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Cryptic Philippine pit vipers

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Philippine pit vipers

Luzon is home to one of the most venomous snakes in the world. Yet, there is no antivenom for this endemic reptile.

A highly venomous lowland ambush predator, the Philippine pit viper is notorious to camouflage in its natural environment using its color or markings.



Besides, this snake has the ability to stay still for hours before attacking, or by hiding from potential predators in plain sight.

The bite of a Philippine pit viper transfers its deadly venom, causing excruciating pain. At the very least, the victim can lose a limb if untreated immediately, or worse, end up dead.

While there is no record of human death attributed to the bite of a Philippine pit viper, a researcher seeks to establish the cryptic diversity of this endemic reptile with the hope that life-saving antivenom can be developed someday.

USAID-funded research

Speaking during a webinar, dubbed “Connected to the Wild Biodiversity Research Series,” held on October 6, Yñigo del Prado, an MS Biological Science Student at the University of Santo Tomas, presented his study on Philippine pit viper and highlighted the country’s richness in terms of biological diversity and endemism.

The biodiversity research series features different researches funded and supported by the United States Agency for International Development under its Protect Wildlife Project and in cooperation with the Department of Environment and Natural Resources (DENR) and its Biodiversity Management Bureau (BMB).

During his talk, del Prado said, “This rich biodiversity is explained partially by [the Philippines’s] equally rich geographic history and unique topography.”

Ecological importance

Snakes are ecologically important for being part of the food cycle in a particular ecosystem, said DENR Assistant Secretary Ricardo Calderon.

In a telephone interview on October 21, Calderon said a healthy population of snakes, including the Philippine pit vipers, ensures a healthy or balanced ecology.

“They are part of the food cycle. As much as possible, we don’t want to disrupt the hierarchy. Any disruption to the food cycle will result in an imbalance,” said Calderon, the concurrent director of the DENR-BMB.

Snakes, he said, feed on small animals, like rats. “When your snake population goes down, the population of rats increases,” he explained.

Biogeographic regions

According to del Prado, following the numerous biodiversity studies done in the Philippines, lower sea levels during the glacier period repeatedly connected adjacent islands forming the Pleistocene Aggregate Island Complexes (PAIC), which allowed animals to cross nearby islands.

He said the country has five PAIC, namely Luzon, Mindoro, Palawan, Greater Mindanao and Negros-Panay islands.

“Each of these PAIC contains unique animals and are now considered as primary regions of biodiversity hosting distinct sets of wildlife,” he said.

He added that the unique topography of each landmass has helped explain intra-island biodiversity.

“Mountain ranges, such as [those] in Luzon, have been found to contain localized micro endemism found only on specific mountains or islands, further identifying them as biogeographic regions,” he added.

Biodiversity hot spot

While the Philippines is indeed rich in biodiversity, del Prado agreed with other biodiversity experts in saying that unfortunately the country is also recognized as a global biodiversity hot spot because of numerous threats that result in a rapid rate of biodiversity loss.

These threats include habitat loss, climate change, disease, invasive alien species that propels plants and animals toward extinction, he explained.

“This puts us in a race to identify and underscore each and every species to take appropriate conservation steps,” he said.

Species identification

However, he said that naming one species from another is easier said than done.

Philippine pit vipers, he said, are also known for different names: ahas tulog, dupong, hingunguto, mandadalag, ramuranon and arimuranon.

A lot of species are described solely on the basis of looks, measurement and unique features, he said.

However, he said two or more species that are superficially indistinguishable and exist in a separate region has been the cause of confusion for taxonomist.

“This so-called cryptic diversity has been discovered, distinguished through distribution, morphology and ecology,” he said.

To avoid the pitfalls of mistakenly naming a species, scientists rely on molecular technique, which he used along with morphological analysis.

Cryptic speciation

Notorious for cryptic speciation—a biological process that results in having a group of species that contain individuals which are morphologically identical to each other but belong to different species—is the Asian green pit viper, the most diverse group of venomous snakes in tropical Asia, del Prado said.

“It is also the most commonly encountered venomous snake in Southeast Asia. Its members are very difficult to classify because of their wide distribution range and very similar anatomy,” he said.

According to del Prado, there are 50 different species of green pit vipers, with a number still increasing through reexamination using molecular techniques.

Common lowland snake

The Philippines, he said, has three species of pit vipers occurring in separate, nonoverlapping regions. They are common lowland snakes that can benefit from further studies to differentiate them from other species of pit vipers.

These are the *Trimeresurus schultzei* that is known to occur only in Palawan; the

Trimeresurus mcgregori that occurs exclusively in Batanes, and *Trimeresurus flavomaculatus* found throughout the country.

T. schultzei, commonly known as Schultz’s pit viper that was named after *W. Schultze*, who collected the type specimen; *T. mcgregori*, is known as McGregor’s pit viper, McGregor’s Tree Viper or Batanes Bambusotter; while *T. flavomaculatus*, is more commonly known Philippine pit viper.

“The [Philippine pit viper] occurs in all major Philippine islands except in Palawan,” del Prado said. All three species belong to the Indo-Malayan pit vipers.

Complicated history

The Philippine pit viper’s wide distribution has led to complicated taxonomy history, del Prado said.

The species was earlier described as three distinct species, which was found to be one and the same in 1879.

It was split into three subspecies again in 1964. Between 2001 and 2004, eventually, it was split into two valid species with the reestablishment of the *T. mcgregori* as a separate species.

But del Prado, in an e-mail message to the BusinessMirror on November 2, said there are other pit vipers that are known to occur in the Philippines.

Study focus

“There are five species of pit vipers [meaning they belong to the subfamily *Crotalinae*] in the Philippines. These belong to two genera, *Trimeresurus* and *Tropidolaemus*,” he said.

According to del Prado, for his study, he focused on only one species, the Philippine pit viper, but included the other two species for the molecular analyses.

“With plans of covering the entire archipelago, here I first focused on comparing [viper] populations on Luzon island,” he said.

Initial findings

As a result of his study, del Prado found and described four morphotypes which refer to their color and pattern morphs for individuals of the species found on Luzon island.

“Interestingly, based on previous fieldwork, photos and publications, there appear to be a unique set of morphs for those on Mindanao although I still need to examine live specimens from the area and, hopefully, all Philippine islands for comparison,” he said.

He added that molecular analyses reveal what taxonomists call a species complex.

“We found that [McGregor’s pit viper], which has been described as a separate species based on morphological evidence, nested within the [Philippine pit viper] group, separating [Philippine pit vipers] of Mindanao and Luzon,” he said.

But he said more data, such as taxon sampling, morphological analyses and molecular analyses are needed to make considerable taxonomic decisions.

Hemotoxic venom

Philippine pit vipers are known to have hemotoxic venom, or venom that destroy red blood cells. It damages the circulatory system and muscle tissue and causes swelling, hemorrhage and necrosis, or death of a body tissue.

But del Prado said during the webinar that Philippine pit viper bites are very rare. If ever, a bite causes intense swelling of the arm followed by extreme pain and necrosis.

While there is no record of deaths caused by snake bites, he said it doesn't mean there are zero incidents.

“Maybe it is just because people are not reporting it,” he said.

Ambush predator

What makes the Philippine pit viper deadly is that it is an ambush predator and has the ability not to move, which explains why many call it ahas tulog.

He said there are reports, especially among local hunters from the Agta tribe that hunt shrimps, having been bitten by ahas tulog.

This happens when the pit viper feels threatened.

“The first defense of pit viper is a bite,” he said.

Need for antivenom

According to del Prado, while the Philippines is known for having some of the world's most venomous snakes, it has no antivenom to speak off.

“We still have no antivenom. We have 150 species of snakes, 33 species of which are venomous and dangerous, but [antivenom for] only 1 species, for the Philippine cobra, was produced,” he lamented.

“Antivenom are supposed to be species-specific because venom toxicity and effects vary for every species,” he said.

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