

CEOSE Mini-Symposium  
Women of Color in STEM: Getting  
there cuando no hay camino:  
Chicanas in Mathematics,  
Science and Engineering

October 27, 2009  
Arlington, VA

The Committee on Equal Opportunities in Science and  
Engineering

National Science Foundation  
TERC, Inc.

# Paths to Discovery

Autobiographies from  
Chicanas with Careers  
in Science, Mathematics,  
and Engineering

Norma E. Cantú, Editor  
With an Introduction by Aída Hurtado

## Getting There Cuando No Hay Camino (When There Is No Path): Chicanas in Mathematics, Science and Engineering

**Norma E. Cantú, Ph. D.**

Professor of English and U.S. Latina/o  
Literatures

University of Texas at San Antonio

- Introduction

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- Adelante Project and Book Development /Organization
- Testimonio as Research Tool: Autobiographies
- Findings: Themes and Factors
- Implications and Directions for Policy in STEM for Latinas



# The Adelante Project

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- ▶ NSF grant
- ▶ MALCS gathering 2003 and subsequent writing
- ▶ AAAS publication of *Flor y Ciencia: Chicanas in Mathematics, Science and Engineering* and UCLA's *Paths to Discovery: Autobiographies of Chicanas with Careers in Mathematics, Science and Engineering*



# Book development and organization

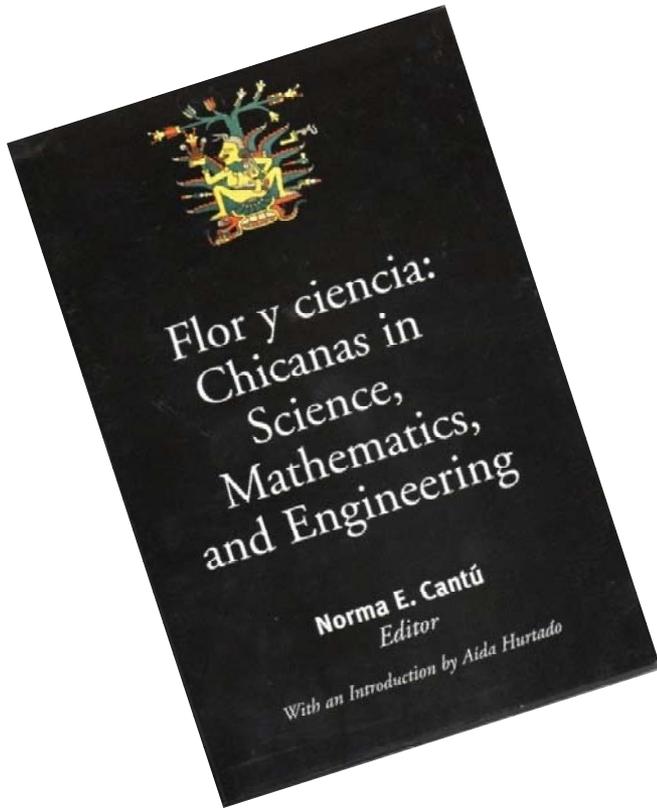
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## ▶ Telling to Live: Latina Feminist Testimonios: Contributors--

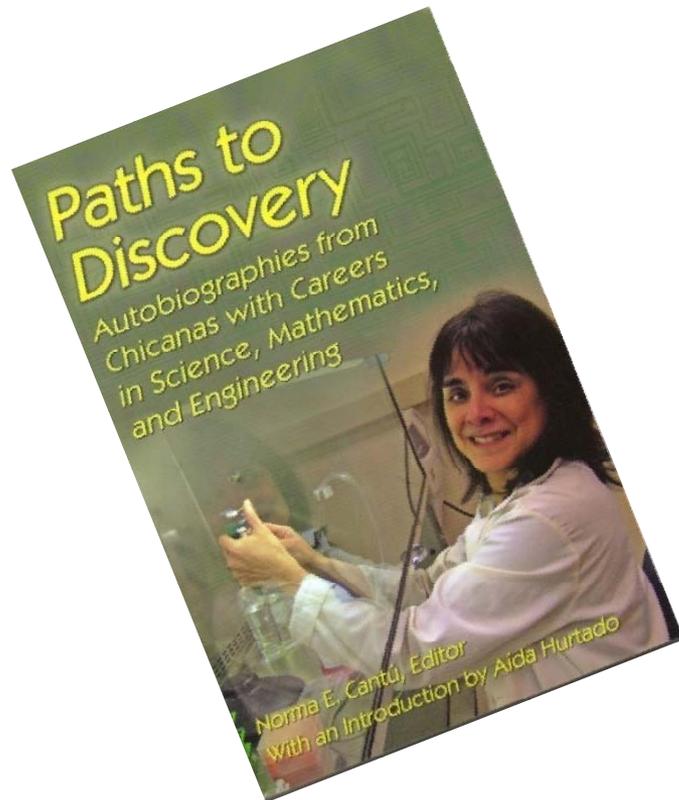
- ▶ Luz del Alba Acevedo
- ▶ Norma Alarcon
- ▶ Celia Alvarez
- ▶ Ines Hernández Avila
- ▶ Ruth Bejar
- ▶ Rina Benmayor
- ▶ Norma E. Cantú
- ▶ Daisy Coco de Filippis
- ▶ Gloria Cuadraz
- ▶ Liza Fiol Matta
- ▶ Yvette Flores
- ▶ Aurora Levins Morales
- ▶ Clara Lomas
- ▶ Iris Lopez
- ▶ Mirtha Quintanales
- ▶ Eliana Rivero
- ▶ Caridad Souza
- ▶ Patricia Zavella



# Flor y Ciencia: Chicanas in Mathematics Science and Engineering (2006)



# *Paths to Discovery: Autobiographies from Chicanas with Careers in Mathematics, Science and Engineering (2007)*



# The Authors



CHAPTER 1 

*What I  
Did on My  
Summer  
Vacation*

***Elma González***  
*Professor Emerita of  
Ecology and  
Evolutionary Biology*



CHAPTER 2 

*Haciendo  
Caras*

*The Making of a  
Scientist*

***María Elena Zavala***

*Professor of Biology*



CHAPTER 3 

*Life  
Lessons*

***Cleopatria Martínez***  
*Professor of Mathematics*



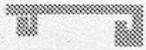
CHAPTER 4 

*Our History,  
My Life*



*Elizabeth  
Rodríguez-Johnson  
Senior Policy Analyst*



CHAPTER 5 

*¡Claro  
Que Sí Se  
Puede!*

*Lupita D. Montoya*  
*Assistant Professor of*  
*Environmental Engineering*





## CHAPTER 6

# *Mi Viaje en Esta Vida*

*The Life of a  
Laredo Girl*

*Martha Cecilia  
Zúñiga*

*Professor of Molecular,  
Cellular, and  
Developmental Biology*



CHAPTER 7 



*The  
Education  
of a Chicana  
Scientist*

***Elvia Elisa Niebla***

*Director of Global Change  
Research*



CHAPTER 8 

*Aprendiendo  
a Vivir*



***Elsa Cantú Ruíz***

*Assistant Professor of  
Mathematics Education*

CHAPTER 9 

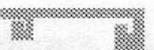
*A's for  
Academics,  
C's for  
Conduct*

***Diana Martinez***

*Professor of Biochemistry  
and Dean, College of  
Science and Technology*





CHAPTER 10 

*On the  
Inside,  
Looking In  
The Roots of a  
Life in Science*

***Lydia Villa-Komaroff***  
*Chief Executive Officer  
and Chief Scientific Officer*



# Introduction and appendix

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- ▶ Aida Hurtado's Introduction
- ▶ Deborah Santiago's Appendix



# Findings...

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- ▶ Testimonio as a qualitative research tool
- ▶ Master narratives and success
- ▶ Parents, family, community
- ▶ Teachers and mentors
- ▶ Reading and academic preparation
- ▶ Negotiating stigma: race, class, gender



# Findings...

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- ▶ **Testimonio as Qualitative Research Tool**
  - ▶ Telling stories chronicles paths to achievement
  - ▶ The stories reveal the key obstacles and conditions
  - ▶ Theorizing around testimonio allows for a differential consciousness (Sandoval)
  - ▶ The method can be replicated



# Findings...

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- ▶ **Master Narratives**
  - ▶ Reinscribe power between groups
  - ▶ Establish norms: “that’s just the way things are”
- ▶ **These Stories defy the dominant master narratives of success**
  - ▶ **Overcoming obstacles**
    - ▶ Poor educational preparation due to a racist educational system
    - ▶ Lack of resources for academic success



# Findings...

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- ▶ **Role of parents, family, community**
  - ▶ The home and community provided educational scaffolding that provided the authors with a sense of possibility for a career in science and mathematics
  - ▶ Supportive mothers
  - ▶ Understanding of extended family



# Findings...

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## ▶ Role of Teachers and Mentors

- ▶ Teachers in k-12 inspired and provided support
- ▶ Professors encouraged and opened doors
- ▶ Authors were provided with opportunities
- ▶ Mentors supported projects, decisions, offered options – were there in many ways including financial, moral and technical support



# Findings...

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- ▶ Reading in English is essential and all authors enjoyed reading for pleasure
- ▶ Language played a key element in success—they all told stories of how their home language and the school language impacted their experience. Their bilinguality was an asset that was not valued.



# Findings

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- ▶ **Negotiation of stigma:**
  - ▶ Racism
  - ▶ Sexism
  - ▶ Classism
  
- ▶ **Authors dealt with various situations successfully overcoming race, class and gender biases.**



# Other Themes and factors

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- ▶ Passion for the field
- ▶ Desire to give to the community
- ▶ Involved with programs and organizations that support increasing the number of Chicanas in STEM (SACNAS, Adelante Project, Etc)



# Implications and Directions for Policy in STEM for Latinas...

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- ▶ Synthesis of findings and pointing forward
- ▶ Continuing the process
- ▶ What can be done...



# Implications and Directions for Policy in STEM for Chicanas/Latinas ...

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- ▶ **Additional and creative programs at all levels that provide**
  - ▶ Access to education
  - ▶ Opportunities for success
- ▶ **Teacher training and preparation**
  - ▶ Content based, culturally relevant
  - ▶ Higher education faculty ready to lend a hand
- ▶ **Recruitment to and Support in graduate school**
  - ▶ If students are not ready, allow them opportunity to get ready!
  - ▶ Support and ease the path to a doctoral degree



# PATHS TO DISCOVERY: CHICANAS IN MATHEMATICS, SCIENCE AND ENGINEERING



*Elma González as a postdoctoral fellow in the Beavers lab at the University of California, Santa Cruz, 1973.*



*Elvia Elisa Niebla collecting soil samples in Death Valley, California, circa 1980.*



*Martha Cecilia Zúñiga working in the lab, 2007.*



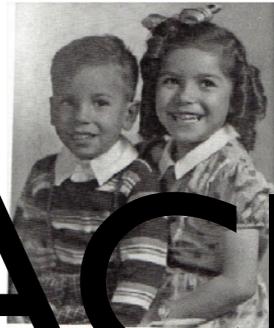
*Elvia Elisa Niebla with her family, 1948.*



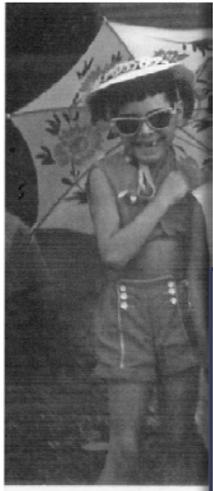
*Diana Marín with her mother, brother Tom, and cousin Tony, 1946.*



*Lydia Villa-Komaroff, the only girl in her high school physics class, 1965.*



*Cleopatra Martínez and her brother, 1953.*



*Martha Cecilia Zúñiga, 1956.*



*Cleopatra Martínez with her mother, 2005.*



*Lupita D. Montoya, circa 1968.*



*Diana Marín as an undergraduate researcher at Oak Ridge National Laboratory, 1962.*



*Elma González, age 2, with her aunt, Guadalupe López, and cousin Sylvia López, in Laredo, Texas, 1944.*



*Maria Elena Zavala with her mother and father (and rosebush), circa 1956.*

# GRACIAS