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TWO NEW DENDROBATID FROGS
FROM NORTHERN VENEZUELA

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STUDY of the amphibian fauna of the Cordillera de la Costa of northern Venezuela in the vicinity of Portachuelo Pass has shown the presence there of a species of *Phyllobates* and one of *Prostherapis* which are undescribed.

Both of these animals are inhabitants of the cloud forest which covers the ridges and peaks in the vicinity of the pass. Described by Beebe and Crane (1947), this forest is characterized by moderate and even temperatures, high humidity, and low light intensity. The vegetation is almost entirely evergreen, with an upper canopy at 20 m., and includes a number of dwarf palms, tree ferns, abundant epiphytes, and scanty ground cover. A number of small mountain streams dissect the steep slopes. Even in the season of low rainfall, the fog (*neblina*) keeps the air and vegetation wet.

The field work on which this report is based was done at the Estación Biológica de Rancho Grande, which lies above the city of Maracay and close to Portachuelo Pass. For the use of its facilities I am greatly indebted to the Venezuelan government through the Ministro de Agricultura y Cria and the Director Forestal and to the Station's director, Dr. Tobias Lasser. I also wish to thank Dr. Ernst Schaefer, who was the resident zoologist at the Station, Professor Alonso Gamero-Reyes, Srs. P. A. Dominguez and José García, and my wife Dr. Avery R. Test for much personal assistance. Financial support for the field work came in large part as a grant from the Horace H. Rackham School of Graduate Studies of the University of Michigan. To Dr. Norman E. Hartweg and Dr. Charles F. Walker go my thanks for assistance and for use of the facilities of the Division of Herpetology in the Museum of Zoology. Both have read the manuscript and offered helpful suggestions.

Prostherapis neblina, new species

HOLOTYPE.—UMMZ 113001; Portachuelo Pass, Rancho Grande, Estado Aragua, Venezuela; Dec. 14, 1951; F. H. Test.

PARATOPOTYPES.—UMMZ 113002–113026; 24 males and 9 females, from cloud forest on both sides of Portachuelo Pass and on both north and south slopes of the ridge, between altitudes of 900 m. and 1100 m.

RANGE.—Known only from the type locality.

DIAGNOSIS.—A moderate-sized *Prostherapis* (10 adult males average 25.3 mm. in snout-anus length; 10 females, 27.4 mm.); back uniformly dark brown and bounded on each side by a pale line above a lateral longitudinal black band, through which a whitish line extends longitudinally from the groin to, or nearly to, a point above the base of the foreleg; immaculate underparts except for a dusky clouding in some males and a transverse black bar in front of the pectoral girdle in females (nearly obsolete in males); head with lateral black band extending to lower border of eye; below this and extending from foreleg to foreleg, a distinct pale line on upper lip; lip with a narrow, black, ventral border; first and second fingers approximately equal; third toe distinctly longer than fifth; all of light-colored ventral areas yellow in life.

DESCRIPTION OF TYPE.—Adult female, snout-anus length 26.7 mm. Snout broad and truncate, as long as eye. Nostril much nearer tip of snout than eye. Loreal region nearly vertical and flat. Interorbital space wider than upper eyelid. Tympanum distinct, one-half diameter of eye. Maxillary teeth present. Tongue nicked posteriorly. Hind limbs stout; tibiotarsal joint reaching nearly to nostril; toe 3 reaching a little beyond 5; first and second fingers nearly equal when alongside one another; fingers free, very slight webbing between toes 1-2, 2-3, and 3-4; digital pads moderate, discs of finger 3 and toe 4 about two-thirds diameter of tympanum; three metatarsal tubercles, the middle and proximal ones less well developed; a well-defined dermal ridge extending inside of toe 1 and proximally along ventrolateral aspect of tarsal segment nearly to its base. Skin roughened, but with well-defined tubercles only on posterior part of back and posterior base of thigh.

In alcohol, after fixation in formalin, venter immaculate except for a narrow dusky line along lower lip and a dusky bar 1.4 mm. wide and of varying intensity across throat immediately in front of pectoral girdle. Back uniformly sooty brown or blackish, becoming slightly paler posteriorly and with a pale median stripe 4 mm. long at extreme posterior end. Snout brown, paler than back. Along each side of back a

gray stripe 1 mm. wide, from eye to three-fourths of way to thigh, contrasting with color of back and sides. Sides black, the ventral limit of the black meeting the eye at its lower border; a narrow whitish line extending through the black from groin two-thirds of way to base of forelimb and continued farther forward by isolated whitish dots; lower border of lateral black area irregular posteriorly. Face with black band around tip of snout from eye to eye; below it a whitish band around snout from foreleg to foreleg; edge of upper lip narrowly black. Pectoral limb light brown dorsally, barred with blackish; upper arm with a longitudinal dark band on front and rear. Pelvic limb light gray to smoky brown dorsally, with distinct blackish bars.

VARIATION.—The variation shown by the adult specimens at hand is rather small, except for sexual dimorphism. Adult females (10 specimens) average 27.4 mm. (range, 26.5–28.9) and 10 males average 25.3 mm. (range, 24.1–26.9) in snout-anus length. Males tend to have the pale areas lightly clouded with dusky; they have the throat bar narrower and poorly defined or even scarcely indicated. A few females have the ventral surface of the thighs lightly freckled with melanophores. Nonsexual variation includes the following: Back sometimes uniform blackish, at other times with a few, small, pale mottles faintly indicated; dorsolateral stripes rarely extending far enough posteriorly to join above anus; lateral whitish lines of variable forward extent, sometimes reaching to a point above base of foreleg; posterior lower part of lateral black area interrupted by whitish mottling in some specimens; ground color of limbs dorsally varying from pale gray to dusky brown, the dark bars in some places being broken into mottling or freckling.

In life dorsal surface of head and body uniformly deep brownish black, becoming paler (brownish tan) on top of snout; dorsolateral pale strip yellowish tan; sides and facial band black, a yellowish ivory line dividing the black side horizontally in front of hind leg. A brassy gold band extending from foreleg along upper lip to join that from other side at tip of snout. Dorsal surface of legs yellowish brown with black bars. Ventrally, except for the black markings, all surfaces yellow, most intense on throat, which is orange-yellow. Under surface of legs bright lemon yellow, the forelegs sometimes clouded with dusky. Belly usually paler yellow, especially anteriorly and medially where it becomes more or less flesh color in some individuals. Chin yellowish ivory. Males dusker than females and less yellowish on ventral side of body and head.

REMARKS.—This frog appears to be closely related to *P. trinitatis*, which occurs commonly in the same region. After preservation some

specimens of the two species are distinguished only by careful comparison. One of the most easily detected and most consistent differences is the relation of the black lateral band to the posterior edge of the eye. In *trinitatis* the lower border of this band cuts across the upper part of the tympanum and meets the eye close to its posterior angle. In *neblina* the lower edge of the band covers more of the tympanum and meets the eye near its ventralmost border. Thus, the area between tympanum and eye is black. A small, wedge-shaped, dark spot occurs in this area in some specimens of *trinitatis*, but it does not extend to the bottom of the eye and usually is not as dark as in *neblina*, nor is it continuous with black area posterior to the tympanum.

Another highly consistent and conspicuous difference between preserved specimens of the two species lies in the less prominent throat bar of *neblina*. In adult females it is narrower (usually less than 2 mm.) than that of *trinitatis* (usually more than 2 mm.), less intensely black, and not reticulated, as it often is in *trinitatis*. Some adult males of *neblina* have no indication of a throat bar; an occasional one has a rather well-defined bar as wide as 2.2 mm.; most have a faintly indicated and poorly defined bar. In adult males of *trinitatis* the throat bar is more prominent than in males of *neblina*, more nearly approaching the condition in the most prominently barred *neblina* females in being dark gray rather than intense black, with little or no reticulation, and narrower than in the female of *trinitatis*.

Other distinguishing characteristics of *neblina* are its larger size, adult males averaging 3 mm. and females 2 mm. longer than 110 specimens of *trinitatis*; narrower head, the length from tip of lower jaw to a line joining base of forelegs being 91.8 per cent (range 86–104) of its width in 10 *neblina*, whereas 9 *trinitatis* average 82 per cent (range 70–101); more uniformly colored (less blotched) back; paler, more distinct stripes bordering the back laterally; upper lip nearly or quite without blotches or dusky clouding; hind legs often more prominently banded because of paler interspaces. In life all individuals of *neblina* are most easily distinguished from *trinitatis* by the yellow ventral surfaces of the legs and to a lesser extent of the body and by the uniformly dark brown back margined by the dorsolateral tan stripes.

Still other differences associated with the live animal are even more useful than external morphology in distinguishing between these two species. The song of *trinitatis* is a long series of clearly defined single notes, whereas that of *neblina* consists of a series of short trills. The two species are strikingly different in escape behavior; individuals of *trinitatis* take alarm when an approaching person is still several feet away

and move hurriedly to the shelter of a rock. In contrast, *neblina* allows a close approach, often to within a few inches, and when finally flushed moves deliberately, with short hops. A third outstanding difference is that *trinitatis* is a frog of small streams and *neblina* an inhabitant of humid slopes.

The males of both species carry tadpoles on their backs.

The young of *neblina* and *trinitatis* show the same differences which have been noted above as characterizing the adults. In addition they are even more easily distinguished by the apparent lack of a pectoral bar in the former species and the presence of a well-developed one in the latter. Under magnification one finds a series of punctate melanophores, more or less widely spaced, across the chest of young *neblina*. In the five available subadult males, which range in snout-anus length from 13.1 mm. to 18.8 mm., these melanophores form a narrow band which varies in conspicuousness from gross invisibility (in the largest and smallest males) to a very pale gray band 0.8 mm. wide. The single immature female (16.7 mm.) has a band appearing faintly gray to the naked eye, obsolete in the center, but reaching a maximum width of 0.9 mm. at the sides. These pale gray bands result from the presence of larger numbers of more closely spaced melanophores.

In contrast, the young of *trinitatis* show a very distinct band which appears grossly as a continuous black area except for a certain amount of reticulation in some individuals. The most poorly developed band in the series of 6 males and 14 females at hand is a distinct but dusky one of 1.3 mm. width in a male with snout-anus length of 16.7 mm. In all but one of the others (14.8–23.5 mm.) the pectoral band is black or blackish.

It is noteworthy that both sexes of the young of *neblina* are marked much like the adult male, with a very poorly defined pectoral band, whereas in *trinitatis* both sexes when young resemble the adult female in having a clearly apparent band.

Boettger's name, *Prostherapis herminae*, proposed in 1893 and based on five specimens from Puerto Cabello, was synonymized with *P. trinitatis* by Barbour and Noble (1920). That their action was correct and that the name *herminae* does not refer to the frog here described as *neblina* is indicated by the following features of Boettger's description: Male dusky greenish gray dorsally; ventrally entirely dusky leather brown or black; dorsal side of female gray with black spots and flecks; larger flecks on dorsal side of proximal part of thigh grayish white; ventral side white; snout-anus length of male 23½ mm., of female 25 mm. Although Boettger does not state whether his specimens were adults,

these measurements are less than the minimum for sexually mature *neblina*. The only part of his description which suggests *neblina* is the characterization of the posterior side of the proximal part of the thigh as orange-yellow; but as *trinitatis* frequently has the posterior part of both fore- and hind legs yellowish brown, this is not necessarily an indication that Boettger had specimens of *neblina*. On the contrary, it appears clear that *herminae* belongs in the synonymy of *trinitatis*.

In recent years the generic name *Prostherapis* (Cope, 1868: 137) has been used only by Breder (1946: 405), referring to *P. inguinalis* Cope, the type species. The name is used here on the advice of Dr. E. R. Dunn (*in litt.*), who states that *inguinalis* is congeneric with the species assigned to *Hyloxalus* (Espada, 1870: 59) by recent authors.

Phyllobates bromelicola, new species

HOLOTYPE.—UMMZ 113027; 1375 m. on Pico Periquito, Rancho Grande, Estado Aragua, Venezuela; Jan. 10; 1952.

PARATOPOTYPES.—UMMZ 113028–113030; 1310 m. on Pico Periquito, Rancho Grande; Sept. 25, 1951.

RANGE.—Known only from the upper slopes of Pico Periquito near Rancho Grande.

DIAGNOSIS.—A small, slender, delicate frog with depressed head and body; tympanum distinct, about half diameter of eye; tibiotarsal joint reaching eye; toes 3 and 5 about equal when laid alongside 4, first finger falling short of tip of second when laid against it; slight remnant of web considerably thickened; grayish tan back freckled with white and bordered laterally by a slender, well-defined whitish line; a black band around snout through eye to groin, fading posteriorly to a narrow line adjacent and ventral to dorsolateral white line; no distinct light line on sides; tips of digits blackish; underparts immaculate or mottled with dusky, bright yellow in life; adult females to 20.1 mm. in snout-anus length.

DESCRIPTION OF HOLOTYPE.—Head short, broad, and depressed, the width at posterior edge of eyes 90 per cent of distance from anterior angle of foreleg to tip of lower jaw; snout slightly longer than eye; nostril nearer tip of snout than eye; loreal region nearly vertical, flat; interorbital space wider than upper eyelid; tympanum distinct, about one-half diameter of eye; posterior border of tongue entire; maxillary teeth present. Trunk depressed. Hind limbs slender; tibiotarsal joint reaching eye; toes 3 and 5 approximately equal when laid alongside 4, reaching to penultimate joint of 4; first finger falling short of tip of

second when laid against it; slight remnant of web between toes considerably thickened; digital discs bluntly elliptical, that on finger 3 about three-fourths diameter of tympanum, that on toe 4 about one-half; two well-developed metatarsal tubercles, none on tarsus. Skin of belly roughened; ventral side of upper arm and thigh and posterior part of back slightly and finely tuberculate. Adult female, 17.1 mm. in snout-anus length.

In preservative top of head and body grayish tan, freckled with white; back bordered laterally from eye to hind leg by slender, well-defined whitish line; sharply defined black band around tip of snout to eye, continuing to groin as a wider band which fades out posteriorly except for a narrow black line adjacent to dorsolateral white line. Upper sides of hind legs grayish, freckled with whitish; a blackish bar across middle of thigh and a black spot on proximal part; a blackish bar on shank; front of thigh with a narrow, longitudinal, irregular, blackish line distally; upper surfaces of forelegs pale straw color clouded with dusky; tips of digits blackish. Upper lip white. Underparts immaculate whitish.

VARIATION.—The three paratopotypes are a female of 16.3 mm. with enlarged ova, one of 15.9 mm. with small ova, and a male of 14.7 mm. Another specimen of 20.1 mm. is recorded in my field notes but appears now to be missing from the collection. There is little variation in the specimens, the greatest being evident in the missing one, which field notes describe as follows: Dorsolateral white line and black of the sides not continuous, bars on legs several and dusky, a tiny black spot in middle of back ringed with white, and venter pale yellowish, mottled with dusky, especially in the center of the throat, anterior belly, and on the legs. In the specimens at hand the only variations from the holotype are that the proximal spot on the thigh is enlarged into a bar, and the whitish upper lip is edged ventrally by an extremely narrow line of black.

In life the ground color of the dorsum is olive, bordered by a distinct white hairline; lateral band black; bars on thigh and shank black (dusky in the 20.1 mm. specimen); tips of digits black; underparts bright yellow throughout except in the large individual mentioned above, in which the yellow was pale and mottled with dusky as described.

REMARKS.—*P. bromelicola* was found in bromeliads whose leaves held considerable water. It was never seen on the ground except when disturbed enough to leave its bromeliads. In addition to the specimens mentioned above, seven others were marked and released, and addi-

tional individuals were seen but not captured. All were at elevations of 1325–1400 m. in cloud forest (upper montane rain forest of Beard, 1944) in the vicinity of Rancho Grande. A few pale tadpoles found in pools of some of the bromeliads in September may have belonged to this species. The considerably enlarged ova of the two adult females are blackish with pigment.

On geographic grounds the small and somewhat similar *P. brunneus* may be the closest evolutionary relative of *bromelicola*. *P. brunneus* is a wide ranging species which occurs within an air-line distance of 15.5 km. of Rancho Grande, in cloud forest on a peak above the coastal village of Turiamo. Neither *Phyllobates bromelicola* nor *Prostherapis neblina* was found here. It is perhaps significant in this connection that the latter, a much larger frog, occupies at Rancho Grande an ecologic niche very similar to that of *Phyllobates brunneus* above Turiamo. Inability to compete with the larger terrestrial *Prostherapis neblina* in the Rancho Grande region may be the reason why *Phyllobates brunneus* does not occur there and why *Phyllobates bromelicola* is not a terrestrial species. From *brunneus*, *Phyllobates bromelicola* is distinguished by a shorter head; first finger shorter than second; equality of toes 3 and 5; web remnants between toes 2 and 3, and 3 and 4 considerably thickened; thighs more slender, body depressed; light freckling on back; tips of digits blackish, contrasting strongly with more proximal parts; dorso-lateral white line always very narrow, well defined, and contrastingly paler than rest of back; no chain of diamond-shaped darker spots on back.

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