

# 11

## Eureka! We Got It All Wrong



The green thornytail iguana, *Uracentron azureum*, eats almost exclusively ants, but, unlike desert ant specialists, it is extremely active and agile.

Photo by Bill Magnusson.

If the generalizations about savanna lizards really reflect basic ecological processes, they should hold up for forest lizards as well. We therefore decided to study the relationships among morphology, movement and diet for lizards in Reserva Ducke, a 10,000 ha reserve covered in tropical rainforest that is less than 20 km from the center of Manaus. We did not have as many students to help us, so Albertina and I started collecting data in our “spare” time. Basically, we got a lift to the Reserve headquarters most Friday nights, walked four kilometers to our camp and stayed there until Monday morning, when we would catch a lift back to the city. Saturdays and Sundays were spent observing lizards and collecting natural-history information on other reptiles and amphibians<sup>144</sup>.

Some of the lizards were the same as I had seen around the INPA grounds. Collared tree lizards lived on the trunks of the trees and forest whiptails foraged in the leaf litter, occasionally climbing into low bushes or jumping up to get spiders hidden in rolled leaves. Two other species were rare or absent from the city, however. As we walked through the forest, we would occasionally be surprised by a lizard falling out of a tree and then scrambling up another. We caught some and they were Amazon green anoles<sup>145</sup>, members of a large species for an anole that could be more than a hand span long and as thick as my index finger. They looked agile and had long claws for holding onto branches, so it was hard to believe that they were so clumsy that they kept falling out of trees.

The fourth species we studied intensively, the diving lizard<sup>146</sup>, clung to the vertical trunks of trees during the day in a position less than the height of an average person, but slept on branches over the stream at night. If threatened, the lizards would dive into the water and hide on the bottom for long periods, much like the water dragons I had seen in Australia.



**Photo 11.1** *The green anole, *Anolis philopunctatus*, lives high in the canopy, but will jump long distances to catch insects on understory bushes, often resulting in it falling to the ground. Photo by Bill Magnusson.*

We basically studied those lizards because they were the most common and the most easily observed. However, they turned out to have a variety of life styles that made them ideal for testing the generalities in the literature that we had corroborated in savanna lizards. The collared tree lizards ate almost exclusively ants and lived on tree trunks. The green anoles lived in trees and ate mainly solitary invertebrates, avoiding ants and other social insects. The forest whiptails foraged actively on the ground for a variety of little creatures and the diving lizards remained essentially motionless for most of the day, generally moving only when they came to the ground to catch an insect.

It was much harder to follow the lizards in the forest than in the savanna. The collared tree lizards and green anoles lived high in the canopy and it was generally best to lie on our backs looking up to record what they did. The diving

lizards were extremely wary and would flatten against the trunk or move to the other side of the tree if we got much closer than 10 m. The whiptails were relatively easy to follow, but they only came out when enough sunlight reached the floor of the forest for them to warm up to their activity temperatures, which were almost as high as those of the savanna whiptails.

A Masters student, Thierry Gasnier, joined us to study the behavior of the lizards, and we soon found how little we knew about the forest species, and how little they conformed to the generalizations in the literature<sup>147</sup>. Albertina was lying on a carry mat watching a green anole in a tree about five meters above our camp site and I sat beside her to watch the lizard. It had been climbing nimbly on the trunk and branches of the small tree, but it kept nodding its head and expanding the bright red dewlap under its throat, so we presumed that it was more interested in attracting a mate or repelling competitors than in looking for food.

After a few minutes, it closed its dewlap and cocked its head to one side, looking at some bushes three meters below. It jumped off the tree and fell into the bushes, grabbing a big green grasshopper from a leaf as it went by. We later saw several hunting the same way. The lizards weren't clumsy, they were catching insects by throwing themselves at them. It was a bit like a person jumping off a three-story building to grab an apple as they fell past a tree, and then climbing back up to look for another one!

There was an extensive literature indicating that desert lizards that specialized on ants were slow moving and had tank-like bodies; adaptations for digesting food wrapped in thick chitin and containing lots of toxic substances. The collared tree lizards had apparently not read any of the papers. They were a lot chubbier than the green anole, but not very different from many closely related species that did not eat mainly ants. They also moved around almost continually and their foraging had little if anything in common with that of the desert ant specialists. Although they were not included in the studies, our observations on

green thorny-tail iguanas also went against the generalizations on arid-zone lizards. The thorny-tail iguanas ate only ants, but they did not have wide waist lines and they were the most active and fastest lizards of the canopy, rarely staying still for long and jumping more than a meter from branch to branch.



**Photo 11.2** *The collared tree lizard, Plica umbra, lives on tree trunks and eats mainly ants. Despite its diet, it is not as slow moving as desert lizards that are specialists on ants. Photo by Bill Magnusson.*

An influential paper had indicated that lizards that spend most of the day motionless, waiting for prey to pass by, specialized on relatively large active insects and avoided small prey<sup>148</sup>; therefore they would not be expected to eat nocturnal invertebrates that remain hidden underground during the day. Nevertheless, the mean size of the prey eaten by the diving lizards was no bigger than that expected for lizards of their size, and the lizards had often eaten worms, scorpions and other prey that were only taken by wide-foraging desert lizards.



Something was different about the forest and we thought it might be related to when the lizards foraged. The diving lizards were generally already on their perches away from the stream no matter how early we searched for them, so we decided to follow a lizard from the time it left its night-time perch over the stream. We located one at night and got into position at four thirty in the morning while it was still dark. As soon as the first light reached the forest floor at about five thirty and we could make out the lizard on the branch over the stream, it turned, climbed out of the bush, ran four meters to a tree trunk, climbed up a meter and assumed its foraging position. It did not leave it even during heavy rain.

We could now see why the sit-and-wait lizard could catch nocturnal prey and prey that is supposedly only available to wide foragers that use smell to detect prey in underground retreats. Nocturnal species were still active at dawn when the lizards started to scan the ground for food, and burrowing species were forced to the surface by heavy rain when no other species of lizard was foraging.

One of the most distinctive things about the diet of wide-foraging desert lizards is the predominance of termites, and the forest is full of termites. You only have to scratch a little into the leaf litter and you will find many. The forest whiptails were as active as most wide foraging desert lizards, even though they could only maintain activity temperatures for a short period of the day when there were no clouds and the sun was directly overhead, making sun flecks on the ground. Nonetheless, they did not eat termites. It seems that there are so many other types of prey, which are probably more digestible, that the forest whiptails do not take advantage of the superabundant termites. The last of the major generalizations about diet and foraging mode had crumbled. The lizards had humbled us!



**Photo 11.3** *The diving lizard, *Uranoscodon superciliosus*, perches on vertical trunks watching for invertebrates on the ground from dawn to dusk and in any weather.*  
*Photo by Bill Magnusson.*

