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TWO NEW SPECIES OF SOUTH AMERICAN *CENTROLENELLA* (ANURA: CENTROLENIDAE) RELATED TO *C. MARIAE*

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ABSTRACT: Two new *Centrolenella* are described, *C. azulae* from the Cordillera Azul of Perú, and *C. puyoensis* from the Amazonian slopes of the Ecuadorian Andes. *Centrolenella azulae* is distinguished by its moderately large size, the presence of vomerine teeth, a snout truncate in dorsal view and slightly protruding in profile, a color pattern in preservative of very diffuse lavender with small colorless spots, basal webbing on the outer fingers, and a low ulnar fold. *Centrolenella puyoensis* is distinguished by its moderately large size, a snout truncate in dorsal view and rounded in profile, a color pattern in preservative of purplish-gray with large cream spots, a tympanum that is three-fourths exposed, and intricate anal ornamentation. Both new species are closely related to the Peruvian *C. mariae*, and together the three species form the *C. mariae* group, definable on a number of shared, derived characters. A hypothesis of relationships within the *mariae* group is presented, postulating *puyoensis* as the most primitive and *azulae* as the most derived of the trio.

Key words: Amphibia; Anura; Centrolenidae; *Centrolenella*; New species; New species group; Relationships; Ecuador; Perú

KNOWLEDGE of the centrolenid frogs of Perú has accrued quite slowly. Since the first report of a Peruvian centrolenid (Boulenger, 1918), only three other works on Peruvian centrolenids have appeared. Duellman (1976) described two new species, *Centrolenella spiculata* and *C. truebae*, discussed additional specimens of the poorly-known endemic *C. ocellata*, and reported Peruvian localities for two species (*C. munozorum* and *C. siren*) previously known only from Ecuador. Duellman and Toft (1979) described *C. mariae*. Cannatella and Duellman (1982) described two more species, *C. phenax* and *C. pluvialis*, noting that the Peruvian "*C. siren*" of Duellman (1976) was actually a separate species, which they named *C. phenax*. They also added Peruvian localities for *C. bergeri* and *C. midas*, provided distributional summaries for the nine named Peruvian species, and noted that as many as five undescribed Peruvian species are represented in collections (but are inadequate for description).

Most of the named Peruvian centrolenid frogs (seven of nine species) occur on the eastern Andean slopes and adjacent isolated ranges above 1000 m. *Centrolenella midas* and *C. munozorum* occur below 500 m in the Amazonian lowlands (Cannatella and Duellman, 1982). No species has been reported from the Pacific slopes or lowlands.

Many isolated and semi-isolated sierras and cerros in Amazonian Perú remain largely uncollected. The potential for high endemism in such isolated upland regions is exemplified by the discovery of three new anuran species in expeditions to the Serranía de Sira, including *C. mariae* (Duellman and Toft, 1979). Northwest of the Serranía de Sira is an even larger and higher semi-isolated range, the Cordillera Azul. This cordillera is the northern portion of a chain which extends northwest to southeast then curves around southwesterly to meet the Cordillera Real of the Andes. It lies between the Pampa del Sacramento and Río Pachitea on the east and the Río Huallaga on the west; some of its higher peaks reach well above 2000 m. A road from Tingo María to Pucallpa traverses the cordillera near the border of the Departamentos Huánuco and Loreto. Just off this road, Wade C. Sherbrooke collected a distinctive new *Centrolenella*, which is described below. Definition of characters and arrangement of characters follow Lynch and Duellman (1973) and Flores (1985); the webbing formula is from Savage and Heyer (1967). Measurements were taken with a dial caliper to the nearest 0.1 mm. The following abbreviations are employed: SVL = snout–vent length; E–N = eye-to-nostril distance; HW = head width.

Centrolenella ***azulae*** sp. nov.

Holotype.—USNM 195988, a gravid adult female, 27.5 mm SVL, from near Km. 184, about 3.3 km (by Tingo María–Pucallpa Rd.) west Fdo (= Fundo, a local word for rural property or farm) Nuevo Mundo, Cordillera Azul, Provincia Leoncio Prado, Departamento Huánuco, Perú, 1500 m, obtained on 6 October 1966 by W. C. Sherbrooke.

Diagnosis.—Distinguished by the following combination of features: snout truncate in dorsal view, slightly protruding in profile (Fig. 1); all skin surfaces with very fine granulations; dorsal color pattern in preservative a fine stippling of lavender on a cream background with scattered small unpigmented spots; first finger much longer than second; prominent prepollex; webbing extremely reduced on outer two fingers (basal; Fig. 1E); and indistinct ulnar ridge present.

Description.—Males unknown; adult female holotype relatively large, 27.5 mm SVL; head much wider than body, HW 36.4% of SVL. Snout very slightly sloping, short, truncate above and slightly protuberant in profile; canthus rostralis round; loreal region flat; lips flared; nostrils nearly terminal on snout, extremely protuberant, dorsolaterally oriented, internarial area concave. Eyes large, diameter 41.9% of head length, protuberant, directed anterolaterally but much more anteriorly, oriented approximately 60° to long axis of head. E–N 59.0% of eye diameter. Supratympanic fold moderate, lower one-half (left side) to one-third (right side) of tympanum visible; tympanum directed dorsolaterally with slight posterior inclination. Vomerine dentigerous processes small, low, widely separated between choanae, bearing 2–3 teeth; choanae squarish, separated by about three times their own diameter, diameter about 60% width of pad on first finger. Tongue circular, not notched behind, free posteriorly for about one-sixth its length.

Low, unscalloped dermal fold on ventrolateral edge of forearm; finger lengths in decreasing order 3 1 4 2; lateral fringes on fingers; webbing absent between first and second and second and third fingers, basal between third and fourth, webbing formula III 3⁻-3⁻ IV; digital discs on fingers well-developed, with truncate tips, pads roundly triangular with proximally directed apex; subarticular tubercles small, round; 2–3 supernumerary tubercles, rest of palmar surface areolate; palmar tubercle moderately large, oval; prepollex prominent, bulging. Hindlimbs slender, tibia length 58.9% of SVL; no dermal ridges or tubercles on tarsus; inner metatarsal tubercle prominent, elongate, 2.5 times longer than wide, outer metatarsal tubercle absent; subarticular tubercles moderately large, round; supernumerary tubercles absent, plantar surface lightly areolate; toes about one-half webbed, webbing formula I 2-(2½-2¾) II 1½-(2⅔-3⁻) III 1½-(2⅔-3⁻) IV (3-3⅓)-2 V; toe lengths in decreasing order 4 5 3 2 1; toe discs much smaller

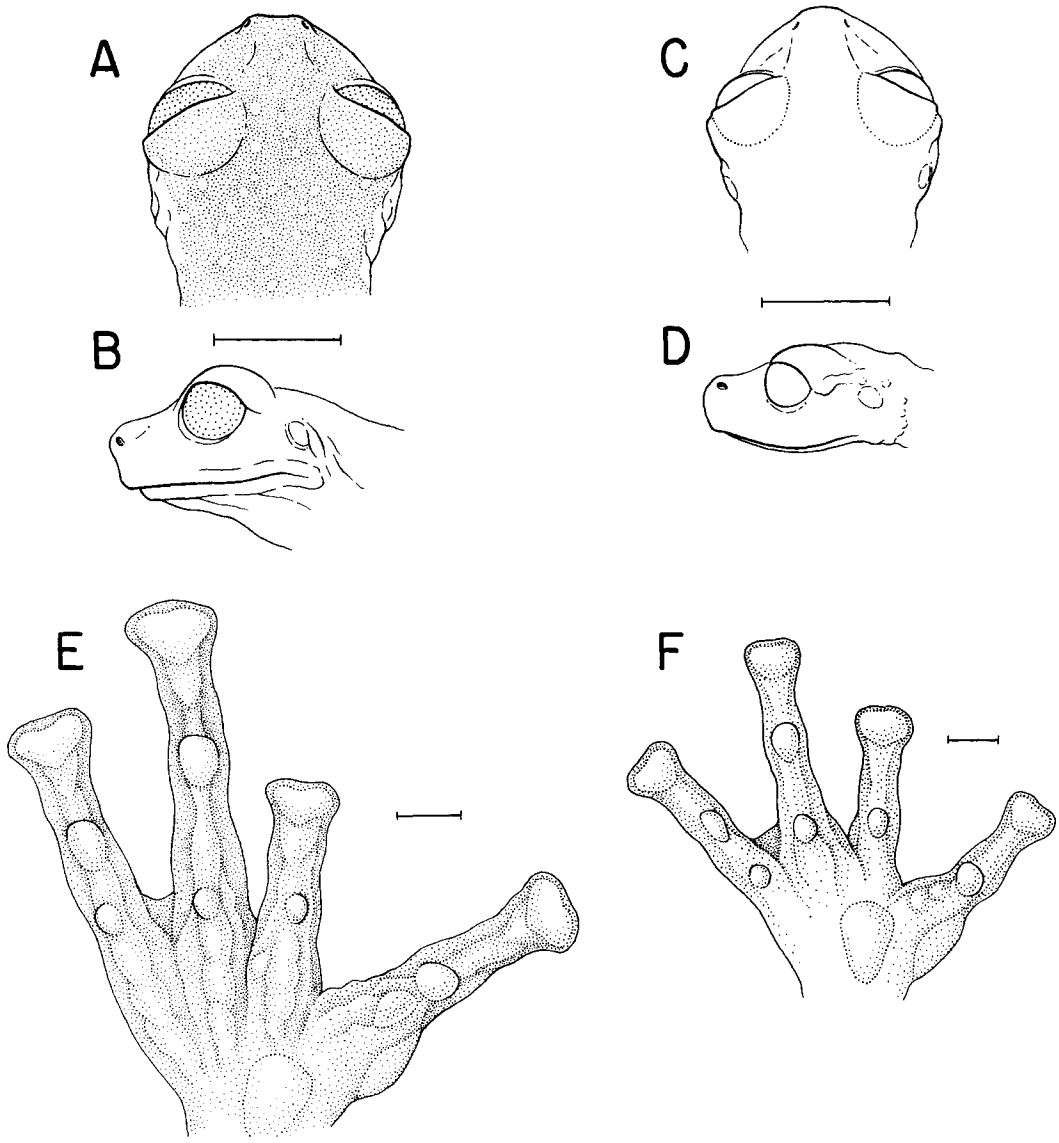

FIG. 1.—(A) Dorsal view and (B) profile of the head of *Centrolenella azulae* (USNM 195988, holotype, 27.5 mm); scale bar = 5 mm. (C) Dorsal view and (D) profile of the head of *Centrolenella puyoensis* (holotype, MCZ 91187, 25.0 mm SVL); scale bar = 5 mm. (E) Palmar view of the hand of *Centrolenella azulae* (USNM 195988, holotype); scale bar = 1 mm. (F) Palmar view of the hand of *Centrolenella puyoensis* (MCZ 91187, holotype); scale bar = 1 mm.

than those on fingers, tips apically rounded, pads roundly triangular (apex directed proximally).

All skin surfaces covered with extremely fine granulations (observable only under high magnifications); skin on dorsum otherwise smooth with a few scattered low warts corresponding to light spots; skin on belly and posteroventral surface of thighs coarsely areolate. Vent a slit formed by a horizontal flap of skin; opening oriented ventrally at mid-level of thighs.

Color in preservative: Cream with a uniform but diffuse lavender stippling on dorsal surfaces of body and limbs except for upper lip and upper arm; small unpigmented spots around low warts interspersed among dorsal stippling; all other

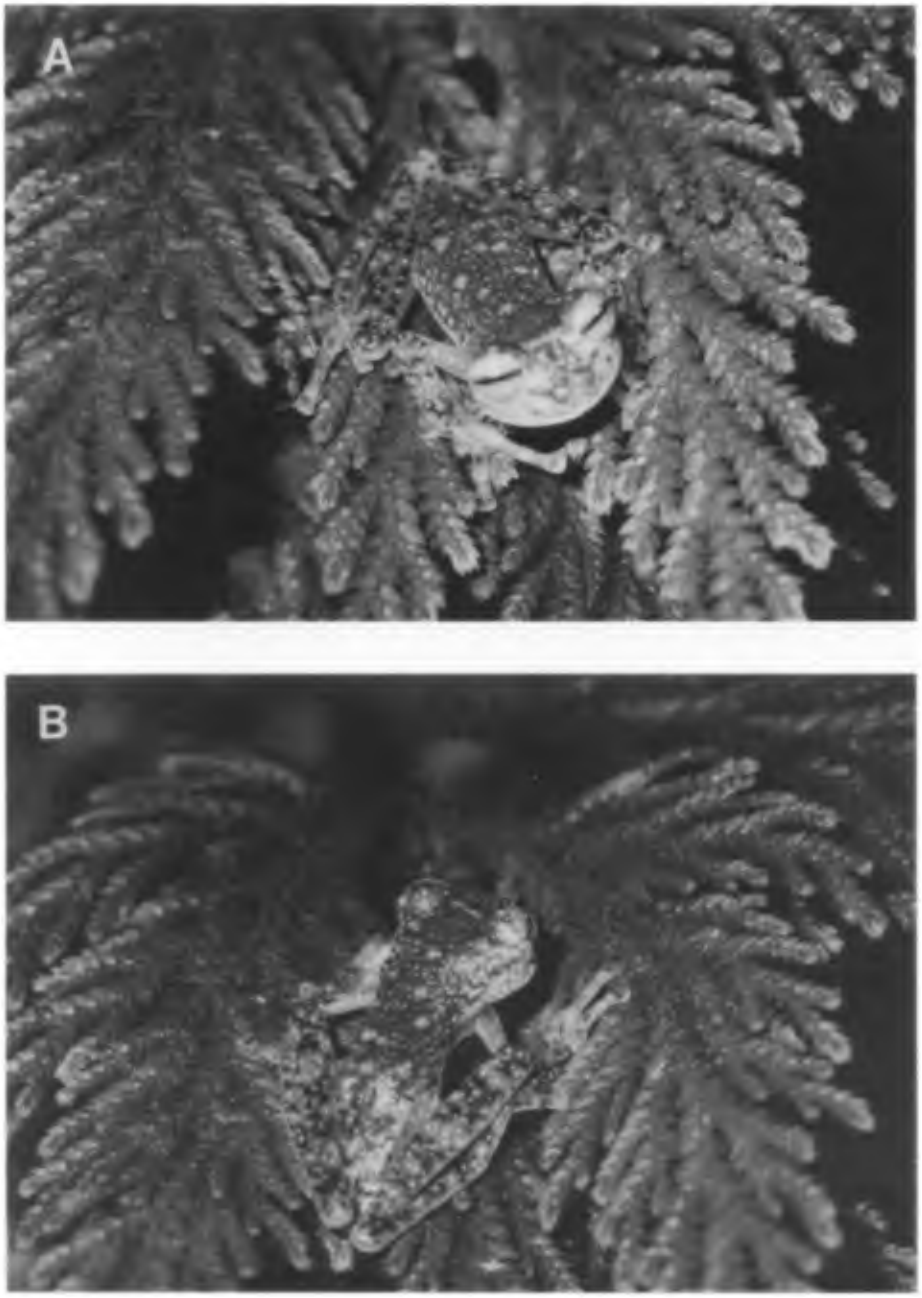

FIG. 2.—(A) Anterior view of holotype of *Centrolenella puyoensis* (MCZ 91187) in life. (B) Posterior view of holotype of *C. puyoensis* in life (from transparencies by Kenneth Miyata).

surfaces cream. Parietal peritoneum white, visceral peritoneum clear.

Color in life (field notes, W. C. Sherbrooke): Dorsal surfaces uniform darkish green with very small (approximately 1 mm) yellow specks that contrast strikingly with background; yellow line along the upper margin of skin surrounding each eye. Ventrally, light bluish green on chin, silver white across chest and anterior half of body,

posteriorly transparent with bluish-green tint. Iris iridescent yellow with numerous wavy black lines.

In his field notes, Sherbrooke matched the following coloration features with plates depicted in Maerz and Paul (1930): the green dorsal coloration corresponds to Plate 22, H-8, and the light bluish green on the chin to Plate 25, G-4. Sherbrooke also noted that the dorsal green coloration varied from time to time.

Measurements of holotype.—SVL 27.5, E–N 2.3, eye diameter 3.9, HW 10.0, head length 9.3, shank length 16.2.

Distribution.—Known only from the type locality.

Etymology.—The specific epithet is the Latin genitive of azul, in reference to the Cordillera Azul.

Comparisons.—For ease of comparison, the numbered diagnostic format of Lynch and Duellman (1973) as modified by Flores (1985) is provided for *Centrolenella azulae.*

(1) Prevomerine teeth 2–3; (2) bones pale green (?); (3) parietal peritoneum white, visceral peritoneum clear; (4) color in life dark green with yellow specks; in preservative, cream with a uniform but diffuse lavender stippling and small interspersed unpigmented spots; (5) webbing between outer fingers minimal, III 3⁻-3⁻ IV; (6) webbing on foot I 2-(2½-2¾) II 1½-(2⅔-3⁻) III 1½-(2⅔-3⁻) IV (3-3⅓)-2 V; (7) snout truncate in dorsal view, slightly protruding in profile; (8) all skin surfaces with very minute granulations (visible only under high magnification); dorsal skin otherwise smooth, with scattered low warts in unpigmented spots; (9) low ulnar dermal fold, no fold on leg; (11) lower one-half to one-third of tympanum visible, directed dorsolaterally with slight posterior inclination; (12) no prepollical spine in female.

Three Peruvian *Centrolenella* have a lavender to purple dorsal ground color with light spots or flecks in preservative. *Centrolenella midas* differs from *C. azulae* (compared in parentheses) in having more webbing on the hands and feet, the lower two-thirds of the tympanum exposed (lower one-half to one-third), a color pattern in preservative of white flecks on a purple ground color (clear spots on a lavender ground color), and in being smaller with the largest adult female 25.6 mm SVL (27.5 mm). *Centrolenella phenax* lacks vomerine teeth (present), has the lower four-fifths of the tympanum exposed, has the first finger as long as the second (first much longer than second), and is smaller with a maximum recorded SVL of 22.1 mm. *Centrolenella pluvialis* lacks vomerine teeth, has the anterior half of the parietal peritoneum white, shows slightly more webbing on the hands and feet, has the lower three-fourths of the tympanum visible, and has the first finger as long as the second.

The only other Peruvian centrolenid requiring comparison to *C. azulae* is *C. mariae*. Both are relatively large centrolenids with vomerine teeth, reduced webbing on the hands and feet, and a first finger much longer than the second. *C. mariae* differs in having a much darker dorsal ground color with much larger light spots (diffuse dorsal ground color with minute light spots), no ulnar fold (present), and a snout that is round in dorsal view (truncate).

Remarks.—The type locality lies within the cloud forests of the Cordillera Azul. It had been raining most of the morning when Sherbrooke collected the holotype from the shoulder of a student, where it had jumped after being disturbed by a class collecting plants. The site is in dense rain forest below the road between Tingo Maria and Pucallpa. The following plants were recorded at the site: Bixaceae—*Bixa orellana*; Caesalpiniaceae—*Cassia* sp.; Fabaceae—*Erythrina* sp.; Lauraceae—*Nectandra* sp.; Mimosaceae—*Acacia polyphylla, Cedrelinga cateniformis, Inga* sp.; Moraceae—*Cecropia* sp., *Clarisia racemosa, Ficus anthelmentica*; Piperaceae—*Piper angustifolium*; and Polygonaceae—*Triplaris* sp. Sherbrooke (1975) provided climatological data and a description for the adjacent foothills at an elevation lower than that of the type locality.

A second distinctive new *Centrolenella* related to *C. azulae* and *C. mariae* was taken by Kenneth I. Miyata in 1975 from the Amazonian slopes of the Ecuadorian Andes.

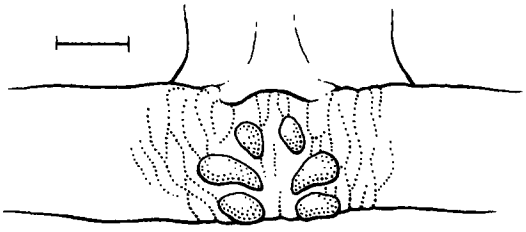

FIG. 3.—Posterior view of holotype of *Centrolenella puyoensis* (MCZ 91187) showing the configuration of paired tubercles and folds below the vent. Scale bar = 1 mm.

Centrolenella ***puyoensis*** sp. nov.

Holotype.—MCZ 91187, an adult female, 25.0 mm SVL, from 1.0 km W Puyo, Provincia de Pastaza, Ecuador, between 1000–1050 m elevation, collected on 24 August 1975 by Kenneth I. Miyata.

Diagnosis.—Distinguished by the following combination of characteristics: dorsal color pattern in preservative dark purplish-gray with numerous large cream spots and small cream flecks (Fig. 2); snout truncate in dorsal view, rounded in profile (Fig. 1); lower three-fourths of tympanum exposed; all skin surfaces with very fine granulations; first finger longer than second; webbing reduced between outer two fingers (basal; Fig. 1F); unique anal ornamentation consisting of a peculiar configuration of tubercles and folds below the vent (Fig. 3).

Description.—Males unknown; adult female holotype of moderately large size, 25.0 mm SVL. Head wider than body; HW 35.6% of SVL. Snout concavely sloping, long, truncate in dorsal view, round in profile; canthus rostralis weakly defined; loreal region slightly concave; lips flared; nostril four-fifths the distance from anterior corner of eye to tip of snout. Eyes protuberant, directed anterolaterally at approximately 45° to long axis of head. E–N 71.4% of eye diameter. Supratympanic fold moderately developed; lower three-fourths of tympanum visible, directed dorsolaterally with a slight posterior inclination. Vomerine dentigerous processes moderate in size, transverse between choanae, each bearing three teeth; choanae round, separated by about 3.5 times their own diameter, equal in diameter to pad of first finger. Tongue very large, extending posteriorly past angle of jaws, ovoid with base wider than apex, not notched behind, barely free posteriorly for about one-twelfth its length.

Low, non-enameled ridge on ventrolateral edge of forearm and hand; finger lengths in decreasing order 3 1 4 2; weak lateral fringes present on fingers; webbing absent between first and second fingers, vestigial between second and third fingers, webbing formula for outer fingers III 3⁻-(2½-2⅔) IV; digital discs poorly developed, only slightly expanded with respect to width of digit, tips truncate to slightly concave, pads roundly triangular (apex directed proximally); subarticular tubercles moderately large, round, flattened, simple; supernumerary tubercles large, some approaching size of subarticular tubercles, numerous; palmar tubercle moderately large, oval; concealed prepollical spine absent. Hindlimbs slender, length of tibia 67.2% of SVL; well-developed, unscalloped fold on tarsus; inner metatarsal tubercle of moderate size, oval (feet somewhat desiccated), outer metatarsal tubercle possibly absent (poor preservation of feet precludes definite determination); subarticular tubercles small, round, simple; supernumerary tubercles small, indistinct; toes about two-thirds webbed, webbing formula I 2-(2⅓-2½) II 1½-2⅓ III (1½-1⅔)-2⅔ IV (2⁻-2⅔)-(1⅔-2⁻)V; toe lengths in decreasing order 4 5 3 2 1; discs on toes poorly developed, only slightly expanded, much smaller than those on fingers, pads rounded.

All skin surfaces shagreened with minute, granular spinules; dorsal skin also with low, very flat warts corresponding to light spots, those posterior to eyelid, above tympanum, in cheek region and under eye with projecting, somewhat rounded spicules. Skin on belly areolate, skin on proximoventral surfaces of thighs lightly rugose. Intricate ornamentation inferior to vent consisting of several folds and small tubercular swellings, and three pairs of prominent tubercles, one pair just below

vent, a second pair at mid-level of thighs, and a third (most prominent and protuberant) on ventral surfaces of thighs (Fig. 3). Vent a slit formed by horizontal flap of skin; opening oriented posteroventrally at mid-level of thighs.

Color in preservative: Dorsal color pattern dark purplish-gray with many large cream spots. Parietal peritoneum white, visceral peritoneum clear.

Color in life (Fig. 2): Color transparencies of the holotype show a parrot-green dorsal ground color with yellow-green spots, flecks, and interorbital bar, and dark green reticular markings on the dorsum of the limbs. The eye is a light blue-green with a transverse green-brown bar running from the medial corner of the eye, through the iris to the lateral corner of the eye. The collector noted that the venter was pale transparent greenish-white.

Measurements of holotype.—SVL 25.0, E–N 2.0, eye diameter 2.8, HW 8.9, head length 8.0, shank length 16.8.

Distribution.—Known only from the type locality.

Etymology.—The specific epithet refers to the type locality, located in the environs of Puyo.

Comparisons.—For ease of comparison, the numbered diagnostic format of Lynch and Duellman (1973) as modified by Flores (1985) is given for *Centrolenella puyoensis*.

(1) Vomerine teeth three on each process; (2) bones green; (3) parietal peritoneum white, visceral peritoneum clear; (4) color in life green with yellow-green spots and flecks; in preservative, dark purplish gray with many large cream spots; (5) webbing between outer fingers III 3⁻-(2½-2⅔) IV; (6) webbing on foot I 2-(2⅓-2½) II 1½-2⅓ III (1½-1⅔)-2⅔ IV (2⁻-2⅔)-(1⅔-2⁻) V; (7) snout truncate in dorsal view, rounded in profile; (8) all skin surfaces with very minute granulations (visible only under high magnification); dorsal skin otherwise shagreened with numerous scattered warts corresponding to light spots; (9) low ulnar and well-developed, unscalloped tarsal folds present; (11) lower three-fourths of tympanum exposed, directed dorsolaterally with slight posterior inclination; (12) no prepollical spine in females.

Centrolenella puyoensis is unlikely to be confused with any other Ecuadorian centrolenid. Only *C. medemi* from the Amazonian slopes of southern Colombia and northern Ecuador shares the distinctive color pattern of a dark purplish-gray ground color with many large, light spots, but *medemi* differs markedly from *puyoensis* in a number of other features: the first finger is shorter than the second, the dorsal skin is smooth, anal folds and tubercles are absent, it has slightly more finger webbing (formula of III 2⁻-1½ IV) and much more toe webbing (almost completely webbed, with a formula of I 0-0 II 0-0 III 0-1 IV 1-0 V), the snout is truncate both in dorsal view and profile, ulnar and tarsal folds are lacking, and the tympanum is concealed.

Only two other *Centrolenella* require comparison with *C. puyoensis*: *C. azulae* and *C. mariae*, both Peruvian species. All three species are relatively large, have prevomerine teeth, a white parietal and clear visceral peritoneum, a dorsum that is some shade of purple with light markings in preservative, reduced hand and foot webbing, and a first finger much longer than the second. As summarized in Table 1, *puyoensis* differs in a number of characters from the other two species: a snout that is truncate in dorsal view and rounded in profile (round, truncate in *mariae* and truncate, protruding in *azulae*), greater tympanum exposure (three-quarters versus a maximum of one-half in the other two species), a dark ground color with large cream spots (as in *mariae*, but diffuse lavender with small colorless spots in *azulae*), slightly greater hand and foot webbing (see Table 1), an ulnar fold (absent in *mariae*), and intricate anal ornamentation (absent in the other two species). Although sample sizes are limited, a comparison of measurements and proportions of the three species (Table 2) indicates notably greater E–N/eye diameter and shank length/SVL ratios for *puyoensis*.

Remarks.—The holotype of *C. puyoensis* was collected in the evening, after 2200

TABLE 1.—A comparison of selected traits among the three species comprising the *Centrolenella mariae* group.

Character	Species		
	mariae	*azulae*	*puyoensis*
Snout shape: dorsal view; profile	round; truncate	truncate; protruding	truncate; round
Tympanum exposure	one-half	one-third to one-half	three-fourths
Color pattern in preservative	purplish-gray with large cream spots	very diffuse lavender with small colorless spots	as in *mariae*
Interdigital webbing (h = hand, f = foot)	h: III 3-3 IV f: I 2-2 II 1½-2½ III 1½-2½ IV 2½-2 V	h: III 3⁻-3⁻ IV f: I 2-(2½-2¾) II 1½-(2⅔-3⁻) III 1½-(2⅔-3⁻) IV (3-3⅓)-2 V	h: III 3⁻-(2½-2⅔) IV f: I 2-(2⅓-2½) II 1½-2⅓ III (1½-1⅔)-2⅔ IV (2⁻-2⅔)-(1⅔-2⁻) V
Ulnar fold	absent	present	present
Ornamentation below vent	absent	absent	present

h. It had rained the previous day and night. Other frogs collected with the holotype included *Eleutherodactylus conspicillatus, E. diadematus, E. lacrimosus, E. lanthanites, E. martiae, E. quaquaversus, Hyla granosa,* and *Hyla* sp.

Duellman and Toft (1979:67) stated that "*Centrolenella mariae* differs from all known centrolenids by the presence of the large paired tubercles on the ventral surfaces of the thighs." At first we also were impressed by the large paired tubercles present on *C. azulae* and *C. puyoensis*, indicating perhaps that these tubercles were unique to this trio of species. However, after carefully comparing most other Ecuadorian centrolenid species plus many other Central and South American species, we realized that most centrolenids possess these tubercles, which range in size from barely noticeable to even slightly larger than those found in *C. mariae*. Indeed, Lynch and Duellman (1973:7) described and figured such "subanal" tubercles, and noted their occurrence in the majority of Ecuadorian centrolenids.

TABLE 2.—Measurements and proportions of female holotypes (and only known specimens) of *Centrolenella mariae, C. azulae,* and *C. puyoensis*. Abbreviations as in text except: ED = eye diameter; HL = head length; and ShL = shank length.

	mariae	*azulae*	*puyoensis*
SVL	30.0 mm	27.5	25.0
HW/SVL	34.7%	35.6	36.4
ED/HL	42.3%	41.9	35.0
E-N/ED	61.0%	59.0	71.4
ShL/SVL	55.3%	58.9	67.2

DISCUSSION

Centrolenella azulae and *C. puyoensis* are closely related to *C. mariae* from the Serranía de Sira of Perú (see Fig. 4 for the distributions of these species). We consider these three species to form the *C. mariae* species group, sharing the following characters: (1) vomerine teeth and dentigerous processes; (2) parietal peritoneum white, visceral peritoneum clear; (3) color pattern in preservative some shade of purple with light spots; (4) interdigital webbing very reduced; (5) first finger longer than second; (6) minute granulations present on all skin surfaces.

We tentatively view characters (4) and (6) above as synapomorphies defining the *C. mariae* species group, basing our hypothesis on the following proposed character polarities (0 = primitive state, 1 = derived state):

A. Interdigital Webbing

We follow Duellman's (1975) view that the Centrolenidae probably is derived from the Hylidae, and therefore have used hylids as an outgroup and interpreted widespread character states within hylids as primitive for centrolenids. Our impression from the literature and familiarity with hylid species is that most hylids possess at

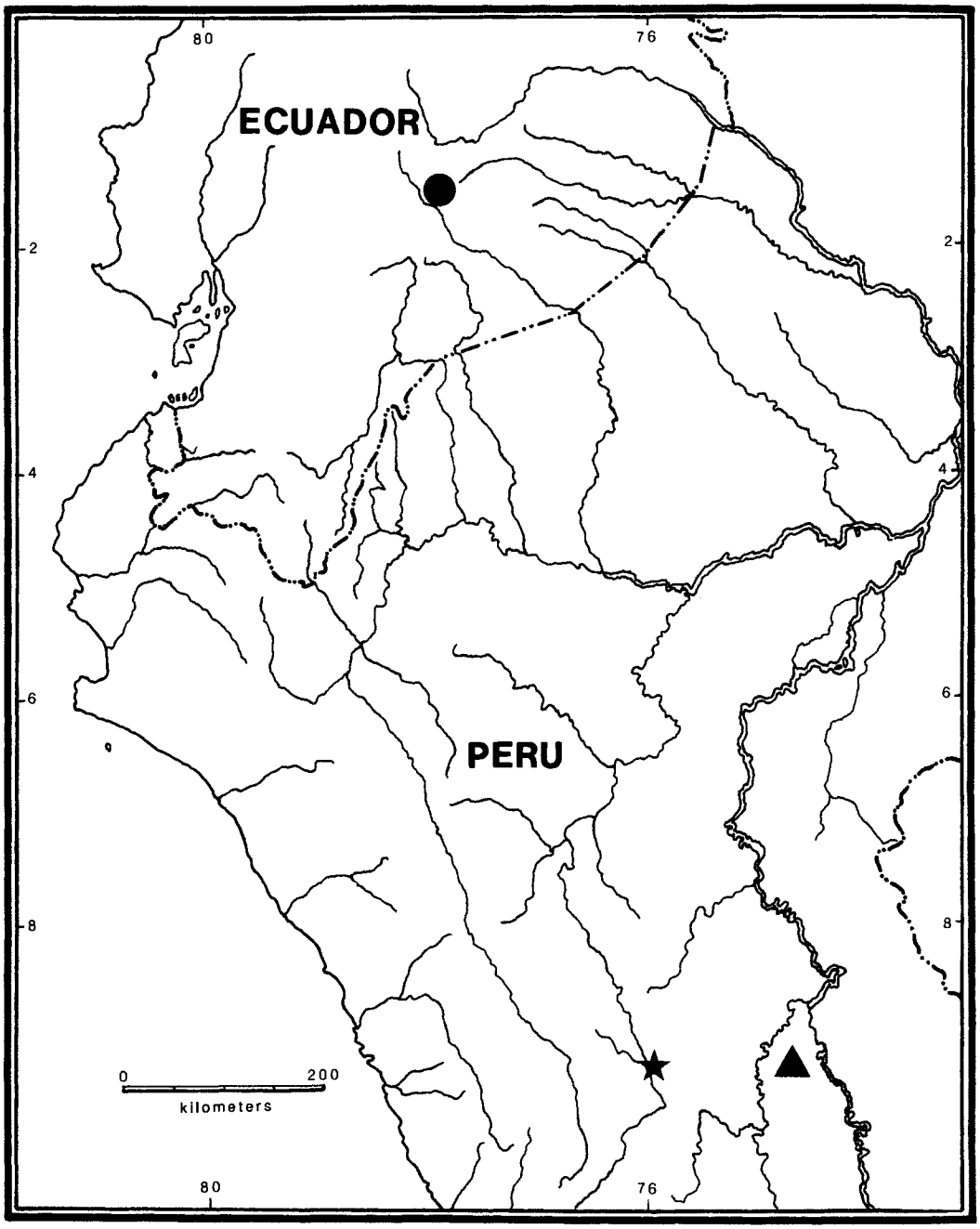

FIG. 4.—Map of southern Ecuador and northern Perú showing locality records for *Centrolenella puyoensis* (dot), *C. azulae* (star), and *C. mariae* (triangle).

least partial webbing of the hands and feet. The majority of the Middle American hylids, for example, possess partial to full interdigital webbing (Duellman, 1970). Within centrolenids, at least partial interdigital webbing also seems to be widespread. For example, only six of the 19 Ecuadorian species reviewed by Lynch and Duellman (1973) have webbing formulas which approach those of the *C. mariae*

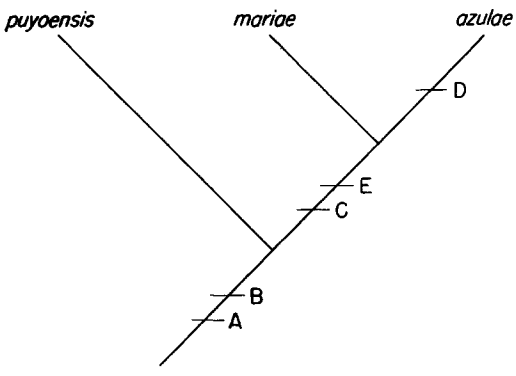

FIG. 5.—Postulated relationships within the *Centrolenella mariae* species group. Traits are lettered, and correspond to the derived state (1) as discussed in the text.

species group. Therefore, reduction of interdigital webbing is considered derived, and the coded character states and polarity are: 0 = at least partial interdigital webbing; 1 = interdigital webbing very reduced or absent.

B. Minute Granulations on Skin Surface

No other known centrolenids possess such granulations, and their presence in the *mariae* group is therefore viewed as derived: 0 = absence of minute granulations on skin surface; 1 = presence of minute granulations on skin surface.

On the basis of the preceding two characters, we tentatively establish the *mariae* group based on character states considered synapomorphic. Our presently inadequate knowledge of centrolenid relationships and lack of information on variation within the group, together with the likelihood that undescribed species occur within the distribution of the *mariae* group, preclude analysis of the other four characters shared by the species group, and preclude anything more than this preliminary group description.

Comparisons within the *mariae* group (Tables 1 and 2) reveal several differences, three of which are useful for phylogenetic analysis.

C. Tympanum Exposure

Most Middle American hylids (Duellman, 1970:25) and Ecuadorian centrolenids (Lynch and Duellman, 1973:5) exhibit a partially- to fully-exposed tympanum, a fully-concealed tympanum occurring in few species. We therefore consider there to be an evolutionary trend toward reduction in tympanum exposure, with less exposure being more derived. Within the *C. mariae* group, *puyoensis* possesses a tympanum that is three-fourths exposed, while *mariae* and *azulae* have tympanums one-half or less exposed. The coded character states and character polarity are: 0 = tympanum three-fourths exposed; 1 = tympanum one-half exposed.

D. Color Pattern in Preservative

Both *C. mariae* and *C. puyoensis* have a dark purplish-gray ground color with large cream spots, a color pattern shared by the unrelated *C. medemi*. *Centrolenella azulae* has a very diffuse lavender dusting with small colorless spots, an apparently unique color pattern. As such we view the color pattern of *azulae* as more derived: 0 = dorsal color pattern in preservative dark purplish-gray with large cream spots; 1 = dorsal color pattern in preservative diffuse lavender with small colorless spots.

E. Hand Webbing

As explained in A, we consider reduced interdigital webbing to be more derived. Table 1 reveals slight differences in hand webbing formulae among the three *mariae* group species, with the most marked difference between *puyoensis* (slightly more webbing) and the other two. Although the webbing formula is subject to some intraspecific variability, we tentatively view the hand webbing differences in the *mariae* group to be phylogenetically significant in the following manner: 0 = hand webbing formula <III 3-3 IV; 1 = hand webbing formula III 3-3 IV or greater.

Our hypothesis of relationships in the *C. mariae* group is summarized in Fig. 5. We consider *puyoensis* to be most primitive by virtue of its greater tympanum exposure and more extensive hand webbing. *Centrolenella azulae* is considered more

derived than the other two species in its unique color pattern.

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A NEW SPECIES OF *CONIOPHANES* (SERPENTES: COLUBRIDAE) FROM NORTHWESTERN PERU

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Abstract: A new species, *Coniophanes longinquus*, is described from the Río Zaña Valley on the western slope of the Andes in northwestern Peru. It is the southernmost species of the genus, and the only one for which definite Peruvian localities are known. It differs from all congeners in having a unique pattern of paired dorsal blotches on the anterior part of the body, and is unusual in having only 17 dorsal scale rows at midbody. The new species appears to be closely related to *Coniophanes dromiciformis* of southern Ecuador and *C. joanae* of eastern Panama on the basis of shared details of color pattern and hemipenial structure. The occurrence of *Coniophanes dromiciformis* in Peru, based on two specimens from the James Orton collection, is questionable.

Key words: Colubridae; *Coniophanes*; *Coniophanes longinquus*; *Coniophanes dromiciformis*; Peru; South America

Snakes of the genus *Coniophanes* occur primarily in humid or subhumid forests of Mexico and Central America (McCoy, 1969; Myers, 1969). Two species have been reported from South America: *C. fissidens*, a wide-ranging Mexican and Central American species that is known from several localities in western Colombia and northwestern Ecuador; and *C. dromiciformis*, reported from the vicinity of Gua-