SCIENTIST AT WORK | RAMPA RATTANARITHIKUL

Pesky Critter Makes for a Busy Career

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CHIANG MAI, Thailand — Rampa Rattanarithikul is sitting on a stool in the Museum of World Insects and Natural Wonders, which she founded with her husband in 1999. Behind her hangs some museum merchandise — T-shirts printed with a mosquito graphic — and on the walls are vaguely psychedelic paintings of Mothra-size mosquitoes posing before blood-orange sunsets.

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Wichai Taprieu for The New York Times

BUGGED Rampa Rattanarithikul at her museum in northern Thailand.

Suddenly, she leans down with a long-practiced motion and lightly swats at her ankle. “Mosquitoes are my enemy,” she says with a weary laugh.

Dr. Rattanarithikul, 69, has devoted 50 years to the study of mosquitoes, first as an entry-level technician, then as a trained taxonomist and finally as a medical entomologist for the Armed Forces Research Institute of Medical Sciences, or Afrims. It is a joint American-Thai medical project under the auspices of the Walter Reed Army Institute of Research and the Royal Thai Army.

She has collected hundreds of thousands of specimens in the field. She has classified, dissected, analyzed and mounted the limp little bodies onto slides. Most were shipped to the Walter Reed Biosystematics Unit at the Smithsonian Institution in Washington, where they constitute perhaps half of the collection of 1.5 million mosquitoes, the largest in the world. She also maintains another large collection at the Afrims museum in Bangkok.

This painstaking, classical taxonomy has helped identify over 420 mosquito species and discover two dozen more.

“Her work has been a major contribution,” said Ralph E. Harbach, an American entomologist at the Natural History Museum in London and a former Afrims officer who has collaborated with Dr. Rattanarithikul since the early 1980s. “Without it we would be 40 years behind in that region.”

Thailand is the hub for understanding the nature of mosquitoes in Southeast Asia, Dr. Harbach said. The size of California, it is home to about 14 percent of the world’s 3,000 mosquito species. Researchers in neighboring countries where mosquitoes cause enormous public health problems can use Dr. Rattanarithikul’s work to help distinguish the hundreds of harmless, if annoying, mosquito species from the dangerous “vector” species. In Thailand, of the 450 identified species, 10 are vector species.

Dr. Rattanarithikul began her work in 1959, as a lab technician for a malaria mosquito research project in Bangkok conducted by the Southeast Asia Treaty Organization, a cold war alliance. The project’s goal was to protect American troops from tropical diseases like cholera and malaria. (Even then the hope was to create a malaria vaccine, a goal Army scientists are still working on.)

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In 1965, the organization sent Dr. Rattanarithikul and her husband, Manop, who had been working for the project since 1950, to the Smithsonian for a summer to work as mosquito taxonomists at the museum's collection.

Her husband eventually went on to practice law, but Dr. Rattanarithikul stayed with mosquitoes. In the early 1970s she became a senior laboratory technician. Trained with practical experience both in the lab and in the field, she impressed the Army captain in charge of the Afrims lab: Bruce Harrison, who later led the Smithsonian's mosquito unit for half a decade.

"Other techs could ID mosquitoes, but when Rampa told you it was so-and-so species, you'd better pay attention," said Dr. Harrison, now an entomologist with the North Carolina Department of Environment and Natural Resources. "She had so much practical experience. She was extremely smart, but she didn't have an education."

By the late 1970s, Dr. Harrison, then the head of entomology for Afrims, pushed her to get a doctorate. It wasn't until 1996 that she received her doctorate in medical entomology from Kobe University in Japan. She had to learn Japanese to do so. She was in her 50s.

Though she retired from Afrims in 1997, Dr. Rattanarithikul has since rejoined the institution and continues to research vector species. In Thailand, these mostly fall into three genuses: Anopheles, Aedes and Culex. When mosquitoes bite humans, they can infect us with parasites or viruses; bites can transmit diseases like malaria, dengue fever and Japanese encephalitis.

Today, geneticists and molecular scientists can test mosquitoes for infections with unerring accuracy. But only vector species need to be tested. Someone in the field needs to identify them, and that is not a simple task.

"Mosquitoes are not varieties," Dr. Harrison said. "They're as different from each other as we are from chimps, or crows are from eagles. Mosquitoes aren't as complex as humans, but they've been around much longer. They have a lot of genetic variations."

That is where Dr. Rattanarithikul's taxonomical expertise comes in. "I trust my eyes and the microscope," she said.

The culmination of her life's work is the six-volume Illustrated Keys to the Mosquitoes of Thailand, published by The Southeast Asian Journal of Tropical Medicine and Public Health. These keys, of which she is lead author, provide detailed characteristics and distribution of larval and adult female mosquitoes in Thailand. (It is only the female mosquitoes that feed on blood.)

"Anyone can use my keys," she said. That is important in a region beset by mosquito-borne diseases (though not as devastated as sub-Saharan Africa, where Anopheles gambiae spreads malaria). Of its neighbors, Thailand has had the most success in lowering infection rates, with a national effort dating to the 1960s.

Besides mosquito-control measures like insecticide-treated bed nets and spraying the pesticide DDT, Thailand has a network of more than 250 malaria clinics to test and treat patients.

Dengue fever is an increasing threat for everyone. According to the World Health Organization, dengue fever cases in Thailand rose 43 percent, to 58,836, from 2006 to 2007. Vietnam also has tens of thousands of cases annually. It is spread by the city-loving Aedes aegypti, which finds the traditional water jars found in Thai homes a convenient breeding ground. Unlike Anopheles, it feeds during the day. And though less deadly than malaria, dengue fever cannot be treated with medicine.

It is the pressing nature of this research that keeps Dr. Rattanarithikul working. "I'm waiting for my second retirement," she said with a laugh. "I want to publish these keys, but then I want to give up mosquitoes. I would like to work with our collection here."

Mosquitoes are a small fraction of Thailand's largest entomological collection at the Museum of World Insects and Natural Wonders, which has 10,000 species in 28 orders and 315 genuses.

Mosquitoes that she discovered dangle from pins on one wall, but more impressive are gloriously iridescent butterflies, fabulously cartoonish foot-long walking sticks and enormous beetles with spiky horns curved like scimitars.

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The museum's collection should eventually be surpassed by the Queen Sirikit Botanical Garden, just outside Chiang Mai. It is there that Thailand's first national entomology collection is being created with help from the Natural History Museum in London, a project led by Dr. Harbach. Dr. Rattanarithikul has been a consultant to the project, teaching Thai students and technicians to organize, conserve and maintain an insect collection.

Dr. Rattanarithikul hopes some of the younger entomologists will learn classical taxonomy along with cutting-edge genomics. "The problem is, in Thailand, we have no taxonomists," she said. "I'm the only one. We are trying to encourage and train people. But they don't want to sit at the microscope all day."

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