

ECOLOGICAL OBSERVATIONS ON AN ALL FEMALE POPULATION OF THE LIZARD *LEPIDOPHYMA FLAVIMACULATUM* (XANTUSIIDAE) IN PANAMÁ.—

The xantusiid lizard *Lepidophyma* reaches the southern periphery of its range in the vicinity of the Canal Zone (Fig. 1). In January 1968, incidental to other ecological studies in central Panamá, we located a population of *Lepidophyma flavimaculatum* Duméril. Since little on the ecology of these lizards has been published, we decided to sample the population on a regular basis to obtain data on the reproductive biology and parasitology.

The population sampled is located in the Canal Zone on the Caribbean side of the Isthmus of Panama, 3 miles SE of Achioté, Colon Province (9°14' N, 80°0.5' W). The lizards were restricted to a limestone ridge approximately 500 × 300 m. The ridge, approximately 100 m above sea level, is dissected by the drainages of several small semi-permanent streams, and supports a heavy and relatively undisturbed stand of Tropical Moist Forest (Holdridge, 1967). Many of the trees reach a diameter of one meter or larger, with prominent buttresses. The forest floor has many logs in various stages of decay and relatively little underbrush.

Lepidophyma were taken chiefly under thoroughly rotten logs at least 15 cm in diameter. Individuals were most abundant near the top of the ridge. We have repeatedly

failed to locate the species in other apparently suitable localities in the area.

Over a one and one-half year period, 50 individuals (including five laboratory-born lizards and one full term embryo) have come from this locality. All have been females. When we first noted this skewed sex distribution, particular attention was given to a search for males. None have been collected.

We have taken five additional female specimens of this species at three other locations in Panamá (Fig. 1): one from near the Rio Frijoles, 3 miles N of Gamboa, Canal Zone; three from the Madden Forest Preserve, Canal Zone, and one from El Aguacate near the north base of Cerro Trinidad, Panama Province. Dr. Stanley Rand has a living adult female in his laboratory, collected on Barro Colorado Island. Dan Badgely and Kenneth Nemuras obtained a female near Almirante in Bocas del Toro Province. We also find that all literature reports of the species from Panamá, when sex is noted, are of female specimens.

The above data are unusual, and strongly suggest that Panamanian populations of *Lepidophyma* may be all-female. The possibility that males are present in an extremely low ratio or that they exhibit differing micro-habitat choices or activity periods cannot be ruled out on the basis of our data. It should be noted, however, that sex ratios in other species of xantusiid lizards appear to be 1:1

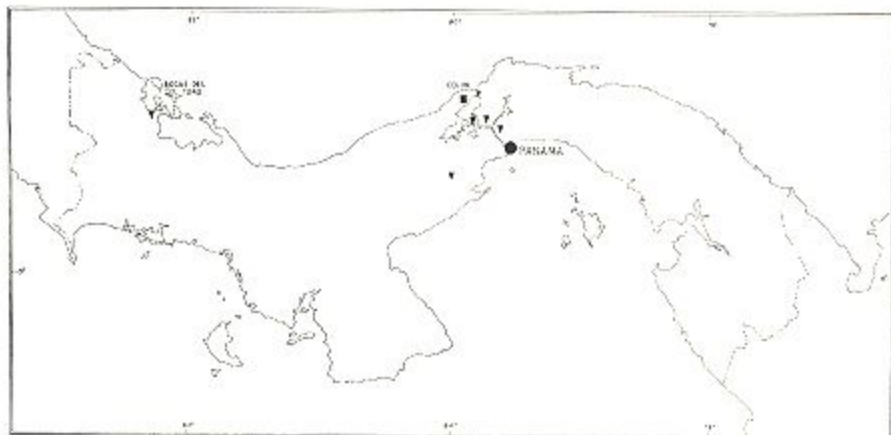


Fig. 1. Panamanian localities mentioned in text. Study area, 3 miles SE Achote, Colon Province, is indicated by a square symbol; others by triangles.

in all known cases. Zweifel and Lowe (1966) found no evidence to contradict a 1:1 sex ratio for *Xantusia vigilis* in California. Collections of California night lizards made by one of us (Telford) in 1962-63 consisted of 16 ♂ and 19 ♀ *Xantusia henshawi*, and 31 ♂ and 30 ♀ *Klauberina riversiana*, and no studies have shown sexual differences in microhabitat or activity period of any xantusiid species. In any event, a condition as peculiar as that described here is indicative of an ecological or genetic anomaly of considerable interest.

Most *Lepidophyma* taken have been young of the preceding year: a series of 20 collected from December to April ranged from 58 to 72 mm snout-vent length. Ovaries of these specimens had numerous follicles of similar, small size; none had enlarged yolked follicles. A gravid female, 99 mm S-V, collected 29 January 1969 contained four small embryos. Two gravid females were collected 27 April 1969: one, 100 mm S-V, contained an undeveloped oviducal egg and an apparently full-term embryo, 38 mm S-V length. The embryo had distinct ovaries. The second female, 95 mm S-V, gave birth on 7 June to three young, and on 9 June, to two more. All five siblings, preserved 48 hr later, were female, and were 35-37 (\bar{x} 36 mm) S-V. They possessed well-developed fat bodies in addition to a large quantity of coelomic yolk. Also on 27 April we collected an apparently new-born *Lepidophyma*, 38 mm S-V length, with a still open umbilical scar and distinguishable ovaries. A juvenile, collected 4 July 1968, was 40 mm S-V at time of capture,

while a series of 16 specimens collected in mid-August contained no specimens less than 50 mm S-V.

The above data suggest that *Lepidophyma* are born in late April-early June, around the beginning of the wet season, at a S-V length of 35-38 mm, and apparently do not reach sexual maturity until at least 20 months of age. This assumes that lizards 58-72 mm in January are about eight months old, and will grow another 20-30 mm in their second year.

The ecological relationships of *L. flavimaculatum* are too poorly known to permit any rigorous comparison with the other, better studied, all-female lizard species. The "weed hypothesis" put forth by Wright and Lowe (1968) might be applicable here in that these populations are located near or at the periphery of the range of the species (and the family) in tropical America.

R. L. Bezy and C. H. Lowe of the University of Arizona are currently examining the karyotypes of several individuals from this and other populations of the species. Their findings may shed light on the cytogenetic origin of this apparent unisexual condition. Continued discoveries of parthenogenetic lizard populations might indicate that the genetic/physiological alterations entailed by such a reproductive mode are not as difficult to attain as has previously been believed.

We thank C. H. Lowe and R. L. Bezy for advice and assistance, and for suggestions on the manuscript. The staff and facilities of the Gorgas Memorial Laboratory, Panamá, and the Middle America Research Unit, Canal Zone, have cooperated in many ways.

This study was supported by NIH Grant EX-00139 to the Center for the Biology of Natural Systems, Washington University, St. Louis (Campbell), and by NIH Grant AI-01251-12 to Gorgas Memorial Laboratory (Telford).

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