

PhD in Genetics, Molecular and Cellular Biology

Cycle XXXVIII

NAME: Claudia Cecilia Alfaro Contreras

SUPERVISOR: Prof. Mariangela Bonizzoni

PROJECT TITLE: Investigating the arm race between *Aedes albopictus* and its viruses

REVIEWER: Prof. Fausto Baldanti

CV: Find it attached in the following pages



Claudia Cecilia Alfaro Contreras

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● EDUCATION AND TRAINING

03/09/2022 – CURRENT – Pavia, Italy

PH.D. CANDIDATE IN GENETICS, MOLECULAR AND CELL BIOLOGY – University of Pavia

Fellowship "Facing Global Challenges", to undertake research in "Emerging Viral Threats"

Address Pavia, Italy

27/09/2020 – 26/07/2022 – Pavia, Italy

M.SC. MOLECULAR BIOLOGY AND GENETICS – University of Pavia

- Concepts of molecular biology: genomes, evolution, transcriptomes and proteomes. Epigenetics and the mechanisms that govern it.
- Human molecular biology and cellular biochemistry: molecular mechanisms behind different genetic disease and diverse types of cancer. Development of therapies and diagnosis for each one. Molecular mechanisms behind the function of each organelle and any disease associated with them.
- Molecular entomology: physiology of insects, relevance in biotechnological approaches and in description of several biochemical mechanisms. Medical importance, interaction with pathogens and the development of methods to suppress the population.
- Microbiology: bacterial genomes, molecular mechanisms that govern their physiology of the bacteria and its interaction with phages. Pathogenicity and infection process of bacteria, viruses and fungi.
- Methods for molecular and biochemical studies: different types of chromatography, spectrophotometry and other spectrometric techniques. Immunochemistry, ELISA and fluorescence microscopy methods. Techniques for generation of transgenic organisms and cell lines.
- Structural biology and molecular pharmacology: principles behind crystallography and electron microscopy, along with the techniques necessary for both cases. The overall process for the discovery of new drugs and the methods for candidate trials. Drug targets and their potential mechanisms of actions.
- Plant biotechnology: molecular mechanisms behind plant regeneration, DNA damage repair and differentiation. Development of transgenic plants as a solution for problems related to climate change, malnutrition and molecular farming.

Address Pavia, Italy | **Final grade** 110 e lode

12/2014 – 12/2019 – Guatemala, Guatemala

B.SC. BIOCHEMISTRY AND MICROBIOLOGY – Universidad del Valle de Guatemala

General:

- General Biology, Ecology, Botany and Human Anatomy
- Thermodynamics and physical chemistry
- Multivariable calculus
- General physics

Specific topics:

- Organic and analytical chemistry: basic organic chemistry techniques such as crystallization, distillation and chromatography. Main organic reactions and synthesis of different compounds.
- Instrumental analysis: HPLC, gas chromatography, spectrophotometry, IR, FID, polarimetry, refractrometry.

- Biochemistry, metabolism and enzymology: specific techniques for metabolic and enzymatic studies.
- Molecular Biology and Genetic Engineering: PCR (real time, conventional, RT, Touchdown), nucleic acid extraction (traditional techniques and commercial kits), bacterial transformation, induction with IPTG, recombinant proteins production...
- Immunology and Immunochemistry: flow cytometry, cytokine analysis, ELISA, western blots, cell count, etc.
- Microbiology (medical and applied to bioremediation): identification of pathogenic bacteria, biochemical analysis, stainings, growth curves, water analysis, optimization of secondary metabolites.
- Biometry and Bioinformatics: BLAST, alignments, phylogenetic trees development, protein sequence analysis.

Address Guatemala, Guatemala | **Final grade** Summa Cum Laude (95/100)

● WORK EXPERIENCE

29/09/2020 – CURRENT – Pavia, Italy

RESEARCHER ASSISTANT INTERN – BONIZZONI LAB

Current laboratory for the development of the PhD project.

Internship for training and for development of Master's thesis.

-Study of the mosquito *Aedes albopictus* ovaries proteome: rearing of mosquitoes, description of the bidimensional PAGE profile of two strains and performing in-gel digestion of proteins followed by LC/MS coupled proteomic analysis Use of bioinformatic tools and databases to describe the differences in abundance of proteins between samples.

-Production of a recombinant protein coded by a viral integration in the genome: plasmid cloning, transformation in bacterial cells and optimization of the protein production protocol. Finally, set up of solubilization of recombinant protein by using detergents, different pHs, time course experiments and isoelectric precipitation.

22/05/2020 – 28/08/2020 – Guatemala, Guatemala

MEDICAL LABORATORY ANALYST – LABORATORIO NACIONAL DE SALUD

Processing samples for COVID-19 diagnosis via qRT-PCR and reporting results for the Health Ministry. Analyst in charge of organizing and achieving the goals established for my shift. The technical processes in which I participated include:

1. Labelling for traceability of each sample.
2. Inactivation of any potential biodanger from samples.
3. Extraction of RNA and its following use for qRT-PCR.
4. Interpretation and reporting of results.

12/2019 – 03/2020 – Guatemala, Guatemala

MOLECULAR BIOLOGY CONSULTANT – CENTER OF STUDIES FOR BIOTECHNOLOGY

-Producing dsRNA for Anopheline spermatogenesis gene silencing using transgenic bacteria.

-Performing cages experiments with *Anopheles albimanus* mosquitoes for gene silencing.

-Evaluating phenotypes of mosquitoes.

-Evaluating the effects of the silencing by qPCR.

Address Guatemala, Guatemala

14/01/2019 – 11/2019 – Guatemala, Guatemala

RESEARCHER ASSISTANT INTERN – CENTER FOR BIOTECHNOLOGY STUDIES OF UNIVERSIDAD DEL VALLE DE GUATEMALA

Developing a research regarding the production of RNA interference of the *doublesex* gene for the female elimination of *Anopheles albimanus* mosquitoes, main malaria vector in Central America.

-Using bioinformatics to identify targets for gene silencing.

-Cloning fragments of the gene of interest.

-Generating transgenic bacteria that can express the dsRNA of the gene for the technique.

- Inducing and extracting dsRNA and prepare them to be fed to the larvae.
- Optimizing a qPCR for the measurement of the expression of each female isoform of the gene.

Address Guatemala, Guatemala

26/06/2018 – 23/11/2019 – Guatemala, Guatemala

LABORATORY TEACHING ASSISTANT – UNIVERSIDAD DEL VALLE DE GUATEMALA

For the courses of Introduction to Molecular Biology and Microbiology Techniques (2018 & 2019) and Microbiology I (2019)

- Teach basic molecular biology, biochemistry and microbiology techniques to first and second-year students.
- Check prelaboratory reports, laboratory reports and lab performance.
- Guide the students through the development of lab projects.

Address Guatemala, Guatemala

01/01/2017 – 23/11/2020 – Guatemala, Guatemala

UNIVERSITY TEACHING ASSISTANT – UNIVERSIDAD DEL VALLE DE GUATEMALA

Checking homeworks, worksheets and short exams. Also providing help in doubt solving for the students. I have been an assistant professor for the following courses:

- Calculus II (2017)
- Introduction to Life Sciences (2018)
- Biochemistry of Macromolecules (2018-2019)
- Statistics I (2018-2019)
- Statistics II (2018-2019)
- Introduction to Molecular Biosciences (2019)
- Microbiology I (2019)

Address Guatemala, Guatemala

17/01/2018 – 08/08/2018 – Guatemala, Guatemala

RESEARCHER ASSISTANT INTERN – CENTER OF BIOTECHNOLOGY STUDIES OF UNIVERSIDAD DEL VALLE DE GUATEMALA

- Fruit fly (*Anastrepha ludens*) research regarding ARNi for sterilization of males.
- Control of *Klebsiella* sp. presence in fruit fly pupae.

Address Guatemala, Guatemala

30/05/2018 – 21/06/2018 – Medellin, Colombia

RESEARCHER ASSISTANT INTERN – BIOFRUN RESEARCH GROUP OF UNIVERSIDAD NACIONAL DE COLOMBIA

- Development of a *Fusarium* cell stress determination protocol.
- Growth control of *Fusarium* sp. by direct counting and spectroscopy.

Address Medellín, Colombia

● PUBLICATIONS

Endogenous viral elements in mosquito genomes: current knowledge and outstanding questions

<https://doi.org/10.1016/j.cois.2021.10.007> – 2022

Umberto Palatini, Claudia Alfaro Contreras, Laila Gasmi, Mariangela Bonizzoni. 2022. Endogenous viral elements in mosquito genomes: current knowledge and outstanding questions. *Current Opinion in Insect Science*. 49: 22-30. <https://doi.org/10.1016/j.cois.2021.10.007>

● LANGUAGE SKILLS

Mother tongue(s): **SPANISH**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C2	C2	C2	C1
ITALIAN	B2	C1	B2	C1	B2
PORTUGUESE	A2	B1	A2	A2	A2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

● JOB-RELATED SKILLS

Job-related skills

Molecular Biology: macromolecules extraction (proteins, DNA, cDNA, RNA and lipids), electrophoretic analysis for proteins and nucleic acids, PCR (conventional, RT-PCR, qPCR), preparation of competent cells, bacterial transformation, ligations, clone screening, induction of the expression of a recombinant gene, purification of recombinant proteins, bidimensional PAGE.

Microbiology: culture preparation, bacterial inoculation techniques, plaque replication, bacterial characterization with biochemical and morphological assays, growth curves, water and food analysis.

Advanced Equipment: IR, UV and Visible spectrophotometers, HPLC, gas chromatography, atomic absorption, flame photometry.

Bioinformatic skills: R programming, NCBI, BLAST, BASH, VectorBase and general knowledge of bioinformatic databases.

● PRESENTATIONS

Presentations

"TSWV identification in pepper samples collected from Santa Rosa and its evaluation in indicator plants" presented at III Scientific Fair at Universidad del Valle de Guatemala, November 19th of 2019.

Awarded 1st place in the Science Fair.

"iRNA development for the control of *Anopheles albimanus*, malaria vector in Central America" presented at II Biotechnology Congress at Universidad del Valle de Guatemala, October 22nd of 2019. Awarded 1st place for this poster presentation.

"Eliminating females of *Anopheles albimanus*, main malaria vector in Central America" presented at X Biochemistry and Microbiology Congress at Universidad del Valle de Guatemala, September 6th of 2019. Awarded 1st place for this poster presentation and TurboTalk.

"Development of an RNAi strategy for the female elimination of *Anopheles albimanus*, main malaria vector in Central America" poster presented at X Biochemistry and Microbiology Congress at Universidad del Valle de Guatemala, September 6th of 2019.

"Characterization of the sex specific isoforms of the *dsx* gene in *Anopheles albimanus*, main malaria vector in Central America" presented at Center of Studies of Biotechnology of Universidad del Valle de Guatemala, August 7th of 2019.

● HONOURS AND AWARDS

Honours and awards

Fellowship for the project "Facing Global Challenges" for undertaking research in "Emerging Viral threats" (2022-2025): A fellowship for financing the PhD project for the three years of its duration.

Dipartimento di eccellenza of Biology and Biotechnology department of University of Pavia scholarship for a masters degree (2020-2022): Scholarship awarded to a first year international master student with outstanding marks in the admission exam. It is used for covering financial tuition, accomodations and related expenses.

Academical Merit and Honor Award (2016-2019): For academical excellence and obtaining an average in grades superior to 90 points during each academic period (2015-2018). Awarded yearly by Universidad del Valle de Guatemala.

Potencia-T Scholarship (2015): Scholarship awarded in regard of academical excellence, human quality and talent. It is used for financing college tuition fees; non refundable. Awarded by Universidad del Valle de Guatemala.

Beyond Duty Award (2012): Awarded by Guatemala's municipality to distinguished students for their academical record and human quality

● NETWORKS AND MEMBERSHIPS

Memberships

World Society of Virology (2022-current): Active member of the WSV, dedicated to scientific exchanges in the latest discoveries about viruses.

Society for Invertebrate Pathology (2022-current): Active member of SIP, society dedicated to update its members in the newest descriptions of invertebrates and their interaction with pathones.

Enactus member (2017-2019): Student association that develops social entrepreneurship projects in order to help Guatemalan communities that lack of development chances.

Biochemistry and Microbiology Student Association (2019): Student group who seeks the wellness of all the Biochemistry students. In charge of performing different activities in order to show them the different applications of the career.

● RECOMMENDATIONS

PhD Mariangela Bonizzoni

Principal investigator of Molecular Entomology at University of Pavia, Italy

Internship supervisor

mariangela.bonizzoni@unipv.it

PhD Pamela Pennington

Career director and PI of Center of Studies of Biotechnology at Universidad del Valle de Guatemala

pamelap@uvg.edu.gt

PhD Diego Archila

Professor

larchila@fredhutch.org

MBA Gonzalo Mejía

Professor and assisted professor

gemejia@uvg.edu.gt

MSc Anna Yunuen Soto

Assisted laboratory professor

aysoto@uvg.edu.gt

MSc Miriam Barrera

Head of Virology Laboratory at Laboratorio Nacional de Salud
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MSc Francisco Valencia

Internship supervisor at Universidad Nacional de Colombia
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