

Some of the 50 new species of aquatic insects that MU entomologist Bob Sites and his colleagues discovered on trips to Thailand occupy unique niches in the environment, such as rocky cliff faces behind tumbling waterfalls.



Photo by Akkawat Vithavepradit



# Making aquatic acquaintances

Story by John Beahler

A researcher's recent trips to Thailand have netted new bug species.

To say you're an entomologist—a bug scientist—means your subject area is so vast it's almost incomprehensible. When it comes to bugs, there are billions and trillions more of them than there are of us.

"Nobody knows how many there are," says MU entomologist Bob Sites. "There are in the neighborhood of one million insect species that have been described. Estimates of the total number are as high as 30 million, and most of the undescribed species are in the tropics."

The legendary bank robber Willie Sutton once said he robbed banks because that's where the money was. Sites travels to the tropics because that's where the bugs are. Since the mid-1990s, he has made more than 20 trips to Thailand working on various research and training projects and keeping

an eye out for new insect species.

Over the past few years, he and fellow researchers and graduate students from Thailand and around the world have hit a biological bonanza. They've discovered more than 50 new bug species during collecting trips around the country.

In particular, Sites is interested in aquatic insects that live in Thailand's streams, rivers, waterfalls and ponds. The Latin name for one family of these bugs is *Gerridae*, but they're better known as water striders or pond skaters. Some people even call them Jesus bugs because they walk on water.

Anyone who has spent any time around creeks and lakes knows what they look like. They're the small, long-legged critters that skitter across the water's surface without sinking. This seemingly miraculous

buoyancy comes from microscopic hairs at the tips of their legs that trap air to repel water and keep them afloat. Their legs actually grip the water's surface and propel them forward.

These little guys are speedy, too. They've been clocked at 1.5 meters per second, practically supersonic for something so small. Their speed helps these aquatic raptors hunt down their prey. They eat almost anything: mayflies and fly larvae, water beetles and even small fish. They've been known to cannibalize members of their own species. Water striders are found all over the world; some have adapted to live far out on the ocean.

The National Science Foundation (NSF) has funded Sites' insect quest as a biodiversity project to catalog aquatic insect species in northern Thailand. He and his

To tell one insect species from another, entomologists look for characteristics such as size differences and variations in color patterns, reproductive organs and wing shape.

Photos courtesy of Bob Sites



*Hydrotus montatharus*

*Cheroclela n.sp.*

*Cheropocoris asiaticus*

*Gestralia limnocoides*

*Helescoris sp. L-130*

*Nantokocoris okekawati*

*Nantokocoris siamensis*

*Naucoris scutellaria*



fellow researchers have traveled to national parks and natural areas all the way from the southern tip of Thailand's Kra Peninsula to its borders with Burma, Laos and Cambodia. This part of the Indo-Burma region has incredible biodiversity, Sites says. "The northern mountain region is an area where the faunas of different regions overlap and come together. It's squarely within one of Conservation International's 'biodiversity hotspots.'"

The region is one of 34 islands of habitat Conservation International has identified as containing the world's most distinctive

and most threatened plants and animals. The area's remoteness often keeps scientists from conducting vital research that could help preserve them. "Some of those countries, you just can't get into them," Sites says. "It's difficult to do research there, and it can be very dangerous."

Often, local government officials are suspicious of any outsiders and put up bureaucratic roadblocks. Researchers also have to watch out for unexploded ordnance and landmines left over from decades of war and revolution. In some parts of northern Thailand, Sites and the research team have to dose themselves with pills to fend off malaria. Traipsing through tropical forests has other potential dangers, such as running into illegal timber cutters or poachers hunting for rare animals.

"I was more worried about snakes than anything else," Sites says. "I'm not a big fan of snakes." There was even one time that a research subject turned on him. On one collecting trip, Sites picked up a water bug that bit him on the pad of his little finger. These bugs inject toxins into their prey to immobilize them and liquefy their internal tissues. "It was much, much worse than a bee or wasp sting," he says. "I felt intense pain all the way to my elbow for a good 30 minutes."

For the most part, though, Sites has nothing but good things to say about his experiences in Thailand. The research team typically stayed in national park guesthouses where there was always tasty food and simple, comfortable accommodations, he says. They took Thai-style showers by ladling water over themselves from a bucket. At night, they set out black-light bug traps to see what varieties of nocturnal insects they could discover. His genial Thai hosts made the project even more enjoyable. "The Thai people invariably are wonderful," he says. "There's nobody like

them on the planet."

Their collecting journeys took them to parts of the country that not many outsiders get to see. They walked forested mountain trails to set collecting traps on the rock faces behind tumbling waterfalls. They waded up streambeds with collecting nets at the ready to pounce on their tiny quarry.

"These are beautiful, clear rushing streams, maybe knee deep, with rocky, gravel bottoms. You get in there and collect until you don't find anything new," Sites

Sites did get even with that bug that gave him a savage bite. That species will be named *horribilus*, a name usually reserved for particularly nasty characters.

says. "You don't really know what to expect. In some places you're amazed at the proportion of new things. In one creek, every species we pulled out was undescribed."

Scientists look at a number of distinguishing characteristics to tell one type of water strider from another. They take into account size, variations in color patterns, differences in reproductive organs and wing shape, among other factors.

It takes a scientist to love the lingo. Here is part of Sites' description in an academic journal article of a new water strider, *Ptilomera jariyae*, the research team discovered in western Thailand: "This species can be recognized by the well-developed median lobe of the proctiger in the male and the absence of a ventrolateral lobe of abdominal segment VII in the female."

Researchers often get to name the species they discover. They use the classification system that Swedish botanist Carolus Linnaeus developed in the 1700s



Photo by Rob Hill

As director of MU's Enns Entomology Museum, Sites rides herd on 5.75 million insect specimens, some of which were collected more than 100 years ago.



and that children still learn in school today: kingdom, phylum, class, order, family, genus, species. Linnaeus certainly didn't have any self-esteem issues about his system. He once famously observed, "God created. Linnaeus organized." He was known for naming especially unpleasant plants and animals after his scientific adversaries.

Sites and his colleagues named most of their Thai discoveries after the geographic areas where they were found. But he did get even with that bug that gave him such a savage bite. That species will be named *horribilus*, a name usually reserved for particularly nasty characters. The grizzly bear, for instance, is *Ursus arctos horribilus*.

Sites also is helping Mizzou students and other scientists discover academic opportunities in this region of the world. In summer 2007, he was on a panel of international scientists that advised the Vietnamese government on establishing ecological research plots in a national park in that country. Since 2001, he has led MU undergraduates on annual study-abroad trips to Thailand, and graduate students often work with him there on research projects.

Just months after the 2004 Indian Ocean tsunami, Sites led an NSF-funded team to look at freshwater ponds along the devastated Thai coast. The sea's surge had killed all freshwater insects in the ponds, and scientists wanted to know how quickly they would come back.

The environment had been completely destroyed, and Sites' team had the chance to see what happened next. "The last Indian Ocean tsunami of this magnitude occurred 30,000 years ago," he says. "So these opportunities don't come very frequently." The researchers are still collecting data.

Although his tsunami research might seem obscure, it has important practical applications, Sites says. Rice makes up a big part of the Thai diet, and this research could provide clues about how quickly a rice paddy can recover after it's been inundated by salt water. But what is the practical appli-



Photo by Rob Hill

cation in discovering new aquatic insects?

That question doesn't make much sense to Sites. Science, after all, is science. "Why go into space? Why go to the moon?" he counters.

For that matter, why slog through the streams and forests of Thailand looking for new aquatic insects? "Because we don't know what's there," he says. "We want to know." ■

On collecting trips to Thailand and Vietnam, Sites and his colleagues discovered six species of an entirely new genus of water bugs that live in waterfalls. The genus is called *Namtokocoris* after the Thai word for waterfall.

**MORE >** See more pictures of Sites' bug-collecting trips to Thailand.  
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