

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ADDITIONS TO THE LEIOLOPISMID LIZARDS
KNOWN FROM THE PHILIPPINES, WITH
DESCRIPTIONS OF
A NEW SPECIES AND SUBSPECIES

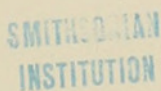
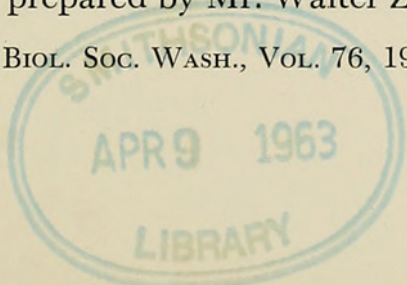
BY WALTER C. BROWN AND ANGEL C. ALCALA

*Menlo College, Menlo Park, California and Natural History
Museum, Stanford University, California;
Silliman University, Philippine Islands*

At the time of our review (1956) of the Philippine lizards belonging to the section *Leiolopisma* of the genus *Lygosoma*, six species were known to occur in the Philippines. Subspecies were recognized for three of the species: *auriculatum* (three subspecies), *quadrivittatum* (two subspecies), and *pulchellum* (two subspecies). In the case of *L. quadrivittatum*, one of the subspecies (*infralineolatum*) is wholly outside of the Philippine archipelago, occurring in the Celebes and adjacent small islands.

Extensive field work by the authors on Zamboanga Peninsula, Mindanao Island, in 1959 adds two more species, one previously undescribed, to the Philippine list; and collections by Professor D. S. Rabor in the mountains of northern Luzon in 1957 indicate the need of recognizing three rather than two subspecies of *L. pulchellum*.

We are deeply grateful to J. C. Battersby of the British Museum (Natural History) who reexamined the types of *L. infralineolatum* and *L. subvittatum* for us. We are grateful also to Neil Richmond of the Carnegie Museum in Pittsburgh (hereafter designated as C. M.), Robert F. Inger of the Chicago Museum of Natural History (C.M.N.H.), and Alan Leviton of the California Academy of Sciences (C.A.S.) for permitting us to examine pertinent material in the collections of their respective institutions. We also wish to thank Dr. Inger for his suggestion that we describe the new subspecies of *L. pulchellum*. Drawings were prepared by Mr. Walter Zawojski, Stanford Re-



search Institute. This study is a part of the senior author's research program on the systematics and ecology of the amphibians and reptiles in the tropical forests of the Philippines, supported by National Science Foundation Grant 13085.

The field work on Dapitan Peak of the Malindang massif, in Zamboanga Peninsula, revealed the presence of a population of *L. q. quadrivittatum* and of a second species, similar in many characteristics, including ear covered by scales, but larger in size and differing in some features of the color pattern. The color pattern of the second species reminded us of that described for *L. subvittatum* by Günther (1873: 167) and suggested that the status of this species should be reexamined. *L. subvittatum* was placed by Boulenger (1887: 328), without comment, in the synonymy of *L. infralineolatum*.

Original color descriptions of Günther are as follows:

L. subvittatum: "A broad bluish-white band runs along the middle of the back from the snout, and appears to be continued on the tail; it is bordered on each side by a narrower black band, which becomes indistinct in the posterior half of the trunk. Along the side of the head and neck there is another similar white and black band, the white band proceeding from the supraciliary edge, but this band is lost behind the shoulder. Sides of the body and lower parts whitish, immaculate. Legs with very faint brownish spots."

L. infralineolatum: "Black above, with three golden-yellow longitudinal bands, as broad as the black ground-colour between. The middle band commences on the end of the snout, and is continued on the tail; the lateral band commences on the supraciliary edge, and runs along the side of the back to the root of the tail, where it is lost. The entire lower side with fine brown, longitudinal lines running along the meeting edges of the rows of scales. Limbs finely reticulated, and the toes annulated with black."

Careful comparison of a series, including one of the syntypes, of *L. q. quadrivittatum* and two specimens, including the type of *L. q. infralineolatum* (reexamination was made for us by Mr. Battersby), with the series of the larger species from Mindanao reveals that the dark longitudinal stripes are consistently prominent, relatively unvarying in width, and unbroken for the length of the body in both subspecies of *L. quadrivittatum*, whereas in the case of the larger species from Mindanao the dark stripes become narrow and fade out (except for one juvenile specimen) on the anterior part of the body (Fig. 1). This is similar to the fading out which is characteristic of *L. semperi* from eastern Mindanao.

The comparison also reveals one more significant difference, other than size and color; namely, the number of middorsal scale rows between the

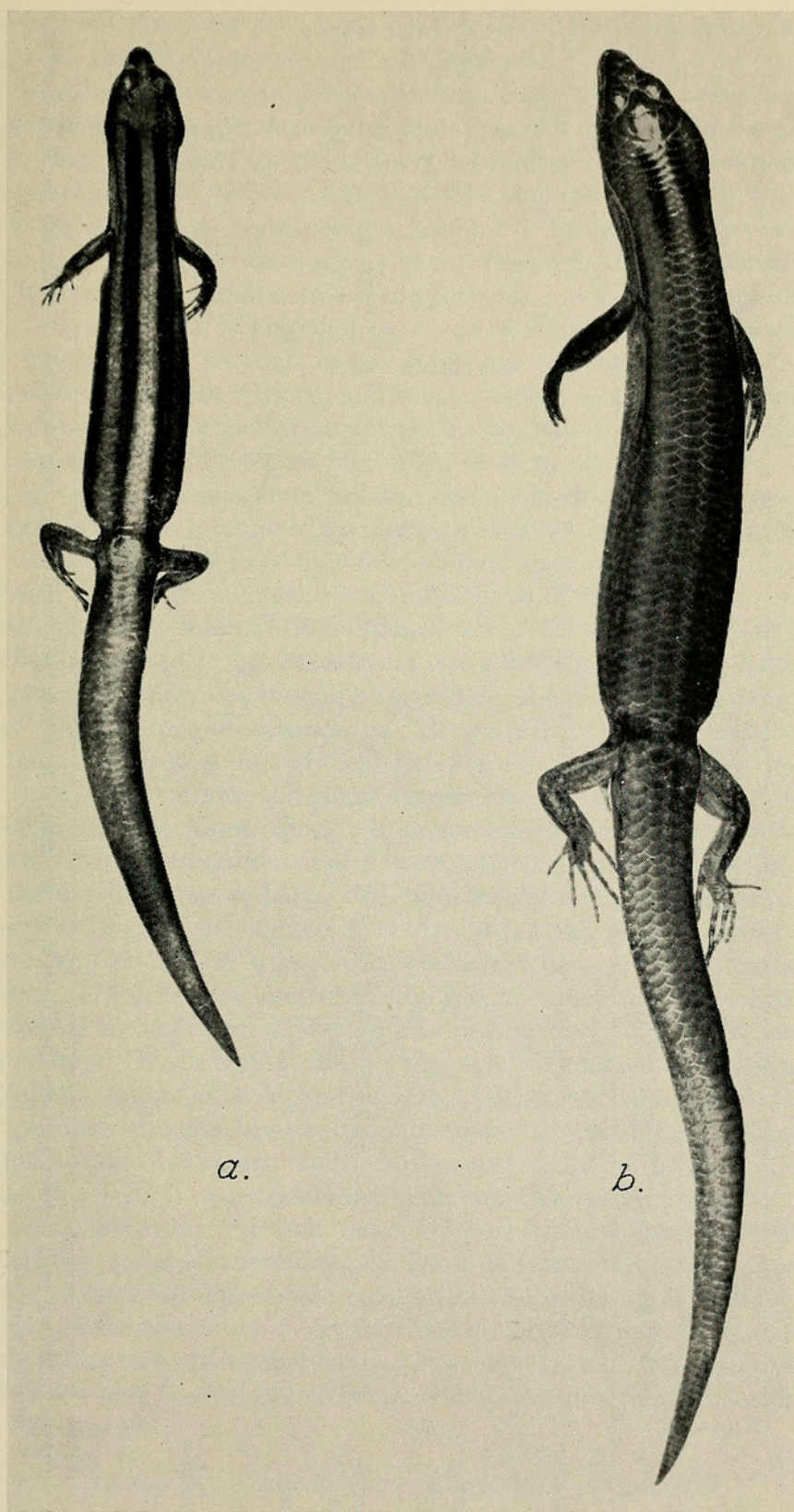


FIG. 1. Dorsal views of *Lygosoma* (*Leiolopisma*) sp. a, *L. q. quadrivittatum*, snout-vent length 36 mm; b, *L. subvittatum*, snout-vent length 52 mm.

TABLE 1.—Scale counts and body length for five Asiatic-Pacific forms of *Lygosoma* (*Leiopisma*) having the ear opening covered by scales*

SPECIES	MIDBODY SCALE ROWS		MIDDORSAL SCALE ROWS (parietals to middle of hind limb)																4TH TOE LAMELLAE		SIZE AT MATURITY	
	18 19 20 21 22 23 24		45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64															29-41 mm S-V	47-56 mm S-V			
<i>L. subvittatum</i>	2	8 1																S-V of type = 39	9			
<i>L. surdum</i>	1 T																		S-V length of type = 52			
<i>L. q. quadri- vittatum</i>	4 16 S		2 7 2 4 3 3 1 2 1																			
<i>L. relictum</i>	1																					
<i>L. q. infraline- olatum</i> †	2 T																					

* The numbers following each species indicate the number of specimens for which the characteristic was observed. T indicates the type specimen is included; S indicates syntype.

† In addition to the two specimens indicated here, as pointed out by Brown and Alcalá (1956: 3), Boulenger (1897: 216) examined 10 specimens from Celebes and did not mention any variation from 22 midbody scale rows. Pending availability of additional material from Celebes, we continue, as in 1956, to follow Boulenger in regarding the Celebes population (*infralineolatum*) as distinct from the Philippine population (*quadrivittatum*).

parietals and the point even with the middle of the hind limbs. In our review of the Philippine species of *Leiolopisma* (1956) and in other papers dealing with various genera of skinks, this middorsal count has been made between the parietals and the point opposite the vent. In the present paper, since the counts for the types of *infralineolatum*, *subvittatum*, and *surdum* were made between the parietals and the middle of the hind limbs, we have made corresponding counts for those species reported in Table 1. Elsewhere in the present paper, the counts for middorsal scale rows were made as usual, between the parietals and the point opposite the vent. It is interesting to note that the range of middorsal scale rows, based on counts from the parietals to the point opposite the vent for 17 specimens of *quadrivittatum* (Brown and Alcalá, 1956), was 48 to 53; while the range for the present series of 25 specimens, based on counts from the parietals to the middle of the hind limb, is 45 to 53. As shown in Table 1, *L. q. infralineolatum* from Celebes and *L. q. quadrivittatum* from the Philippines exhibit a range of middorsal scale rows from 45 to 53. Counts for nine of the specimens of the undetermined species from the Philippines exhibited a range in middorsal scale rows from 57 to 64. The type of *L. subvittatum* has a count of 58 middorsal rows. The count for the types of *L. subvittatum* and *L. infralineolatum* was made for us by Mr. Battersby, who also very kindly compared one specimen of our series from Mindanao Island with the type of *subvittatum*. He states that the larger size of the Mindanao specimen is the only real difference he can note. Since the type of *L. subvittatum* is in much closer agreement with the series constituting the sample of the larger species from western Mindanao than with the series of *L. q. quadrivittatum* or of *L. q. infralineolatum*, we revive the name *subvittatum* from the synonymy of *infralineolatum*, as available for the larger species from Mindanao. Whether or not the populations of Mindanao and Celebes are subspecifically distinct cannot be determined at this time. The other two known oriental species which share the character, ear covered by scales, are *L. relictum* from Engano Island and *L. surdum* from Malay. Dr. Robert F. Inger, who has reexamined the type of *L. nitens* Peters from Sarawak, Borneo, states (personal communication) that this specimen also has the ear opening covered by scales, not minute as originally stated by Peters. Inger further states that he believes it to be conspecific with *L. quadrivittatum*. Pending the availability of a much larger series from the Sarawak area, only four species—*surdum*, *relictum*, *subvittatum*, and *quadrivittatum* (the latter with two subspecies, *quadrivittatum* and *infralineolatum*)—are recognized and included in Table 1. On the basis of the characters shown, and the assumption that these four species do comprise a phylogenetic group of related species, it appears that *L. subvittatum* may have closer affinities with *L. surdum* than with either of the other species.

Lygosoma (Leiolopisma) subvittatum (Günther)

Cophoscincus subvittatus Günther, 1873: 167 (original description); holotype in British Museum; Manado.

Material examined: Depitan Peak, Zamboanga Peninsula, Mindanao Island, 11 specimens (Stanford University, 22199–22209).

Diagnosis: A *Leiolopisma* of small to medium size, snout-vent length 47 to 56 mm at maturity (9 specimens); habitus moderately slender, snout not strongly depressed, rounded; its length about 6 to 8½ per cent of the snout-vent length; prefrontals separate or barely in contact; four large supraoculars; fourth supralabial beneath the center of the eye; ear covered by scales; nuchals present; midbody scale rows 20–24; fourth toe lamellae 17–21; scale rows between parietals and the point even with the middle of the hind limb 57–64; limbs pentadactyl, moderate in length.

Color (in alcohol): Dorsum (adults) rather brownish tan with a lighter dorsolateral stripe, bordered laterally by a darker area which, in some specimens, is in the form of a narrow stripe in the region of the neck and forelimb; a dark brown stripe on either side of the light vertebral area, beginning in the frontoparietal and supraocular region and narrowing and fading out in the region of the forelimbs (Fig. 1, *b*); upper surface of limbs dusky; toes with dark transverse blotches; venter rather uniformly light. One juvenile, 35 mm snout-vent length, approaches more closely Günther's original description of a whitish middorsal stripe. Also in this juvenile, the dorsal and dorsolateral dark stripes continue with only moderate fading to the region of the hind limbs, as is typical of *L. quadrivittatum*.

Habitat: The 11 specimens of *L. subvittatum* from Mindanao Island were all found in humus of epiphytic ferns in original forest in the upper dipterocarp and the submontane zones on Dapitan Peak at altitudes of about 3,000 to 4,500 feet. The four specimens of *L. quadrivittatum* from the same locality were collected at altitudes of 2,400 to 2,500 feet, three from under moss on the trunks of trees and only one from an epiphytic fern. On Negros Island, also *quadrivittatum* has been taken only at low altitudes, below 2,000 feet, where specimens have been taken from leaf axils of Pandanus trees and sago palm. On Palawan Island, in the area around Thumb Peak and Central Peak, where no other species of *Leiolopisma* is presently known, *L. quadrivittatum* occurs primarily in the aerial fern habitat. Twenty-eight of 31 specimens, collected in dipterocarp forest at altitudes between 200 and 1,500 feet, were found in aerial ferns. The other three were found beneath bark or in tree holes.

***Lygosoma (Leiolopisma) zamboangensis*, new species**

The unique specimen of this species was collected in the transitional submontane–montane forest zone on the west side of Dapitan Peak, Zamboanga Peninsula, Mindanao Island, by the junior author in April 1959.

In the counts for midbody scale rows, middorsal scale rows between parietals and base of tail, and subdigital lamellae, as well as in the moderate dilation of the basal lamellae, it is in close agreement with a series of *Lygosoma (Leiolopisma) semperi* Peters (1867: 18) from Mindanao Island. However, it differs markedly from *semperi* in the shorter, more

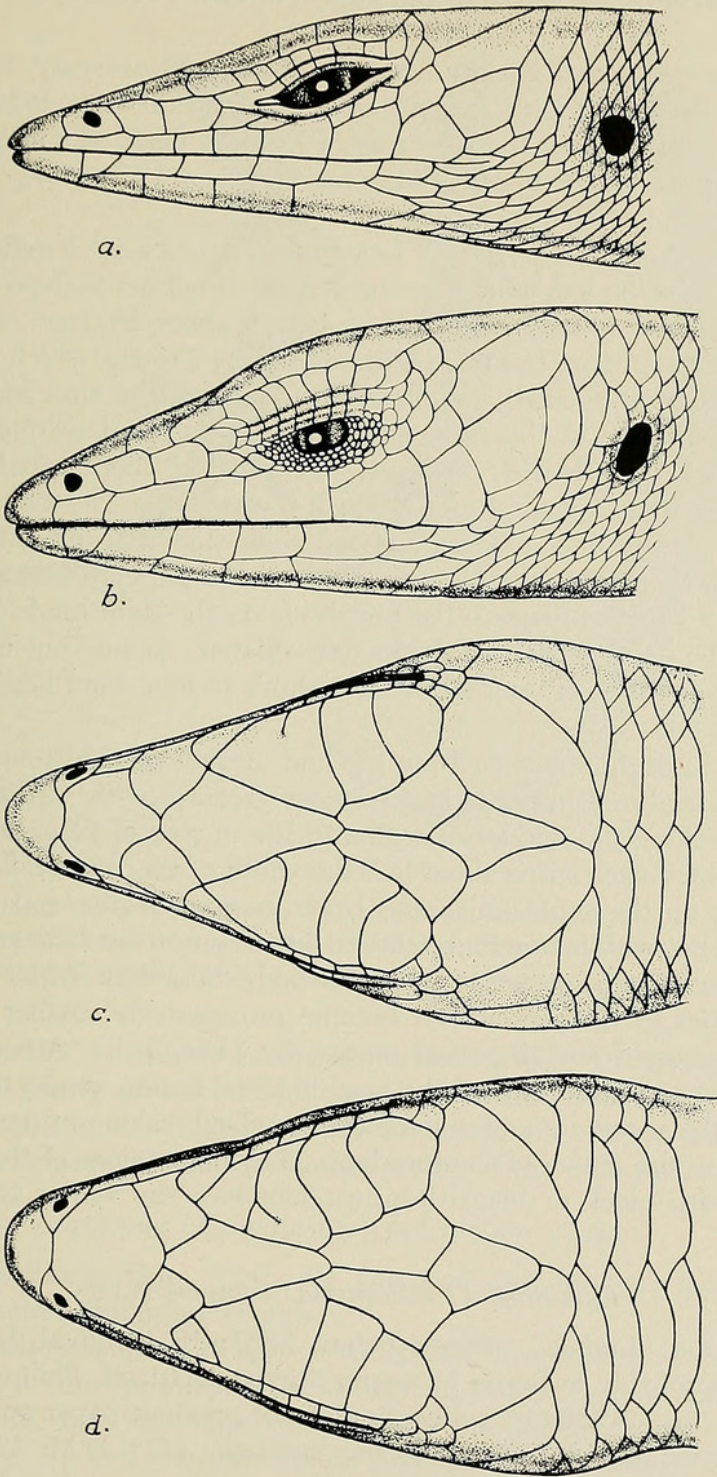


FIG. 2. Lateral (above) and dorsal (below) views of head of *Lygosoma* sp. a, *L. semperi*, with eye open; b, *L. zamboangensis* n. sp., with eye closed; c, *L. semperi*; d, *L. zamboangensis* n. sp.

blunt, less depressed snout, the number of the supralabials anterior to the center of the eye, the shape of the large temporal (Fig. 2), and the color pattern.

Holotype: Natural History Museum, Stanford University, No. 22425, a male, collected 24 km southeast of Buena Suerte, New Piñan (about 5,200 feet altitude), on the west side of Dapitan Peak, Mount Malindang massif, Zamboanga Peninsula, Misamis Occidental Province, Mindanao Island, Philippine Islands.

Description of type: A small *Leiolopisma*, snout-vent length 44.5 mm for a mature male; habitus rather slender, snout not much depressed, relatively short and bluntly rounded, its length about $8\frac{3}{4}$ per cent of the snout-vent length; prefrontals separated by the frontal which is in contact with the frontorostal; frontorostral slightly broader than long; frontal $1\frac{1}{2}$ times as long as the fronto-parietals; interparietal distinct; 4 large supraoculars; nuchals 4-4; postnasal and frenal of about equal length; 6 supralabials, fourth longest and beneath the center of the eye; temporals enlarged; ear opening moderate; tympanum slightly sunk; 24 midbody scale rows; 54 middorsal scale rows between the parietals and the base of the tail; 19 lamellae beneath the fourth toe on the right hind foot, the 11 beneath the basal phalanges moderately dilated. Snout-vent length 44.5 mm, axilla to groin 24 mm; snout to forelimb 16 mm; hind limb 17.5 mm; snout 3.75 mm.

Color (Kodachrome slide from life and alcohol preservation): Ground color of dorsal and upper lateral surfaces greenish with a rust-brown iridescence along the middorsal region in life; a pair of black or blackish-brown stripes, each stripe about half the width of the vertebral scale rows, beginning on the supraocular and fronto-parietal region and continuing unbroken but with increasingly uneven outer margin onto the anterior part of the body. On the posterior part of the body these dark stripes are broken into a series of blotches which become progressively smaller and more widely separated and dispersed posteriorly (Fig. 3, a). A second black stripe begins on either side of the head in loreal region, passes through the eye and above the ear and undergoes a similar breaking-up and dispersal posterior to the region of the fore-limb. The upper sides of the limbs are spotted with black or blackish-brown blotches; the venter is uniformly light.

Lygosoma (Leiolopisma) semperi Peters

Lygosoma (Lipinia) semperi Peters, 1867: 18 (original description); holotype probably in Berlin Museum; Mindanao Island, Philippines.

At the time (1956) of publication of our previous paper on this group of lizards we had examined only one specimen (C.N.H.M. 22552) from eastern Mindanao Island. We have since examined a series of additional specimens from eastern Mindanao (C. M. 1685, 1687, 1689-92, 1694-95) which are in close agreement with the previously examined specimens in both scale counts and color pattern. Another specimen (C.N.H.M. 9651) collected by D. S. Rabor and party at San Isidro, Matuquinas, Samar Is-

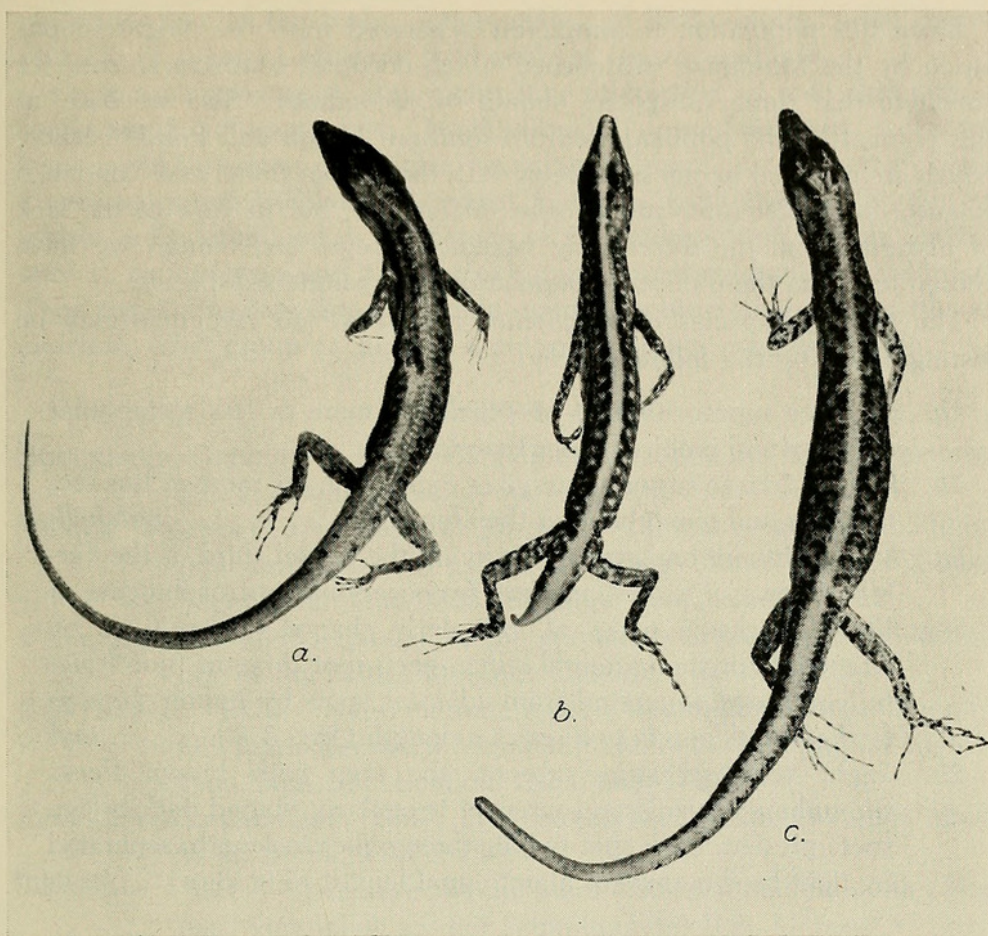


FIG. 3. Dorsal views of *Lygosoma* (*Leiolopisma*) *pulchellum*. a, *L. p. levitoni*, snout-vent length 41 mm; b, *L. p. pulchellum*, snout-vent length 43 mm; c, *L. p. taylora*, snout-vent length 50 mm.

land, in May 1957 is tentatively referred to this species. Unfortunately, the specimen is poorly preserved but appears to differ from the Mindanao series primarily in the lighter ground color and the darker and longer dorsolateral stripes which extend to the region of the hind limbs.

Lygosoma (*Leiolopisma*) *pulchellum* (Gray)

Lipinia pulchella Gray, 1845: 84 (original description); holotype in British Museum; Philippine Islands.

In our previous paper (1956) we recognized two subspecies, one from Negros Island and the other from Mindanao, Bohol, Luzon, and Pollillo islands. These were distinguished primarily on differences in the color pattern (Fig. 3) and the number of supraoculars. A recent collection made by D. S. Rabor in the mountains of northern Luzon, although limited to three specimens, reveals the presence of a population in the northern mountains which is more closely related, on the basis of the above characteristics, to the Negros population than it is to the population in southern Luzon.

Since this population is completely separated from the Negros population by the Mindanao subspecies, which occupies southern Luzon, we conclude that three subspecies should be recognized. Also we note, at this point, that the populations from southern Luzon and Polillo islands, which are grouped in one subspecies with those from Bohol and Mindanao islands, do exhibit some minor color differences; but in view of the lack of material from the intervening islands of Leyte and Samar, we have chosen to retain these disjunct populations in a single subspecies.

The three subspecies of *pulchellum* which we do recognize may be distinguished by the following key:

- 1a. Six large supraoculars, 4 of which are more or less rectangular in shape and much broader than long 2
- 1b. Four or 5 large supraoculars, 2 or 3 of which are more or less rectangular and much broader than long *pulchellum*
- 2a. A whitish vertebral stripe occupying the mesial third of the vertebral rows of scales, marked by occasional encroachments of brown flecks; a series of irregularly shaped brown spots on either side of the vertebral stripe, each spot three or four scales in length and separated from adjacent spots by lighter, brown-flecked areas one to two scales in length (Fig. 3, c) *taylori*
- 2b. Light vertebral stripe absent, the area with brown flecks throughout; dorsolateral series of irregularly shaped dark brown spots present, each spot two or three scales in length, separated by light brown areas of about equal length (Fig. 3, a) *levitoni*

Lygosoma (Leiolopisma) pulchellum levitoni*, new subspecies

Holotype: Chicago Natural History Museum No. 120953, a male, collected by D. S. Rabor and party in May 1957, in the Cordillera Mountains in northern Luzon Island.

Paratypes: C.N.H.M. 120954–55, same locality as the holotype.

Diagnosis: A small *Leiolopisma*, snout-vent length 41 to 44 mm (two specimens); snout sharply pointed; head and snout strongly depressed; midbody scale rows 22–24 (three specimens); scale rows between parietals and base of tail 53–55 (three specimens); 6 supraoculars, second through fifth more or less rectangular as in the population from Negros Island; narrow middorsal whitish stripe not present; a longitudinal series of dark brown spots at the outer edges of the two middorsal scale rows.

Color: Dorsum light brownish, the result of a dense pattern of small, brown flecks on a light (whitish) background; a dorsolateral series of irregularly shaped dark brown spots present; each spot two or three scales in length and separated by lighter areas of about the same length on the body; spots on the base of the tail somewhat smaller and more widely separated; a dark brown line beginning at the nostril, passing through the eye, above the ear and forelimb, and broken into a series of spots on the

*Named for Dr. Alan Leviton who worked extensively on Philippine snakes.

posterior part of the body; upper surface of limbs spotted with brown (Fig. 3, *a*); venter uniformly light without brown markings.

From a zoogeographic standpoint it is interesting to note that only a single species of *Lygosoma* (*Leiopisma*), *L. quadrivittatum*, is known from north Borneo, as is also true for Palawan Island. Dr. Robert F. Inger (personal communication) states that *L. nitens*, from Borneo, the type of which he has examined, is a synonym of *L. quadrivittatum*. From Celebes only *L. subvittatum* and *L. quadrivittatum infralineolatum* are recorded. Thus the Philippine group of eight species appears to be primarily an endemic, relict group or, in part, a group which has evolved in situ.

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