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AMPHIBIANS AND REPTILES OF THE CORDILLERA DE GUANACASTE, COSTA RICA; A FIELD LIST WITH NOTES ON COLOUR PATTERNS AND OTHER OBSERVATIONS

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INTRODUCTION

The herpetofauna of Central America is perhaps nowhere more diverse or speciose than in Costa Rica. A voluminous record of literature has also established the amphibian and reptile life of this country as amongst the most well documented of any in the Neotropics, although further work will undoubtedly shed more light on the local distribution patterns and ecology of species. Probably the best known individual area is the lowland wet forest site of La Selva in the province of Heredia, where a variety of herpetological research has been undertaken since the late 1950s (reviewed by Donnelly, 1994 and Guyer, 1994).

The most recent and comprehensive checklist available is that by Savage and Villa (1986), which lists 362 species and includes detailed identification keys and general distribution information. Many of those found at higher elevations are also featured in a regional guide to the herpetofauna of the Monteverde area by Hayes et al. (1989). Among other indispensable references for the field biologist is a classic series of papers published by E.H. Taylor during the 1950s (list appended), which provides descriptions of most of the caecilians, salamanders, anurans, lizards and snakes, although a considerable number of others have since been added, and the nomenclature of many superseded. The venomous snakes of the country are treated in an illustrated guide by Picado (1931, reprinted 1976).

Costa Rica is divided medially by a spine of volcanic highlands that extend in the north as the Cordillera de Guanacaste. The section of this range nearest the Nicaraguan border is dominated by the peaks of Volcàn Orosi, which rises to an elevation of 1487 metres, and Volcàn Cacao (1659 m), followed to the south by Volcàn Roncón de la Vieja (1895 m) and Volcàn Santa María (1916 m). These mountains and the surrounding lowlands of Guanacaste embrace a rich diversity of vegetation types, ranging from tropical dry forest on the Pacific coastal plain, through a number of wetter, montane variants, to elfin cloud forest. Information on the herpetofauna of the area is limited. Sasa & Solórzano (1995) provide an account of species composition in the dry Pacific lowlands, listing 18 amphibians and 59 reptiles from Parque Nacional Santa Rosa, but the herpetofauna of the adjacent Cordillera highlands is relatively unknown.

Some 36,000 hectares surrounding the volcanoes of Orosi and Cacao are designated as a protected area (Parque Nacional Guanacaste), within which five biological field stations are operated by the Area de Conservación Guanacaste (A.C.G.). The highest of these is Estación Cacao, which lies at an elevation of some 1000 metres. Two other facilities are located on on the slopes of Volcán Santa Maria and Volcán Rincón de la Vieja (Parque Nacional Rincón de la Vieja). The following is a list of the amphibians and reptiles

observed while the author was conducting botanical fieldwork from four of these stations (Pitilla and Maritza on Volcán Orosi, Cacao on Volcán Cacao, and Santa Maria on Volcàn Santa Maria) between 30th May and 23rd June 1996. The information is tendered in the form of an event-based record with notes on prevailing weather conditions, microhabitat, dates of observation and, in some cases, times of day that specimens were found; brief colour descriptions and other notes are also included for some of the more variable and little known species. With the exception of one lizard observed but not captured (*Ameiva festiva*), only those animals that were examined in the hand are listed. Voucher photographs of most species were taken as a means of verifying identification (specimens were not collected), copies of which have been deposited with the Picture Library at the Natural History Museum, London (reference numbers cited where applicable).

CLIMATE AND LOCALITY INFORMATION

Detailed records of rainfall for the Cordillera de Guanacaste area are few, although the Pacific (leeward) versant is known to be characteristically drier, and the Atlantic much wetter, with maximum precipitation falling at middle elevations. Annual rainfall varies from approximately 1500 mm on the Pacific side to some 5000 mm on the Atlantic (Coen, 1983). The rainy season begins in late April or May, extending through to as late as February on the Atlantic versant. Seasonality is more pronounced on the Pacific side, and is especially severe in the lowlands. Average temperatures for the monthly maximum are higher on the Pacific coast than on the Atlantic at the same elevations; for the Pacific, the mean value at sea level is approximately 32.6°C, and on the Atlantic, 29.9°C (Coen, 1983). The warmest month may be March, April or May, and the coolest November, December or January.

Little has been published with respect to the classification of ecological formations in the Guanacaste highlands, although certain forest types are perhaps comparable with those of La Selva described by Hartshorn & Hammel (1994), and possibly the lower slopes of the Monteverde area (Lawton & Dryer, 1980); the categories used here follow the life-zone system of Holdridge (1967).

Localities

Estación Biológica Pitilla. Volcán Orosi, Atlantic versant; 10°59'26"N, 85°25'40"W, elevation 600 m. Vegetation in the immediate vicinity of the field station is characterised largely by tall grasses and shrubs of the family Melastomataceae. Above this it changes to closed canopy, semi-evergreen (Tropical wet forest) and evergreen (Tropical premontane rain forest) vegetation, with an abundance of epiphytes, woody vines, and herbaceous climbers. The lower trunks and branches of trees are typically covered with heavy growths of moss. Understory vegetation is dense in places and sparse in others, with a thick ground layer of wet leaf litter that may be covered with ferns. Approximately 4000 mm of rain falls between May and February, and even the 2 month dry season remains moist.

Estación Biológica Maritza. Volcán Orosí, Pacific versant; 10°57'36"N, 85°29'36"W, elevation 500-600 m. The field station lies at the interface between the Tropical moist forest belts and Tropical premontane moist forest; the former is characterised by an extensive plateau of open, rocky, scrub/savannah, dominated by the grass *Hyparrhenia rufa* with Melastomataceae shrubs and occasional stands of deciduous trees, mostly *Quercus oleoides*, and the latter by closed canopy, semi-evergreen forest, which becomes increasingly wetter with elevation. The area receives some 2000-4000 mm of rain between May and December.

Estación Biológica Cacao. Volcán Cacoat; 10°55'43"N, 85°28'10"W, elevation 1000 metres. The vegetation immediately above the field station is dominated by tall, evergreen closed canopy forest, with relatively sparse understory and ground layer vegetation (Tropical premontane rain forest); at an elevation of some 1500-1650 metres the exposed upper slopes are characterised by elfin cloud forest, with stunted trees festooned with epiphytes (Tropical lower montane rain forest). Rainfall is heavy and may persist for many weeks during the wet season. Nights can be as cool as 14-16°C.

Estación Biológica Santa Maria. Volcán Santa Maria, Pacific versant; 10°46'50"N, 85°17'55" W, elevation 950-1100 m. Tropical moist and Tropical wet forest formations. The area is characterised by tall, semi-evergreen closed canopy forest, with areas of open grassland and dense scrub forest on the lower slopes.

SPECIES LIST

Bufonidae
Bufo marinus L. Cane Toad.
Multiple records (10+). Volcán Orosí, Estación Maritza.
This species was commonly observed foraging at night around the various buildings of the field station.

Hylidae
Scinax staufferi (Cope). Stauffer's Tree Frog.
1. Volcán Orosí, Estación Maritza. Photo ref. T13858.
This individual was found calling on the night of 7th June in the shower block of an accommodation building.

Smilisca baudini (Duméril & Bibron). Mexican Tree Frog.
5. Volcán Orosí, Estación Pitilla. Photo ref. T13835.
Individuals were found between 3rd and 6th June calling at night from small pools after heavy rain, or perched on wooden rafters of field station buildings.

Leptodactylidae
Eleutherodactylus biporcatus (Peters). Broad-Headed Rain Frog.
1. Volcán Orosí, forest trail approx. 1 km above Estación Pitilla. Photo refs. T13837-13838.
A juvenile specimen, S-V length 21 mm, found on 3rd June amongst wet leaf litter. Dorsum dull yellow-brown, darker middorsally and on the upper surface of the forearm, with dark spots enclosing regulate warts and tubercles. Ventral surface dark grey, finely mottled with white under the chin, throat, and forelimbs, and marked with larger, more sharply defined white spots on the abdomen and anterior edge of thighs; undersurface of hands yellowish tan. Eye: iris dark bronze suffused with black.

Eleutherodactylus sp., *cruentus* group.
1. Volcán Orosií, forest trail approx. 1 km above Estación Pitilla. Photo ref. T13839.
A small leptodactylid (S-V length 20 mm) of this species group was found on 5th June amongst wet leaf litter at the base of a dead tree. The specimen had a moderately prominent heel tubercle (calcar) and, following Savage (1981), is assignable to *E. erasinus* (Cope); it had an indistinct canthus, and was conspicuous in also having a relatively small typanum (approx. one quarter of diameter of eye) and a tuberculate dorsum with well developed tubercles on the posteroventral margin of the forearm and lower leg. Dorsum olive brown, almost blackish on the upper surface of the head, with a broad yellowish tan, black-edged middorsal stripe extending from the occiput to the vent; lower dorsolateral surfaces dull silvery-white finely mottled with black. An ill-defined dark 'trouser' patch present at vent. Anterior edge of forearm dull yellowish tan. Hind limbs with prominent darker barring; posterior surface of thigh, calf, and groin

Plate 1: *Norops oxylophus*. Pitilla, Volcán Orosí.

Plate 2: *Imantodes inornatus*. Pitilla Volcán Orosí.

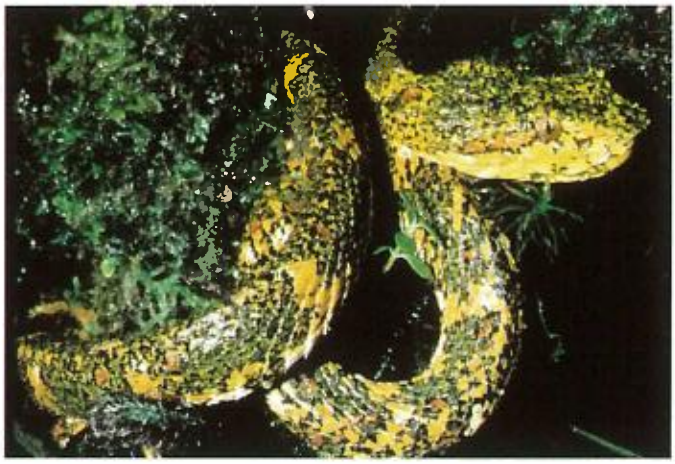

Plate 3: *Bothriechis schlegelii.* Pitilla Volcán Orosí.

Plate 4: *Porthidium ophryomegas.* Maritza, Volcán Orosí.

Plate 5: ***Rhinoclemmys pulcherrima.*** Maritza, Volcán Orosí.

immaculate orange-pinkish brown. Finger and toes disks whitish with dark spotting at the tip. Ventral surface whitish and peppered with fine dark spots, most prominent under the chin and throat. Eye: a conspicuous feature of the frog was the bright yellow coloration of the sclera; iris dark bronze-brown with fine black reticulations.

Although found on the ground, the frog instinctively climbed upwards when released.

Eleutherodactylus gollmeri (W. Peters). Gollmer's Litter Frog.
1. Volcán Orosi, forest trail approx. 1 km above Estación Pitilla. Photo ref. T13836.
An adult specimen, S-V length 40 mm, found during the day (4th June) concealed amongst wet leaf litter. Dorsal coloration pale bronze-brown with a fine yellow middorsal stripe, a pair of conspicuous yellow median blotches, and a pair of small black tubercles behind the shoulders. Head yellowish above, sharply demarcated from the brown dorsal colour by a dark transverse ridge extending between the eyes; side of head with a dark face mask, enclosing the typanum and terminating posteriorly low on the side behind the axilla; canthus marked with a fine white line that follows the upper edge of the face mask behind the eye. A well-defined dark triangular 'trouser' patch present at vent. Limbs pale brown strongly barred with darker brown, the bars finely edged with yellow. Venter whitish, immaculate except for some fine, indistinct grey stippling under the chin. Eye: upper half of iris gold with fine black reticulations and lower half black.

Leptodactylus fragilis (Brocchi). White-Lipped Frog.
1. Volcán Orosí, Estación Maritz. Photo ref. T13840.
An adult frog (S-V length 33 mm) found during the day on 6th June under a stone in transitional open scrub/savannah dominated by *Quercus* and Melastomataceae.

Physalaemus pustulosus (Cope). Tungara Frog.
Multiple records (10+). Volcán Orosí, Estación Maritza. Photo ref. T13841.
These diminutive, toad-like species were observed calling at night in shallow puddles and water-filled vehicle tracks. Several foam nests were also found after rain on 5th June.

Ranidae
Rana forreri Boulenger. Dry Forest Leopard Frog.
3. Volán Orosí, Estación Maritza. Photo ref. T13831/R.
Specimens were all observed in the vicinity of streams and on trails around the field station at night (3rd to 6th June) in closed canopy woodland and open scrub/savannah dominated by *Quercus* and Melastomataceae.

Rana warszewitchii (Schmidt). Brilliant Forest Frog..
4. Volcán Orosí, forest trails above Estación Pitilla. Photo refs. T13832/R - T13833 (adult) and T13834 (juvenile).
An adult specimen, S-V length 58 mm, and three juveniles (one specimen S-V 25 length mm) were found during the day (4th June) on the forest floor at the side of a shaded stream. Dorsal coloration of adult uniform dark chocolate brown; head with conspicuous, narrow cream-coloured labial stripe. Hind limbs with indistinct darker barring; posterior surface blackish brown on thigh and brick red on calf, sharply contrasted by approx. 5-7 bright yellow spots. Ventral surface of chin, throat and abdomen pale yellow with pinkish flecks; undersurface of hind limbs pinkish-rose, marbled with pale yellow beneath femur. Dorsal surface of juveniles golden tan with irregular metallic green flecks; lateral surfaces and side of head below canthus dark brown; posterior surface of hind limbs suffused with pinkish orange without yellow spots of adult; webbing between toes coral red. Venter whitish finely mottled with brown; a dark 'trouser' patch present at vent, the lower edge bordered with small white spots. Eye: upper one-third of iris gold and lower two-thirds suffused with black.

The frogs had the conspicuous habit of sitting in a pronounced upright position. Both the adult and juveniles produced a 'squeak-like' vocalization when captured.

Emydidae
Rhinoclemmys pulcherrima (Gray). Painted Wood Turtle.
1. Volcán Orosí, rock road to Inter-American Highway approx. 2 km from Estación Maritza. Photo ref. T13842.
An adult specimen of this ornately patterned turtle was found during the morning of 11th June in open scrub/savannah dominated by *Quercus* and Melastomataceae. Weather conditions at the time were dry and sunny.

Gekkonidae
Gonatodes albogularis (Duméril and Bibron). Yellow-Headed Gecko.
Multiple records (10+). Volcán Orosí, Estación Maritza; Volcán Santa María, Estación Santa María. Photo ref. T13843.
Males and females of this strikingly dimorphic and ubiquitous species were observed on most days, typically about 1 metre above the ground on the trunks of large trees and sides of wooden buildings.

Phyllodactylus tuberculosus (Wiegmann). Leaf-Toed Gecko.
Multiple records (10+). Volcán Orosí, Estación Maritza. Photo ref. T13844.
Adults and juveniles of this gecko were commonly observed by night on the outside walls and ceilings of field station buildings (7th to 9th June). Dorsum pale grey with irregular black spots on the head, body (except lateral surfaces) and limbs; an irregular dark stripe extending from the snout through the eye and along the side of the head; tail with dark spotting at the base and tip, with 4 dark crossbands in between; venter immaculate cream.

Sphaerodactylus millepunctatus Hallowell. Spotted Gecko.
1. Volcán Orosí, Estación Maritza.
The specimen was found on 5th June beneath a stone in close proximity to the field station.

Iguanidae
Ctenosaura similis (Gray). Black Iguana.
Multiple records (10+). Lower Pacific slopes of Volcán Orosi.
A common species, frequently observed basking on rocks and in the lower branches of trees in open scrub/savannah. The species is particularly common in the Tropical dry forest zone of the Pacific lowlands.

Phrynosomatidae
Sceloporus variabilis (Wiegmann). Rose-Bellied Lizard.
1. Volcán Orosí, forest trail approx. 500 metres above Estación Pitilla.
The lizard (a female) was found on 3rd June beneath a discarded wooden board in Melastome-dominated scrub forest.
Polychrotidae
Norops capito (Peters). Big-Headed Anole.
1. Volcán Orosí, forest trail approx. 1 km above Estación Pitilla.
A small juvenile (newly-hatched ?) found on 3rd June perched face down on the side of a sapling tree, approx. 2 metres from the ground.

Norops cuperus (Hallowell). Dry Forest Anole.
Multiple records (10+). Volcán Orosí, Estación Maritza; Volcán Santa María, Estación Santa Maria. Photo ref. T13845.
A species commonly observed in the vicinity of the field stations. Dewlap of male pastel pink, with a large yellowish spot covering much of the base and adjoining free margin.

Norops limifrons (Cope). Slender Anole.
1. Volcán Orosí, forest trail in open woodland approx. 2 km above Estación Pitilla.

The specimen (a male) was found basking on the leaf of an understory shrub, approx. 1 metre above the ground (3rd June). Dorsal coloration pale brown with a whitish vertebral stripe, punctuated at regular intervals with small dark spots, and a pale dorsolateral stripe. Tail marked with conspicuous broad, dark bands. Dewlap greyish white tainted with orange at the base.

Norops oxylophus (Cope). Stream Anole.
3. Volcán Orosí, forest trail approx. 2 km above Estación Pitilla. Photo ref. T13846.
All specimens were observed on rocks in or at the side of a forest stream (3rd June). Dorsum of adult male olive brown with a conspicuous pale dorsolateral stripe, extending from the snout posteriorly over the axilla (here bordered above and below by black) and along the side of the body; lower sides dark brown, mottled with whitish spots, and limbs with dark barring; dewlap uniform burnt yellow-orange.
Individuals of this medium-sized anole evaded capture by jumping deftly from stone to stone or occasionally scurrying across the water, taking refuge in crevices between rocks.

Scincidae
Mabuya unimarginata Cope. Central American Mabuya.
1. Volcán Orosí, Estación Maritza.
The specimen was observed basking on a large rock (6th June), concealed amongst climbing foliage in dry scrub/savannah dominated by *Quercus* and Melastomataceae. A second specimen was observed but not captured near the summit of Volcán Cacao, at an elevation of some 1500 metres in elfin cloud forest (9th June).

Teiidae
Ameiva festiva Lichtenstein and von Mertens. Middle American Ameiva.
2. Volcán Orosí, Estación Pitilla.
Both specimens were adults, observed on several occasions between 3rd and 5th June foraging around and beneath the wooden buildings of the field station.

Xantusiidae
Lepidophyma flavimaculatum A. Duméril. Yellow-Spotted Night Lizard.
A juvenile specimen of this highly secretive species was found on 20th June beneath a stone at the edge of the field station. Dorsum black with approx. 50 sharply defined yellowish spots dispersed over the dorsolateral surfaces either side of the vertebral line; head black, with preocular, loreal, anterior nasal, and supralabials outlined with yellow; tail dark greyish brown with indistinct pale spotting.
Colubridae
Conophis lineatus (Duméril, Bibron and Duméril). Road Guarder.
1. Volcán Orosí, Estación Maritza. Photo Ref. T13847.
An adult specimen of the typical striped colour phase was found at 17.15 hrs. on 11th June amongst rocks and dry grass at the edge of the field station clearing; transitional open scrub/savannah dominated by *Quercus* and Melastomataceae. A second snake was observed foraging at the side of a trail at 15.50 hrs. in hot, dry sunny conditions on the following day.

Dendrophidion vinitor Smith. Barred Forest Racer.
2. Volcán Orosí, forest trail approx. 1 and 3 km above Estación Maritza on trail to Cacao. Photo ref. T13848.
The snakes were juveniles (total length approx. 250 mm) found active at 10.00 hrs on 8th June and late morning on 9th June; elevation 750-850 metres. On both occasions the ground was wet following rain, although weather conditions at the time were dry and sunny. Dorsum and tail pinkish brown with numerous (one specimen with 52 on body) silvery-white crossbands extending to the ventral surface, those on the neck broadest (2-3

scales wide) and most sharply defined, the edges of the bands on the forebody irregularly bordered either side with black, those of the lower dorsum bordered with black only on the posterior margin; the crossbands become progressively indistinct posteriorly (almost indeterminate on tail), dividing into regular lines of dark and light spots, the lowermost row (dark) forming a continuous narrow stripe along the ventrolateral edge of the tail. Top of head same colour as dorsum, paler on the sides with whitish supralabials; upper edge of supralabials behind eye edged with a fine dark line. Venter dull whitish, immaculate.

When alarmed, these wary and swift-moving snakes had the conspicuous habit of raising the head and forebody high off the ground.

Imantodes inornatus (Boulenger). Yellow Blunt-Headed Tree Snake.
1. Volcán Orosí, forest trail approx. 200 m below Estación Pitilla. Photo ref. T13849.
An adult specimen (approx. total length 520 mm) of this vine-like arboreal species was found after dark (18.45 hrs.) on 4th June in a small tree some 2.5 meters from the ground, at the edge of a seasonal (dry) pond. Cloud cover at the time was extensive, screening illumination from the moon, and rain was falling as a fine mist. Dorsum and tail orange brown with very narrow, indistinct, dark crossbands; head also orange brown (including iris of eye), sparsely flecked with black. Venter pale orange-brown peppered with small dark dots, and a dark, diffuse median line.

In response to capture, the snake flattened its head and compressed the body laterally, although refused to bite.

Masticophis mentovarius (Duméril, Bribron and Duméril). Neotropical Whipsnake.
2. Volcán Orosí, rock road to Inter-American Highway approx. 8 and 10 km west of Estación Maritza.
Both snakes were large adults observed on 11th June, one was a recently killed specimen found dead on the rock road to the field station (total length 1.6 metres), and the other was watched as it foraged along the edge of a pool in open scrub/savannah. Guyer and Laska (1997) reported on a specimen from Cacao attempting to engulf a juvenile *Boa constrictor*.

Ninia sebae (Duméril, Bibron and Duméril). Red-Backed Coffee Snake.
1. Volcán Santa Maria, Estación Santa Maria. Photo ref. T13850.
The snake was an adult (approx. total length 200 mm) found during the day on 19th June beneath a rusting metal sheet in the field station clearing. Dorsal surface dull reddish brown, unicolour with a dark nuchal band edged anteriorly and posteriorly with yellow; upper surface of head black.

Spilotes pullatus (L.). Tiger Rat Snake.
1. Volcán Orosí, rock road to Inter-American Highway approx. 250 m west of Estación Maritza. Photo ref.T13851.
A large adult, total length in excess of 2 metres, found on the ground (11th June) in transitional open scrub/savannah dominated by *Quercus* and Melastomataceae. Dorsal coloration predominantly pale yellow, marked with broad, black, diagonally oriented bands anteriorly, and with black on the lower dorsum and tail confined to the outlines of the scales.

Stenorrhina degenhardtii (Berthold). Degenhardt's Scorpion-Eating Snake.
1. Volcán Orosí, forest trail approx. 500 m. above Estación Pitilla. Photo ref. T13852.
A juvenile found on 4th June during light rain in an area dominated by tall grasses and Melastomataceae shrubs. Dorsum pale brown with a middorsal series of blackish brown blotches extending to the tip of the tail (22 on body and 6 on tail), the first forming an

inverted 'Y'-shaped stripe on the nape, and the remainder aligned as irregular transverse bars. Sides marked with two alternating series of small, squarish spots, and a lower series of occasional spots on the ventrolateral edge. Head same colour as dorsum with the sutures of the upper head scutes darkened, a diffuse, dark spot in the centre of the frontal and at the posterior confluence of the parietals, and another irregular dark blotch in the centre of each parietal; side of head with an indistinct dark stripe bordering the upper edge of the supralabials behind the eye. Venter dull whitish with dark spots and a medial suffusion of dark pigment on the subcaudals.

Viperidae

Atropoides nummifer (Ruppell). Jumping Pitviper.

2. Volcán Orosí, approx. 1 km (photo ref. T13853) and 2 km (photo ref. T13854) north of Estación Maritza on trails to Casa Fan and Cacao.

Both specimens of this stout-bodied terrestrial species were large adults (total length in excess of 650 mm), found on 8th and 10th June in open woodland, one observed active in mid-morning and the other in the afternoon (16.30 hrs.) concealed amongst leaves and dry grass at the side of the trail. Weather conditions on both occasions were warm, dry and sunny. When disturbed the snakes formed a tight circular coil with the head in the centre and the mouth widely agape, although neither attempted to bite.

Bothriechis schlegelii (Berthold). Eyelash Palm Pitviper.

2. Volcán Orosí, forest trail approx. 1 km above Estación Pitilla (photo ref. T13855); Volcán Cacao, Estación Cacao (photo ref. T13856).

The two specimens represent different colour variants of this polymorphic species. The Pitilla snake, an adult approx. 600 mm in total length (marbled yellow-green colour form), was found at 13.30 hrs. on 3rd June near ground level draped over a heap of fallen, moss-covered branches. Surrounding understory vegetation was wet and dripping heavily after prolonged rain.

The specimen from Cacao, total length approx. 400 mm. (grey-green lichenose colour form), was found on the evening of 9th June perched unconcealed on a rafter inside the roof of a wooden building, approx. 3.5 metres above the ground; elevation 1000 metres.

Porthidium ophryomegas (Bocourt). Dry Forest Hognosed Pitviper.

1. Volcán Orosí, Estación Maritza. Photo ref. T13857.

A juvenile (total length approx. 300 mm), found on 11th June foraging after dark (19.00 hrs.) during light rain close to the field station in an area of open scrub/savannah dominated by *Quercus* and Melastomataceae. The species is primarily an inhabitant of lowland Tropical dry forest, and occurs here at the boundary of the Tropical moist forest and Tropical premontane moist forest belt probably at the limit of its ecological distribution.

RESUMEN

Este trabajo recoge una amplia lista de anfibios y reptiles estudiados en la Cordillera de Guanacaste en Costa Rica, entre el 30 de Mayo y el 23 de Junio de 1996. El área estudiada abarca una gran diversidad con diferentes tipos de vegetación, que van desde el bosque tropical seco de la llanura costera del Pacifico, pasando por diferentes pisos de vegetación, hasta el bosque lluvioso 'elfin'. Las observaciones se hicieron a diferentes alturas del Volcán Orosí, Volcán Santa Maria. Se incluyen breves descripciones de color de las especies más variables y menos conocidas. Las fotografias realizadas se utilizaron para verificar la identificación, copias de las mismas se encuentran depositadas en la Biblioteca Fotográfica del Museo de Historia Natural de Londres.

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