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THREE NEW SKINKS RELATED TO *Sphenomorphus variegatus* (PETERS)

ROBERT F. INGER

CURATOR, DIVISION OF REPTILES AND AMPHIBIANS

Availability of a syntype of *Lygosoma (Hinulia) variegatum* Peters and seventeen other specimens from Mindanao, the type locality, permits clarification of the relation of these Philippine lizards to populations from Borneo and New Guinea that have been identified as *variegatus*. Boulenger (1887) included Borneo, Timor, the Moluccas, and New Guinea in the range of *variegatus* and later (1897) added Celebes. De Rooij (1915) followed Boulenger and listed many localities outside the Philippines.

One of the diagnostic features of *variegatus* is a large black spot on the side of the neck about five scale rows deep and extending from behind the upper corner of the tympanum to above the insertion of the arm (fig. 41). This spot occurs in all of the Philippine specimens at hand (20), varying only slightly in length. A black streak, not quite as deep, extends forward from the upper corner of the tympanum to the eye. The lips are barred with black, the white interspaces being wider than the bars. Otherwise the head is a uniform dark brown laterally and dorsally. The body ground color above is dark brown, with small black squarish spots arranged in a paravertebral row and, in some individuals, in a dorsolateral row. Small light spots are usually present in these same rows and are especially conspicuous at the upper border of the large spot on the neck. Ventrally these Philippine skinks are immaculate cream-colored.

As comparison with the descriptions of coloration in the Bornean (pp. 259 and 262) and Papuan samples (p. 264) will show, the pattern of *variegatus* is quite distinct. Papuan lizards have a narrower black stripe on the neck, which is continued forward to the nostril and commonly backward to the groin, but they have no bars on the lips. The Bornean skinks lack the large black cervical spot; those from northeastern Borneo have heavier labial bars, whereas those from northwestern and western Borneo usually lack labial bars.

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In certain scale counts also (see Table 1), *variegatus* differs from the other populations. The number of infradigital scales is larger and the supraciliary count smaller than in the Bornean populations. The Philippine lizards have fewer supralabials, supraciliaries, supraoculars, infradigitals, and ventral scales than the Papuan population.

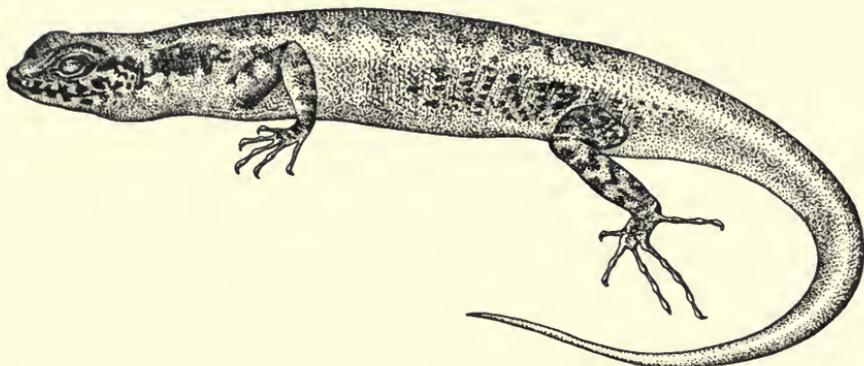


FIG. 41. *Sphenomorphus variegatus* (Peters). Syntype (CNHM 73842); snout-vent 57.0 mm.

These differences are of the order of magnitude associated with interspecific gaps in *Sphenomorphus*, so that the Bornean and Papuan lizards are described below as distinct species. As indicated above, two Bornean populations are involved, a northeastern and a western one. They are sufficiently distinct from one another to warrant specific recognition.

The following abbreviations are used: BM=British Museum (Natural History), CNHM=Chicago Natural History Museum, USNM=United States National Museum.

Sphenomorphus sabanus,¹ new species. Figures 42, 43.

Holotype.—Chicago Natural History Museum no. 63671. An adult male collected at the Sapagaya Forest Reserve, Sandakan District, North Borneo, on July 18, 1950, by Robert F. Inger.

Diagnosis.—A slender *Sphenomorphus*, with no auricular lobules; usually 6 supraoculars, 15–16 supraciliaries, 18–22 scales under fourth toe, 38–40 scale rows; no black spot on neck and no black lateral stripe. Males in life with an orange flush on flanks.

Description of holotype.—Habitus slender, limbs relatively long; tail thick at base; snout obtusely pointed, slightly longer than horizontal eye diameter; interorbital and lores concave; ear opening without lobules, vertically oval, depth slightly less than eye-nostril distance.

¹ From Sabah, an earlier name for North Borneo.

Rostral much wider than deep, broadly in contact with frontonasal; latter wider than frontal, pentagonal; prefrontals broadly in contact with each other, pentagonal, about two-thirds width of frontonasal; frontal longer than its distance from tip of snout, much narrowed posteriorly, in contact with first three supraoculars; 7

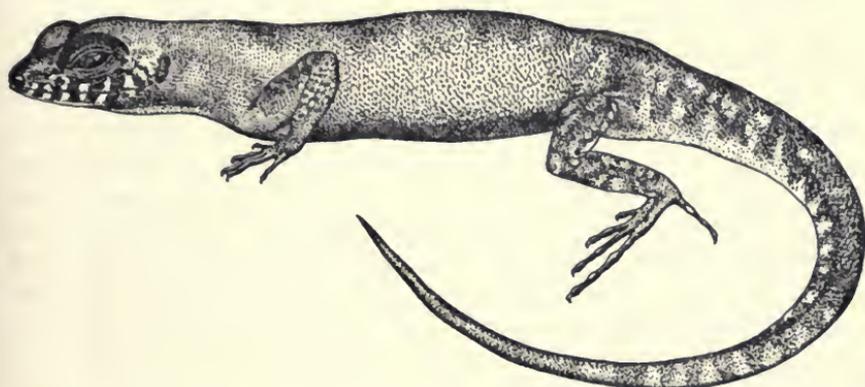


FIG. 42. *Sphenomorphus sabanus*, new species. Holotype (CNHM 63671); snout-vent 50.8 mm.

supraoculars, first largest; frontoparietals about two-thirds length of frontal, much longer than interparietal; parietals meeting behind interparietal; nostril pierced in a single nasal; no supranasal; 2 superimposed anterior loreals; 16 supraciliaries; 7 upper labials, fourth to sixth below eye, sixth largest; 6 infralabials; mental as wide as rostral; three pairs of chin shields, first pair in contact, others separated by gulars.

Scales of body smooth; in 40 rows around posterior third of body; dorsals and ventrals subequal, laterals smallest; 86 scales between mental and vent; 2 enlarged preanals, about half as long as longitudinal axis of anterior chin shield; scales under hand and foot obtusely keeled; 13 scales under fourth finger, 21 under fourth toe.

Color (in alcohol) above dark grayish brown with indistinct small darker areas on back; no dorsolateral black stripe or row of black spots; no black cervical spot; temporal region mottled with black; lips heavily barred with black, the whitish interspaces usually narrower than the bars; ventral surfaces immaculate cream-colored.

Measurements (mm.): snout-vent, 50.8; tail (largely regenerated), 73.0; head (to ear opening), 11.3; snout, 4.5; foot (to tip of fourth toe), 12.1.

Paratypes.—All from North Borneo. CNHM 14271–72 from Sandakan; CNHM 63667–70, 63672–74, 63676 from Sapagaya Forest Reserve, Sandakan District; CNHM 63675 from near mouth of Kretam Kechil River, Kinabatangan District; CNHM 76202–03 from Sepilok Forest Reserve, Sandakan District; CNHM 76204–16 from Deramakot, Kinabatangan District; CNHM 76217–21 from Kalabakan, Tawau District; CNHM 76222 from Brantian River Estate, Tawau District.

These samples, from scattered localities in eastern North Borneo, are very similar in coloration. In alcohol the ground color varies from brown to grayish brown, though in life they all appear dark gray. The black labial bars are wider than the interspaces in five-sixths of the lizards, equal to or narrower than the interspaces in the remainder. Adult males usually have an orange flush on each flank in life, but no other distinctive markings. In approximately one-fourth of the paratypes the frontonasal and frontal meet and thus separate the prefrontals. Variation in scale counts is given in Table 1. Snout-vent length in females varies from 47.5 to 58 mm. The two largest (54 and 58 mm.) contain two and three large (10–12 mm.) ova, respectively. The largest male is 51 mm., snout to vent.

Comparisons.—As indicated above, *sabanus* has wider labial bars than *variegatus* but lacks the latter's large black cervical spot. The dorsolateral stripe diagnostic of the Papuan lizards is also lacking. Statistically significant differences (at the 0.01 level) between *sabanus* and *variegatus* exist in the numbers of supraciliaries and of the scales under the fourth toe. Equally significant differences between *sabanus* and Papuan lizards described below are found in the numbers of supralabials, supraciliaries, and scales under the fourth toe (see Table 1).

Sphenomorphus sabanus, *S. multisquamatus* (described below), and *S. kinabaluensis* (Bartlett) are the only members of the genus (or subgenus of authors) in either Borneo or Sumatra having six or seven supraoculars; but *kinabaluensis* has only 15 to 17 scales under the fourth toe (18–22 in *sabanus*), and it has shorter limbs, the adpressed limbs barely overlapping, whereas in *sabanus* and *multisquamatus* the hind limb reaches the axilla at least.

Sphenomorphus sabanus differs from *multisquamatus* in coloration, the latter either lacking labial bars or, at most, having small checks on the labial sutures. The most significant color difference between the two forms involves the sexual color of the males. As already noted, males of *sabanus* in life have an orange area on each side,

whereas males of *multisquamatus*, described from life by Bartlett (1895), are blue on the throat and have no orange color laterally.

Differences between *sabanus* and *multisquamatus* in the number of scale rows around the posterior third of the body, the number of ventrals from the mental to the vent, and the number of supracili-

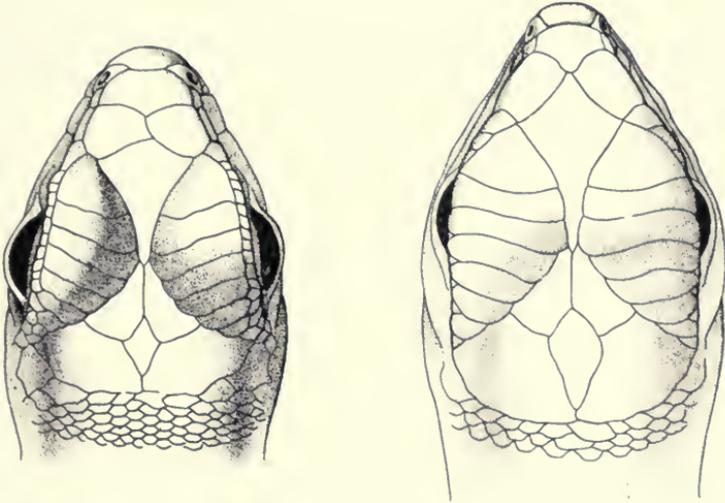


FIG. 43. Dorsal views of heads of *Sphenomorphus sabanus* (left) and *S. multisquamatus* (right).

aries (see Table 1) reach statistically significant levels (P equal to or less than .01).

These two Bornean forms are also differentiated by the shape of the tail, which is compressed distally in *multisquamatus* but circular in cross section in *sabanus*. Finally, the preanals are usually much shorter than the longitudinal axis of the anterior chin shield in *sabanus* but equal to or longer than the latter shield in *multisquamatus*.

***Sphenomorphus multisquamatus*, new species.** Figures 43, 44.

Holotype.—British Museum (Natural History) 1929.12.22.99. An adult male collected at Kiau (3000 feet), Mount Kina Balu, North Borneo, in April, 1929, by F. N. Chasen and H. M. Pendlebury.

Diagnosis.—A slender *Sphenomorphus* with no auricular lobules; 6 or 7 supraoculars, usually 14 or 15 supraciliaries, 18–22 scales under fourth toe, 40–46 scale rows; no black cervical spot; with or without black lateral stripe. Males in life bluish on throat and sides of neck.

Description of holotype.—Habitus slender; limbs relatively long, the adpressed hind limb reaching just beyond the shoulder; tail thick at base, tapering rapidly, strongly compressed; snout obtusely pointed, slightly longer than horizontal eye diameter; interorbital strongly concave, lores less so; ear opening without lobules, vertically oval, depth about half eye-nostril distance.

Rostral much wider than deep, broadly in contact with frontonasal; latter slightly narrower than frontal, hexagonal; prefrontals broadly in contact with each other, pentagonal, equal in width to frontonasal; frontal longer than its distance from tip of snout, much narrowed posteriorly, in contact with first three supraoculars; 7 supraoculars, first largest, last smallest; frontoparietals slightly longer than half frontal length, equal in length to interparietal; parietals separated by a small azygous scale behind the interparietal; nostril pierced in a single nasal; no supranasal; 2 superimposed anterior loreals, the upper arching over the nasal to a point above the nostril; 14 supraciliaries; 7 upper labials, fourth to sixth below eye, fifth and sixth largest; 6 infralabials; mental as wide as rostral; three pairs of chin shields, first pair in contact, others separated by gulars.

Scales of body smooth, in 42 rows around posterior third of body; dorsals and ventrals subequal, laterals smallest; 96 scales between mental and vent; 2 enlarged preanals, equal to longitudinal axis of anterior chin shield; scales under hand and foot rounded, several with a large pore; 13 scales under fourth finger, 19 under fourth toe.

Color (in alcohol) above dark grayish brown with four rows of squarish black spots; sides with obscure dark mottling; no black cervical spot; temporal region and lips mottled with black; sides of neck and throat with bluish cast; ventral surfaces otherwise immaculate whitish.

Measurements (mm.): snout-vent 60.0; tail (largely regenerated) 65.8; head (to ear opening) 13.8; snout 5.9; foot (to tip of fourth toe) 14.4.

Paratypes.—CNHM 78391 from Kiau, Mount Kina Balu, North Borneo; USNM 130235 from Bundu Tuhan, Mount Kina Balu, North Borneo; BM 93.3.6.42–43 from Sarawak River, First Division, Sarawak; BM 92.10.7.6 from Mount Dulit and BM 1904.7.19.50–51 from Balingian, Third Division, Sarawak; BM 95.2.28.13–14, 95.2.28.16, CNHM 78392 from “Sarawak.”

These paratypes do not form as homogeneous a lot as do those of *sabanus*. The depth of the tympanum varies from one-half to two-thirds of the eye-nostril distance and the frontonasal may be nar-

rower or wider than the frontal. Only in the holotype are the parietals separated. Four from Balingian and the Sarawak River have small dark checks on the labial sutures.

The four from the general locality "Sarawak" have fewer scale rows (40-41) and ventrals (80-95) than the others (scale rows 42-47,

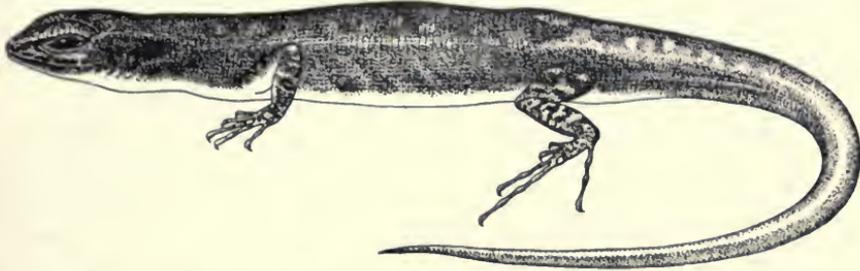


FIG. 44. *Sphenomorphus multisquamatus*, new species. Paratype (CNHM 78391); snout-vent 60.0 mm.

ventrals 92-101), and the two males have deeper-toned and more extensive bluish areas than does the holotype.

The eleven adults seen vary from 56.2 to 68.5 mm. snout to vent. Three mature males included in the sample measure 60.6-63.5 mm.

Scale counts are summarized in Table 1.

Remarks.—This species is the one referred to by Smith (1931, p. 24) as *variegatus*, and, in fact, he had examined most of the specimens listed above. However, one of the British Museum specimens assigned to *variegatus* by Boulenger (1887) and Smith, a lizard with the locality "Borneo" and collected by Dillwyn, cannot be identified with assurance. Its counts (ventrals 82, scale rows 38) agree with *sabanus* but like *multisquamatus* it lacks labial bars; tentatively I identify it as *sabanus*.

A second British Museum lizard (no. 1935.11.5.10), from Mount Penrissen, Sarawak, has the scale counts (ventrals 102, scale rows 44) of *multisquamatus* but has a conspicuous dark cervical stripe extending forward through the eye and a round tail. This specimen is provisionally identified as *multisquamatus*.

Comparisons.—*Sphenomorphus multisquamatus* differs from *kina-baluwensis*, with which it is sympatric in the Kina Balu region, in the same ways as does *sabanus* (see p. 260). Comparison with *sabanus* has already been made.

Sphenomorphus multisquamatus differs from both *variegatus* and *melanopleurus* in coloration, in the number of scale rows, in the num-

ber of ventrals, and in the number of scales under the fourth toe. It lacks the large cervical spot of *variegatus* and the loreal stripe of *melanopleurus*, whereas the last two forms evidently lack the blue masculine coloration of *multisquamatus*.

Sphenomorphus melanopleurus, new species. Figure 45.

Holotype.—Chicago Natural History Museum no. 78383. An adult male from Marienberg, Sepik River, New Guinea, collected by Walter A. Weber and Frank C. Wonder in May, 1929.

Diagnosis.—A slender *Sphenomorphus* with no auricular lobules; usually 7 supraoculars, 14–16 supraciliaries, 8 supralabials, 25–28 scales under fourth toe, 38–42 scale rows; a more or less continuous black dorsolateral stripe from snout to base of tail; lips not barred.

Description of holotype.—Habitus slender; limbs relatively long; tail thick at base, tapering rapidly; snout obtusely pointed, longer than horizontal eye diameter; interorbital weakly concave; lores vertical; ear opening without lobules, vertically oval, depth slightly less than eye-nostril distance.

Rostral much wider than deep, broadly in contact with frontonasal; latter wider than frontal, anterior and posterior borders roughly straight, parallel; prefrontals broadly in contact with each other, pentagonal, two-thirds width of frontonasal; frontal length once and a half times its distance from tip of snout, much narrowed posteriorly, in contact with first three supraoculars; 7 supraoculars, the first the largest; frontoparietals about half the length of frontal, shorter than interparietal; parietals meeting behind interparietal; nostril pierced in a single nasal; no supranasal; 2 superimposed anterior loreals; 15 supraciliaries; 8 supralabials, the fifth to seventh below the eye, the sixth and seventh the largest; 6 infralabials; mental as wide as rostral; three pairs of enlarged chin shields, the first pair in contact, the others separated by gulars.

Scales of body smooth; in 40 rows around body; dorsals and ventrals subequal; 84 ventrals between mental and vent; 2 enlarged preanals, each longer than the longitudinal axis of the anterior chin shields; scales under hand and foot obtusely keeled; 16 scales under fourth finger, 26 under fourth toe.

Color (in alcohol) above brown with a pair of paravertebral rows of black spots beginning on occiput; a black dorsolateral stripe, narrow on canthus, broadening to four scales on neck, and continuing on to base of tail; edges of stripe crenulated on trunk; lips faintly

mottled, but not barred; under side cream-colored, a dark brown spot at ventral border of arm insertion.

Measurements (mm.): snout-vent 44.6; tail ($\frac{3}{4}$ regenerated) 72.0; head (to ear opening) 10.1; snout 4.1; foot (to tip of fourth toe) 10.6.

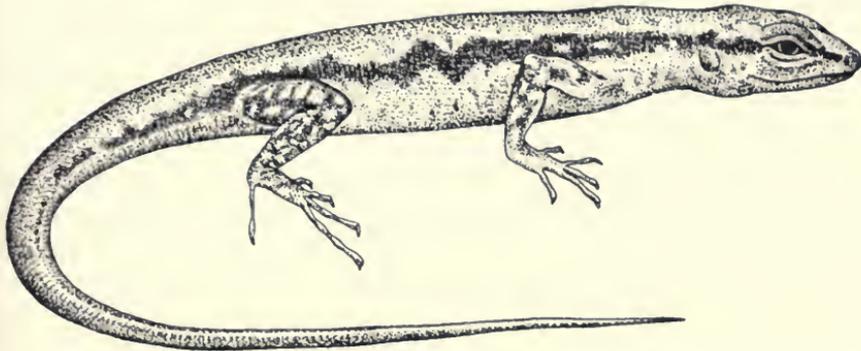


FIG. 45. *Sphenomorphus melanopleurus*, new species. Holotype (CNHM 78383); snout-vent 44.6 mm.

Paratypes.—All from New Guinea. CNHM 14160 (1), 15488 (41), and 15528 (12) from the type locality; CNHM 10879 from Lake Sentani, near Hollandia; CNHM 15502-05 from Manokwari; CNHM 43082, 43084-85, 43087-95 from Hollandia; CNHM 43102 from Doromena.

In many of the paratypes the black stripe is broken into a series of large oblong spots on the trunk and in a few individuals it is very faint or absent on the neck. In a very small proportion of this large sample, the stripe is represented only by a few black dorsolateral spots. All, however, have the characteristic dark spot at the ventral border of the axilla. About one-fifth of the specimens have a small azygous shield between the prefrontals, and about one-tenth have the prefrontals separated by the frontonasal. The frontoparietals are equal in length to the interparietal in one-fifth of the series, but shorter in the remainder. Variation in scale counts is summarized in Table 1.

Maximum size among the males is 46.9 mm., among the females 48.9 mm. Only two females (45.5 and 48.9) contain nearly mature ova.

Comparisons.—The figures used by de Rooij (1915, figs. 70 and 76) to illustrate *variegatus* are evidently based on Papuan material. At least it is certain that the specimen shown is not from the Philippines or from Borneo. The color pattern is quite distinct and two

elements illustrated are present in Papuan *melanopleurus* but not in *variegatus* or *sabanus*: (1) a dark loreal stripe and (2) no black labial bars. De Rooij's figure also shows the interparietal longer than the frontoparietals, another diagnostic character of the Papuan population.

In addition to these characters, *melanopleurus* differs from *sabanus* and *variegatus* in having larger preanals (longer than anterior chin shields, as compared to shorter in *variegatus* and *sabanus*), and it differs from those species and *multisquamatus* in the scale counts referred to on preceding pages (see also Table 1).

The presence of two superimposed anterior loreals, six or seven supraoculars, and 38 to 42 rows of scales around the body distinguish *melanopleurus* from all other Papuan *Sphenomorphus* except *simus* Sauvage, which is sharply differentiated by its keeled dorsal scales.

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Table 1.—Summary of Counts on Four Species of *Sphenomorphus*

	Supralabials							Infralabials						
	6	6/7	7	8	9	5	5/6	6	7	8	6	7	8	
<i>variegatus</i>			13				1	9	3					
<i>sabanus</i>	1	2	26		2			25	1					
<i>multisquamatus</i>	2		8	1	3			5	1					
<i>melanopleurus</i>			1	16	3			12	7	1				
	Supraoculars							Supraciliaries						
	6	6/7	7	7/8	8	11	12	13	14	15	16	17	Mean ±SE	
<i>variegatus</i>	13	2				1	2	5	2	3			13.31 ±0.35	
<i>sabanus</i>	23	2	5						1	6	8	5	15.85 ±0.20	
<i>multisquamatus</i>	6	5						1	2	4	2		14.78 ±0.32	
<i>melanopleurus</i>		1	17	3	1			4	3	10	3		14.60 ±0.22	
	Scale rows around body													
	37	38	39	40	41	42	43	44	45	46	47	Mean ±SE		
<i>variegatus</i>		3	3	1	3	2						38.83 ±0.44		
<i>sabanus</i>			8	1	13	1	2					39.52 ±0.25		
<i>multisquamatus</i>				3	1	2	1	1	1	1	1	42.73 ±0.75		
<i>melanopleurus</i>				3	7	2	1					39.85 ±0.34		

Table 1.—Summary of Counts on Four Species of *Sphenomorphus* (Continued)

	Scales under fourth toe																Mean ± SE				
	16	17	18	19	20	21	22	23	24	25	26	27	28	29							
<i>variegatus</i>						3	4	4		1	2	1				23.13 ± 0.51					
<i>sabanus</i>			8	5	6	7	4									19.80 ± 0.26					
<i>multisquamatus</i>	1	1	2	2	2	1	2									19.27 ± 0.59					
<i>melanopleurus</i>								1	1	7	4	3	5	2		26.30 ± 0.34					
Ventrals, mental to vent																					
under 79	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	over 97	
<i>variegatus</i>	2	1	1	3	2	3	1				1										81.93 ± 1.17
<i>sabanus</i>	1	2	2	1	5	2	2	2	1	2	1	1	1								84.17 ± 0.79
<i>multisquamatus</i>	1										1			3		1	2	1	1	1	93.00 ± 1.61
<i>melanopleurus</i>			1		2	2	1	2	3	2	3	2	2		1						87.05 ± 0.70



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