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Congratulations!
Dr. Fabio Sánchez and Dr. Jannette Cruz,
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Fabio Sánchez, Ph.D.



Jannette Cruz, Ph.D.

- Fabio Sánchez was awarded a B.S. in Computer Science in 2001 from Universidad Metropolitana, a M.S. and Ph.D. in Biometrics in 2003 and 2006 respectively from Cornell University.
- Jannette Cruz was awarded a B.S. in Chemistry in 2001 from Universidad Metropolitana and a Ph.D. in Pharmacy in 2006 from the University of Puerto Rico.



Student
Peer Reviewed
Publications

Characterization of an Arabidopsis Enzyme Family That Conjugates Amino Acids to Indole-3-Acetic Acid⁽¹⁾

Paul E. Staswick,^{a,1} Bogdan Serban,^b Martha Rowe,^a Iskender Tiryaki,^{a,2} Marién T. Maldonado,^{a,3} Mitsa C. Maldonado,^{a,3} and Walter Suza^a

^aDepartment of Agronomy and Horticulture, University of Nebraska, Lincoln, Nebraska 68583

^bDepartment of Biochemistry, University of Nebraska, Lincoln, Nebraska 68583

Substantial evidence indicates that amino acid conjugates of indole-3-acetic acid (IAA) function in auxin homeostasis, yet the plant enzymes involved in their biosynthesis have not been identified. We tested whether several *Arabidopsis thaliana* enzymes that are related to the auxin-induced soybean (*Glycine max*) GH3 gene product synthesize IAA-amino acid conjugates. In vitro reactions with six recombinant GH3 enzymes produced IAA conjugates with several amino acids, based on thin layer chromatography. The identity of the Ala, Asp, Phe, and Trp conjugates was verified by gas chromatography-mass spectrometry. Insertional mutations in GH3.1, GH3.2, GH3.5, and GH3.17 resulted in modestly increased sensitivity to IAA in seedling root. Overexpression of GH3.6 in the activation-tagged mutant *dff1-D* did not significantly alter IAA level but resulted in 3.2- and 4.5-fold more IAA-Asp than in wild-type seedlings and mature leaves, respectively. In addition to IAA, *dff1-D* was less sensitive to indole-3-butyric acid and naphthaleneacetic acid, consistent with the fact that GH3.6 was active on each of these auxins. By contrast, GH3.6 and the other five enzymes tested were inactive on halogenated auxins, and *dff1-D* was not resistant to these. This evidence establishes that several GH3 genes encode IAA-amido synthetases, which help to maintain auxin homeostasis by conjugating excess IAA to amino acids.

INTRODUCTION

Throughout their life cycle, plants adjust their growth and development in response to a variety of internal and external cues. A critical mechanism to coordinate these responses is regulation of the quantity and activity of the phytohormone indole-3-acetic acid (IAA). The amount of active IAA in specific tissues is determined by an array of metabolic processes, including regulation of its synthesis, transport to or from specific cells or tissues, IAA inactivation and reactivation, and degradation via multiple oxidative pathways (for reviews, see Bartel, 1997; Normanly, 1997; Bartel et al., 2001; Ljung et al., 2002). In addition to the free acid, IAA occurs in a variety of modified forms, such as glycosyl esters and amide-linked conjugates with various amino acids and peptides. Only free IAA is established to be the direct biologically active compound, but its conjugates help to maintain IAA homeostasis, both by inactivating IAA and by serving as a reservoir of IAA that can be released upon hydrolysis.

IAA conjugates undoubtedly occur in all higher plants and in at least some lower plant species. Besides the ester conjugates, amide conjugates with Asp, Glu, Ala, Gly, Val, and Leu have been found in a variety of plants, and conjugates with other amino acids may also occur (Normanly, 1997; Ljung et al., 2002; Rampey et al., 2004). The amount of conjugated IAA is generally greater than, and sometimes far exceeds, the level of the free acid in plant tissues (see Bandurski et al., 1995). Conjugate formation and hydrolysis is developmentally regulated and varies significantly among plant tissues (for review, see Kiezkowski and Schell, 1995). Perturbing IAA homeostasis can also influence IAA conjugate level. For example, the exogenous application of IAA or other auxins generally increases IAA conjugate level, and the expression of transgenes involved in IAA synthesis or metabolism can also alter the amount of conjugates that accumulate (Sitbon et al., 1992; Normanly et al., 1993).

A substantial quantity of IAA in plants can exist as amide conjugates with peptides that range in size from 3.6 to 35 kD. In fact, IAA peptides are the major amide conjugate in bean (*Phaseolus vulgaris*) (Blaiek and Cohen, 1986) and *Arabidopsis thaliana* seeds (Ljung et al., 2002), the proportion relative to free IAA varying among tissues and during development. By contrast, IAA-Asp and IAA-Glu account for only 1% of the total amide conjugates of IAA in *Arabidopsis* (Tam et al., 2000), and even lower quantities of IAA-Ala and IAA-Leu occur in this species (Kowalczyk and Sandberg, 2001; Rampey et al., 2004). Nevertheless, evidence indicates that amino acid conjugates play important roles in IAA metabolism, particularly as temporary storage reserves and by initiating the catabolism of IAA (Cohen and Bandurski, 1982; Bandurski et al., 1995).

¹ To whom correspondence should be addressed. E-mail pstaswick1@unl.edu; fax 402-472-7904.

² Current address: Department of Agronomy, Kahramanmaraş Sutcu Imam University, Kahramanmaraş, 46060 Turkey.

³ Current address: Department of Science and Technology, Universidad Metropolitana, San Juan, Puerto Rico 00928.

The author responsible for distribution of materials integral to the findings presented in this article in accordance with the policy described in the Instructions for Authors (www.plantcell.org) is: Paul E. Staswick (pstaswick1@unl.edu).

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UNIVERSITY OF
Nebraska
Lincoln



Marién Maldonado
Doctoral Program Student
University of Nebraska-Lincoln

B.S. Cellular Molecular Biology
Universidad Metropolitana



Mitsa Maldonado
Graduate Student
Universidad de Puerto Rico
Medical School

B.S. in Cellular Molecular Biology
Universidad Metropolitana

Student Peer Reviewed Publications

Mathematical Physics

Intrinsic Spectral Geometry of the Kerr-Newman Event Horizon

Martin Engman, Ricardo Cordero Soto

(Submitted on 28 Sep 2005 (v1), last revised 16 Mar 2006 (this version, v2))

We uniquely and explicitly reconstruct the instantaneous intrinsic metric of the Kerr-Newman Event Horizon from the spectrum of its Laplacian. In the process we find that the angular momentum parameter, radius, area; and in the uncharged case, mass, can be written in terms of these eigenvalues. In the uncharged case this immediately leads to the unique and explicit determination of the Kerr metric in terms of the spectrum of the event horizon. Robinson's "no hair" theorem now yields the corollary: One can "hear the shape" of noncharged stationary axially symmetric black hole space-times by listening to the vibrational frequencies of its event horizon only.

Comments: Final version with improved abstract, updated references, corrected typos, and additional discussion

Subjects: **Mathematical Physics (math-ph)**; General Relativity and Quantum Cosmology (gr-qc); Differential Geometry (math.DG)

MSC classes: 58J50 (Primary); 83C15; 83C57 (Secondary)

Journal reference: J.Math.Phys. 47 (2006) 033503

DOI: [10.1063/1.2174290](https://doi.org/10.1063/1.2174290)

Cite as: [arXiv:math-ph/0509067v2](https://arxiv.org/abs/math-ph/0509067v2)



Ricardo Cordero,
Ph.D. (2011)

Ari
University



Display Settings: Abstract

Send to:

Anal Chim Acta. 2007 Jan 2;581(1):1-6. Epub 2006 Aug 7.

Electrocatalytic detection of insulin at RuOx/carbon nanotube-modified carbon electrodes.

Wang J, Tangkuaram T, Loyprasert S, Vazquez-Alvarez T, Veerasai W, Kanatharana P, Thavarungkul P.

Departments of Chemical and Material Engineering, Chemistry and Biochemistry, The Biodesign Institute, Arizona State University, Tempe, AZ 85287-5801, USA. joseph.wang@asu.edu <joseph.wang@asu.edu>

Abstract

A bilayer surface coating, prepared by electrodepositing ruthenium oxide (RuOx) onto a carbon nanotube (CNT) layer, offers dramatic improvements in the stability and sensitivity of voltammetric and amperometric measurements of insulin compared to the individual (CNT or RuOx) coated electrodes. The enhanced electrocatalytic activity towards insulin is indicated from lowering the potential of the oxidation process (starting around 0.35 versus Ag/AgCl) and the substantially higher sensitivity over the entire potential range. A wide linear dynamic range (10-800 nM) was achieved with a detection limit of 1 nM. The marked electrocatalytic activity of the RuOx/CNT coating towards insulin is coupled with a greatly enhanced stability. For example, the insulin amperometric response of the RuOx/CNT-coated electrodes is highly stable, with 97% of the initial activity remaining after 60 min stirring of 2 x 10(-6) M solution (compared to significantly faster current diminutions at the RuOx- or CNT-coated surfaces). The results suggest great promise for miniaturized sensors and detectors for monitoring insulin.

PMID: 17386417 [PubMed - indexed for MEDLINE]

+ Publication Types, MeSH Terms, Substances, Grant Support

+ LinkOut - more resources



Terannie Vázquez, Ph.D. (2009),
Arizona State
University

A Mathematical Comparison of Prevention Strategies for Addicted Women

Angela Ortiz

Department of Mathematics and Statistics,
Arizona State University

David Murillo

Department of Mathematics and Statistics,
Arizona State University

Fabio Sánchez

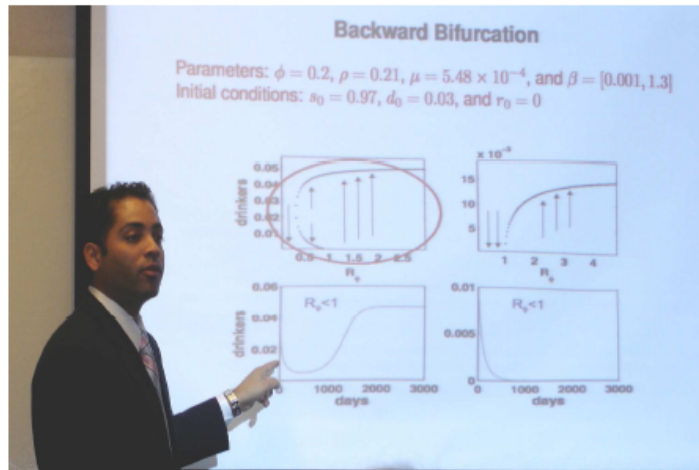
Department of Biological Statistics and Computational Biology,
Cornell University

Abstract

Crack-cocaine use among pregnant women is major public health concern leading to children born addicted to cocaine, an increased rate of HIV infection and many other health and social problems. Many programs exist that focus on the rehabilitation of women and mothers who use cocaine. We use deterministic approach to model the effectiveness of these programs. The focus will be on populations of women (often commercial sex workers) who are encouraged or forced to use drugs by drug dealers, pimps or both. The impact of drug rehabilitation and other treatment programs among particular groups is explored as well as the role of drug enforcement on the dynamics of this system. In particular, the roles of pimp's pressure on women to use drugs, the inability of drug users to quit due to addiction, and the relapses among those in rehabilitation programs are explored. The effect of longer jail terms for drug dealers and pimps is discussed in the context of the model and data available.



Ángela Ortiz,
Ph.D. (2010)
Arizona State
University



Fabio Sánchez,
 PhD. 2006
 Cornell University

<http://www.people.cornell.edu/pages/fas9/>

Publications

Ph.D. Dissertation. *Studies in Epidemiology and Social Dynamics*. November 2006. [\[PDF\]](#)

D. Murillo, A. Ortiz and F. Sánchez. *A Mathematical Comparison of Prevention Strategies for Addicted Women*, *Sonoran Journal of Graduate Mathematics*, Issue 1, 2005. [\[PDF\]](#)

J. Gjorgjieva, K. Smith, J. Snyder, G. Chowell-Puente, F. Sánchez and C. Castillo-Chávez. The Role of Vaccination in the Control of SARS. *Mathematical Biosciences and Engineering*, Vol. 2 No. 4, pp.753-769, October 2005. [\[PDF\]](#)

G. Chowell, F. Sánchez. *An Outbreak of Dengue in Mexico, 2003: Quantifying the role of interventions*. *Journal of Environmental Health*, Vol. 68 No. 10, pp. 40-44, June 2006. [\[PDF\]](#)

Sánchez, F., Engman, M., Harrington, L. and C. Castillo-Chávez. *Models for Dengue Transmission and Control*. **Modeling The Dynamics of Human Diseases: Emerging Paradigms and Challenges**. AMS Contemporary Mathematics Series. Gumel A. (Chief Editor), Castillo-Chavez, C., Clemence, D.P. and R.E. Mickens. [\[PDF\]](#)

G. Chowell, A. Cintron-Arias, S. Del Valle, F. Sánchez, B. Song, J. M. Hyman, H. W. Hethcote, and C. Castillo-Chavez. *Mathematical applications associated with the deliberate release of infectious agents*. **Modeling The Dynamics of Human Diseases: Emerging Paradigms and Challenges**. AMS Contemporary Mathematics Series. Gumel A. (Chief Editor), Castillo-Chavez, C., Clemence, D.P. and R.E. Mickens.

Fabio Sánchez, Xiahong Wang, Carlos Castillo-Chávez, Paul Gruenewald and Dennis Gorman. *Drinking as an epidemic--a simple mathematical model with recovery and relapse*. **Evidence Based Relapse Prevention**. Edited by Katie Witkiewitz and G. Alan Marlatt, 2006. [\[PDF\]](#)

Bridge to Graduate School Ph.D. and Doctoral Degrees

ARIZONA STATE UNIVERSITY, Phoenix, AZ



Angela Ortiz
Computer Science
Ph.D. Graduate 2010



Terannie Vázquez
Chemistry
Ph.D. Graduate 2009



Ricardo Cordero
Mathematics
PhD Graduate 2011

UNIVERSIDAD CENTRAL DEL CARIBE, Bayamón, PR



Pedro González
Cellular Molecular Biology
MD 2010



CORNELL UNIVERSITY, Ithaca, NY



Fabio Sánchez
Computer Science
Ph.D. Graduate 2006



UNIVERSITY OF PUERTO RICO, Río Piedras, PR



Mitsa Maldonado
Cellular Molecular Biology
Pharm D. Graduate 2010



Jannette Cruz
Chemistry
Pharm D. Graduate 2006



Daniel Meléndez
Natural Sciences
Pharm D. Graduate 2008

UMET-STEM ALUMNI WITH DOCTORAL DEGREES

Ph.D., Doctor in Medicine, Pharm D - Law Degrees

ARIZONA STATE UNIVERSITY, Phoenix, AZ



Angela Ortiz
Computer Science
Ph.D. 2010



Terannie Vázquez
Chemistry
Ph.D. 2009



Ricardo Cordero
Mathematics
Ph.D. 2011



Dalvin Méndez
Chemistry
Ph.D. 2014
Post-Doc Program



Emmanuel Morales
Computer Science
Ph.D. 2014

UNIVERSITY OF PUERTO RICO, Río Piedras, PR



Nildris Cruz
Biology
Ph.D. 2014
Post-Doc Program



Daniel Meléndez
Natural Sciences
Pharm D. 2008



José Gaudier
Cellular Molecular Biology
Ph.D. 2014



Clarymar Ortiz
Biology
Pharm D. 2014



Mitsa Maldonado
Cellular Molecular Biology
Pharm D. 2010



Jannette Cruz
Chemistry
Pharm D. 2006

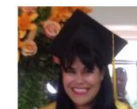


Jomar Suárez
Cellular Molecular Biology
MD 2011

UNIVERSIDAD IBEROAMERICANA, San to Domingo, RD



Carolina Sánchez
Biology
MD 2010



Larimar Candelario
Biology
MD 2014



Jessica Cuevas
Chemistry
MD 2012

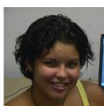


Brenda Cuello
Biology
MD 2010



Lemuel Melecio
Cellular Molecular Biology
MD 2013

UNIVERSIDAD INTERAMERICANA, School of Law, PR



Nicole Villalba
Cellular Molecular Biology
Juris Doctor 2009



Atzel Devrón
Environmental Science
Juris Doctor 2012

ST. GEORGE'S UNIVERSITY, Grenada



José Evans
Biology
DVM 2006



Maria Rodriguez
Biology
DVM 2007

BAYLOR COLLEGE OF MEDICINE, Houston, TX



Ramón Román
Cellular Molecular Biology
Ph.D. 2015



Indhira De La Rosa
Cellular Molecular Biology
Ph.D. 2014

NEW MEXICO STATE UNIVERSITY, Las Cruces, NM



Amir González
Environmental Science
Ph.D. 2011



Gloricelys Rivera
Cellular Molecular Biology
Ph.D. 2011

LIFE UNIVERSITY Atlanta, GA



Alejandra Irizarry
Computer Science
D.C. 2008

CORNELL UNIVERSITY, Ithaca, NY



Fabio Sánchez
Computer Science
Ph.D. 2006



VERMONT LAW SCHOOL, South Royalton, VT



Wildalys De Jesús
Environmental Science
Law Degree 2006

UNIVERSITY OF ILLINOIS, Chicago, IL



Yahira Báez
Cellular Molecular Biology
Ph.D. 2012
Post-Doc Program

UNIVERSITY OF CALIFORNIA, Irvine, CA



Oscar González
Psychology
Ph.D. 2011

VANDERBILT UNIVERSITY, Nashville, TN



Thompson LeBlanc
Computer Science
Ph.D. 2012



MIE ALUMNI WITH DOCTORAL DEGREES

UNIVERSITY OF VIRGINIA, Charlottesville, VA



Ruth Castellanos
Cellular Molecular Biology
Ph.D. 2012
Post-Doc Program

FRIEDRICH SCHILLER UNIVERSITY, Germany



Yahaira Naaldijk
Cellular Molecular Biology
Ph.D. 2013
Post-Doc Program

UNIVERSIDAD AUTÓNOMA DE GUADALAJARA, México



Giselle González
Cellular Molecular Biology
MD 2012



Christian Cruz
Cellular Molecular Biology
MD 2013



UNIVERSIDAD CENTRAL DEL CARIBE, Bayamón, PR



Pedro González
Cellular Molecular Biology
MD 2010



VIRGINIA TECH UNIVERSITY, Blacksburg, VA



Ana Mercedes
Chemistry
Ph.D. 2011



THE UNIVERSITY OF TEXAS, Southwestern Medical Center



Jerfiz Constanzo
Biology
Ph.D. 2016

LOMA LINDA UNIVERSITY, Loma Linda, CA



Carlos Diaz
Chemistry
Ph.D. 2015

UNIVERSIDAD INTERAMERICANA, School of Optometry, PR



Idalis Ocasio
Sales and Distribution
DO 2010



UNIVERSITY OF TEXAS, El Paso, TX



Victor Correa
Cellular Molecular Biology
Ph.D. 2016



UNIVERSITY OF NORTH TEXAS, Denton, Texas



Reinaldo Santos
Physics
Ph.D. 2015



UNIVERSIDAD DE GRANADA, Granada, Spain



Michael Caraballo
Cellular Molecular Biology
Ph.D. 2016

UNIVERSIDAD DE SALAMANCA, Granada, Spain



Triana Merced
Biology
Ph.D. 2012

MIGUEL HERNANDEZ, UNIVERSITY OF ELCHE, Spain



José Ayala
Cellular Molecular Biology
Ph.D. 2013

PONCE HEALTH SCIENCES UNIVERSITY, PONCE, PR



Lorangelly Rivera
Cellular Molecular Biology
M.D. 2016

UNIVERSITY OF HEALTH SCIENCES, Antigua



Cristina Tatis
Biology
M.D. 2016



Ashley González
Cellular Molecular Biology
M.D. 2016

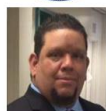
UNIVERSIDAD DEL TURABO, Gurabo, PR



Verónica Bezars
Biology
N.D. 2016



HOWARD UNIVERSITY, Washington, DC



José Tirado
Environmental Science
Ph.D. 2016



María Vélez
Biology
Ph.D. 2013



Raúl García
Computer Science
Ph.D. 2016

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, NC



Sujei Carro
Environmental Science
Ph.D. 2014



ROSS UNIVERSITY, St. Kitts



Etienne Rossy
DVM 2015



Julianna Murati
DVM 2015

International Undergraduate Research Program (2009-2010)



Ana G. Méndez University System
Student Research Development Center

SUMMER 2009

International Research Program
Spanish Research Council



Instituto de Investigaciones Biomédicas de Barcelona (IIBB)

Ashley Gonzalez
Cellular Molecular Biology
Universidad Metropolitana

Juliana M. Fadro
Applied Microbiology
Universidad de Este

María García
Biology
Universidad Puerto Rico

Christina Tate
Cellular Molecular Biology
Universidad Metropolitana

Instituto de Investigaciones Marinas de Vigo

Juan P. Alvarez
Environmental Science
Universidad Metropolitana

Centro Andaluz de Biología Molecular y Medicina Regenerativa, Sevilla

Emanuel Villanueva
Cellular Molecular Biology
Universidad Metropolitana

Ariela Medina
Cellular Molecular Biology
Universidad Metropolitana

Instituto de Biomedicina, Granada

Jessica Diaz
Agri-food Microbiology
Universidad de Este

Centro de Investigaciones Biológicas (CIB), Madrid

Jonathan A. Lopez
Biology
Universidad Metropolitana

Instituto de Investigaciones Químicas, Sevilla

Dalia Higuera
Chemistry
Universidad Metropolitana

Hércules Carrasquillo
Chemistry
Universidad Metropolitana

Instituto de Biomedicina de Valencia, Valencia, (IBV)

Karla T. Franco
Cellular Molecular Biology
Universidad Metropolitana

Instituto de Ciencias Marinas de Andalucía, Cádiz

Gabriel Jullá
Graduate Student
Universidad Metropolitana

Instituto de Investigación de Aeronáutica y Nanotecnología (IAAN), Oviedo

Rafael Díaz
Mechanical Engineering
Universidad de Turabo

Instituto Cajal, Madrid

Olga Quintero
Mathematics Graduate Student
Universidad de Turabo

Instituto de Ciencias de Materiales de Barcelona

Carlos Peña
Mechanical Engineering
Universidad de Turabo

Instituto de Investigación de Inteligencia Artificial, Barcelona

Jorge Contreras
Electrical Engineering
Universidad de Turabo

Luis Daniel James
Mathematics Graduate Student
Universidad de Turabo

Centro de Investigaciones sobre Desestificación, Valencia

Lissette Capote
Mathematics Graduate Student
Universidad de Turabo









ANA G. MÉNDEZ UNIVERSITY SYSTEM
Vice-Presidency for Planning and Academic Affairs
STUDENT RESEARCH DEVELOPMENT CENTER

Summer 2010



**INTERNATIONAL RESEARCH
INTERNSHIPS PROGRAM**

**Instituto de Parasitología
Biomedicina López Neyra, Granada**

Luz Cumba
Cellular Molecular Biology
Universidad Metropolitana

Julianna Falero
Biology
Universidad de Este

Daniela Piñero
(Graduate)
Universidad Metropolitana

Jessica Diaz
Microbiology
Universidad del Este

**Instituto de Investigación en
Inteligencia Artificial, Cataluña**

Uriel Marouэт
Computer Engineering
Universidad de Turabo

**Centro de Biología Molecular
Severo Ochoa, Madrid**

Graciela Quintero
Environmental Science
Universidad de Turabo

**Instituto del Cáncer
de Salamanca**

Kaisa Muller
Cellular Molecular Biology
Universidad Metropolitana

**Instituto de Robótica
e Informática Industrial, Barcelona**

Andrea Morales
Electrical Engineering
Universidad de Turabo

**Centro de Automática y
Robótica, Madrid**

Alcides Alvear
Computer Engineering
Universidad de Turabo

**Instituto de Biología Molecular
y Celular del Cáncer de Salamanca**

André Medina
Cellular Molecular Biology
Universidad Metropolitana

**Instituto de Investigaciones
Biomédicas Alberto Sols, Madrid**

Martiza González
Cellular Molecular Biology
Universidad Metropolitana







AGMUS-CSIC

Juan F. Arratia, Ph.D



President and Founder
Scientific Caribbean Foundation, Inc.
San Juan, Puerto Rico

Former Principal Investigator (PI) of MIE, CCCE,
Puerto Rico Laser, AMISR, AGMUS Institute of
Mathematics. Arecibo Observatory REU, Co-PI
Administration of Arecibo Observatory, UNICA
Puerto Rico Alliance

Alumni of Fulbright, Organization of American State, Rotary
International, American Field Service, Universidad Tecnica del
Estado. 2006 White House Presidential (PAESMEM) Award
Recipient. Fulbright Specialist

Phone: (787) 308 5132

E-mail: juan.arratia@gmail.com

Web Page: <http://www.scfpuertorico.com>