/CH301, Elementary Biochemistry.
BYS/CH361, General Biochemistry I.
BYS/CH362, Laboratory of General Biochemistry I.
BYS/CH363, General Biochemistry II.
BYS365/CH364, Laboratory of General Biochemistry II.
BYS419/619, Microbial Genetics
BYS490, Senior Seminar
BYS491, Genetics of Street Cats and Dogs.
BYS492, Undergraduate Research
BYS499, Honor Thesis
BYS547/CH561, Biochemistry I.
BYS548/CH562, Biochemistry II.
BYS690, Graduate Seminar
BYS691, Advance Techniques in Structural Biology.

SERVICES

UAH committees

Committee Chair, Master Admissions-Committee. (January 1, 2012 - Present).

Committee member, PhD program in Biotechnology (January 2009-2014)

Committee Member, Undergraduate Minority Mentor Program. (April 1, 2011 - Present).

Committee Chair, Microbiology Faculty search. (December 2017-March 2018)

PTAC committee member, College of Sciences; chaired once (2015-2017)

Committee Member, Honors Program and College. (September 1, 2011 - September 1, 2015).

Advisor for Student organizations

Hispanic Professional Engineers. (September 1, 2013 - Present).

Helping Paws. (September 1, 2016 - Present).

Hispanic Students Organization (2013-2015)

Recreational Outfit Club. (September 1, 2013 - September 1, 2015).

Student Org Advisor, UCA (September 1, 2018 – Present).

Services to the scientific community

Review Panelist:

National Science Foundation, Washington, Virginia. (February 4, 2014 - February 5, 2016).

Journal Reviewer:

Plos One (2015-2016).

Journal of Bacteriology (2014-2015)

Nature Biotechnology (2017)

Nucleic Acid Research (2018-2020)

Nature Structural and Molecular Biology (2019-2020)

Services to the community

High School outreach:

First Workshop: "*The life depends on genes*" elaborated each year from 2010-2016

First Workshop: "*Molecular Physiology of the Human Body*" elaborated each year from 2010-2015

SRC Chair for the Alabama Science and Engineering Fair from 2012 to 2021