

Predatory lizard enters Brazil clandestinely

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Species native to Cuba has been identified in several areas on the São Paulo coast in Brazil. Credit: Ivan Prates

It all began with a photograph of a lizard posted on Facebook in August 2015 by the Brazilian Herpetology group. It was a strange lizard that had

been observed in a residential area near the Port of Santos, São Paulo State, by Ricardo Samelo, a biology student at the Santos Coast campus of the Federal University of São Paulo (UNIFESP).

"Everyone in the group was excited about that photograph. It was different from any other lizard ever seen in Brazil," recalled herpetologist Ivan Prates, currently studying for a PhD at the City University of New York (CUNY), with Ana Carolina Carnaval, a professor at the same university, as his supervisor.

They immediately began trying to identify the [species](#). The strongest candidate was *Anolis carolinensis*. The genus *Anolis* comprises 391 species, almost all of which live in the Caribbean and in Central and South America. A single species, *A. carolinensis*, is endemic to North America.

"I commented on the photograph to my supervisor, Prof. Carnaval, and we decided to find out what species it was," Prates said. "I contacted Ricardo Samelo and took the opportunity while attending a conference in Brazil to go into the field with him in Santos to try to solve the riddle."

The researchers could hardly imagine they were about to identify the first occurrence in South America of a species endemic to Cuba, *A. porcatulus*, which is invasive, predatory and potentially harmful to Brazilian fauna.

The identification was published in the *South American Journal of Herpetology*. The study was supported by FAPESP and the US National Science Foundation (NSF) via the research project "Dimensions US-BIOTA São Paulo: a multidisciplinary framework for biodiversity prediction in the Brazilian Atlantic forest hotspot".

When they arrived at the place where Samelo had seen the lizard that

caused a stir in their social network, the two biologists observed a large number of [lizards](#).

"At that time, we still thought it was *A. carolinensis* and found dozens of the strange lizards," Prates said. "We decided to ask people living nearby if they were familiar with the lizards. They all said they were. The same thing happened when we went to investigate in Guarujá and São Vicente, where these lizards are also abundant. We expect the same thing to happen in Cubatão. We've found males, females and hatchlings, showing the invasive species is procreating and well established on the São Paulo coast."

Back in New York, Prates recruited biology student Leyla Hernandez to help study the DNA from samples collected from the lizards to determine whether they were really the US-native species *A. carolinensis*. They were not. The DNA belonged to the Cuban species *A. porcatius*.

"The genus *Anolis* is a complicated research subject," Prates said. "There are hundreds of species, many of which are very similar. Furthermore, they can hybridize by interbreeding, which makes identification particularly hard."

Invasive species are undesirable because they compete with native species for the available resources. Nevertheless, some invaders are worse than others. That may be the case on the São Paulo coast.

"*A. carolinensis* is sold as a pet in the US," Prates said. "Therefore, that was our first hypothesis to explain the introduction of a new species in the Santos area. Someone who had it as a pet must have released it. Alternatively, it might have escaped or been lost."

However, *A. porcatius* is not widely sold as a pet. "It's an exotic species

and relatively large at about 15 cm in length," Prates said. "These lizards are generalist predators. They mainly eat arthropods, but they can also prey on small mammals, such as mice, and even on other lizards."

This species has been sighted in the Dominican Republic, he added, where it is also invasive and competes with native lizards. This suggests its introduction into the Santos area may threaten the survival of local lizard populations. Worse, it could take up residence in neighboring areas.

A. porcatius has also invaded Florida, which is near its original Cuban habitat. "In the US case, a few specimens might have gotten there by sea, as they're capable of surviving on branches or other pieces of floating plant debris, such as tree trunk fragments or palm leaves," said Brazilian-born Carnaval, a professor in CUNY's Biology Department.

The floating invasion hypothesis does not apply to the Brazilian case. The distance between Cuba and Santos is 6,100 km. "Our best hypothesis is that *A. porcatius* arrived in Brazil by ship, possibly in a container or in the cargo hold of a merchant vessel. This idea is reinforced by the fact that everywhere we've found communities of *A. porcatius*, they're close to a container yard in the Port of Santos," Carnaval said.

"Our DNA study suggests these lizards could have come here from Florida, where they're also exotic, rather than directly from Cuba," Prates added.

According to Carnaval, the identification of *A. porcatius* in the Baixada Santista area was a one-off study for her laboratory. "Like most of the team at my lab, Ivan Prates researches the demographic history of other species of *Anolis* that live in the Amazon and Atlantic Rainforest biomes in Brazil and their responses to climate change," she said.

"Our project is a very large undertaking that involves biologists who are working on biodiversity systematics and documentation, population genetics and physiology with geologists, geographers, climatologists and environmental engineers."

The aim of this research is to understand the past in order to predict the future. "We document general patterns of species diversity and endemism including genetic lineages throughout the Atlantic Rainforest in order to understand how these patterns have emerged and changed in the last 120,000 years," Carnaval explained. "We strongly emphasize the responses of species in the Atlantic Rainforest to climate change in the past as a basis for more realistic predictions of potential responses to future climate change."

Provided by FAPESP

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