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A NEW SPECIES OF THE MICROHYLID FROG GENUS *CHIASMOCLEIS* FROM PANAMA

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We here describe a new species of frog from Panama and, in so doing, announce for the first time the presence of the microhylid genus *Chiasmocleis* in North America. We do this on the basis of 34 specimens, all from Old Panama, near sea level on the Pacific side of the isthmus, and some 5 miles from the present site of Panama City.

Dr. Bliss Shrapnel collected 27 of these specimens as long ago as 1936 and showed them to Dunn in that year. The specimens were all young (largest 16 mm. long), and Dunn was quite dubious as to their identity but thought they might be *Elachistocleis*, at that time the only microhylid recorded from Panama. These 27 specimens were variously dispersed (nine of them are A.N.S.P. Nos. 23789, 25001–25008), but all were in the hands of the senior author at the time of writing.

Trapido collected one specimen in August, 1944 (H. T. No. 5301), and five more on January 5, 1947 (H. T. Nos. 6361–6365). His first is 26 mm. long; the others are from 15–20 mm. long.

Evans collected one specimen February 5, 1946 (A.M.N.H. No. 52741). It is 19 mm. long. As the examination of this specimen by Dunn and Evans in the summer of 1946 brought up the subject for consideration, and as it has been drawn for publication, we make it the type of:

***Chiasmocleis panamensis*, new species**

TYPE: A.M.N.H. No. 52741, collected by Howard Evans.

TYPE LOCALITY: Old Panama, Republic of Panama.

RANGE: Known only from type locality.

DIAGNOSIS AND DEFINITION: A *Chiasmocleis* skeletally resembling *C. albopunctata* (the genotype), but in characters of fingers and in color resembling *C. boliviana*.

The authors have shared in the descriptions to follow. Evans has described his type specimen; Dunn has described the others. Trapido has provided color notes from life of the five taken by him in 1947.

No comments are available on the conditions under which Shrapnel got his specimens in 1936, but a fair notion of the habitat can be gained by the comments of Trapido for his 1944 specimen, found "...under a large stone..." and the additional note that he "turned stones" getting his 1947 specimens. Evans discovered the type "...amidst the old ruins in a grassy clearing, beneath a flat rock on moist soil."

DESCRIPTION OF TYPE SPECIMEN, A.M.N.H. No. 52741, BY HOWARD EVANS: The snout is acute, prominent, and once and a half as long as eye, with the canthus rostralis rounded and indistinct. The loreal region is slightly flattened, with the nostril much nearer to tip of snout than to the eye. The interorbital area is twice as broad as the length of the upper eyelid. The fingers are moderate and free, not dilated distally, and with three metacarpal pads. The subarticular tubercles are rounded and moderate, the first finger shortest, with one tubercle, the second slightly less than twice as long as the first, with one tubercle; third longest, with two tubercles; fourth slightly longer than second, with two tubercles. The toes are tapering and free, having no rudiment of webbing. A single rounded metatarsal tubercle is present near the base of the first toe. The subarticular tubercles are rounded and moderate. The first toe is shortest, with one tubercle, the second twice as long as the first, with one tubercle, the third twice as long as the second, with two tubercles, the fourth three times as long as the second, with three tubercles, the fifth slightly longer than the second, with two tubercles. The tibiotarsal articulation does not quite reach the tympanic region.

The skin is smooth above and below, with no postocular or occipital fold. A slight tympanic depression is present.

The color above is light brown, with a broad, irregular, dark, dorsal stripe with its apex commencing between the upper eyelids, narrowing slightly at the scapula, broadening again and then narrowing distinctly behind the scapula, from which it broadens

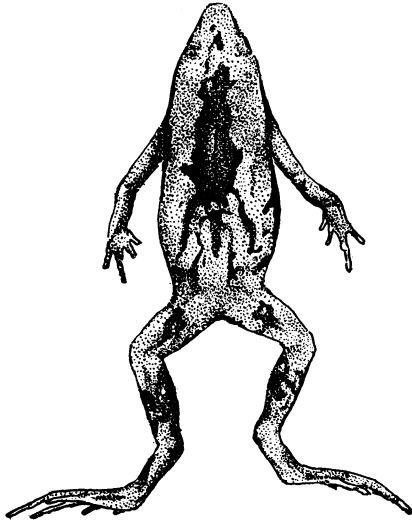


FIG. 1. Type specimen of *C. panamensis*.

to the femoral region and branches out on each groin. Single cross bars appear on the femur, tibia, and tarsus. (When the limb is folded, femur against tibia against tarsus, a stripe or continuous bar runs across them to the dorsal stripe.) A dark lateral stripe extends from the posterior border of the eye to the femur. An indistinct dark stripe extends along the upper eyelid to the dorsal edge of the nostril. The under side is white with brown flecks, most dense in the gular region, and finely and evenly flecked on the femur, tibia, and tarsus. A black-edged skin fold lies above the anus (possibly due to preservation). The body is 19 mm. in length.

DESCRIPTION OF H. T. No. 5301: The snout is prominent, pointed, and once and a half as long as the eye; the canthus rostralis is rounded; the loreal region oblique, and not concave. The nostril is much nearer the tip of the snout than to the eye; the interorbital space is about four times as wide as the upper eyelid; the fingers are short, not dilated, and free, the second shorter than the fourth; toes not dilated, free and without fringe. The subarticular tubercles are poorly developed, but a small circular inner metatarsal tubercle is present; heel reaching axilla; the skin is smooth above and below. A rather faint transverse fold or groove extends from the corner of the mouth across the occiput behind the eyes.

Gray above with a central, darker, wedge-shaped area with the apex between eyes, widening irregularly to the groin. Traces of lateral extensions of this are present in the region of the scapula and of the sacrum. The sides are darker with white dots or flecks; on the belly the white dots increase in size and number and merge to reduce the gray to vermiculations. The throat and limbs are colored much like the sides. A faint middorsal light line is present.

Length 26 mm.

The above description is as closely as possible in the order used by Parker (1934) for species of *Chiasmocleis*.

VARIATION IN THE 34 SPECIMENS: The dorsal pattern is more vivid in the smaller specimens collected by Shrapnel than in the larger ones collected by Trapido and Evans. A faint middorsal line is apparent only in Trapido's No. 5301, and in his Nos. 6362-6365. Definite barring on the legs (a bar on the thigh, a double bar on the tibia) is noticeable in the type and in A.N.S.P. No. 25003, but scarcely at all in the other specimens.

FIGURES: We figure the type and the shoulder girdle of A.N.S.P. No. 25004, one of the 16-mm. specimens collected by Shrapnel.

COLOR NOTES FROM LIFE ON *Chiasmocleis*: Collected at Old Panama January 11, 1947, by Graham Fairchild and Harold Trapido. (H. T. Nos. 6361-6365.)

The dorsal pattern consists of a median dark triangular area with scalloped edges, commencing just anterior to the orbits or between them, broadening posteriorly at three points, one on the nape of the neck, one just behind the insertion of the fore limbs, and a third midway between the fore and hind limbs. This dark area diffuses into the ground color posteriorly. There is much variation in the intensity of this dorsal pattern. Dorsolaterally there is variation in intensity of pigmentation and the color itself. One specimen is metallic bronzy, while others are gray. One specimen has dark metallic iridescence in the light dorso-lateral areas. The light markings of the dorsal surface of the limbs, particularly the fore limbs, vary as does the dorsolateral body color from bronzy iridescent to gray. Ventrally, the specimens are flesh colored with white pigment spots irregularly arranged, though some of the frogs have these white spots aggregating to form short longitudinal bars laterally. The bronze or gray of the dorsolateral portion of the trunk gives way to tan or chocolate ground color on the sides, spotted with white. The bronze or

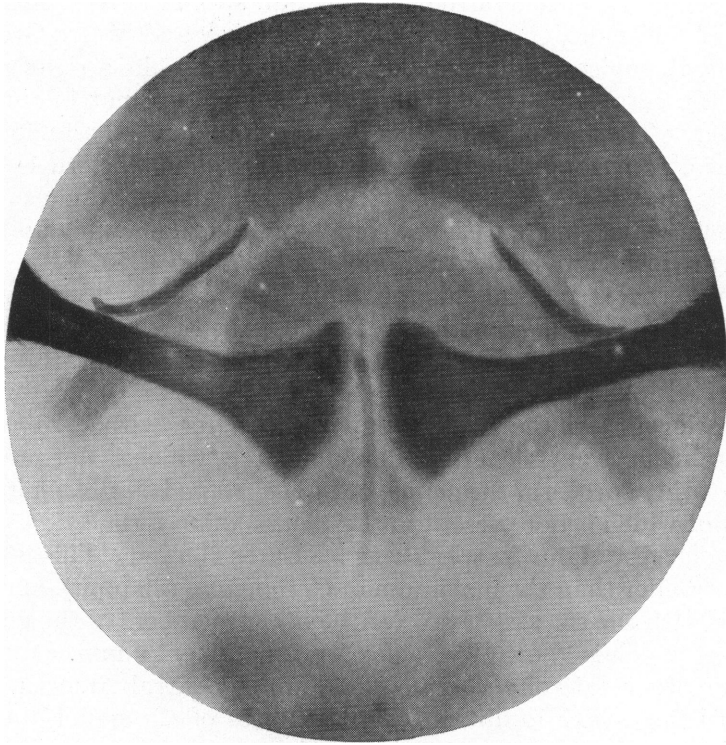


FIG. 2. Photograph of shoulder girdle, stained and cleared. The large bones are the coracoids; the small are the clavicles.

gray ground color of the sides merges gradually into the flesh color of the venter.

The median dorsal dark area under the dissecting microscope is seen to consist of very deep brown or black ground color with minute flecks of white or gold. Posteriorly these flecks become more abundant, and the dark dorsal marking, in consequence, appears more diffuse. One specimen had the light flecks in the dark ground color of the median dorsal dark area aggregated along the middorsal line, resulting in a very thin and faint median dorsal stripe.

REMARKS: The genus *Chiasmocleis* has hitherto been known only from South America east of the Andes. Parker (1934) records specimens from Paraguay, Bolivia, Brazil, and British Guiana. The senior author is aware of, and will report elsewhere on, specimens from eastern Peru.

In skeletal characters the Panamanian species agrees with the type of the genus, *C. albopunctata* of Paraguay and Matto Grosso, that is, the epicoracoids are long, the clavicles make a right angle with the coracoids, the maxilla and the jugal are not in sutural contact. These skeletal characters are found in all the species except *C. boliviana* of Bolivia, eastern Peru, and western British Guiana, in which species the epicoracoids are short, the clavicles make an obtuse angle with the coracoids, and the maxilla and the jugal are in sutural contact (cf. Parker, 1927, figs. 4, 5).

In external structural characters the Panamanian species agrees with *C. boliviana* (and with a yet undescribed form from eastern Peru) in lacking webbing or fringing on the fingers, and thus disagrees with the other species of the genus.

In color pattern the Panamanian species agrees with *C. boliviana* in having a symmetrical dark dorsal pattern, which is not present in the other species of the genus, but *C. boliviana* has a black inguinal spot which is not present in the Panamanian form.

The largest of our 34 specimens measures 26 mm. This is one-third smaller than the maximum of *C. boliviana* (39 mm.), and fits better with the sizes recorded for the other members of the genus, none of which is known to reach a length of over 29 mm.

The other microhylid species of lower Central America are listed below, with localities from the notes of the senior author, which are additional to those given by Parker (1934). He has been able to examine 80 specimens of microhylid frogs from Nicaragua, Costa Rica, and Panama as against 12 examined by Parker.

1. *Hypopachus variolosus* (Cope), 1866 = *Hypopachus seebachii* Kieferstein, 1867. The type specimen of the former name seems to be U.S.N.M. No. 6486, from "Arriba" (= upper), Costa Rica. The type material of the latter is presumably in Göttingen; the locality was simply "Costa Rica." To the localities Bebedero and San José, given by Parker, can be added Miravalles (M.C.Z.) and Cartago (A.N.S.P.). The first three localities are Pacific slope, from near sea level to 3800 feet; the last is Atlantic drainage at 4500 feet. The animals were very abundant and calling at Cartago May 23, 1936, in a pond in a pasture, in company with equally active *Bufo marinus*, *Bufo coccifer*, *Rana pipiens*, and *Agalychnis moreletii*.

2. *Elachistocleis pearsei* (Ruthven). The type is in the University of Michigan. The type locality is Fundación, at the base

of the Santa Marta massif in Colombia. This name can be used for the larger specimens, more coarsely marbled on the belly, that come from northwestern South America and Panama. In Panama it was recorded by Parker from "Agua Caliente," a locality based on a Vienna Museum specimen. To this can be added Aguadulce in Coclé (Vienna Museum) and Sitio Conte in Coclé (A.N.S.P.).

3. *Microhyla aterrima* (Günther). The type, in the British Museum, is from "Costa Rica." To this can be added a definite locality, Carillo, on the Atlantic slope (M.C.Z.).

4. *Microhyla pictiventris* (Cope). The type is U.S.N.M. No. 14196 from "Nicaragua." Parker saw no specimens. The localities Escondido River, 50 miles above Bluefields, Nicaragua (U.S.N.M.), and Reventazon River, Costa Rica (M.C.Z.), can be added. Both are Atlantic drainage. The three specimens have a definite rudimentary web, and thus the species belongs in Parker's key with *elegans* and *equatorialis*, and not where he puts it. It differs from *elegans* in lacking a "round inguinal spot," but is very closely allied to that species and to *equatorialis* of Ecuador. It differs from *equatorialis* in color of belly. The three are southern allies of *carolinensis*, differing from it in having rudimentary webs on the feet. No related forms are known from Panama or from Colombia.

The use of the generic name *Gastrophryne* Fitzinger, 1843 (type *rugosa* = *carolinensis*), as "convenient to designate the American forms which have completely lost the webs between the toes" (Stejneger and Barbour, 1939, p. 48) does not have this merit of convenience and no other merit has been suggested. It is not at all convenient to regard *elegans* and *pictiventris* as generically separate from *carolinensis*.

These microhylid frogs are all very similar externally, and the genera are based on characters of the shoulder girdle. *Hypopachus* has well-developed clavicles which participate in the glenoid. *Chiasmocleis* and, to a greater degree, *Elachistocleis* have reduced clavicles. *Microhyla* lacks clavicles and procra-coid cartilages. The detection of these skeletal characters requires delicate dissection or staining and clearing. It is thus deemed useful to provide an artificial key for the five species concerned.

- A. Two metatarsal tubercles (outer compressed) toes 1/4 to 1/2 webbed;
Costa Rica.....*Hypopachus variolosus*

- AA. One metatarsal tubercle (inner, rounded, not compressed).
- B. Toes 1/2 webbed; black, lighter below; Costa Rica, Colombia, Ecuador..... *Microhyla aterrima*
- BB. Toes free or with rudimentary web.
- C. Toes with rudimentary web; no flash markings; a definite demarcation between lighter dorsum and darker sides; bold, well-defined light spots on darker background on belly; dark dorsal pattern and tibial bars sometimes present; Nicaragua and Costa Rica..... *Microhyla pictiventris*
- CC. Toes quite free; no definite demarcation between lighter dorsum and darker sides; belly mottlings vague and ill defined.
- D. No flash markings; a dark dorsal pattern; tibial bars sometimes present; a difference between lighter dorsum and darker sides; Panama..... *Chiasmocleis panamensis*
- DD. Flash markings of red in groin, hind thigh, and inner shin; no dorsal pattern nor tibial bars; no color difference between dorsum and sides; Panama and Colombia.....
..... *Elachistocleis pearsei*

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