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Notes on a Collection of Squamate Reptiles from Eastern Mindanao, Philippine Islands Part 2: Serpentes

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Abstract. -A systematic collection of the herpetofauna occurring in the Diuata Range of eastern Mindanao, Philippine Islands, with incidental collections from the Mount Apo Range, was made from April-September 1982. This paper completes taxonomic and ecological notes that were taken on the squamates of this region. Although conclusions about the effect of habitat alteration on snake populations are necessarily tentative due to sampling difficulties, some comments on apparent and potential shifts in population size and habitat use of the more common snake species are made.

Key words: Reptilia, Squamata, Serpentes, Philippines, taxonomy, ecology

Introduction

Except for reviews by Taylor (1922) and Leviton (1959) and biogeographic works by Brown and Alcala (1970), Leviton (1963a, 1970) and Wüster and Thorpe (1989, 1990, 1991a), very little is known about the ecology and distribution of Philippine snakes. This paper describes ecological and distributional data taken on the snakes of an area in eastern Mindanao, Philippine Islands, that I visited from April-September 1982. An earlier paper on the lizards of this area describes the sites and methodologies I used during this study. Scalation data taken on snakes included dorsal scale rows at ten ventral scutes posterior to the head, mid-body, and ten ventral scutes anterior to the anal plate; ventral scute counts; and subcaudal scale counts. This data is given only when it adds to data previously published.

Species Accounts

Family Colubridae

Ahaetulla prasina preocularis.—Two specimens were taken, one lacking specific data that was probably collected at or above the upper elevational limit of 800 m given by Leviton (1967). This species has a morphology typical of arboreal snakes, but is frequently taken on the ground, where it may descend to forage on *Mabuya* skinks (Leviton 1967). If *Mabuya* is a favored food item, then it is highly likely that *A. prasina* favors open areas, as does *Mabuya*. A female was taken on April 6 on a road in early second-growth habitat near site 1. Five oviducal eggs (22.8-31.1 mm in length) were found in this specimen.

Specimens examined: LSUMZ 41804-41805.

Boiga cynodon.—This snake is arboreal by morphology, but two specimens were captured in drift fences and one found dead on a road at site 1. They were all collected or killed at night, and were found in both early second-growth and primary forest habitats. Prior studies give no elevational information (Alcala, 1986; Leviton, 1968a; Smith, 1943; Taylor, 1922); the present specimens were found at 450-650 m. This species is aggressive and has very large palatine teeth which are quite effective in defense. Taylor (1922) stated that this species is rare in the Philippines, but it was the most commonly captured *Boiga* species at my study sites. As Leviton (1968a) noted, *B. cynodon* has an arboreal morphology and diet (birds and bird eggs), but all specimens were captured on the ground.

Specimens examined: LSUMZ 41814-41816.

Boiga dendrophila latifasciata.—This specimen was taken on a road at night at about 500 m elevation in early second-growth forest. Previous reports indicate

that this species is a common inhabitant of lowland swampy areas (Taylor, 1922; 1965; Tweedie, 1983), but the present specimen was found in hilly country far from such habitat. The stomach of this specimen contained bird feathers. Previous studies found this species to also eat bats and lizards (Alcala, 1986; Leviton, 1968a; Taylor, 1922).

Specimen examined: LSUMZ 41812.

Calamaria gervaisi.—This burrowing species was common in primary forest, but was rarely found in early second-growth forest. One specimen was collected 20 cm underground when digging a pit-can hole. Four adults were taken in a single pit-can during four days in April. The significance of this aggregration is unknown. A female collected April 10 contained one egg 3.4 mm in length. Segmented worms were found in the stomachs of two specimens.

Specimens examined: LSUMZ 41769-41778.

Cyclocorus nuchalis taylori:.—One specimen was found in leaf litter in the primary forest, the other was caught in a drift fence in early second-growth forest. One specimen had eaten a juvenile *Mabuya multicarinata.* Leviton (1965) found specimens of the skink genera *Mabuya* and *Sphenomorphus* in stomachs of the *C. nuchalis* he examined.

Specimens examined: LSUMZ 41796-41797.

Dendrelaphis caudolineatus terrificus.—Leviton (1968b) gave an elevational range of 0-35 m for this species, but I collected specimens of this snake from 100-1000 m. Also, I did not note any particular association with water, as did Alcala (1986). Although thought to be primarily arboreal (Leviton, 1968b), all the specimens I collected were taken on the ground. One specimen had eaten a terrestrial skink, *Sphenomorphus coxi.* A specimen examined by Leviton (1968b) also contained a terrestrial skink, *Mabuya* species. One specimen that I collected was taken in grassland in an extremely large ca. 100 square km) clear-cut area. This species is arboreal in its morphology, but these data indicate common use of the terrestrial microhabitat.

Specimens examined: LSUMZ 41798-41800.

Dryphiops philippina.—This specimen was collected by a native near Mount Talomo and is the first specimen of this species collected on Mindanao. The ventral scute count of this specimen is 172, increasing the known variation of 177-188 reported by Leviton (1964a). Previous specimens were taken near sea level (Leviton, 1964a), but this specimen may have been collected as high as ca. 1000 m. This species was previously known only from Luzon, Negros, and Sibuyan (Leviton 1964a). Subsequent investigations should discover it on other large islands in the Philippine archipelago.

Specimen examined: LSUMZ 41790.

Elaphe erythrura erythrura.—This species is a common ground-dwelling diurnal inhabitant of all forest situations. It feeds on lizards, birds, and mammals (Alcala, 1986; Leviton, 1977; Taylor, 1922). My specimens commonly had mammals or mammal remains in their stomachs, and I consider this species to be a typical, heavy-bodied, mammal-eating constrictor that opportunistically takes other prey. It is also a common food item of the Philippine Eagle (*Pithecophaga jefferyi*) and the Philippine Serpent-Eagle (*Spilornis holospilus*). Alcala (1986) reports an altitudinal range to 500 m, but I took specimens up to 1065 m. I collected young snakes August 1 and September 8 (two snakes). These specimens measured 465, 383, and 409 SVL, respectively. The two largest of this group were identified as young males. Leviton (1977) stated that year-old young probably measure 400 mm SVL.

Specimens examined: LSUMZ 41807-41811.

Oligodon maculatus.—This is only the fifth known specimen of this species. Taylor (1922) took two specimens beneath sod and trash piles at Bunawan, Agusan, in the Agusan Valley of Mindanao. A third specimen was taken in northern Surigao Province (Taylor, 1925). A fourth was collected on Mount Todaya in the Mount Apo Range (Leviton, 1962). My specimen was taken during daylight in the forest floor litter on Mount Talomo, Mount Apo Range, at about 1000 m elevation. Alcala (1986) reports two specimens from 400 and 850 m elevation, but gives no further information. Including my data, an altitudinal range of 400-1000 m is indicated. This species is known only from eastern Mindanao. Leviton (1962) stated that this species has 17 dorsal scale rows throughout; my specimen reduces to 15 in the posterior third of the body. Leviton also noted that the loreal may be present or absent; in my specimen it is absent. This specimen also differs from the ones analyzed by Leviton in having one instead of two preoculars. My specimen also has fewer scutes than those examined by Leviton, increasing the known variability in ventral scute counts to 156-164. The specimen I collected is male. The stomach was empty.

Specimen examined: LSUMZ 41806.

Oxyrhabdium modestum.—The specimen taken was a gravid female with eight eggs measuring 18.9-26.1 mm in length. This specimen was collected on a road at about 400 m elevation in late second-growth forest. There is no further data to add to that given by Leviton (1964b).

Specimen examined: LSUMZ 41803.

Psammodynastes pulverulentus.—This is a common and aggressive rear-fanged colubrid of the forest floor litter. It is diurnal and was taken in all habitat types. Juveniles 190 and 197 mm SVL were collected May 3 and May 23 at site I. I found insects, a lizard tail, and a snake (*Calamaria gervaisi*) in the stomachs of the specimens I examined. This species is primarily known as a lizard feeder, but frogs and snakes are also taken (Greene, 1989; Leviton, 1983). Greene (1989) did not report insects as a food item in the specimens he examined.

Specimens examined: LSUMZ 41779-41789.

Rhabdophis auriculata auriculata.—This species is a common diurnal member of the leaf-litter herpetofauna in all habitat types investigated. I did not find it to be associated with water, as reported by Alcala (1986). These are small inoffensive snakes which usually attempt to conceal themselves rather than flee or bite when captured. I collected gravid females June 17 (three eggs, 9.9-10.5 mm in length) and 30 (one egg, 9.0 mm), and July 8 (three eggs, 5.3-7.6 mm) and 23 (two eggs, 9.0-9.2 mm). Juveniles 135-235 mm SVL were collected April 7, 11, and 12, May 18 and 23, June 14, and July 8. The gradually increasing SVL of these specimens indicate that they could be the members of a single cohort. Leviton (1970) indicated two hatching seasons in the Mount Apo Range, during June-July and October-November. My observations within the Diuata Range indicate that the hatching season here could occur as early as March, but data are scanty. Specimens had eaten frogs and frog eggs, as also reported by Leviton (1970).

Specimens examined: LSUMZ 41749-41768.

Stegonotus muelleri.—This is the eighth known specimen of this species, and only the second taken on Mindanao (Leviton 1959). Virtually no ecological data are available. This specimen was found dead on a logging road in early second-growth forest at about 590 m elevation. Leviton (1959) found three adult *Rana limnocharis* in the stomach of a large adult; the present specimen's stomach was empty. The specimen I collected is male. Its ventral scute count is higher than that given for males by Leviton (1959), thereby increasing the range of this measurement to 217-236.

Specimen examined: LSUMZ 41802.

Tropidonophis dendrophiops dendrophiops.—Specimens were collected during the day in all habitats, but always near swift-flowing streams. The altitudinal range given by Alcala (1986) extends to 700 m; one individual I collected was taken at 900 m. Juveniles were collected April 18 (161 mm SVL), May 21 (242 mm SVL), and June 24 (308 mm SVL) at site 1. These could be members of a single cohort born in March or April. One specimen was collected in a pit-can eating a frog. Taylor (1922) also reported frogs as common food items of this species. Alcala (1986) refers to this species as *Natrix dendrophiops.* Malnate and Underwood (1988) have recently assigned this species to the genus *Tropidonophis*

Specimens examined: LSUMZ 41791-41795.

Family Elapidae

Maticora intestinalis philippina.—One specimen was taken in a pit-can at site 2 in late second-growth forest at 400 m elevation. This snake is thought to be rare in the Philippines (Alcala, 1986; Taylor, 1922). Leviton (1963b) gives no ecological information, and Taylor (1922) describes an apparent anti-predator display during which specimens exhibit aimless thrashing motions, similar to displays described for other New and Old World coral snakes (Greene, 1973). Despite Alcala's (1986) statement that this species is found in arboreal ferns as well as under rotten logs, I consider this species to be a typical semi-fossorial coral snake. This agrees with Taylor's (1922) observations. There are no data on food habits of this species; my specimen's stomach was empty.

Specimen examined: LSUMZ 41817.

Naja samarensis.—This is an alert diurnal species. It is quite common around habitations and early second-growth habitats. Contrary to Alcala (1986) and Taylor (1922), this species was never found in primary forest, and residents told me that they never saw individuals of this species in the forest. It is likely that the conversion of much of the Philippines into altered habitat has resulted in an increased abundance of this highly venomous snake. I saw or collected this species from sea level to 1000 m elevation. Despite its highly toxic venom (Minton 1967), the local residents believed that this snake brought luck, and individuals found under and around houses were invariably left alive. I actively sought out reports of envenomation resulting from bites of *N. samarensis,* but received no such reports, and was told by locals that bites of this species were seldom problematical. This is in contrast to conclusions reached by Reyes and Lamana (1955). This is a spitting cobra, and there is at least one report of an accurate strike in the eyes resulting in a great deal of pain but no serious after-effects (Van Wallach, personal communication). I handled many specimens, but never saw one exude any appreciable quantity of venom. This species is known to eat frogs, snakes (*Calamaria gervaisi*), and rodents (Gressitt, 1937; Leviton, 1964c; Taylor, 1922). A specimen I examined contained a small *Bufo marinus* (SVL 95mm), and Van Wallach reports (personal communication) only *B. marinus* in the stomachs of *N. samarensis* he collected in rice paddies on Mindanao near the city of Surigao. *N. samarensis* itself is eaten by the Philippine Eagle (*Pithecophagas jefferyi)* and the Philippine Serpent-Eagle (*Spilornis holospilus)* Two juveniles were taken with an adult male from a hole in the ground at 1000 m on Mount Talomo. These specimens were brought to me by a local resident. It was not possible to ascertain whether there was any significance to this aggregation, but other cobras are known to guard both eggs and young (Campbell and Quinn, 1975; Tryon, 1979; Tweedie, 1983). Wüster and Thorpe (1991b) have recently elevated *Naja naja samarensis* to full species status, and I use this new species designation in this paper.

Specimens examined: LSUMZ 41819-41824.

Discussion

Unlike lizards, snakes are rarely taken in such numbers that it is possible to gauge their relative abundance in any given habitat. Therefore, ecological conclusions based on studies such as this one are few and tentative. Most of these conclusions have already been reached in individual species accounts.

The pace of destruction of primary forest in the Philippines has created a great deal of second-growth habitats of various types. At least one snake, *Naja samarensis*, has probably benefitted from this trend. Taylor (1922) observed this species in primary forest, but neither I nor any other biologists that I worked with, nor any local residents, ever told me of seeing this species in the primary forest. I consider it a common snake of second-growth and agricultural areas. Other species, such as *Elaphe erythrura erythrura* and *Rhabdophis auriculata auriculata* appear to be common in all habitats, although they have not undergone an apparent shift in habitat preference similar to *N. samarensis*. The only other very abundant snake, *Calamaria gervaisi*, may be adversely affected by deforestation, in that it was common in primary forest but not in second-growth habitats. Logging causes both soil compaction from the movement of heavy equipment and soil drying from increased insolation. It seems likely that these changes would adversely affect a burrowing animal such as *C. gervaisi*.

Snake ecology suffers from the typical problems inherent to studies of higher level predators. Since they are frequently at the top of the food chain, snakes never seem to be very abundant. In addition, they are secretive by nature, making collection and observation difficult. If we are to understand the effect of habitat loss on snake populations, it will be necessary to use novel approaches which are uniquely designed to overcome these specific problems.

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