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NOTES ON TROPICAL *LAMPROPELTIS*¹

BY EMMETT REID DUNN

It is not surprising that considerable new material of the genus *Lampropeltis* should have turned up since Blanchard monographed it in 1921.² The fifteen intervening years have witnessed much herpetological activity. It is extremely creditable to the care and discernment of Blanchard that no serious alterations have been made in his arrangement of the genus. The present paper calls attention to some material not seen by him, but the alterations in his scheme are only minor ones.

1. After scrutiny of the facts presented by Stuart³ and after examination of the Guerrero, Mexico, specimens mentioned by him therein, I conclude that intergradation between *Lampropeltis triangulum nelsoni* and *L. polyzona* takes place and that therefore the latter should stand as *L. triangulum polyzona*.

2. The type specimen of *Lampropeltis micropholis* Cope 1860. *Proc. Acad. Nat. Sci. Phila.*, 12: 257. Panamá, Dr. John L. LeConte.

¹ Contributions from the Department of Biology, Haverford College, No. 29.

² Frank N. Blanchard, "A revision of the King Snakes: Genus *Lampropeltis*," *U. S. Nat. Mus. Bull.*, 114 (1921): 1-vi, 1-260, Figs. 1-78.

³ L. C. Stuart, "Studies on Neotropical Colubrinae. V. A New Snake of the Genus *Lampropeltis* from Yucatan," *Occ. Papers Mus. Zool. Univ. Mich.*, 309 (1935): 1-6.

Blanchard⁴ says of this specimen "originally at Acad. Nat. Sci. Philadelphia, now apparently lost." I believe, however, that the specimen which served Cope as the type of *micropholis* is still in the collection of the Academy under the number 3427, Panamá, Dr. Ruschenberger. A comparison of Cope's statements about the type of *micropholis* with Blanchard's data for A.N.S. 3427⁵ and with my own observations on A.N.S. 3427 follows.

The dorsal scales of the type are given by Cope as 21. No. 3427 has a maximum of 21 decreasing posteriorly to 19 and to 17 according to Blanchard and to me. No one in 1860 gave more than the maximum count. The ventrals are given by Cope as 219. Blanchard counts 221. I count 220. The caudals of the type were 43. Blanchard and I count 44 on 3427. Labials of the type were 7/9. Blanchard and I agree on 7/9 for 3427. Cope does not give ocular or temporal counts of the type. Blanchard and I count oculars of 3427 as 1-2. Blanchard gives the temporals of 3427 as 2-2-4 on the left, 1-3-4 on the right. I count 2-3-4 on the left, 1-3-4 on the right.

The length of the type was 16 inches 11 lines = approximately 16 $\frac{1}{2}$ inches = approximately 435 mm. Blanchard gives 443 mm. for 3427. The specimen is now somewhat soft and can be stretched. I get approximately 17 inches, or approximately 435 mm. Cope gives the tail of the type as 2 inches, which is exactly the length of the tail of 3427. Blanchard does not give the tail length of 3427 save as 11.7 per cent of the total length. From Cope's figures the type had the tail 11.8 per cent of the total length. I can arrive at anywhere from a percentage of 11.76 to 11.49 in computing this on 3427 as the body is soft and the tail in perfect condition.

Cope states that the type had a black neck collar, 10 paired black rings on the body, 2 on the tail, and a black tip. Blanchard says of 3427, "13 annuli." I find that 3427 has a black collar on the neck; 10 paired black rings on the body;

⁴ *Op. cit.*: 149.

⁵ *Ibid.*: 153.

a black ring at the anus; 2 broad black bands on the tail, the anterior obscurely divided by 3 rows of light (red ?), black spotted scales; tip of the tail black.

To sum up, Cope's description of the type fits 3427 just as well and even slightly better than Blanchard's description of 3427 fits 3427, since the former description is more detailed as to color characters. The locality is the same for the type as for 3427. The data as to Dr. John L. LeConte and Dr. Ruschenberger certainly differ, and it is not possible at present to elucidate this discrepancy. Possibly LeConte did the collecting and Ruschenberger the presenting. A great many Academy specimens obviously have the giver rather than the collector. The specimen has the sort of label with which earlier Academy types were usually provided.

I have had several years' experience in looking over the Academy collection for the types of salamanders, frogs, lizards, and snakes, checking even specimens specifically labelled "type" or "original of figure" with the original descriptions. It has been a disillusioning experience, but I have seldom encountered a specimen whose characters and data showed less discrepancy with the description. I therefore consider A.N.S. 3427 the type of *micropholis* Cope.

3. Blanchard saw 8 specimens of the genus from the area Nicaragua-Costa Rica-Panamá. I have seen the 4 he had from Nicaragua and 6 additional specimens, the 2 he had from Costa Rica and 14 additional specimens, the 2 he had from Panamá and 17 additional specimens. The material available at present (45 specimens) is over 5 times that available in 1921. I can thus assert that intergradation between *polyzona* and *micropholis* exists, and, indeed, takes place over a wide area. I can further describe a new race, characterized by melanistic adults and low dorsal scale count, occurring at higher altitudes in the mountains of Costa Rica and western Panamá, based on 7 specimens, none of which were available to Blanchard in 1921.

The differences between *polyzona* and *micropholis* as given by Blanchard are: *polyzona*, 2 anterior temporals; *micropholis*,

1; *polyzona*, caudals more than 49; *micropholis*, less than 49; *polyzona*, snout black with a light transverse bar on or near the prefrontals; *micropholis*, snout yellowish with transverse black spots. These are taken from the key,⁶ with the omission of the word "usually" from the statements of the last two characters in *polyzona*, and with the omission of the qualifying phrase "if two, the upper much the smaller" from the first character in *micropholis*.

In *polyzona*, in addition, there are:

Narrow annuli of white or yellow . . . $\frac{1}{2}$ to $1\frac{1}{2}$ scales in width . . . scales of the yellow rings may be uniform in color, but more often they are strongly tipped and mottled with black, and infrequently the latter color may almost obliterate the yellow. . . . The red rings, although not infrequently narrower, are usually wider than the groups of black and yellow rings that separate them.⁷

In *micropholis*:

The . . . white or yellow rings . . . are much widened . . . and . . . have each a conspicuous oval black spot at the distal end . . . the red ones are commonly about as wide as the black and yellow ones put together.⁸

These statements (even with the omission of Blanchard's qualifying phrases) do not indicate any great diversity between the forms in any pair of contrasted characters. The majority of Blanchard's *polyzona* came from Mexico (31 specimens), and the majority of his *micropholis* from Ecuador (16 specimens), and his characters, taken together, certainly serve to discriminate between the Mexican and Ecuadorian populations.

SNOUT BAR VERSUS SNOUT SPOTS

All Nicaraguan specimens seen have a light bar across the snout. Two Costa Rican specimens (neither with definite locality; A.M.N.H. 5917 and M.N.C.R.) have a coloration which is intermediate. All others from Costa Rica have a

⁶ *Ibid.*: 20.

⁷ *Ibid.*: 141.

⁸ *Ibid.*: 149-150.

bar, except 2 black adults from the mountains. Five Panamanian specimens have barred snouts; 2 from the mountains of western Panamá, 1 from the Panamá "sabanas," and 2 from "Isthmus of Panamá" in the British Museum. One western mountain specimen has a spotted snout, and 1 is completely black. Five more have spotted snouts; the type of *micropholis*, 1 from Madden Dam Road, United States National Museum 24499 from "Atlantic side of Isthmus of Darien," 1 from 1700 feet on the Pequeñi-Esperanza divide, and a specimen in the Collegio La Salle which probably came from the neighborhood of Panamá City. All specimens from south of Panamá seem to have spotted snouts.

In this character the Costa Rican population shows the first faint sign of southern tendencies, and the alteration takes place in the Panamanian population.

RELATIVE WIDTH OF BANDS

Blanchard, in the legend for a specimen of *micropholis* from Ecuador, states: "In Colombia the heavily spotted intervals [the white or yellow areas between the paired black bars] are narrower."⁹ This is also true for Central American specimens. The red areas are wider than the black-light-black areas except in a few Panamanian specimens. Thus the change here may be said to begin in Panamá, but reaches its full development only in the Eucadorian population.

Blanchard states:

The transition to *micropholis* is shown by a specimen from Panamá [the type of *micropholis*] and one from Darien, both of which have the yellow rings wider than in *polyzona* but decidedly narrower than Eucadorian examples of *micropholis*. These have the scales of the yellow rings strongly black-tipped but less so than is typical of the latter form.¹⁰

A 4-foot specimen from 1700 feet elevation, on the divide between the Pequeñi and the Esperanza, is unique in that the narrow light areas between the paired black rings are of the

⁹ *Ibid.*: Fig. 70.

¹⁰ *Ibid.*: 146.

same color as the wider light areas: red, each scale with a black spot.

ONE VERSUS TWO ANTERIOR TEMPORALS

Both characters occur in Mexico. The type of *polyzona* has 1 on one side and 2 on the other (exactly like the type of *micropholis*). A single Mexican specimen has 1 on both sides. Twenty-eight other Mexican specimens have 2 on both sides.

In Nicaragua 7 specimens all have 2 anterior temporals.

In Costa Rica 1 lowland specimen and 2 mountain specimens have 2 on both sides; 2 lowland and 1 mountain specimen have 1 on both sides; 6 without definite locality have 2 on both sides, 1 has 1 on both sides. The total number with 2 is 9; with 1, 4.

In Panamá 2 specimens (1700 feet, Pequeni-Esperanza divide, and Panamá "sabanas") have 2 on both sides. One specimen has 1 on one side and 2 on the other (type of *micropholis*). The rest (9), whether mountain or lowland, have 1 on both sides.

In Colombia only 1 specimen is definitely known to have 1 anterior temporal on both sides, the type of *formosa*. Two have been reported by Amaral with 1 on one side and 2 on the other. Two are reported by Blanchard and a third by Amaral with 2 on both sides. However, 4 reported by Amaral, without remarks, may reasonably be assumed to have had the supposedly normal 1 anterior temporal. Granting this assumption Colombian specimens would have 12 sides with 1 to 8 with 2. Actually known data give 4 sides with 1 to 8 with 2.

In Ecuador 1 specimen is known to have 1 on one side and 2 on the other, while 15 have 1 on both sides.

Differentiation in this character between Mexican and Ecuadorian populations is clear. The Costa Rican, Panamanian, and Colombian populations are quite intermediate. The populations of Mexico to Nicaragua inclusive are straight *polyzona*.

Blanchard says that *polyzona* has more than 49 caudals, *micropholis* less than 49. The figures given above show a gradual decrease in general average from Vera Cruz to Ecu-

SUBCAUDAL SCALES

			Average	Average	
Vera Cruz ..	16 ♂	49-61	52.20	27 Vera Cruz	50.85
	11 ♀	42-55	43.70		
Nicaragua ..	2 ♂	52-57	54.50	7 Nicaragua	52.85
	5 ♀	49-55	52.20		
Costa Rica ..	5 ♂	47-55	51.40	11 Costa Rica (range 43-55)	48.90
	4 ♀	45-51	46.80		
Panamá	4 ♂	43-51	47.75	8 Panamá	45.25
	4 ♀	40-45	42.75		
Colombia ...	3 ♂	47-51	49.00	8 Colombia	45.62
	5 ♀	42-47	43.60		
Ecuador	11 ♂	44-49	45.72	17 Ecuador	43.83
	6 ♀	40-46	42.33		

dor. The most marked change occurs between Costa Rica and Panamá. In males there is an increase of 2.2 caudals in Nicaragua, a decrease of 3.1 in Costa Rica, a decrease of 3.65 in Panamá, an increase of 1.34 in Colombia, and a decrease of 4.28 in Ecuador. In females there is an increase of 3.5 in Nicaragua, a decrease of 5.4 in Costa Rica, a decrease of 4.05 in Panamá, an increase of .85 in Colombia, a decrease of 1.27 in Ecuador. Obviously the Mexican and Ecuadorian populations are different, but change takes place gradually and male and female changes in caudal count are, on the whole, independent. In this character the populations of Costa Rica to Colombia, inclusive, must be considered intermediate.

Dorsal and ventral counts are not utilized by Blanchard in discriminating between *polyzona* and *micropholis*. None the less the data I have been able to assemble indicate some quite interesting and peculiar phenomena.

DORSAL SCALE ROWS

Specimens of Vera Cruz *polyzona* have 23 or 21 in equal numbers, but slightly over 58 per cent of the males have 21, and the same proportion of the females have 23. No males with 23 scale rows are known south of Costa Rica. Only two Panamanian specimens, one female and one not sexed, have 23. Colombian females have equally 23 or 21, while over 80 per

cent of Ecuadorian females have 21. There is thus an evident decrease southwards, which begins in Panamá but which is not fully expressed until Ecuador is reached.

There is a still more striking decrease with altitude in the mountains of Costa Rica and of western Panamá, since of 8 specimens from over 1000 meters, 1 male has 21, 1 male has 20, 2 males, 3 females, and a specimen not sexed have 19. Nineteen dorsal scale rows are otherwise known in Central American *Lampropeltis* in Yucatan (*blanchardi* Stuart). Aside from definite mountain specimens I have seen this count in a male and a Panamanian specimen not sexed, and in one male Costa Rican example, all of uncertain provenance. Furthermore, in most of the mountain specimens the scale rows are reduced posteriorly to 15, an extreme reduction otherwise not known in the area.

VENTRAL SCALES

			Average		Average
Vera Cruz ..	12 ♂	211-233	219.10	24 Vera Cruz	223.04
	12 ♀	213-236	224.10		
Nicaragua ..	2 ♂	223-231	227.00	7 Nicaragua	230.57
	4 ♀	228-234	231.50		
Costa Rica ..	3 ♂	223-227	224.60	5 Costa Rica	225.40
	2 ♀	223-230	226.50		
Panamá	5 ♂	215-231	223.80	10 Panamá	226.17
	5 ♀	221-231	228.55		
Colombia ...	4 ♂	218-227	221.75	9 Colombia	222.77
	5 ♀	217-230	223.60		
Ecuador	11 ♂	211-225	217.36	17 Ecuador	216.36
	6 ♀	211-216	213.80		

Here is evident the fact that the Ecuadorian population has fewer ventrals than the Vera Cruz population; further, that in Vera Cruz males have fewer ventrals than females, while in Ecuador they have more. There is a general increase of 7.53 in Nicaragua, a decrease of 5.17 in Costa Rica, an increase of .77 in Panamá, a decrease of 3.4 in Colombia, and a decrease of 6.41 in Ecuador. Ecuador has less than Vera Cruz by 6.68.

KEY TO SOUTHERN *LAMPROPELTIS*

- A. Dorsal scales rarely 19, almost always 21 or 23; adults ringed
- B. Dorsal scale rows 21 or 23 in both sexes; caudals average 48 or more (male average over 50, female over 45); usually two anterior temporals; light areas between black rings narrower; snout black with light crossbar. *polyzona*
- BB. Dorsal scale rows rarely 19, usually 21 in males, never 23 in males, 21 to 23 in females; caudals average 46 or less (male average under 50, female average under 44); usually one anterior temporal; light areas broader; snout spotted
 *micropholis*
- AA. Dorsal scale rows usually 19, rarely 21; adults black
 *gaigae*, n. subsp.

This key will identify all specimens from Ecuador as *micropholis*; all from Mexico to Nicaragua, inclusive, as *polyzona*. It will identify a majority of Colombian specimens as *micropholis*, a majority of lowland Panamanian as *micropholis*, a majority of lowland Costa Rican as *polyzona*, and a majority if not all specimens from the mountains of Costa Rica and Panamá as *gaigae*.

Lampropeltis triangulum gaigae, n. subsp.

TYPE.—Mus. Zool., Univ. Mich. No. 57967, collected by the Gaiges in 1923, ♂, total length, 1480 mm.; tail, 180 mm.

Type locality.—Boquete, Chiriqui, Panamá.

Range.—Mountains of western Panamá and of Costa Rica (Volcán Chiriqui to Volcán Barba), 3900–6500 feet.

DIAGNOSIS.—A *Lampropeltis triangulum* which is black when adult; scale rows usually 19–17–15.

DESCRIPTION.—Ventrals, 223–231 (type, 230); average of 6, 227.66; males, 223–230, average of 3, 225.66; females, 228–231, average of 3, 229.66. Caudals of males, 47, 51; of females, 45, 51. Dorsal scale rows 21–15 in 1 male; 20–17 in 1 male; 19 in 1 male, 1 female, and 1 not sexed; 19–15 in 1 male (the type) and 2 females. Anterior temporal 1 in the type and in 3 others; 2 in 2. The snout has a white crossbar in 1 young Costa Rican specimen and in 1 young Panamanian specimen. In another young Panamanian specimen the snout is spotted.

Specimens I have seen of 300 mm. and 480 mm. snout to vent length are brilliantly barred like their lowland relatives. A "halfgrown" specimen reported by Boulenger, but not seen by me, was likewise barred. One from Monte Redondo, 960 mm. snout to vent, has "whole colour pattern obscure," but the annuli can be made out. Specimens of 1010 mm. and over, snout to vent, are totally black. This form, and, indeed, all *Lampropeltis* from Nicaragua to Panamá, reaches a length of 6 feet.

MATERIAL.—Type and paratypes (seven specimens). Costa Rica: Barba, 1600 m. (MNCR); Monte Redondo (BMNH 94-11-15-12); Irazu (BMNH 94-1-17-14); Palomo, 1200 m. (Coll. San Luis Gonzaga). Panamá: El Volcán, 4000 feet (AMNH 49225); Boquete, 3800 feet (MZUM 57967, type); Quiel, above Boquete, approximately 6500 feet (MCZ 34282).

I have also utilized the data on a "halfgrown" female from Irazu given by Boulenger in the second volume of the *Catalogue of the Snakes in the British Museum*. The specimen has not been seen by me and is no longer in the British Museum.

A young specimen from Chiriqui may belong here (BMNH 93-2-21-19). It has 231 ventrals, 51 caudals (♂), 19-15 dorsal scales, 1 anterior temporal, a bar on the snout, body brilliantly marked, total length, 391 mm.; tail, 49.

Another young specimen from "probably Costa Rica" may also belong here (AMNH 5917). It has 227 ventrals, 49 caudals (♂), 19-17 dorsals, 1 anterior temporal, snout intermediate between bar and spots, body brilliantly ringed, total length, 390 mm., tail, 50 mm.

I should mention that I have seen a single very large specimen, without definite locality but probably Panamanian, which had a maximum of 19 dorsal scales and was brilliantly marked. If it were not for this I should feel more confident that specimens with 19 scale rows were confined to high altitudes. In the interests of accuracy I confine my description to undoubted mountain snakes.

Lampropeltis is extremely rare in lowland Panamá. I have received from Dr. H. C. Clark 4196 Panamanian snakes in the

last 4 years. This lot included only 3 *Lampropeltis*: 1 from Maddem Dam Road in a collection of 590 snakes from that area; 1 from Panamá "sabanas" in a collection of 667 snakes from that area; the third from 1700 feet on the Pequeni-Esperanza divide area in a small collection from many stations. None appeared in 2654 specimens from lowland Darien.

I wish to thank the authorities of the museums in which I have been allowed to examine material, and especially to thank Dr. L. C. Stuart and Mr. H. W. Parker for detailed information on certain specimens.