Pedro Barbosa, the entomology “witch doctor” [1]

Submitted by Wilson Gonzalez-Espada [2] on 1 April 2013 - 12:00am

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Dr. Pedro Barbosa

We are in the middle of a war most people know nothing about. It is a war that has been going on, unstoppable and deadly, for more than 400 million years. I am referring to the co-evolutionary war between plants and insects.

It is very likely that this conflict started as the first insects evolved out of the ocean ecosystem. By that time, many plants have already transitioned and became terrestrial. The first insects that tried dry land discovered the largest “salad bar” in the world, miles and miles all types and sizes of plants for them to enjoy.

Of course, not all plants were identical. Just out of random genetic changes, some plants were edible by insects and others were not. With time and chance mutations, some plants developed ways to fight insects, such as natural insecticidal chemicals or structures like hairs and spines.

In response, insect genetics allowed some of them to eat plants that were not edible to other insects or to develop way to bypass plants’ mechanical defenses. After hundreds of millions of years of evolutionary and genetic “tit-for-tat”, the result is a delicate ecological balance between millions of plant and insect species. Some of these even arrived at a “cease-fire” by establishing mutualistic relationship, a relationship where both organisms get some benefit off each other.

The scientists that study insects are known as entomologists [4], a word that is derived from the prefix “entomos” (meaning segmented, like insect segments) and the suffix “logos” (study of). One of the world-renowned and most prolific entomologists that research the interactions between plants and animals is Dr. Pedro Barbosa [5]. Originally from Guayama [6], the “City of the Witches”, he spent the last 40 years teaching university classes in entomology, working in revealing research studies, training scores of next-generation entomologists, and publishing books and articles that describe and explain the complex relationships between those eternal rivals and inseparable organisms, insects and plants.

Pedro and his family moved from Guayama to New York City in the late 40s seeking a better life and opportunities. It was there that a young Pedro fell in love with science, a feeling that increased exponentially each time he visited the extraordinary American Museum of Natural History [7]. Pedro’s parents, neither of which went beyond the third grade in school, understood the importance of going to college and supported him and his scientific interests. They were “thrilled” that Pedro was accepted to attend City College of New York [8] (Currently CUNY).

As an undergraduate, only blocks away from Harlem, Pedro was one of the few black students enrolled. It was during those years that he desisted about becoming a physician. Pedro reminisces: “99.5 % of the biology majors in college were pre-med. They were not nice people and didn’t care about science, they cared about making money.” At the same time, as he completed his biology class requirements, he noted that several of his professors were entomologists and botanists by training and that they were really into research. “I could see how much they loved their non-pre-med disciplines. I think that made an impression on me,” Pedro noted. Eventually they became his mentorsduring the development of his professional career,

helping him completing his bachelor's degree in 1966.

Dr. Barbosa's enormous motivation to learn about the "wonderful world of insects" led him to Graduate School at the University of Massachusetts [9]. Yet again, he was one of two black graduate students. Pedro remembers an event that changed his life, a conversation with his academic advisor:

"I was lucky in that, given my New York-centric ignorance of the world, I asked my advisor, who was white, what does it take to make it in entomology. To his credit, he didn't dumb it down, but set a bar of achievement that was ridiculous then and still is. He said, 'you have to have 16 publications by the time you get your Ph.D'. I didn't know any better so that was my goal and I did it. Had he said two publications, that is probably what I would have done."

With a Ph.D. in entomology on hand by 1971, Dr. Barbosa continued developing his scholarship in entomology research and science teaching. As an assistant professor, he worked for two years at Rutgers University [10] and for six years at the University of Massachusetts, at the same department where he was granted his M.S. and Ph.D. degrees. It was the University of Maryland [11] that became Dr. Barbosa's "second home", teaching and doing research there for 31 years, until he "officially retired" in 2010 (He still has an office and a lab there).

In his long career as an entomologist, Dr. Barbosa published **138 peer-reviewed articles** in the most recognized science journals worldwide and 19 entomology book chapters. He authored or co-authored 13 textbooks on entomology, insect population explosions, biological control of insects, and the ecology of predator-prey relationships using plants and insects as models. In the field of science education, he contributed four publications and one book chapter.

Dr. Barbosa's academic interests are very broad, including tritrophic relationships (relations that occur within three trophic levels [12], like plants, herbivores and carnivores), multiscale interrelationships (genetic-individual-population-community-ecosystem), within-species genetic divergence in herbivores, and the response of butterflies and moths (commonly known as *Macrolepidoptera*) to parasitoids.

His impressive credentials as an entomologist helped him receive over $7,000,000 in research grants, including funds from the National Science Foundation, [13] the United States Agency for International Development [14], and the United States Department of Agriculture [15]. Thanks to this financial support, Dr. Barbosa has helped train over 100 bachelor and masters students, 13 doctoral students, and 12 post-docs, including renowned professor Dr. Alejandro Segarra Carmona, from the University of Puerto Rico, Mayagüez Campus.

Reflecting about his life as a scientist and what things still surprise him about entomology, plants, insects and their interactions, Dr. Barbosa says: "There is always a new, fascinating, and unknown interaction to be discovered." He theorizes that the future of entomology research will be dedicated to "understanding the molecular and genetic basis of the multitude of interactions among insects, between insects and plants, and between insects and humans."

When asked about what he would recommend to students interested in a career in the life sciences and in entomology, Dr. Barbosa answers: "If you have a passion for science, and in

particular entomology, feed that passion. What better life can you have than to be passionate about something and be able to do it as a ‘job’.”

If you are interested in insects or if you want to study entomology at the graduate level, Dr. Pedro Barbosa [16] can be of assistance and give you important advice. You can contact him through his member profile on CienciaPR [16] or at the Department of Entomology, University of Maryland College Park, pbarbosa@umd.edu [17]. You can also visit his webpage: www.barbosalab.umd.edu [18].

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