

They were hiding in plain sight. It took an understanding of genetics to help uncover five new species of South-east Asian frogs from a group of close to 400 museum specimens which researchers had long thought belonged to only two species. To make the discovery, scientists from Yale-NUS College and the North Carolina Museum of Natural Sciences sequenced the DNA of frogs from collections around the world. **Low De Wei** showcases the five amphibians new to science.

Leaping into the spotlight



Sylvirana annamitica

Found in Laos and Vietnam, near streams in primary forests. This species is named for the Annamite mountains of Laos and Vietnam in which it is found. Many frog species around the world are threatened by climate change, habitat loss, alien predatory species introduced to rivers and a fungus blamed for extinctions worldwide.



Sylvirana montosa

Found in hilly or mountainous regions in Vietnam, Cambodia and Laos, near streams in primary forests. This species is larger than others in this group. Frog fathers are known for their exceptional parenting in the animal kingdom. Some carry eggs in their mouths, let developing tadpoles hitch a ride piggyback-style, or hide them in treetops.



Sylvirana lacrima

Currently known to be found only in Myanmar's Chin State and Mandalay region. Named after the Latin term lacrima, or teardrop, in reference to the teardrop-shaped marking behind the tympanum (eardrum). This species has the smallest males of any species in this group. South-east Asia is home to 700 known amphibian species, with at least 25 of them being native to Singapore.

URGENCY IN CONSERVATION

On average, there is nearly one new species described to science every day from South-east Asia. That is an incredible rate of discovery. At the same time, South-east Asia has the highest rate of habitat destruction in the world. It is very disturbing that we are losing habitat, and thus species both known and yet to be discovered. The accurate identification of species and their geographical range boundaries are imperative for effective conservation.



DR JENNIFER SHERIDAN, assistant professor of science (environmental studies) at Yale-NUS College, who led the research effort, hopes that such discoveries will galvanise and improve conservation efforts in the region.



Sylvirana malayana (above)

Found in Malaysia and Thailand, near streams in primary forests. This is the only species among the five to possess a dark stripe extending from snout to groin, with strong demarcation between the dark (upper) and light (lower) parts of its flank.

Its head is narrower than others in this group. The latest discovery was made possible due to advances in techniques used to identify different species. Early biologists used mainly morphological characteristics – the organism's physical form and structure – to categorise individual frogs into different species. Now, biologists have access to more advanced techniques, such as DNA sequencing, to study samples at both the morphological and molecular levels.



Sylvirana roberti (left)

Currently known to be found only in Myanmar's Tanintharyi region. It is the only species in this group to lack a pineal gland (a gland in the brain), making it one of a few amphibians to have lost this feature.

This species also has a longer snout relative to body length than others in this group. It is named after Dr Robert Inger, curator emeritus of amphibians and reptiles at the Field Museum of Natural History in the United States, in recognition of his contributions to the biology and conservation of South-east Asian frogs.

PHOTOS: DAVE KIZIRIAN, BRYAN L. STUART, LEE GRISMER, CALIFORNIA ACADEMY OF SCIENCES