

# How to Reach Out to Girls, Their Families and Communities to Support Involvement in Inquiry- Based Science

Shirley M. Malcom



## Science as a Human Activity: Babies Explore Their Worlds and Formulate Hypotheses About How the World Works

- Pattern seeking, sense making, language learning
- Everyday biology, everyday physics, everyday psychology
- How the brain makes these connections and, therefore, why experiences are important

## Common to Young Children, Both Boys and Girls

- Item
- Item
- Item

While Division of Labor Within Families May Be Along Gender Lines, There Are Still Opportunities to Reinforce Science as a Part of Roles That Emerge

Example:

Watching the chemical reactions involved in cooking vs. the anatomy that might be learned in butchering animals

At some point and in some, but not all, cultures, the idea starts to set in that girls do not do mathematics and science

- Toys that are offered?
- Behaviors reinforced as appropriate or not
- Behaviors of others that are observed

## What Are the Origins of those Attitudes and Beliefs?

- Popular media?
- Images in press or books?
- Lack of role models in family and / or community. Girls who don't see mothers, aunts, sisters, other women *enjoying* the pursuit of science / math / engineering may not have their minds open to the idea. Harder to counteract the negative images of women's roles or their invisibility.

## Must Begin to Replace the Images of Who Does Science

Girls and young women who participate in science fairs and who excel in science classes can provide positive models

L'Oreal women in science winners and events in country help to dispel this

# L'Oreal 2010 For Women In Science Fellowships in Sub-Saharan Africa



PASCALINE  
FONTEH



NONHLANHLA  
MKHIZE



NDIDI  
NGWULUKA



SONIA  
WOUDBERG



AMANDA  
MASWANGANYE



# Africa-Arab State 2009 L'Oreal-UNESCO Award for Women in Science

Professor  
Tebello Nyokong,  
Rhodes University



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## Nyokong wins Prestigious L'Oreal - Unesco Award for Woman in Science

Rhodes University's Professor Tebello Nyokong, has won the Africa-Arab State 2009 L'Oréal-Unesco Award for Women in Science for her pioneering research into photodynamic therapy which looks at harnessing light for cancer therapy and environmental clean-up. Nyokong is the third South African Scientist to receive this award, and reaffirms Rhodes's place as one of the top research institutions in the country. University of Cape Town's Professor Jennifer Thompson was previously recognised for her work on genetic engineering while Wits University's Professor Valerie Mizrahi was recognised for her tuberculosis research.




Professor Tebello Nyokong

## Tebello Nyokong




Pioneering research into photodynamic therapy which looks at harnessing light for cancer therapy and environmental clean-up

# Jennifer Ann Thomson, Microbiologist, University of Cape Town



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**Jennifer Ann Thomson – Microbiologist**



Jennifer Thomson has a BSc in zoology from the University of Cape Town, an MA in genetics from Cambridge University and a PhD in microbiology from Rhodes University in South Africa. She was a post-doctoral fellow at Harvard Medical School and spent a sabbatical year at the Massachusetts Institute of Technology. She was a lecturer, senior lecturer and Associate Professor in the Department of Genetics at the University of the Witwatersrand in South Africa before starting and being the Director of the Laboratory for Molecular and Cell Biology for the Council for Scientific and Industrial Research. She then became Professor and Head of the Department of Microbiology at the University of Cape Town (UCT), a post she held for 12 years until the Department merged with the Department of Biochemistry. She is now a Professor of Microbiology in the Department of Molecular and Cell Biology at UCT. Her main current research interests are in the development of maize resistant to the African endemic maize streak virus (MSV) and tolerant to drought. The MSV work has been shown in glasshouse trials to give excellent protection. Her group is now embarking on biosafety analyses – the first in South Africa – prior to field trials. These will be the first analyses and trials of a transgenic plant developed in Africa, for an African problem, using African plant genes. Other positions held in the past include the Deputy Dean of Science at UCT, chair and member of the South African Genetic Engineering Committee, co-founder and chair of SA Women in Science and Engineering, and

# Valerie Mizrahi, Biochemist and Molecular Biologist University of the Witwatersrand

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## HHMI INTERNATIONAL RESEARCH SCHOLARS

### Valerie Mizrahi, Ph.D.



Dr. Mizrahi earned her Ph.D. in chemistry from the University of Cape Town in 1983. From 1983 until 1986, she did postdoctoral work at Pennsylvania State University. She subsequently held positions with the South African Council for Scientific and Industrial Research, Smith Kline & French Research & Development, the University of the Witwatersrand, and the South African Institute for Medical Research. She is professor at the University of the Witwatersrand Medical School; director of the Molecular Mycobacteriology Research Unit of the South African Medical Research Council, National Health Laboratory Service and University of the Witwatersrand, Johannesburg; and codirector of the Centre of Excellence for Biomedical TB Research of the Department of Science and Technology (DST) and National Research Foundation of South Africa. She is a fellow of the Royal Society of South Africa and a member of the Third World Academy of Sciences and the Academy of Science of South Africa. She has won the 2000 Unesco-L'Oréal For Women in Science prize (Africa Region), the 2006 DST Distinguished Woman Scientist Award, the 2006 Gold Medal of the South African Society for Biochemistry & Molecular Biology, and in 2007, she was awarded the Order of the Mapungubwe for contributions to biochemistry and molecular biology in South Africa. This is her second HHMI award.

**RESEARCH ABSTRACT SUMMARY:**

Valerie Mizrahi is studying the mechanisms of DNA metabolism, culturability, and resuscitation in *Mycobacterium tuberculosis*, the organism that causes human tuberculosis. Development of more effective tools for TB control require understanding the mechanisms underlying TB's remarkable ability to adapt to adverse conditions and persist in a dormant state from which it can reactivate to cause disease.

**International Scholar 2000 - Present**  
University of the Witwatersrand

**RESEARCH ABSTRACT**

- [Mechanisms of Physiological Adaptation in \*Mycobacterium tuberculosis\*](#)

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Must Also Affirm that Science Belongs to  
Women in the Community, Too

## Ways in Which Science Already Is Part of the Lives of Women, as Well as Men...and Where It Already Belongs to Communities

- Agricultural practices
- Medicinal plants
- Using solar energy
- Improving quality of water

While These Efforts to Provide a More Inclusive Face to Science May Begin to Affect Attitudes, the Question Is How to Affect *Practice*

## How Teachers Are Educated and Trained (Race and Gender Inclusion?)

- Are the strategies included?
- How to interact with parents and communities?



## The Nature of Curriculum

- Things that would appeal to girls
- Things that would appeal to boys
- Gender-neutral
- It matters what examples we use

## Classroom Management

- Monitoring whether girls are as likely as boys to offer explanations
- Calling on students and soliciting their ideas rather than allowing for shouting out of answers
- Offering a sufficient amount of “wait time”
- Working alone or in groups (are both girls and boys handling the materials, collecting data?)

# Classroom Engagement

- Responding to explanations that might be offered
- Encouragement and support
- Allowing for modification and extension of initial ideas

## Strategies to Improve Practice

- Have a colleague watch and time the amount of interaction with boys and girls
- How much time is spent in controlling behavior vs. offering instruction
- How much time the teacher speaks vs. students

## Parents and Community

- Festivals and fairs to celebrate the role of S&T
- Engaging families in the same types of activities as their children
- Children as explainers
- Introducing families to college students and working professionals in science, including aspects of their home and family lives (live and virtually)