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A new species of lygosomine lizard (Reptilia: Lacertilia: Scincidae; *Sphenomorphus*) from Mt. Isarog, Luzon Island, Philippines

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Abstract.—*Sphenomorphus knollmanae,* a new species, is described on the basis of recently collected material from Mt. Isarog, Bicol Peninsula, southeastern Luzon, Philippines. The small series (n = 5) differs from its congeners by the combination of its fused frontoparietals, relatively low number of paravertebrals (73–83) and midbody scales (34–39), the presence of 17–20 subdigital fourth toe lamellae, distinctive patterns of coloration, and a host of measurements related to its small body size (SVL = 47.5–51.0 mm). To better distinguish between the new species and two closely related congeners, univariate and multivariate analyses were performed on a suite of morphological characters. The three species were found to be well differentiated morphologically.

Worldwide, the genus *Sphenomorphus* contains over 120 species and is a "taxonomically residual" plesiomorphic taxon that "remains a convenient repository for . . . species, pending further phylogenetic analysis" (Myers & Donnelly 1991:2). Brown & Alcala (1961b) reported that Oriental and Australian zoogeographic regions contain over 60 scincid species in *Sphenomorphus.* In their key to Philippine Scincidae, Brown & Alcala (1980) recognized 22 species of *Sphenomorphus,* subdividing these into five groups based on external morphology. The Group I species of Philippine *Sphenomorphus* are *S. beyeri* (Taylor 1922) and *S. diwata* (Brown & Rabor 1967, see Brown & Alcala 1980, for review). Until recently, *S. beyeri* was known only from the holotype, collected by E. H. Taylor on Mt. Banahao, Laguna province, southern Luzon Island (Taylor 1922). During a recent biodiversity inventory of the Philippines conducted by the National Museum of the Philippines (PNM) and the Cincinnati Museum of Natural History (CMNH), we rediscovered and redescribed *Sphenomorphus beyeri* from specimens taken on Mt. High Peak, Zambales Mountains, west central Luzon Island (Brown et al. 1995). *Sphenomorphus diwata* also is currently known only from a small number of specimens collected in the Diwata Mountains, Surigao del Sur Province, northern Mindanao Island (Brown & Rabor 1967, Brown & Alcala 1980).

While examining material in the United States National Museum of Natural History (USNM), R. I. Crombie brought to our attention a small series of *Sphenomorphus* skinks that appeared very similar to our specimens of *S. beyeri* from the Zambales. At the time, we were not confident in the assignment of these specimens to our concept of *S. beyeri* (from the type locality or from Mt. High Peak) as several inconsistencies immediately were apparent. Following detailed examination of these specimens and a host of univariate and multivariate statistical analyses we concluded that differences between this series and its most closely-related congeners were sufficient to warrant its recognition as a distinct species.

Methods

Morphological characters and scale counts used here follow definitions and abbreviations in Brown & Alcala (1980) and Brown et al. (1995). Measurements were taken to the nearest 0.1 mm with digital calipers. All measurements are based on specimens preserved in 70% ethanol. In cases where scales of interest are found on both sides of the head (e.g., labials), scale numbers are given in pairs, separated with a long dash (—), designating left from right respectively. Mensural and meristic character abbreviations (defined in Brown et al. 1995) include: snout-to-vent length (SVL), tail length (TL), axilla-groin distance (AGD), hind leg length (HLL), head length (HL), head breadth (HB), snout length (SL), eye diameter (ED), tympanum diameter (TD), paravertebrals (PVS), midbody scales (MBS), supralabials (SUL), and infralabials (IFL). Specimens examined are deposited in the California Academy of Science (CAS) the Cincinnati Museum of Natural History (CMNH), the National Museum of the Philippines (PNM), and the United States National Museum of Natural History (USNM).

Statistical analyses were performed using the Statistical Analysis System software, version 6.03 (SAS Institute Inc., 1988a, 1988b). Sexually immature specimens (*S. beyeri*, PNM 2303 and CMNH 3654, CAS 61183; *S. diwata*, CAS 133514; *Sphenomorphus* sp., USNM 318343) were excluded from univariate and multivariate analyses. A Student-Newman-Keuls multiple range test was performed on both raw and log (base 10) transformed data to determine patterns of significant character variation. Two principal component analyses were performed, both on the correlation matrix of the variables. The first included only raw (untransformed) data; the second was carried out on the log (base 10) transformed data, in order to minimize the effects of size differences among the different populations examined herein; in the case of the log (base 10) transformed analysis, the size component of the variation is restricted to principal component axis one. In both instances, the first and second and the first and third principal component scores were then plotted in order to ascertain morphological differentiation among groups.

Results

Sphenomorphus beyeri, S. diwata, and *S.* n. sp., distinctly segregated into discrete groups in the principal component analysis (Fig. 1). In the PC analysis based on raw data (Fig. 1a, b), principal component one differentiates between *S.* n. sp. and *S. diwata* and between the new species and *S. beyeri.* This component loads heavily on HL, SVL, HB, HLL, AGD, and SL. Principal component two distinguishes between *S. diwata* and remaining Group I *Sphenomorphus.* This component loads heavily on fourth toe lamellae and MBS as well as TD, ED, and PVS. The third principal component differentiates between *S. beyeri* and remaining Group I *Sphenomorphus.* This component loads primarily on fourth toe lamellae, PVS, and TD. Together, the first three principal components account for 85.7% of the variation (PC I, 55.0%; PC II, 16.7%; PC III, 14%).

In the PC analysis based on the log transformed data (Fig. 1c, d), principal component one and two discriminate between *S.* n. sp. and *S. diwata,* while principal components two and three discriminate between *S. diwata* and *S. beyeri.* Principal component three also discriminates between *S. beyeri* and the new species. The first four principal components account for 91.6% of the variation (56.4, 16.8, 13.2, and 5.2, respectively). Factor loadings along the first prin-

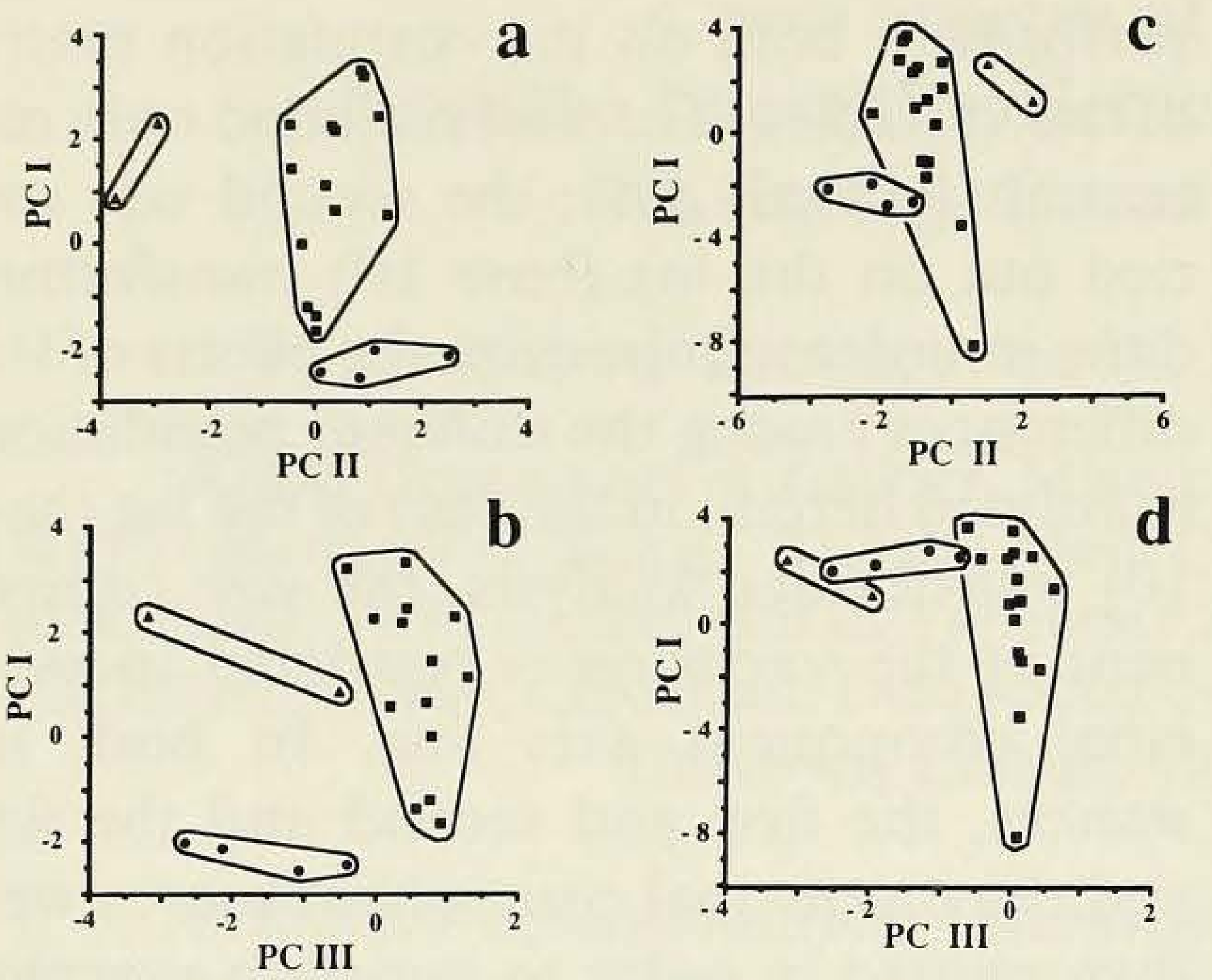

Fig. 1. Plots of principal component scores for two species of Group I *Sphenomorphus* and the new species examined in this study. Component I versus component II (a); component I versus component III (b); component I versus component III for log (base 10) transformed data (c); component I versus component III for log (base 10) transformed data (d). Symbols are: squares = *S. beyeri*; triangles = *S. diwata*; circles = *S. knollmanae*, new species.

cipal component are relatively homogeneous, indicating that the size variation generally has been isolated to this component, while shape is more important among remaining principal components. High loadings in principal component two are shown in discrete characters (scale row counts). An additional PC analysis carried out on the correlation matrix of the log (base 10) transformed variables but using only measurements (not shown), indicates that tympanum and eye diameters were the heaviest contributors to the variation in PC axes two and three.

An important point to make regarding these analyses concerns the orientation of the principal component axes of each putative species group's dispersion in multivariate space. Orthogonal orientation of the axes in multivariate space has been interpreted as indicative of differing allometric growth patterns (Voss et al. 1990, Voss & Marcus 1992); a corollary of the foregoing is that different orientations of the principal component axes are thereby good evidence of distinct specific status. In the case of the analyses of the populations of *Sphenomorphus* examined herein, it is quite clear that the orientation of the axes of dispersion are quite distinct both in analyses based on raw data as well as log (base 10) transformed data. This particular distinction is especially severe between *S. beyeri* and remaining *Sphenomorphus* examined and is clearly observed in the raw data plots, but more significantly in the log (base 10) transformed data, which minimizes the contribution of size to principal component axis one.

In view of the quantum separation in allometric growth patterns, as well as morphology between the Mt. Isarog *Sphenomorphus, S. beyeri,* and *S. diwata* in both multivariate (PCA) and univariate analyses (ANOVA) of discrete and continuously varying characters, we describe the series from Mt. Isarog as:

Sphenomorphus knollmanae, new species
Figs. 2, 3

Holotype.—PNM 2311 (formerly USNM 318342), adult male, collected by L. R. Heaney on 1 May 1988, in loose leaf litter alongside a fallen, partially decomposed log on the forest floor in primary mid montane forest at 1125 m on Mt. Isarog (Philippines, S. Luzon, Bicol Peninsula, Camarines Sur Prov.), 4.5 km N, 20.5 km E Naga City, 13°40′N, 123°22′E (map: fig. 1 in Goodman & Gonzales 1990).

Paratypes.—(4) USNM 318341 (female) and 318343 (juvenile), same data as above except as follows: USNM 318341, collected by L. R. Heaney on 29 Apr 1988; USNM 318343, collected by S. M. Goodman, 22 Mar 1988. USNM 318344 and CAS 191800 (formerly USNM 318345) collected by S. M. Goodman, 19 Mar 1988, and by R. C. B. Utzurrum on 20 Mar 1988 respectively, at 4 km N, 21 km E Naga City, 13°40′N, 123°22′E, at 1350 m in primary upper montane forest. All specimens collected in loose leaf litter and loose topsoil on forest floor; USNM 318344 and CAS 191800 associated with fallen, partially decomposed logs on forest floor.

Etymology.—Named in honor of the late Margy Knollman, friend and teacher, who guided the senior author through his first scientific experiment at age seven and continued to encourage his herpetological pursuits until the time of her death in November 1989.

Diagnosis.—A small to moderate species of *Sphenomorphus* (SVL, 47.5–51.0 mm) differing from its congeners by a combination of the following characteristics: frontoparietals fused; prefontals separate, in contact, or with azygous interprefrontal; 73 to 83 paravertebrals; 34 to 39 scales around midbody; 17 to 20 subdigital fourth toe lamellae; unique coloration (see below).

Description of holotype.—(PNM 2311) Total Length, 118.7 mm; SVL, 48.7 mm; TL, 70.0 mm; HL, 11.1 mm; SL, 3.9 mm; HB, 7.1 mm; ED, 3.1 mm; lower eyelid scaly with translucent window, oval in shape, arranged horizontally; ear opening and tympanum exposed, not deeply sunken, vertically oval, 1.2 mm in width; ear opening without spines or lobules; limbs pentadactyl, well developed; HLL, 18.3 mm; AGD, 22.7 mm; head (viewed from above) tapered, snout rounded dorsally and laterally; dorsal, lateral, and ventral scales smooth, unstriated; rostral large, visible from above, broader (1.8 mm) than long (0.7 mm), forming a curved suture with frontonasal; latter wider (1.5 mm) than long (1.1 mm); prefrontals in broad contact; frontoparietals fused (2.8 mm wide, 1.8 mm long) frontal moderate, rhomboidal, pointed caudally, 1.9 mm wide, 3.0 mm long, in contact with two supraoculars; interparietal moderate, pointed, 1.3 mm wide, 1.9 mm long; parietals in contact behind interparietal; nasals large and single with round nostril at centers, widely separated by frontonasal and nasal bordered caudally by two pairs of overlapping loreals, dorsal pair slightly larger than ventral; 3—3 large preoculars, most ventral contacts suture between third and fourth labial; 4—4

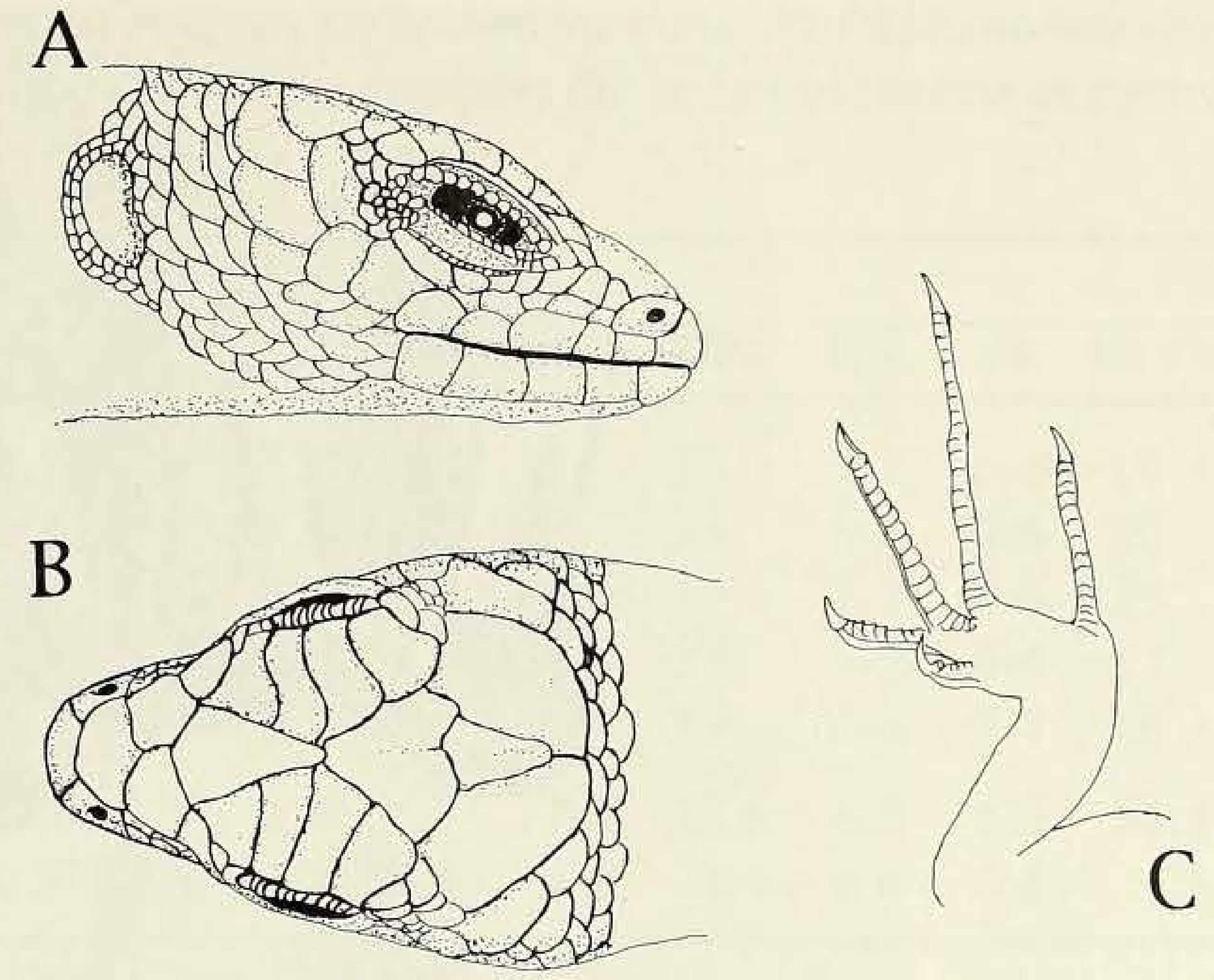

Fig. 2. *Sphenomorphus knollmanae* holotype (PNM 2311)—Lateral (A), and dorsal (B) head scalation and subdigital lamellae, right hind foot (C).

large supraoculars, anteriormost triangular, second widest; last supraocular followed by 3 rows of small scales clustered in postocular region, each row containing 2–3 scales; 3—3 temporals, dorsalmost wraps one-fourth of way around posterior edge of parietal scales; nuchals undifferentiated, except for most lateral pair which is very slightly enlarged; 2—2 rows of small scales between eye and labials; 12—12 supraciliaries; 15—16 lower ciliaries; 6—6 supralabials; 6—6 infralabials; 73 paravertebrals; 34 midbody scales; 20 subdigital fourth toe lamellae; 5 first finger lamellae; toe length (shortest to longest) 4, 3, 2, 5, 1; two strongly enlarged preanal scales apparent; mental chin scale followed by single postmental bordered caudally by two pairs of chin shields; subcaudals only slightly larger than ventrals. The holotype had a live weight of 3.0 g. Body size proportions and coloration discussed below.

Coloration.—Field notes recorded by R. C. B. Utzurrum (courtesy L. R. Heaney, Field Museum of Natural History) state that in life CAS 191800 had a "golden venter, dark brown dorsum, mottled on sides." In alcohol, dorsal surfaces very dark brown with black spots and a darkly pigmented (=2–3 scale rows) black mid-vertebral line. Mid-vertebral line darkest on CAS 191800,

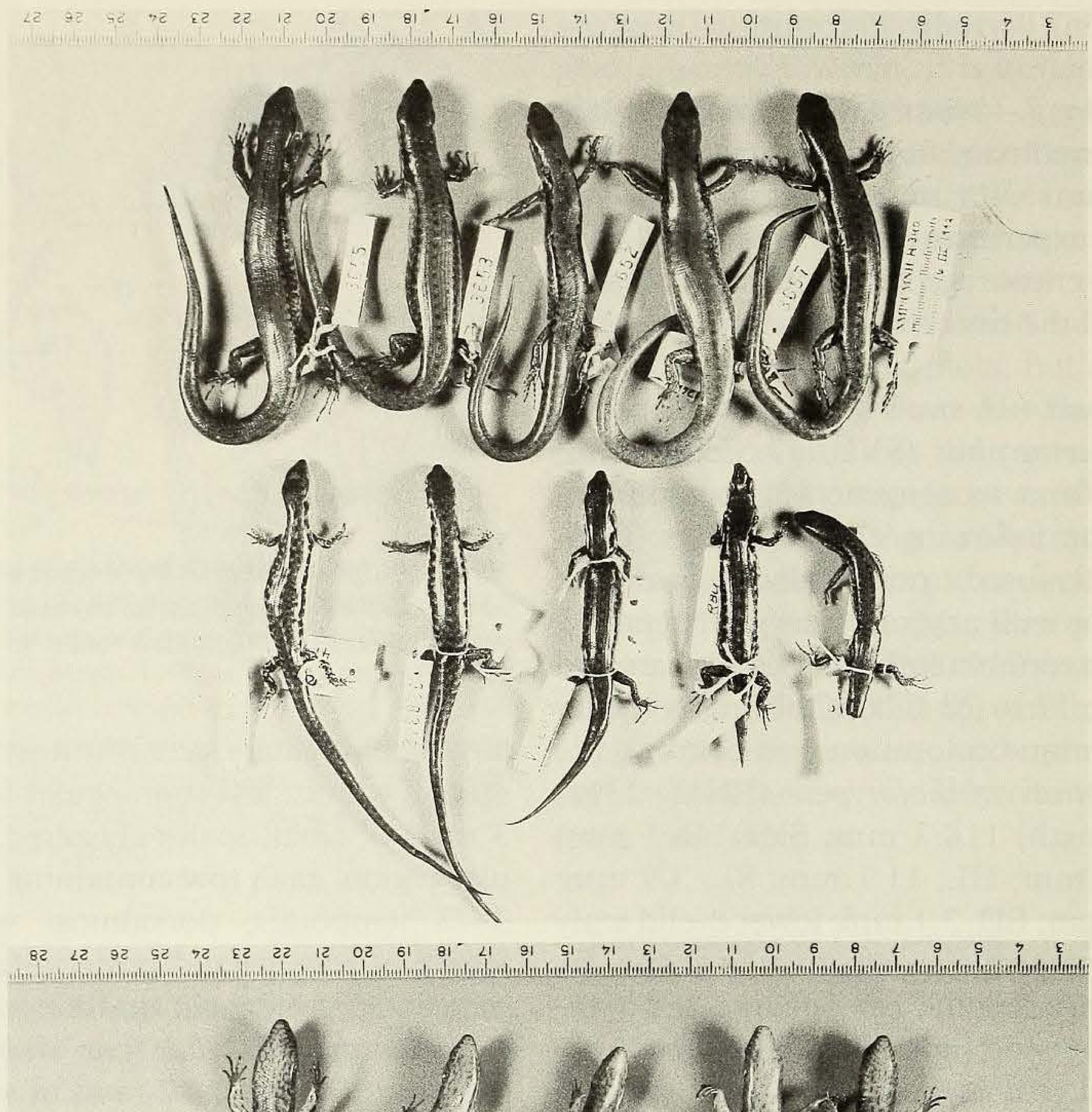

Fig. 3. Dorsal (top) and ventral (bottom) views of the type series of *Sphenomorphus knollmanae* placed underneath five specimens of *S. beyeri* for comparison.

Table 1.—Morphological measurements and scale counts taken from all known specimens of *Sphenomorphus knollmanae* (see text for abbreviations of characters). Standard univariate statistics are presented below as means ± one standard deviation (sexually mature specimens only).

		Character													
Specimen #	Sex	SVL	TL	AGD	HLL	HL	HB	SL	ED	TD	PVS	MBS	SUL	IFL	4th Toe
USNM 318342	f	49.8	71.5	24.9	18.5	10.0	6.2	3.6	2.5	1.2	76	39	7-7	6-6	19
PNM 2311[a]	m	48.7	70.0	22.7	18.3	11.1	7.1	3.9	3.1	1.2	73	34	6-6	6-6	20
USNM 318343	?	47.5	8.3[b]	24.8	15.9	10.0	6.0	3.5	2.5	1.2	83	39	7-7	6-6	19
USNM 318344	f	51.0	41.4[b]	26.5	17.2	10.0	6.4	3.5	2.7	1.4	76	37	7-7	6-6	17
CAS 191800	f	50.4	8.5[b]	28.7	18.3	11.0	6.4	3.2	2.7	1.8	76	35	6-6	7-7	18
Mean		49.1	–	25.3	18.4	10.5	6.6	3.5	2.7	1.3	77.0	36.5	6.5	6.3	18.5
SD		1.3	–	2.5	0.1	0.6	0.5	0.3	0.2	0.3	4.2	2.4	0.6	0.5	1.3

[a] Holotype.
[b] Tail autotomized and partially regenerated.

but also heavy on PNM 231 and USNM 318341, somewhat lighter (1–2 scale rows) on USNM 318343 and 318344. Mid-vertebral line ending abruptly at pectoral girdle where dorsal mottling coalesces into transverse bars that fade caudally (this pattern not apparent in USNM 318343). Laterally, with a heavy series of black blotches, forming a solid stripe in canthal region, and extending posteriorly from nostril, through eye and typanum, to groin. Lateral black stripe anteriorly bordered ventrally by a distinct white line intersecting the tympanum at one-half its height and extending from caudal edge of eye to region dorsal to forearm. Lateral white line on midsection breaking up into series of white spots that continue caudally through anterior one-third length of tail. Ventral surfaces in complete specimens pale yellow from chin to tip of tail (USNM 318344 has a regenerated tail that is completely black; USNM 318343 and CAS 191800, with autotomized tails). Throat pale yellow with dark umber flecks (darkest on CAS 191800 and almost invisible on holotype and USNM 318341). In specimens with heavy speckling, pattern wraps around onto lateral portions of neck, extending to approximately one-half the height of the tympanum.

Variation.—Our sample includes one male, three females and a sexually undetermined juvenile. USNM 31834 and CAS 191800 both were gravid at the time of preservation, each containing two thinly-shelled eggs. USNM 318341 may have been gravid when preserved (remnants of what appear to be eggs remain), but some breakdown of the ovaries has occurred. Table 1 contains morphological measurements of the five specimens of *S. knollmanae* and characters and measurements differing from holotype description follow below.

Variation in head scalation is as follows: rostral 1.5–2.2 ($\bar{X}$ = 1.8 ± 0.3 *SD*; n = 4) mm wide; frontonasal 1.5–1.8 (1.7 ± 0.1; n = 4) mm wide and 1.0–1.1 (1.1 ± 0.1; n = 4) mm long; frontoparietal 2.5–2.9 (2.7 ± 0.2; n = 4) mm wide and 1.7–2.1 (1.9 ± 0.1; n = 4) long; frontal 0.9–1.9 (1.5 ± 0.4; n = 4) mm wide and 1.5–3.0 (2.4 ± 0.67; n = 4) mm long; interparietal 1.1 to 1.4 (1.2 ± 0.1; n = 4) mm wide and 1.7 to 1.9 (1.8 ± 0.1) mm long. Prefrontals are in broad contact (three specimens) or separated by an azygous interprefrontal (one specimen), the latter somewhat wider anteriorly where contacts frontonasal; increasingly narrow caudally where its most caudal border extends slightly beyond margin delineated by contact between prefrontal and frontal. Supraciliaries 12–16 ($\bar{X}$ = 13.4 ± 1.5 *SD*; n = 5) on right and 12–15 (2.6 ± 1.3; n = 5) on left; lower ciliaries, 5–18 (16.2 ± 1.1; n =

Table 2.—Comparisons of selected measurements and scale counts for *Sphenomorphus knollmanae* and two closely related congeners. Presented below are standard univariate statistics (means ± one standard deviation, sexually mature specimens only) and results of Student-Newman-Keuls multiple range tests. Superscript letter by means indicates group assignment (means with same letter are not statistically different at the $P > 0.05$ level). See text for definitions of abbreviations used in this table.

		Character													
		SVL	TL	AGD	HLL	HL	HB	SL	ED	TD	PVS	MBS	SUL	IFL	4th Toe
S. knollmanae	$\bar{X}$	49.1^{a}	—	25.3^{a}	18.4^{a}	10.5^{b}	6.6^{a}	3.5^{a}	2.7^{a}	1.3^{b}	77.0^{b}	36.5^{b}	6.5	6.3	18.5^{b}
n = 4	*SD*	1.3	—	2.5	0.1	0.6	0.5	0.3	0.2	0.3	4.2	2.4	0.6	0.5	1.3
S. beyeri	$\bar{X}$	58.9^{a}	—	30.2^{a}	22.3^{a}	12.5^{ab}	8.2^{a}	4.2^{a}	2.7^{a}	1.5^{b}	91.3^{a}	39.5^{a}	6.5	6.4	20.3^{a}
n = 14	*SD*	6.1	—	3.6	2.0	1.1	0.9	0.4	0.3	0.2	1.7	1.2	0.8	1.3	0.8
S. diwata	$\bar{X}$	54.7^{a}	—	25.6^{a}	24.2^{a}	13.3^{a}	7.9^{a}	4.3^{a}	2.6^{a}	2.6^{a}	92.0^{a}	41.5^{a}	55.5	5.5	13.5^{c}
n = 2	*SD*	4.7	—	5.4	8.6	0.4	0.6	0.6	0.6	0.8	1.4	2.1	0.6	0.5	0.7

5) on right and 14–17 (16.0 ± 1.2; *n* = 5) on left; supralabials 6–7 (6.6 ± 0.5; *n* = 5); infralabials 6–7 (6.2 ± 0.4; *n* = 5) on right and 5–6 (5.8 ± 0.4; *n* = 5) on left.

In specimens with regenerated tails (USNM 318343 and CAS 191800), normal subcaudals replaced by a series of narrow scales that cover entire ventral surface of regenerated tail. Besides holotype, only CAS 191800 was weighed before preservation (3.4 g).

Ratios of morphological measurements for the series (holotype in parentheses) are as follows: SL/HL, $\bar{X} = 0.34 \pm 0.03$, range = 0.29–0.36 (0.35); SL/HB, $\bar{X} = 0.55 \pm 0.03$, range = 0.50–0.58 (0.55); HB/HL, $\bar{X} = 0.61 \pm 0.03$, range = 0.60–0.64 (0.64); HB/SVL, $\bar{X} = 0.13 \pm 0.01$, range = 0.12–0.15 (0.15); HL/SVL, $\bar{X} = 0.21 \pm 0.01$, range = 0.20–0.23 (0.23); ED/SL, $\bar{X} = 0.77 \pm 0.06$, range = 0.71–0.84 (0.77); ED/HB, $\bar{X} = 0.42 \pm 0.01$, range = 0.41–0.44 (0.41); AGD/SVL, $\bar{X} = 0.52 \pm 0.04$, range = 0.47–0.57 (0.47); HLL/SVL, $\bar{X} = 0.36 \pm 0.02$, range = 0.34–0.38 (0.37).

Comparisons.—Table 2 compares *S. knollmanae* with Group I *Sphenomorphus* species. Excepting its low number of paravertebrals, *S. knollmanae* adheres to the gestalt of Group I *Sphenomorphus* members (Brown & Alcala 1980); accordingly, the new species appears closely related to *S. beyeri* and *S. diwata*. Besides size and characters listed in Table 2 of this study, *S. knollmanae* differs from the former by coloration and disposition of color pattern (Brown et al. 1995). It differs from the latter by characters in Table 2 and also in that it invariably has only 4 supraoculars (vs. 5–6 in *S. diwata*) and fused frontoparietals (vs. 2 in *S. diwata*; Brown & Rabor 1967, Brown & Alcala 1980). As in *S. beyeri* (Brown et al. 1995) contact, or lack thereof, between the prefrontal scales is not fixed in this species as it is in *S. diwata* (Brown & Alcala 1980). The azygous interprefrontal scale exhibited by USNM 318344 also is apparent in some specimens of *S. beyeri* (Brown et al. 1995), but not in any known specimens of *S. diwata* (Brown & Rabor 1967, Brown & Alcala 1980).

The low number of paravertebrals in *S. knollmanae* assigns this species to Group III of Brown & Alcala's (1980) key; accordingly, comparisons with *S. leucospilos* and *S. laterimaculatus,* as well as *S. decipiens,* are warranted. Differences between *S. knollmanae. S. leucospilos,* and *S. decipiens* are as follows: *Sphenomorphus knollmanae* distinct by its 73–83 paravertebrals (vs. 63–68 in *S. leucospilos* and 57–66 in *S. decipiens*), 34–39 scales around midbody (vs. 32 in *S. leucospilos* and 32–38 in *S. decipiens*), and 17–20 fourth toe lamellae (vs. 14–18 in *S. decipiens*). *Sphenomorphus decipiens* also has a smaller overall body size

(SVL = 31–45 mm; Brown & Alcala 1980) than *S. knollmanae.* Differences in color pattern and body proportions between these three species also are apparent (Brown & Alcala 1980).

Body measurements and scale counts of the single known *S. laterimaculatus* specimen are very close to the range of variation of both *S. leucospilos* and *S. knollmanae* (see Brown et al. 1995). While the range of paravertebrals and midbody scales in *S. knollmanae* do not overlap with *S. laterimaculatus* (73–83 vs. 72 and 34–39 vs. 40 respectively), the small number of known *S. laterimaculatus* specimens (n = 1) precludes classification based solely on these characters. However, others are apparent: Brown & Alcala (1980) describe the frontoparietal of *S. laterimaculatus* as "long and pointed, almost as long as frontoparietals and interparietal together" (1980:178), a description which does not accord with the relative size of these scales in *S. knollmanae,* especially since the frontal of *S. laterimaculatus* touches three supraoculars, whereas the frontals of *S. knollmanae* only contact two supraoculars. In addition, the holotype of *S. laterimaculatus* has eight infralabials and all specimens of *S. knollmanae* have six or seven. There are six or seven first finger subdigital lamellae in *S. laterimaculatus* and five to six in *S. knollmanae.* Coloration and body proportion differences between these species are also apparent (see Brown & Alcala 1980).

Discussion

At the present time, the new species is only known from the type locality on Mt. Isarog (fig. 1 in Goodman & Gonzales 1990). Detailed habitat descriptions (see Brown 1919, and Whitmore 1984 for review of forest classifications), habitat photographs, and a map of the type locality for *S. knollmanae* are included in Goodman & Gonzales (1990).

Very little is known about the habitat and ecology of *S. knollmanae* and its closely-related congeners, *S. beyeri, S. diwata, S. laterimaculatus, S. decipiens,* and *S. leucospilos.* Excepting *S. decipiens* and *S. diwata,* all are known only from the Luzon faunal region; excepting *S. decipiens,* all are known only from small series. Taylor (1922) reported that the *S. beyeri* holotype from Mt. Banahao was collected on a rock ledge at 1500 m, but we collected most of our specimens from the Zambales Mountains by splitting open rotten logs, in pitfall traps, or under leaf litter—at high elevations (1265–1610 m; Brown et al. 1995). Brown & Alcala (1980) reported that *S. diwata* were found under leaf litter between 1600 and 1700 m on Mt. Hilong-hilong, northern Mindanao (see Brown & Rabor 1967). *Sphenomorphus decipiens* is also semi-fossorial at low to medium elevations (100–1200 m; Brown & Alcala 1980). The known specimens of *S. knollmanae* were taken from similar semi-fossorial environments on the forest floor on Mt. Isarog. All were captured by L. H. Heaney, A. Alcala, and coworkers (under leaf litter, in loose topsoil, occasionally beside rotten logs), while digging for worms to be used as bait for mammal traps. No habitat data are available for *S. laterimaculatus* and *S. leucospilos* (Brown & Alcala 1980).

Studies of high elevation scincids and their habitats have been sorely lacking, with the exception of a few instances (Brown & Alcala 1961a, Custudio 1986). The effects of altitudinal gradients on species richness, abundance, diversity, and distributional patterns have been addressed to a greater extent in birds (Goodman & Gonzales 1990) and mammals (Heaney et al. 1989, Rickart et al. 1991). Efforts to provide a preliminary report of altitudinal effects on scincid lizard distribution in the Philippines currently are under way. While mountain tops have been neglected by many collectors and surveyors in the past, a recent renewal of interest in their unique flora and fauna has produced discoveries (e.g., Gonzales & Kennedy 1990, Lazell 1992, Ross & Gonzales 1992) and rediscoveries (e.g., Ross & Lazell 1990; Brown et al. 1995; Crombie, pers. comm.) of many taxa endemic to the Philippines.

The works of Goodman & Gonzales (1990) and Oliver et al. (1992) have both stressed the importance of continued study of montane regions in order to fuel conservation efforts aimed at preserving these fragile centers of endemism and diversity (see Balate et al. 1992, for a bibliography of conservation in the Philippines). We support their invocations to public awareness with respect to this central issue of Philippine conservation given that we repeatedly have witnessed and participated in discoveries of endemic animals new to science which inhabit extremely limited distributions at high elevations in disappearing fragments of pristine habitat. The loss of such habitat can and often does have effects detrimental to populations of amphibians and reptiles restricted to the immediate area (pers. obs.).

Finally, while we do not wish to engage in speculation (sensu Lazell 1992) of exactly what species may await biologists in similar environments on Philippine mountains, we do agree with Ross & Gonzales (1992) that the northern Philippines (especially the Luzon faunal zone) is zoogeographically complex and contains more centers of endemism than previously thought. Our recent studies suggest that the higher volcanic peaks of southern Luzon (Mt.'s Bulusan, Mayon, Labo, Banahao, Isarog, Samat, Natib, Cuadrado, Angilo and Maquiling) all warrant intensive, long-term survey efforts of the kind that have produced (and continue to produce) many new discoveries on their neighbors.

Comparative material examined.—*Sphenomorphus beyeri* holotype, CAS 61183; *S. beyeri,* PNM 2300-2307, CMNH 3652-3655, 3657-3659, USNM 337768. *S. diwata* holotype (CAS 2478), *S. diwata* (CAS 133514 and 133515).

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