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From Colombia to Lesbos: Experiences with Bee Research and Island Life

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TOP: Aerial view of the island and wetland near Kalloni Bay in western Lesbos.
ABOVE: REU students (cohort 2018) near the ancient city of Pyrrha, a location frequently mentioned in Aristotle's works.

Born and raised in a remote region of Colombia, a South American country dominated by lush tropical rainforests and FARC guerrillas (Revolutionary Armed Forces of Colombia), I never imagined spending my summers in Greece amongst picturesque olive groves and tourists, much less conducting research on one of its islands. Since 2013, I have had the opportunity to spend eight weeks every summer on the island of Lesbos, the third largest island in the Aegean Sea. However, this island is not just like the other Greek islands we all see on television and pamphlets in tourist agencies; it offers more than the lovely white houses with blue accents tightly packed on a foothill facing a turquoise sea. The research experiences on this island are also not comparable with any of those I have had in other international locations.

Lesbos is only about two times the surface area of New York City but is biologically highly diverse. This volcanic island is situated only 9 km from the Turkish coast and has multiple natural ecosystems and agroecosystems including wetlands, chestnut and oak forests, and olive groves. Due to its vicinity to the Asian continent, it supports species of animals and plants from both the Mediterranean region and Asia. In the spring and fall, flocks of migrant birds from Africa are captured by the lenses of photographers and amateur birdwatchers who move like ants throughout the island. More than 20 million years ago, several species of trees covered parts of Lesbos, but today, only their petrified forms remain as evidence of this ancient diversity.

Lesbos is also considered the birthplace of biology, and for some authors, of science as well. Most people know that Aristotle, a disciple of Plato, is considered the father of Western philosophy. What many do not know is that more than 2,000 years ago, after Aristotle left Plato's Academy in Athens to live on Lesbos with his wife Pythias, he wrote *History of Animals*, which some historians credit as the first scientific book on zoology. Aristotle spent at least two years systematically studying and documenting for the first time in human history the biology and anatomy of a wide array of animals, from fish to bees. In the

process, Aristotle was the first to propose a classification of all living things (known as the Scala Naturae), the first to write that whales and dolphins are not fish, and the first to describe the social organization of honey bees.

I did not know many of these things about Lesbos when I first visited it as one of the faculty mentors of a National Science Foundation (NSF) Research Experiences for Undergraduates (REU) program. This REU program, which is hosted by the University of Central Oklahoma, actively engages in research a group of six to eight U.S. undergraduate students each year. The program focuses on the behavioral and physiological responses of pollinators to changes in climate and landscape, and it involves a multinational team of faculty mentors from several universities, including the University of the Aegean. Because Lesbos has been identified as one of the world's hotspots for bee diversity, it is an ideal location for studying bee ecology and behavior. In addition, the historical context of Lesbos makes it a unique place for students to connect ancient history with modern scientific research.

Each year, we modify one of the rooms from a small hotel into a lab and conduct most of our fieldwork along Kalloni Bay, in the same area where Aristotle studied animals more than 2,000 years ago. While searching for bees or plants, we often walk through the narrow cobblestone streets of centuries-old villages and sometimes talk to the locals, just as Aristotle likely did.

I often try to imagine Aristotle in his late thirties, wandering around the island alone, collecting, dissecting, and sketching animals in a notebook. We come to Lesbos with several large suitcases filled with supplies and sometimes bring fancy equipment to the field. Even to identify plants at the field sites, we often rely on apps from our smartphones, while Aristotle most likely did it just with a little bit of help from one of his local friends. Before Aristotle moved to Macedonia to become the teacher of a teenage boy named Alexander (who would, a decade later, create one of the largest empires in history), he also worked with Theophrastus on Lesbos. Theophrastus documented in two books the diverse aspects of plants, from local uses to their functional classification, and today he is regarded as the father of botany. To me, just the thought that in some ways we are following in the steps of Aristotle and Theophrastus is, at times, surreal.

People from Lesbos have always been warm and welcoming. I have felt at home since the moment I set foot on the island, often to the point that the first words to come out of my mouth are in Spanish. People are frequently curious about what we do and ask us why we are staring at plants next to the most stunning beaches in the world, dressed in hiking boots, long pants, and long-sleeved shirts. Although most people leave with a big smile after talking to us, some have confused us with refugees, international investors, or even spies.

REU students (cohort 2022) capturing bees for thermal bioassays along Kalloni Bay.

In 2015, just when Greece was experiencing one of the worst recessions, Lesbos became the island most affected by the European migrant crisis. More than 17,000 refugees arrived on the island, many of whom were held in Moria Refugee Camp, the largest refugee camp in Europe, until it burned down in 2020. I remember seeing long lines of people, many of them barefoot children, walking along roads or just sitting outside in parking lots. Tourism declined dramatically, and the islanders were frequently involved in heated street protests to demand that the government offer better solutions for the refugees and their local economy. Small units of highly trained anti-riot police from Athens were regularly based out of our hotel during those years. While the refugee situation did not impact our research, it was without a doubt a horrible one that touched everyone's hearts. On several occasions, our students collected money to buy food and diapers for the refugees living in our village. In some ways, the refugee crisis in Lesbos reminded me a lot of the region of Colombia where I grew up and the social turmoil I experienced when I was a kid. Thousands of farmers and indigenous peoples have been displaced by violence in Colombia, and the country has received nearly two million people from Venezuela.

I could not visit Lesbos during 2020 and 2021 because of the COVID-19 pandemic. Going back to do research on the island after a two-year gap felt almost like I was starting again. Some of our field sites had been modified by farming and I could not work there; new roads and buildings had been built; new shops were open in town; and some of the local people I knew were no longer there. Many things happened in these two years.

Because I missed the island, I took time to learn a little bit more about it. For example, I did not know that Lesbos is mentioned in the epic works of Homer, the *Iliad* and the *Odyssey*. I remember that reading these books was required in my high school, but what I don't remember is actually reading them. As a kid, I did not realize the importance of these works, and I most likely chose playing soccer under the hot tropical sun over reading them.

To me, Lesbos not only represents an ideal location for biological studies, but a unique setting for students and researchers at the intersection of ancient history, global-scale challenges, and modern scientific research. The next time I visit, I plan to add my old copies of Homer's books to the suitcases full of supplies and fancy equipment.

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