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A NEW GENUS AND SPECIES OF POISON-DART FROG (AMPHIBIA: DENDROBATIDAE) FROM THE ANDES OF NORTHERN COLOMBIA

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Abstract.—A diminutive (3 adult females 18.6–19.3 mm SVL) dendrobatid frog found in cloud forests on the Cordillera Central in Departamento Antioquia, Colombia, is so unlike other dendrobatids that a new genus (*Atopophrynus*) is proposed for the new species (*A. syntomopus*). Unlike other dendrobatids, *A. syntomopus* has extensively webbed toes, has the innermost toe reduced in size and fused to the second, and lacks ears.

In the course of preliminary sampling of the cloud forest frog fauna of the Cordillera Central in northern Colombia, three specimens of a peculiar small frog were collected along a small stream at the highest point on the road between Sonsón and Nariño in southern Antioquia. Because the species presents a combination of characteristics so markedly discordant with those previously reported for dendrobatid frogs we here propose a new genus for it.

Atopophrynus, new genus

Diagnosis.—A dendrobatid frog distinguished from all other dendrobatids by the absence of the disk and pad of the innermost toe of the hind foot and by having that non-digitiform digit fused to the adjacent toe. Functional toes (II–V) of hind foot extensively webbed and bearing large, rounded disks and pads. *Atopophrynus* is also unique within the family in the absence of the tympanic annulus, *cavum tympanicum,* and plectrum.

Type species.—*Atopophrynus syntomopus* Lynch & Ruiz.

Etymology.—From the Greek *Atopos* (=strange, out of place) + *phrynus* (toad); gender masculine.

Atopophrynus syntomopus, new species
Figs. 1, 2

Holotype.—Instituto de Ciencias Naturales, Universidad Nacional de Colombia (amphibian collection) 8611, one of three collected at the crest of the Cordillera Central, 8 km by road E Sonsón, Municipio Sonsón, Departamento Antioquia, Colombia, 2780 m, 13 June 1981, by Vincente Rueda.

Paratypes.—ICN 8612 and 8613 (cleared and stained skeleton), collected with holotype.

Diagnosis.—same as for genus.

Description.—Head narrower than body, wider than long; snout broad, oval (with a pointed tip) in dorsal view (Fig. 1), protruding in lateral profile, short; nostrils directed anterolaterally, protuberant, canthus rostralis evident, rounded; loreal region slightly concave, sloping abruptly to non-flared lips; interorbital

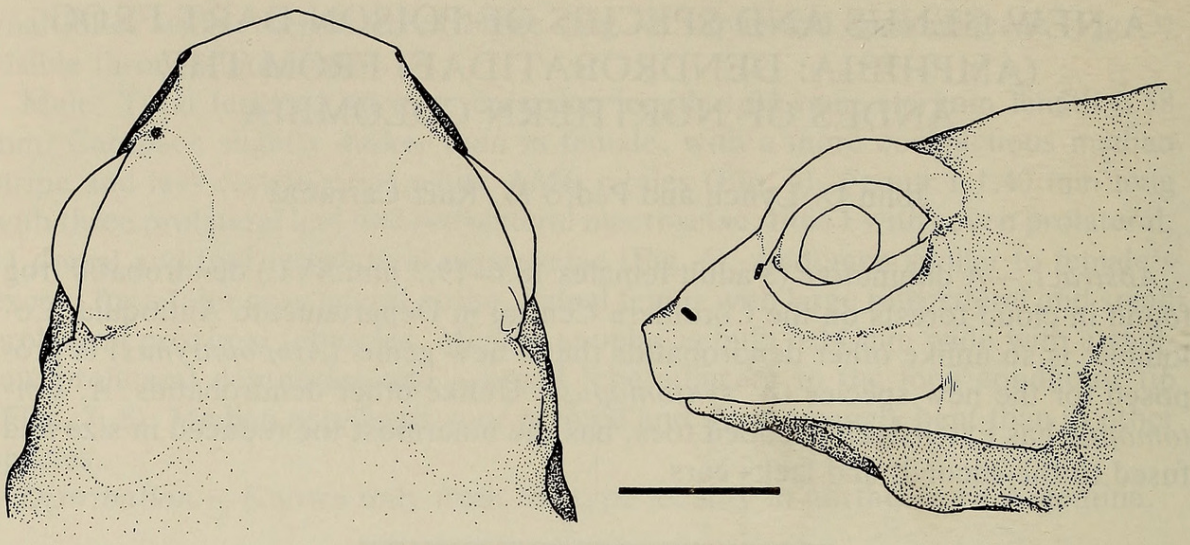

Fig. 1. Head of *Atopophrynus syntomopus*. Dorsal (ICN 8612) and lateral (ICN 8611) views. Line equals 2 mm.

space broader than upper eyelid, flat; temporal region swollen (Fig. 1); no supratympanic fold; no tympanic annulus; postrictal tubercle subconical; choanae round, moderate-sized, lateral on palate but not concealed by palatal shelf of maxillary arch; no vomerine odontophores or teeth; no teeth on premaxillae or maxillae; tongue as long as wide, its posterior margin not indented, posterior ⅓ not adherent to floor of mouth.

Skin of dorsum smooth, lacking folds but bearing a few scattered subconical tubercles; skin of venter smooth; anal opening not extended in sheath; no enlarged tubercles in vicinity of anus; no tubercles on limbs (ulnar and tarsal tubercles or folds absent).

Palmar tubercle round, slightly larger than oval thenar tubercle; other tubercles on hand very low, scarcely distinguishable; digits broad, basally webbed (Fig. 2); fingers II–IV bearing obvious rounded pads; pads bearing disks on ventral surfaces (broader than long); thumb shorter than second finger, not bearing pad or disk; ill-defined pair of scutes on tops of pads on fingers II–IV.

Outer metatarsal tubercle round, as large as, and more pungent (Fig. 2) than inner metatarsal tubercle; latter flat, curved (kidney-shaped); no supernumerary plantar tubercles; foot appearing to have only four toes (Fig. 2); toes II–V bearing low subarticular tubercles, nearly fully webbed (as a fringe on distal portion of toe IV), bearing broad disks on expanded, apically round digital pads; inner margin of toe II bearing fleshy flange along ⅔ of its length; although lacking pad, disk, and subarticular tubercle, this flange containing first toe; hind limbs short, heels of flexed hind legs (when held at right angles to sagittal plane) not meeting.

In preservative, gray above with reddish-brown markings (interorbital bar, scapular and sacral chevrons, blotch on lower back, limb bars, slanted bars on flanks) and flecked with white (most intense on lateral surfaces); ventral surfaces cream, blotched with white and flecked with brown; pair of brown blotches on breast; inner digits pale cream.

In life dorsum red with green markings overlain with white flecks; white flecks

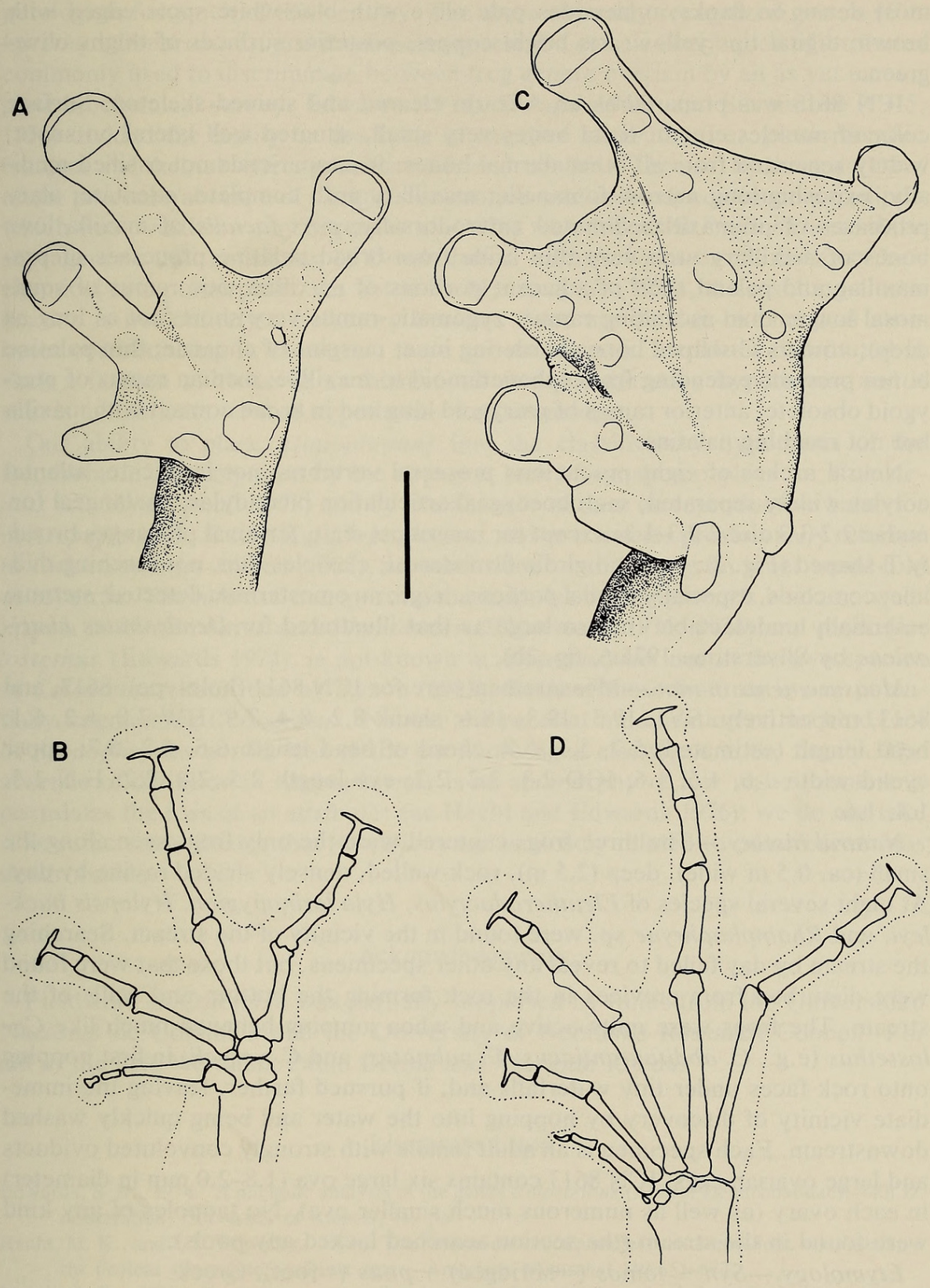

Fig. 2. Palmar views (A) ICN 8612, (B) ICN 8613, and plantar views (C) ICN 8611, (D) ICN 8613, of acropodia of *Atopophrynus syntomopus*. Line equals 2 mm.

most dense on flanks; undersides pale olive with blue-white spots edged with brown; digital tips yellow; iris bright copper; posterior surfaces of thighs olive-green.

ICN 8613 was prepared as an Alizarin cleared and stained skeleton. Surface color of muscles cream; nasal bones very small, situated well lateral on snout, widely separated from all other dermal bones; frontoparietals not ossified medially, exposing long narrow fontanelle; maxillary arch complete, edentate; alary processes of premaxillae directed anterodorsally; *pars facialis* of maxilla low; bones of maxillary arch very thin aside from broad palatine processes of premaxillae and palatal shelf of adjacent portions of maxillae; otic ramus of squamosal longer than ascending ramus, zygomatic ramus very short (not as long as deep); vomers C-shaped bones bordering inner margins of choanae; thin palatine bones present, extending from sphenethmoid to maxillae; median ramus of pterygoid obsolete; anterior ramus of pterygoid long and in broad contact with maxilla but not reaching palatine.

Neural arches of eight procoelous presacral vertebrae not imbricate; atlantal cotyles widely separated; sacrococcygeal articulation bicondylar; phalangeal formulae 2-2-3-3 and 2-2-3-4-3; except for innermost digit, terminal phalanges broadly T-shaped (Fig. 2); pectoral girdle firmisternal; clavicles thin, not reaching midline; coracoids, especially medial portions, large; no omosternum detected; sternum essentially undetectable (not so large as that illustrated for *Dendrobates histrionicus* by Silverstone 1975:6, fig. 2b).

Measurements in mm.—Measurements are for ICN 8611 (holotype), 8612, and 8613, respectively. SVL 19.3, 19.3, 18.6; shank 8.2, 8.4, 7.9; HW 7.0, 6.2, 6.1; head length (estimated) 5.7, 5.3, 5.9; chord of head length 6.6, 6.2, 5.7; upper eyelid width 1.6, 1.5, 1.6; IOD 2.3, 2.2, 2.2; eye length 2.5, 2.4, 2.2; E-N 1.5, 1.4, 1.6.

Natural history.—The three frogs captured were the only frogs seen along the small (ca. 0.5 m wide), deep (2.5 m), rock-walled, densely shaded ravine by day. At night several species of *Eleutherodactylus, Hyla larinopygion, Hylopsis bucklei,* and *Rhamphophryne* sp. were found in the vicinity of the stream. Searching the stream by day failed to reveal any other specimens, but those that were found were disturbed from crevices in the rock forming the bottom and walls of the stream. The frogs were quite active and when jumping behaved much like *Colostethus* (e.g., *C. abditaurantiacus, C. palmatus,* and *C. vergeli*) in first hopping onto rock faces under tiny waterfalls and, if pursued further, leaving the immediate vicinity of discovery by hopping into the water and being quickly washed downstream. Each specimen is an adult female with strongly convoluted oviducts and large ovarian eggs. ICN 8613 contains six large ova (1.8–2.0 mm in diameter) in each ovary (as well as numerous much smaller ova). No tadpoles of any kind were found in the stream (the section searched lacked any pools).

Etymology.—*Syn* + *tomos* (=abridged) + *pous* (=foot), Greek.

Discussion

A persistent concern as to the generic limits within the biologically and pharmaceutically interesting poison-dart frog family Dendrobatidae has plagued her-

petologists for much of this century. The three currently recognized genera (*Colostethus, Dendrobates,* and *Phyllobates*) present a mosaic distribution of attributes commonly used to discriminate between frog genera overlain by an as yet incomplete biochemical survey. Edwards (1974), Savage (1968), and Silverstone (1975, 1976) divided the family on the basis of negative attributes (i.e., plesiomorphic features and their absences in subsets of dendrobatids). The use, by these authors, of the presence/absence of "bright" coloration (not defined) continued a tradition which was overthrown by Myers *et al.* (1978) who delimited *Phyllobates* and the suprageneric unit consisting of *Dendrobates* + *Phyllobates* on the bases of biochemical synapomorphies. As noted by Myers *et al.* (1978), the resulting classification is not entirely satisfactory because there are no non-biochemical attributes corroborating it. However, there are no apparent attributes distributed in such a fashion as to serve as falsifiers of that classificatory hypothesis, and it stands as the least refuted hypothesis of relationships.

Our ability to place *Atopophrynus* into the classificatory hypothesis of the Dendrobatidae is impaired by the apparent lack of synapomorphies for *Colostethus* (cf. Myers *et al.* 1978) and by the absence of data on reproductive behavior in *Atopophrynus*. Excluding *Atopophrynus* and two species provisionally referred to *Colostethus* by Lynch (1982), all other dendrobatids have an inner tarsal fold or tubercle. The habit of transporting the tadpoles on the parent's back, so well-known in *Dendrobates* and *Phyllobates* (Silverstone 1975, 1976) and most *Colostethus* (Edwards 1974), is not known in *Atopophrynus* nor in the two species of *Colostethus* described by Lynch (1982). Each of these features is one potentially fragmenting *Colostethus*. Neither the peculiar modification of the hind foot of *Atopophrynus* nor its loss of the ear is presaged elsewhere in the family. The absence of dentition in *Atopophrynus* is an apomorphy of low value (because it postulates the loss of an attribute; see Hecht and Edwards 1976); we do not take it as sufficient evidence that *Atopophrynus* is closely related to other edentulous dendrobatids.

Acknowledgments

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