

Reptiles of the Santa Lucia Cloud Forest, Ecuador

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Photographs by the author.

Santa Lucia is a cloud forest reserve of some 820 hectares in a lushly forested section of Pichincha Province, Ecuador. Draped over the steep slopes of the Andean Cordillera Occidental, the reserve lies between elevations of about 1400–2600 m. Because the region receives about 2,000 mm of rain per year, the precipitous slopes host an astonishing plant and animal diversity despite the rugged terrain and the often chilly climate. The large Maquipucuna Reserve borders Santa Lucia to the south, protecting an additional 6000 hectares. Together, these reserves protect an extensive complex of pristine and regenerating subtropical cloud forest that makes up much of the Rio Umachaca drainage.

Santa Lucia is a local conservation and eco-tourism cooperative established by a number of land-owning campesino fam-

ilies to find a sustainable alternative to the agriculture and ranching for which a small fraction of the less precipitous slopes were formerly used. About 84% of Santa Lucia's land is primary cloud forest. The remaining area is about evenly divided between secondary forest and pastured hillsides.

Santa Lucia hosts an astounding variety of plant and animal species. Particularly speciose groups include birds, arthropods, and orchids. The current bird list exceeds 370 species and over 340 species of orchids (among nearly 2000 vascular plant species) have been documented in the neighboring Maquipucuna Reserve (Webster and Rhode 2001, 2005).

Although the reptilian fauna of Santa Lucia is not nearly so diverse as the groups mentioned above, many of the species are endemic and have relatively small ranges. Additionally, our



Thick clouds of fog settle on the mountains at night and often linger well into the day.



Situated at the end of a ridge, the lodge at Santa Lucia overlooks lush valleys on three sides.

knowledge of most of these species is so scant that their natural history and habitat preferences usually have not been described in the literature. Perez-Santos and Moreno (1991) published a volume that renders the chaos of identification a bit less imposing, at least as far as snakes are concerned, but no comparable treatment covers Andean lizards, although some fairly comprehensive treatments of entire genera (i.e., Harris 1994, Torres-Carvajal 2001) make diagnosis a bit more feasible. However, the following list is the first that documents the reptilian species from an Andean cloud forest site. I have made every effort to present information in a manner that does not require prior knowledge of obscure Andean taxa and to gather and present all available ecological and distributional data, both from the literature and my own observations.

This list represents the squamate species I found at Santa Lucia over a five-month period from November 2004 to April 2005. Most were caught along a ridge at elevations from 1800–2000 m. Several additional species are probably present in the reserve, especially at its upper and lower reaches. I particularly suspect that one or more species of elusive, litter-dwelling Spectacled Lizards (“microteiids” in the family Gymnophthalmidae) escaped detection. One species in the gymnophthalmid genus *Proctoporus* from the lower reaches of the reserve remains unidentified, as does a species of Ground

Snake (*Atractus*, probably *A. major*). Additionally, the reserve’s guides and staff reported several other species of snakes, but none could be captured and identified.

Readers should bear in mind that considerable geographic variation in coloration exists for many of the species described. However, the color variations mentioned herein refer solely to documented differences within the populations at Santa Lucia. Any information not specifically cited is based on my own observations and measurements.

L I Z A R D S

Anolis aequatorialis Werner 1894

Description: This relatively large anole has snout-to-vent (SVL) lengths that can exceed 80 mm. Dorsal color patterns include a series of dark transverse markings with mottled greens, browns, and blacks, with juveniles exhibiting significantly more brown and black coloration. The striking dewlap has greenish-yellow lines where it comes into contact with the body and throat, but these quickly degenerate into a series of brick-red blotches on a black background. Hints of turquoise often appear on the anterior part of the dewlap near the throat. Both males and females of the species possess dewlaps, although those of males are relatively larger in individuals of similar sizes. Juveniles also have an ocellum on each side of the head poste-



Edge habitats, such as this partially forested slope, provide favorable conditions for some lizards such as *Anolis gemmosus* and *Cercosaura vertebralis*.

rior to the tympanum. This appears to dissipate in older males, but is retained in adult females.

Ecology: This species is most often found on well-shaded leaf litter, although juveniles are frequently seen in low undergrowth near the ground. These lizards seem to prefer cooler substrates and air temperatures, both of which averaged around 18.5 °C. Average body temperature of 21 *A. aequatorialis* was 20.5 °C. The elevational range for the species is roughly 1000–2000 m (Torres-Carvajal 2001).

Anolis gemmosus O'Shaughnessy 1875

Description: This anole reaches just over 60 mm SVL. An astounding diversity of color phases can occur within a single population. Perhaps the most common phase at Santa Lucia is the patterned phase, in which males have a series of transverse rows of black spots. In females, this pattern manifests itself as a caudal series of spade-shaped black blotches. Other color phases include a nearly solid green, which occurs in both males and females, and a female morph with a wide, light-brown vertebral stripe bordered by two thinner gray stripes on a green background. In a very rare variation of the male patterned phase, the spaces between the rows of black spots are filled with large white markings.

Ecology: These anoles appear to prefer cooler environmental temperatures much like those associated with *A. aequatorialis*. Average substrate and air temperatures were both around 19 °C. Body temperature of 34 *A. gemmosus* averaged 21.1 °C. *Anolis gemmosus* differ from *A. aequatorialis* in that they are completely arboreal. The elevational range is roughly 2000–3000 m (Torres-Carvajal 2001). These lizards are most frequently encountered along forest edges, but never in direct sun. The preference for edge habitat is probably an artifact of increased arthropod prey abundance in those areas.

Cercosaura vertebralis (O'Shaughnessy 1879)

Description: A gymnophthalmid of medium size, Santa Lucia *Cercosaura vertebralis* had SVLs to 69 mm, although adults were usually below 65 mm SVL. These lizards have a prominent 2–3 scale-wide vertebral stripe that starts as light orange on top of the head and fades through yellow to become white over the sacrum. Dorsal background color is black to dark brown. Golden-yellow subocular stripes run from the tip of the snout under the tympanum and terminate at the front limbs. White-centered ocelli often are present on the flanks around the fore- and hindlimbs. More prominent ocelli are frequently accompanied by red highlights on the flanks and a red venter mottled with black. In other individuals, the venter would be cream



Anolis aequatorialis. Top: male (left, 80 mm SVL) and female (right, 76 mm SVL); bottom: male (79 mm SVL).

with extensive black mottling. This coloration was displayed far more frequently in animals collected between November and January than in those collected from February to April. This suggests that red on the venter and flanks, as well as the enhanced ocelli, may be breeding coloration.

Ecology: *Cercosaura vertebralis* belongs to a group of three gymnophthalmid genera that have recently been shown to be monophyletic (Doan 2003). The species is highly heliophilic, and individuals are mostly active in dry leaf litter. However, they can be seen both foraging and basking on soil, litter, and deadfall anywhere where sunlight is sufficient. They may be completely absent from the surface for days if weather is not suitable. Substrate and air temperatures for sites at which *C. vertebralis* was found averaged 26.8 and 21.9 °C, respectively. These lizards maintain relatively high body temperatures, which averaged 27.9 °C (n = 20). The species has been recorded at elevations as low as 700 m and as high as 2500 m and ranges from northern Colombia and far southern Panamá through Ecuador and the far north of Perú (Uzzell, 1973).

Proctoporus oculatus (O'Shaughnessy 1879)

Description: This impressive gymnophthalmid can grow as large as 88 mm SVL (Kizirian 1996) and have a tail more than twice that long. The dorsum is dark brown with two faint dorso-lateral bands extending from the head and dissipating near the pelvis. A series of yellow-centered ocelli extend from the neck to the base of the tail. The black-and-white mottled venter gradually fades into a very striking pattern of red and black along the flanks.



Anolis gemmosus. Color phases: transverse bars (top), white blotches (middle), and striped (bottom).



Cercosaura vertebralis is heliophilic (sun-loving), and individuals are mostly active in dry leaf litter.



Proctoporus unicolor quickly turns lethargic when held in the heat of a human hand. They forage under the thick cover of damp leaf litter and hardly ever emerge on the surface.



Proctoporus oculatus is rarely seen on the surface. They seem to prefer the cool temperatures and cover afforded by abundant leaf litter.

Ecology: This species occurs in only a few drainages along the western Ecuadorian Andes, and has been previously recorded in sympatry with *P. unicolor* (Kizirian, 1996). They are rarely seen on the surface, and prefer the cool temperature and cover afforded by abundant leaf litter.

Proctoporus unicolor (Gray 1858)

Description: This medium-sized gymnophthalmid grows to slightly over 60 mm SVL. Dark brown dorsally, it has two light dorsolateral stripes that extend over the shoulders and dissipate quickly. A small amount of white spotting may be present on the throat or flanks. A bright red accents the ventral part of the flanks, and extends most of the way down the tail. The underside of the jaw is white mottled with black. Otherwise, the venter is solid black. Kizirian (1996) indicated that considerably more color variation exists than was observed at Santa Lucia, where all *P. unicolor* generally adhered to the description above.

Ecology: Like *P. oculatus*, this species is limited in range to the northwestern Ecuadorian Andes. It has been previously reported at elevations from 2390–3300 m (Kizirian 1996). These lizards appear to prefer cool temperatures, and quickly turn lethargic when held in the heat of a human hand. They forage under the thick cover of damp leaf litter and hardly ever emerge on the surface. They have extremely powerful jaws and a strong tail that can be up to 250% of SVL if unbroken and not regenerated.

Proctoporus sp.

Description: Only one individual of this unknown species was captured. It measured 49 mm SVL and 146 mm total length (with a complete tail). This lizard had a brown dorsal background color with broken dorsolateral lines of lighter brown blotches outlined with black. Flanks had a number of yellow-centered ocelli that were particularly prominent near the forelimbs and decreased in size posteriorly. Venter was white with regular black spotting forming rows and increasing in intensity posteriorly. White markings remained near the cloaca, but the ventral surface of the tail was solid black with a strong iridescent blue sheen.



Proctoporus sp.: Only one individual of this unidentified species was found in the lower reaches of the reserve at an elevation of about 1500 m.

Ecology: The one individual was found in the lower reaches of the reserve at an elevation of about 1500 m.

Ptychoglossus plicatus (Taylor 1949)

Description: A medium-sized gymnophthalmid lizard, *P. plicatus* grows to about 65 mm SVL. Head scales are light lime green, with the exception of supraocular scales, which are black and have a yellow-green stripe on the very edge. These stripes, as well as the other colored head scales, join at the back of the skull to form a dorsal stripe 3–5 scales wide that fades towards the tail. The dorsal ground color is dark brown. Lateral cream-colored lines extend back from behind the eyes. These lines are more prominent in some individuals than in others, but they usually begin to dissipate around the forelimbs. Flanks are a deep mahogany red. The venter is a bright salmon-red, fading



Ptychoglossus plicatus is an active forager that can sometimes be seen weaving in and out of the leaf litter. They will tolerate both full shade and mixed sun, and are most often found in mature forest.

to cream around the throat and jaw, with some green tinges near the very front of the mandible. *In situ*, *P. plicatus* can appear quite similar to *Cercosaura vertebralis*, but they are easily distinguished by the distinctive cephalic green coloration and relatively thicker vertebral stripe.

Ecology: This species is known to occur from Costa Rica to the Panamá-Colombia border, with another population possibly occurring slightly farther south in northwestern Colombia (Harris 1994). Obviously, a population in northern Ecuador represents a very considerable extension to the range of this species. Because Santa Lucia lies at the upper extremity of their documented elevational range of 30–1890 m (Harris 1994), that more *P. plicatus* were seen several hundred meters below the main collection area, which was located just above 1900 m, is probably indicative of an elevational range mostly below that of the reserve. This lizard is an active forager that can sometimes be seen weaving in and out of the leaf litter. They will tolerate both full shade and mixed sun, and are most often found in mature forest.

Stenocercus varius (Boulenger 1885)

Description: This stocky lizard in the family Tropicuridae can grow to about 8.5 cm SVL (Torres-Carvajal 2000). Basic coloration consists of regular black markings along the dorsum, with a dark greenish-brown background and occasional yellow spots. The top of the head has the same dark background coloration, with the region around the mouth and eyes generally a much lighter shade of green. The flanks also are a lighter shade of green, with yellow-green spots arranged in regular transverse rows. The venter is green to greenish-white with a light orange color on the ventral surface of the tail. These lizards are capable of rapid color change. They can appear nearly melanistic at times, with the light green of the mouth and eyes and the yellow spotting on the flanks completely obscured.

Ecology: *Stenocercus varius* occurs at elevations from 1460–2200 m. They are restricted to montane forests with high rainfall, and are frequently found on tree trunks and fallen logs, particularly in cleared areas. They also occur along forest edges (Torres-Carvajal 2000). They are quite rare at Santa Lucia, although they appear to be quite territorial, with one individual recaptured 3 m from the release site after a period of four months.



Stenocercus varius appears to be restricted to montane forests with high rainfall, and is frequently found on tree trunks and fallen logs, particularly in cleared areas.

S N A K E S

Atractus occidentalis Savage, 1955

Description: This rather small snake in the family Colubridae reaches lengths a bit under 35 cm total length in mature females. They are thick snakes with small heads and no obvious neck differentiation. Symmetrical pairs of black spots mark the dorsum. Dorsal ground color exhibits some variation, with both brown and burgundy phases documented. Additional variation may exist. The venter is black posteriorly and mottled with a rose-tinged cream anteriorly.

Ecology: This species has been documented as occurring at elevations from 1200–3000 m (Perez-Santos and Moreno 1991). They are terrestrial snakes that generally forage in the litter of the forest interior. In mid-February, a heavily gravid female with SVL = 31 cm (34 cm total length) was encountered basking on a trail and responded to capture by playing dead. She was kept



Atractus occidentalis is a small inconspicuous snake that forages in leaf litter on the forest floor.



Bothrocophias campbelli are small, stout pit-vipers that are perfectly camouflaged and almost invisible in leaf litter.

for observation, and, about 12 hours after capture, laid two eggs, each measuring about 3 x 1 cm. Both eggs were fertile and appeared to be developing when candled. However, they had not hatched by the time I left the reserve about 3 months later. They were kept moist and still appeared healthy at that time.

Atractus (major?) Boulenger, 1893

Description: This tentative identification is based on a single specimen that was captured, but could not be photographed. Consequently, the species is only tentatively identified as *A. major*. This individual displayed a very distinct pattern of broken, irregular, longitudinal bands running the length of its body. Markings were brown with black bordering on a brick-red ground color. Venter was white with some dark blotches. The single specimen measured about 45 cm total length (38 cm SVL), which is over the maximum length of most species of *Atractus*, but well under the maximum known for the presumed species (72 cm; Perez-Santos and Moreno, 1991).

Ecology: *Atractus major* is very widespread throughout the Amazonian slopes and eastern lowlands of Venezuela, Colombia, Ecuador, Perú, Bolivia, and Brazil. This species has been documented at elevations from near sea level to almost 3000 m (Perez-Santos and Moreno, 2001). Given this large elevational range, *A. major* or a closely related species could very easily be present on the Pacific slopes of the Andes. This is particularly likely in light of the Huancabamba Depression, an area in northern Perú where both Andean cordilleras drop well below 3000 m.

Bothrocophias campbelli (Freire 1991)

Description: These stout pit-vipers can grow to over half a meter in length. A pattern of brown angular blotches on a gray background extends laterally from either side of the middorsum. These coalesce into a more cohesive banded pattern toward the tail. The venter is gray with black speckling, and a series of regular black splotches occur ventrolaterally.

Ecology: Four species of snakes, including *B. campbelli*, were recently allocated to a new genus, with this species being restricted to the Ecuadorian Cordillera Occidental (Gutberlet and Campbell 2001). This species has a very restricted range, especially in comparison with two of its congeners, both of which have extensive ranges on the eastern side of the Andes and in parts of the Amazonian lowlands. These snakes are perfectly camouflaged and are almost invisible in leaf-litter. They are inconspicuous, secretive, and nocturnal.

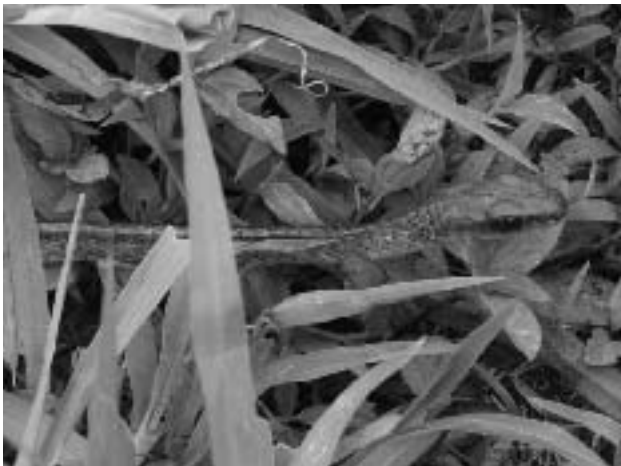
Chironius monticola Roze 1952

Description: This impressive colubrid snake can grow to over 1.5 m in total length. The dorsum is a solid forest-green with dark outlines of each scale. The venter is a light gray-green, turning yellow anteriorly. Throat, jaw, and upper labials are a bright yellow.

Ecology: This terrestrial snake is most often seen basking in the open on warm, sunny days. It is very alert and can disappear rapidly into the leaf litter and undergrowth. They range from



Dipsas oreas elegans is arboreal and has a laterally compressed body and a large, blunt head. The former character facilitates climbing and the latter the consumption of relatively large prey.



Chironius monticola is very alert and can disappear rapidly into the leaf litter and undergrowth.

Venezuela through Bolivia, and have been documented at elevation from 1200–2000 m (Perez-Santos and Moreno 1991).

Dipsas oreas elegans (Boulenger 1896)

Description: This small, elegant colubrid has a laterally compressed body and a large, blunt head. The body is covered by alternating bands of brownish-gray and black. The venter is a silvery gray with black blotches. The long, prehensile tail accounts for about a third of the snake's total length.

Ecology: *Dipsas oreas* is an arboreal snake with an elevational range of 1200–3000 m (Perez-Santos and Moreno 1991). The diet consists mostly of invertebrates, especially soft-bodied species. They are active nocturnally.

Liophis epinephelus albiventris Jan 1863

Description: This medium-sized colubrid snake grows to just under 80 cm (Perez-Santos and Moreno 1991). Ground color of the dorsum is deep green. A series of black spots along the



Liophis epinephelus albiventris (female, 41 cm SVL): This terrestrial species responds to threats by flattening its head and body in a convincing viper impersonation.

dorsum merge posteriorly to form two lateral stripes and a thicker dorsal stripe. The venter is bright yellow, as are the superior and inferior labials. Bright orange skin can sometimes be seen between dorsal scutes.

Ecology: This terrestrial species responds to threats by flattening its head and body in a convincing viper impersonation. This particular subspecies is restricted to Ecuador, whereas two other subspecies occur throughout northern South America as far north as Panamá and as far south as Perú (Perez-Santos and Moreno 1991). Virtually nothing is known about the ecology of this species.

Mastigodryas boddaerti (Sentzen 1796)

Description: A relatively large colubrid snake, *Mastigodryas boddaerti* can reach 160 cm in total length (Perez-Santos and Moreno 1991). It has a brown dorsum, sometimes with dark longitudinal stripes. A white subocular stripe extends from the rostrum to the nuchal region, where it fades into the brown of the dorsum. The venter is a creamy-yellow with a small amount of black spotting. Some variation in coloring has been documented for this species.



Mastigodryas boddaerti. Other than being largely terrestrial, little is known about behavior, habitat use, or life history.

Ecology: A fairly widespread species, *M. boddaerti* ranges from Colombia to Bolivia and Brazil. It has been documented at elevations ranging from close to sea level to about 2000 m (Perez-Santos and Moreno 1991). Aside from the fact that it is mostly terrestrial, not much is known about behavior, habitat use, or life history.



Mastigodryas pulchireps is an alert, terrestrial snake found mainly in forest interior.

Mastigodryas pulchiceps (Cope 1868)

Description: This striking snake has a beautiful pattern consisting of a row of blackish-brown rectangles running along the dorsum, with another lateral row of rectangles along either flank. Each rectangle is separated by a whitish-gray stripe. The tail is almost entirely black. The venter is black with a small white spot on either side of each scale. Black ocular stripes help to camouflage the eyes. Maximum size for this species is not known. The only specimen I caught was 24 cm SVL (32 cm TL). Specimens at the zoology museum at the Pontificia Universidad Católica del Ecuador were “somewhat larger” than the one I caught, but I did not measure them.

Ecology: This species is known from Colombia and Ecuador, although it has heretofore been documented only as high as 1500 m (Perez-Santos and Moreno 1991). The specimen I caught in the reserve was at an elevation of about 1750 m. It is an alert, terrestrial snake found mainly in forest interior. Little else is known about its life history.

Tantilla melanocephala (Linnaeus 1758)

Description: This small colubrid reaches over 40 cm in total length. Neonates can be as small as 5 cm SVL. The neck is not distinctly differentiated. The head is black with a light snout, postocular stripes, and two white spots on the back of the head.



Tantilla melanocephala eats mostly small arthropods and arthropod eggs, and is often found in association with leaf litter.

Dorsal background color is a light brown, and some individuals may have a varying number of longitudinal stripes. The venter is yellow.

Ecology: This is an extremely widespread species, ranging from Central America to northern Argentina and Uruguay. They can occur from sea level to 2500 m (Perez-Santos and Moreno 1991). They eat mostly small arthropods and arthropod eggs, and are often found in association with leaf litter. They were the most abundant snakes I encountered at Santa Lucia, with four of 13 snakes belonging to this species.¹

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¹ Editor's note: Snakes in the mainland Neotropics often are difficult to find, apparently due to a combination of low population densities and secretive habits. The low number of encounters at the reserve also reflects conditions at high elevations, which are rarely ideal for squamate reptiles.