THE ANURA (AMPHIBIA) OF RIO UPANO VALLEY OF EASTERN ECUADOR

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ABSTRACT

This manuscript describes taxonomic work on the anuran fauna of several localities in the Rio Upano Valley of Eastern Ecuador. The multifold significance of the project is documented and the work of other investigators is discussed.

INTRODUCTION

The anuran fauna of the Upano Valley comprises, to date, 11 genera and 25 species, a taxonomic diversity inferior to that of Santa Cecilia, Province of Napo, in the adjacent tropical lowlands. Approximately 24 genera and 81 species are known to occur at Santa Cecilia (Crump, 1974).

To our knowledge one genus (Adenomera) and two species (A. hylaedactylus (Cope) and Colostethus bocagei (Jimenez de la Espada) have not been reported previously from eastern Ecuador. The remaining nine genera and 23 species have been encountered at Santa Cecilia (Crump, 1974). Moreover, the Upano series appear to be conspecific with the lowland populations. Species of Andean provenance were not obtained in the Upano valley. Unquestionably, the Upano valley will yield a greater diversity of species with continued intensive investigation.

Paralleling the Andean escarpment, the Upano valley is partially isolated from the eastern lowlands by the Vieja Cordillera de Cutucú (Fig. 1). Immediately south of the confluence of Rios Upano and Paute the valley is narrowly contiguous with the Amazonian lowlands. Within the valley, base elevations decrease from 1,000 meters near Macas to 914 meters at Méndez. In the greatest length, the Upano valley is 80 kilometers with a maximum width of 20 kilometers.

The lower slopes of the foothills and the western flanks of the Vieja Cordillera de Cutucú are characterized by Tropical Evergreen Rainforest (Rumney, 1968). Scattered remnants of the indigeneous vegetation are extant on the valley floor. Extensive agriculture and cattle husbandry have drastically altered the floristic aspect.

The documentation of the Anura of the Upano valley is of multifold significance: (1) elimination of a biogeographic hiatus in Amazonian Ecuador, (2) establishment of a basis for studies of faunistic changes in a highly disturbed area, and (3) comparison of variation within geographically isolated populations and lowland conspecifiers.

In a previous report (Fugler and Walls, in press, Journ. Tennessee Acad. Sci.), it was noted that certain snake populations in the Upano valley exhibit infra-

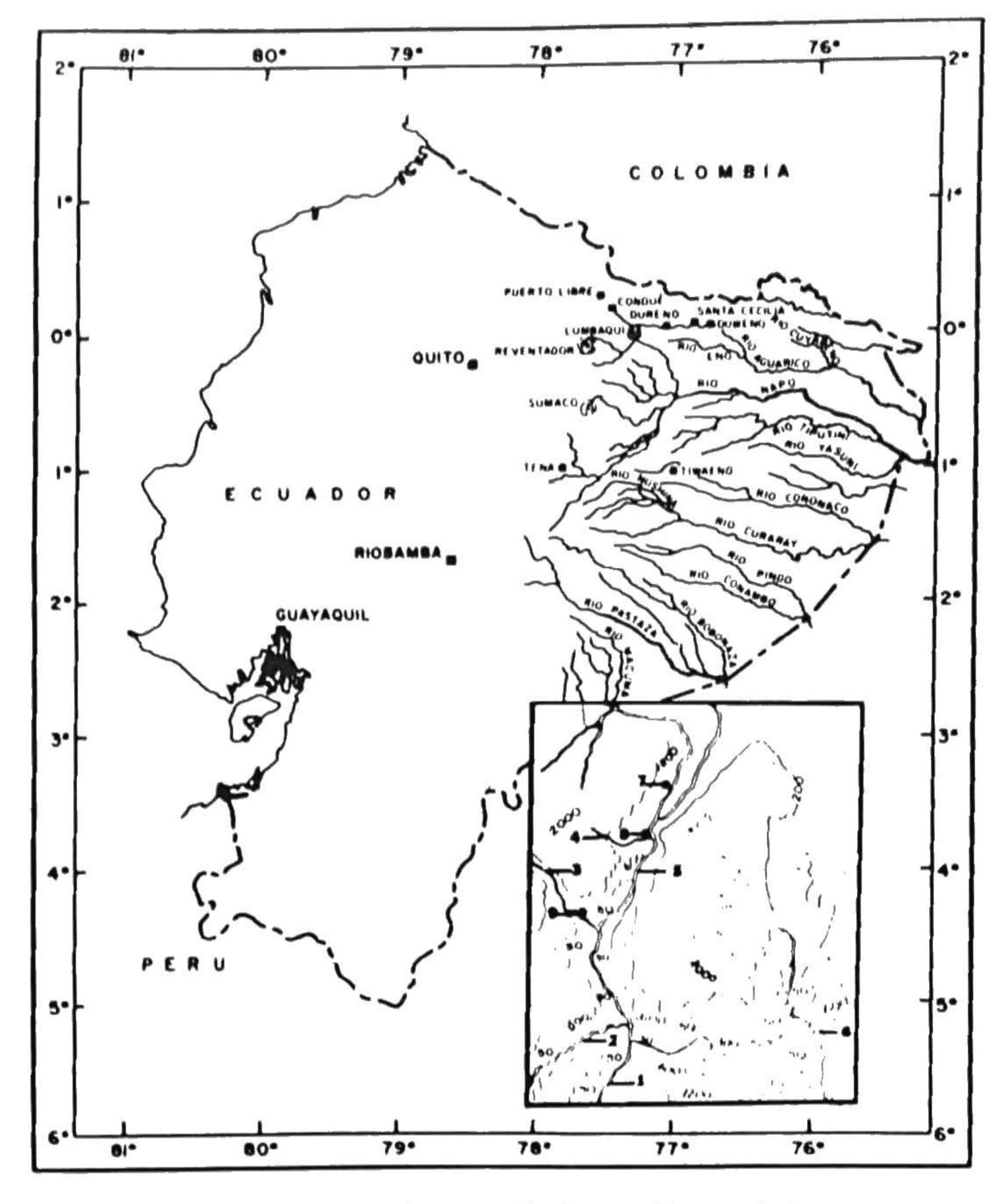


FIG. 1. Map of Ecuador and the valley of Rio Upano (inset): Key to numbered localities: 1- Río Coangos 2- Río Zamora 3- Río Paute 4- Río Tutangoza 5-Río Upano 6- Río Santiago 7- Macas 8- Sucúa 9- Méndez. Localities cited in text but not included on map: Sevilla Don Bosco (E bank of Río Upano opposite Mascas); San José (5 kms. SW Sucúa).

taxonomic divergence from the populations of the adjacent lowlands. Although similar divergence is not observed in the anuran populations, upon the accumulation of adequate series from the Upano valley, such differentiation may exist. Series of apparently undescribed species of *Eleutherodactylus* and *Hyla* are being studies by specialists in the group.

ACCOUNTS OF SPECIES

The taxonomic allocations have been determined by Dr. Shreve of the Museum of Comparative Zoology, Harvard University. With certain exceptions, these determinations are followed. The arrangement of the species is alphabetical.

The specimens discussed hereinafter are deposited in

the Museum of Comparative Zoology (MCZ) and the Vertebrate Collections of the University of North Carolina-Wilmington (UNC-W).

Adenomera hylaedoctylus (COPE)

1868. Cystignathus hylaedactylus Cope, Proc. Acad. Nat. Sci. Philadelphia, 30:15.

1973. Adenomera hylaedactylus (Cope)-Heyer, Contrib. Sci., Los Angeles County Mus. Nat. Hist., 253;32.

Heyer (1973) cited a combination of characters by which A. hyluedactylus is differentiated from other species of the marmoratus group. Although some divergence obtains, the Upano series agrees with the specific diagnosis.

In the Upano series the toes are not expanded into flattened disks; tour longitudinal rows of symmetric dark spots are not present (in some individuals a tendency toward the formation of dorsal stripes is noted); a distinct dorsal stripe extends from the anus to the sacral region in most individuals; the dorsum varies from light-to dark-brown (in individuals with the light dorsum dorsal spots are present and in individuals with a dark dorsum the dorsal spotting is obscured); dorsolateral stripes, present in few individuals, do not reach the eye; a broad middorsal stripe is not present.

Morphometrically, the Upano series conforms with the data previously presented (fide Heyer, 1973) with one exception. The ratio of femur length/anout-vent length (SVI) is attorigly divergent (mean ±1 standard deviation ±1 standard error): MM, 41.22±2.55±0.51; PF, 41.11±2.27±0.42; Heyer (1973), 30.0 ± 3.4. Other morphometric data of the Upano series are as follows; head length SLV, MM, 38.07 ± 1.86 ± 0.1; FF, 36.41 ± 1.87 ± 0.3; head width SVL, MM, 34.61 ± 1.64 ± 0.31; FF, 13 69 ± 1.06 ± 0.20; interorbital distance SVI, MM, 10.1 ± 0.83 ± 0 17; FF, 9.85±0.70±0.13; tibia length/SVL, MM, 47.26± 3.16±0.63; 11, 44 00±5 44±1.01.

A. hylaedactylux, abundant in the Upano valley, has not been reported previously from eastern Ecuador although the species is known from adjacent Columbia and Perú (Heyer, 1973), The presence of A. hyloeduciblus in the Upano valley significantly increases the altitudinal range. The previously reported maximum was 500 m. (Heyer, 1971).

Province of Morona Santingo, Sucua, MM, UNC-W 5, 8, 98, 484, 486 88, 496, 500, 507, 510, 511, 517; FF, UNC-W 15, 479 80, 483, 308 09, 311-12, 314, 320 21, 323-24, 10 Kms, W. Sucha, MM, UNC-W 490, 516. San José, MM, UNC-W 99-100, 489, 491-92, 497-99, 502, 504, 519, 111, UNC-W 101-02, 491, 494-95, 503, 505-06, 518, 522, Mendez, F. UNC-W 501,

Bufo typhonius alatus (Thominot)

1884. Bulo alatur Thominot, Bull. Soc. Philom., 7 (8):151.

1933. Bufo typhonius alatus (Thominot)-Leavitt, Copein, 1:8.

On the basis of five diagnostic characters, Leavitt (1933) allocated the Colombian and Venezuelan populations of B. 17phonius to subspecific status (alatus). Cochran and Goin (1970), noting the great latitude of variation of the subspecific characters, concluded that the populations of H. typhonius were not geographically distinguishable. The Upano series agree closely with the subspecific diagnosis and are herein allocated to B_{i} \pm , alatus,

Variation in selected morphometric characters (in mm.) is as follows: snout-vent length, 21.5-38.5; head length, 7.0-14.8; head width, 78-15.2; femur length, 7.6-15.7; tibia length, 7.9-14.1; foot length, 10.5-21.3.

In life, a distinct middorsal, light-brown stripe extends from the tip of the amout to the anus. The dorsum is dark-brown. The light-brown venter is heavily punctuated with irregularlyshaped melanophores.

B. ±. alatus is reported from numerous localities in the eastern Ecuadorian lowlands and from elevations in eastern Ecuador similar to those of the Upano valley (Parker, 1938).

Province of Morona Santiago, Sucua, MM, UNC-W 9, 11, 10 kms. W Sucha. Unsexed, UNC-W 302-03.

Colostethus bocagei (JIMENEZ DE LA ESPADA)

- 1871. Hyloxalus bocagei Jimenez de la Espada, Journ. Sci. Math. Lisbon, 3:59.
- 1971. Colostethus bocagei (Jimenez de la Espada)-Edwards, Proc. Biol. Soc. Washington, 84 (18):

A single male represents the presence of the species in the Upano valley. The species is known from other Ecuadorian

In preservative, the dorsum is dark-brown. Paired lightyellow dorsolateral stripes are evident; the superior stripe beginning at the posterior aspect of the eye and terminating at the sacral region. The inferior stripe of the same color begins at a point dorsal to the insertion of the humerus and terminates in the sacral region. The upper lip is light-brown. The anterior limbs, light-brown, possess distinct dark-brown bands. The posterior limbs are mottled light- and dark-brown, the dark-brown tending toward banding. The venter, throat, and inferior surfaces of the limbs are yellow-white with minute black punc-

Morphometric data are: snout-vent length, 20.8 mm.; head length, 6.8 mm.; tibia length, 10.8 mm.; greatest diameter of tympanum, 1,3 mm.

Province of Morona Santiago, Sucua, M, UNC-W 547.

Eleutherodactylus conspicillatus (GUNTHER)

1858. Hylodes conspicillatus Günther, Cat. Batr. Sal. Brit, Mus., Ed. 2:92,

1975. Eleutherodactylus conspleillatus Günther-Lynch. Contrib. Sci., Los Angeles County Mus., 272:3.

The systematic status of E. conspicillatus was extensively reviewed by Lynch (1975). In pertinent characters, the single individual from the Upano valley is in agreement with the apeeific diagnosis,

Significant morphometric characters are as follows (fide Lynch, 1975); shout-vent length (SVL), 33.1 mm.; head length/SVL, 31.7条; femur length/SVL, 45.0%; tibia length/ SVL, 53.1第; eye length/interorbital distance, 1,1第; tympanum diameter/eye length, 50,0%; eye to nostril length/eye length.

In life, the dorsal ground color is dark-green. Well-defined black chevions, narrowly bordered in yellow, traverse the dorsum. Red reticulation is prominent on the posterior aspect of the femur. The dorsal surfaces of the limbs are barred in black.

E. conspicillatus is reported from numerous localities on the eastern slope of the Ecuadorian Andes at elevations similar to those of the Upano valley (Lynch, 1975).

Province of Morona Santiago, Sucua, M. UNC-W 1-

Eleutherodactrylus lachrimosus (Jimenez de la Espada) 1875. Cyclocephalus lacrimosus Jimenez de la Espada, Vert. viag. Pacif. Verif. Batr., Lisboa: pl. 3,

The single male (24 mm, shout-yent length) conforms to the description of lowland Ecuadorian populations (Duellman, 1978). Notable differences occur in dark dorsal markings (not present), nature of the dorsal skin (not smooth), and nature of the ventral skin (granular).

The dorsum and flanks, light tan, possess no observable darker marks. The limbs are not barred. The anterior and posterior surfaces of the thigh are tan. The venter cream.

Province of Morona Santiago, San José, M. MCZ 96886.

Eleutherodactylus lanthanites Lynch 1975. Eleutherodactylus lanthanites Lynch, Contri. Sci. Los Angeles Co. Mus., 272:10.

E. lanthanites, uncommon in the Upano valley, is abundant in the adjacent tropical lowlands (Duellman, 1978).

The two individuals agree with the specific description (Duellman, op. cit.) except for certain characters of coloration: pale canthal strips not present (MCZ 97221); pale brown face not present (dark brown); gray throat with median white streak not present (mottled brown with white streak) (MCZ 96887, MCZ 97221); belly not creamy (moderately mottled with brown) (MCZ 96887, MCZ 97221).

The male measures 23 mm, snoot-vent length and the gravid female 37 mm.

Province of Morona Santiago, San osé, MCZ 96887, 10 km. W. Sucua. F, MCZ 97221.

Eleutherodactylus ockendeni Boulenger

1882. Eleutherodactylus ockendeni Boulenger, Cat. Bat. Sal. s. Ecaud., Ed. 2:1882.

The lone female from the Upano valley is referrable to morph A (lacking a prominent occipital mark) as defined by Lynch (1974). In all pertinent characters, the specimen is in conformity with the specific diagnosis (Lynch, 1974).

width/snout-vent length (SVL), 40.2%; head length/SVL, 37.1%, femur length/SVL, 52.7%; tibia length/SVL, 57.8%; tympanum diameter/head length, 7.0%; eye diameter/head length, 36,8%.

In life, the dorsum is translucent buff and on which a middorsal white stripe, edged in black, extends from snout to anus. The venter is translucent white.

E, ockendent is reported from numerous localities in eastern Ecuador at elevations varying from 300 m. to 1,200 m. (Lynch,

Province of Morona Santiago, Sevilla Don Bosco, F, UNC-W

Eleutherodactylus variabilis LYNCH

1968. Eleutherodactylus variabilis Lynch, Journ. Herpetol., 2(3-4):129.

This diminutive species is represented by a single male. Its occurrence in the Upano valley significantly extends the known geographic and altitudinal distribution, E. variabilis was previously known only from the type locality (Province of Napo: Limón Cocha) and adjacent localities (Province of Napo: Santa Cecilia, Río Aguarico).

The specimen conforms with the specific diagnosis (Lynch, 1968) except for the following characters (diagnostic characters in parentheses): first finger much shorter than second (first finger slightly shorter or as long as second); weak lateral fringes are present on fingers (fingers lacking lateral fringes),

Morphometric data are as follows: snoat-vent length, 16.6 mm; head width, 5.5 mm; femur length, 7.7 mm; tibia, length, 8.9 mm.; interorbial distance, 2.1 mm.; eye length, 2.3 mm.; tympanum width, 0,7 mm,

The individual exhibits the "mid-dorsal stripe" pattern of the heretofore described polymorphic variation. In details of color and color pattern, the specimen is in agreement with the specific diagnosis (Lynch, 1968).

The dorsum, in life, is yellow-brown. The ill-defined, middorant stripe is yellow-orange. Fore- and hind- limbs possess dark-brown burs. The venter is uniformly cream,

Province of Morona Santiago, Sucun. M, UNC-W 12. Hyla bifurca Annursson

1945. Hyla (Hylella) bifurca Andersson, Arkiv. för Zoologi, 37A (2):17,

Duellman (1974), reassessing the taxonomic status of the members of the H. leucophyllata group, tabulated morphometric variation in a lowland Ecuadorian population (Province of Napo:Santa Cceilin) of II, bifurca with which the Upano series is in essential agreement.

Morphometric variation in the Upano series (males only) is ns follows: (minimal mean range, mean-maximal mean range, side Duellman, 1977); tibia length/snout-vent length (SVL), 52.0-58.2-63.6; head length/SVL, 29.2-34.8-39.1; tympanum/eye, 27.6-34.1-45.2; SVL, 22.0-23.9-26.0 (mm.),

The dorsum is dark-brown (light-brown, UNC-W 339) with small mid-dorsal punctations in most individuals, in two specimens (UNC-W 113, 110), the dorsum possesses white punctation. Black punctation is present in one (UNC-W 112). The broad inverted U-Shaped stripe, covering the top of the snout and edges of the cyclids, varies from cream to light-brown. The paired dorsolateral stripes terminate approximately equidistant between the insertion of the humerus and femur. In a few individuals, the stripes attain the sacral region. In all but one individual, white spots are present on the tibia distally (white spots present on tibia proximally in UNC-W 108) and immediately above the anus. Variation includes several white spots on the tibia (UNC-W 113), and elongation of the anal white spot (UNC-W 114).

In life, the dorsal ground color varies from olive-green to dark-brown.

H. bifurca was most frequently encountered on vegetation in marshy areas.

The species is reported from Andean elevations of 1,400 m (Duellman, 1974). In Ecuador it has not been reported from localities south of the Río Pastaza drainage.

Province of Morona Santiago, Sucúa, MM, UNC-W 196-97, 202-06, 208-09, 212-14, 216-19, 221, 224-26, 228. San José. MM, UNC-W 198-200, 210-11, 215, 217, 220, 222-23, 227, 229-30, 339; F. UNC-W 201, Sevilla Don Bosco, MM, UNC-W 103-17; F, 207,

Hyla fasciata GUNTHER

1859. Hyla fusciata Günther, 1959:100.

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Duellman (1973), noting that H, calcarata and H, fasciata are difficult to distinguish, enumerated ten characters unique to the latter. The Upano series, although allocable to H. Jusciata, exhibit certain traits diagnostic of H, calcarata.

In the Upano series, the webbing of the hand is vestigial, the calcar is small and conical and the palpebrum is unmarked. The posterior surface of the thigh is distinctly barred and the webbing of the foot is tan- In one individual (UNC-W 315), the dorsum is dark-brown with faint transverse markings (light yellowish-tan with faint transverse markings in others). A narrow, well-defined middorsal dark stripe from the snout to the posterior aspect of the dorsum occurs in all individuals except one (UNC-W 310) in which the stripe is discontinuous. The flanks are spotted anteriorly (UNC-W 310) or bear no markings (UNC-W 312) in contrast to the distinctly barred condition diagnostic of the species. The ventral surface of the thigh is flecked in one individual (UNC-W 310) and immaculate in the others. The belly is unmarked in all specimens, characteristic of H. calcarata.

The maximum shout-yent lengths (SVL) are 35.6 mm, (M) and 50.4 mm (F). Additional morphometric data are (minimal range-mean-maximal range); head length/SVL, MM 33,9-34,4-35.2, FF 31,4-32.0-32.5; head width/SVL, MM 33,3-33,9-34.3, FF 32,9-33,0-33,3; tibia length/SVL, MM 55-0-57,0-59,3, FF 54,7-56.9.3,

In life, the dorsum is light greenish-brown with light-brown transverse bars. The dark-brown middorsal stripe extends from the shout to the anal region. Prominent dark-brown bars are present on the posterior aspect of the femur. The venter is tan-

The series was obtained at night in dense vegetation bordering a small stream.

11. fasclata is reported from numerous localities in the adjacent lowlands and from elevations similar to those within the Upano valley.

Province of Morona Santiago, Sucúa, MM, UNC-W 310, 312, 35; F. UNC-W 313. Macas. F. UNC-W 311, 316. San José. M. UNC-W 314.

Hyla funerea (Coru)

1874. Scytopis funereus Cope, Proc. Acad. Nat. Sci. Philadelphia, 25:123.

1882. Hyla funerea (Cope)-Boulenger, Cat. Batr. Sal. s. Ecaud., Ed. 2:404.

II. funerea is one of the more frequently encountered species in the Upano valley. Its presence in eastern Ecuador was previously established (Crump, 1974).

In life, the dorsum varies from lime-green to light-brown. Distinctly darker mottling or recticulation is present dorsally. The venter is yellow-green. In preservation, the dorsal ground color and the ventral color are cream. Brown reticulation and irregular, ill-defined brown stripes occur dorsally. Brown bars are present on one male,

Selected morphometric data, mean and range (in parentheses) are as follows (males only); snout-vent length (SVL), 24.03 mm. (19.9 mm.-26.1 mm.); head width/SVL, 0.32 (0.30-0.35); head length/SVL, 0.34 (0.32-0.37); femur length/SVL, 0.43 (0.40 - 0.49).

The individuals were captured at night either submerged in shallow water or on low emergent vegetation. The males were in chorus.

Province of Morona Santiago, Sucúa, MM, UNC-W 403-08, 410-16; F. UNC-W 409. Sevilla Don Bosco. M. UNC-W 401: F. UNC-W 400, Méndez, M, UNC-W 402.

Hyla garbei (MIRANDA-RIBEIRO)

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1926. Garbeana gargei Miranda-Ribeiro, Arch. Mus. Nac. Rio de Janeiro, 27:96.

1970. Hyla garbei (Miranda-Ribeiro)-Duellman, Copeia, 3:536.

Duellman (1970a) enumerated seven diagnostic characters of the boulengeri subgroup of the H- rubra group of which two are unique to H. garbeis: (1) small, elongate tubercule on the heel, and (2) a row of tubercules along the lower edge of the jaw.

In the Upano series, the tubercule on the heel is small and truncate rather than elongate. The tubercules of the jaw are small, slightly elevated, and widely spaced. The Upano series is not a variance with the characters delineating the boulengeri subgroup and the H, rubra group.

The snout-vent length (SVL), mean ± 1 standard deviation \pm standard error (range in parentheses), in males, $31.2\pm 1.1\pm 0.31$ (31.2-35.0) is slightly less than previously reported (33.3 mm.) Duellman, 1970). Other biometric data are as follows (males only): head length/SVL, $0.38\pm 0.1\pm 0.02$ (0.36-0.39); tibia length/SVL, $0.56\pm 0.38\pm 0.10$ (0.53-0.59); tympanum/eye, $0.52\pm 0.05\pm 0.01$ (0.43-0.62).

In life, the dorsum varies from olive-green to dark-brown. Irregular dark markings within which are green spots are present dorsally. The lateral aspect of the body is yellow. The anterior and posterior surfaces of the femur are yellow-orange with darker bands. The white venter possesses gray-green flecks. H. garbei is reported from numerous localities in eastern

H. garbei is reported from numerous localities in eastern Ecuador and from elevations similar to those of the Upano valley.

Province of Morona Santiago. San José. MM, UNC-W 464, 477. Sevilla Don Bosco. MM, UNC-W 465-70, 472-76, 478-9; F, UNC-W 471.

Hyla geographica SPIX

1824. Hyla geographica Spix, Atlas, 1824:39.

The three species of the *H. geographica* species group, two of which (*geographica* and *fasciata*) occur sympatrically in the Upano valley, have been treated in detail (Duellman, 1973). The Upano population is conspecific with those of the adjacent tropical lowlands.

H. geographica, relatively abundant in the Upano valley, exhibits the following morphometric variation (mean ±1 standard deviation ±1 standard error (range in parentheses)) (males only): head width/snout-vent length (SVL), 39.9±1.54±0.24 (35.0-42.8); head length/SVL, 36.5±2.22±0.35 (33.3-41.1); tibia length/SVL, 59.14±3.01±0.47 (52.6-68.4); SVL, 36.05±1.89±0.29 (32-40).

Ontogenetic color changes and color and color patterns of adults are in conformity with Duellman's (1973) descriptions.

H. geographica, widely distributed in eastern Ecuador, is reported from elevations similar to those of the Upano valley (Duellman, 1973).

Province of Morona Santiago. Sevilla Don Bosco. MM, UNC-W 383, 385-93, 395-99, 417-31, 433-42; FF, UNC-W 382, 384, 394, 432.

Hyla granosa Boulenger

1882. Hyla granosa Boulenger, Cat. Bat. Sal. s. Ecuad., Ed. 2:358.

The two individuals were captured at night on emergent vegetation of a small pond.

The dorsal ground color, bright-green in life, possesses a faint emerald-green shading. Numberous black spots are dispersed on the dorsum. The limbs are bright yellow with black bars. The venter is emerald-green.

In preservative, the living colors have faded to cream-white as noted by Cochran and Goin (1971). Widely scattered black spots are present on the dorsum, lower arm, shank, and lower leg. A distinct black stripe extends from the nostril to a point immediately anterior of the eye. The choroid coat is glistening black as previously described (Cochran and Goin, 1971). The specimens also conform with Rivero's (1961) description of the Venezuelan form.

No morphological differences are detectable between the Upano specimens and the species description (Cochran and Goin, 1971).

Morphometric characters (in mm.) are as follows (UNC-W 298-299 respectively): snout-vent length, 34.4, 33.2; head length,

11.4, 10.7; head width, 12.5, 12.4; femur length, 17.2, 16.0; tibia length, 16.4, 16.3; inter-orbital distance, 4.0.

Province of Morona Santiago. Sevilla Don Bosco, MM, UNC-W 298-99.

Hyla lanciformis (COPE)

1870. Hypsiboa lanciformis Cope, Proc. Am. Philos. Soc., 11:556.

1882. Hyla lanciformis (Cope)-Boulenger, Cat. Bat. Sal. s. Ecaud., Ed. 2:361.

H. lanciformis, the only member of the lanciformis group (fide Cochran and Goin, 1970) known from eastern Ecuador, is relatively abundant in the Upano valley. The species is known from numerous localities in eastern Ecuador and from localities of similar elevations to those of the Upano valley (Cochran and Goin, 1970).

The Upano series is in conformity with the specific diagnosis (Cochran and Goin, 1970), exhibiting little morphological divergence. Differences in color and color pattern are not evident.

Pertinent morphometric data are as follows (males only), mean ± 1 standard deviation ± 1 standard error (range in parentheses): head length/snout-vent length (SVL), $35.68\pm0.81\pm0.19$ (34.3-37.2); head width/SVL, $29.43\pm0.80\pm0.19$ (28.0-307); femur length/SVL, $55.91\pm1.67\pm0.39$ (53.0-58.7); tibia length/SVL, $63.47\pm18.51\pm4.36$ (48.7-69.1); tympanum diameter/eye length, $66.6\pm8.1\pm1.9$ (58.6-72.3); SVL, $63.30\pm3.67\pm0.86$ (57.8-71.2); maximum SVL, 71.2 mm.

Most of the individuals of the series were captured at night in densely vegetated marshy areas.

In life, the dorsum varies from dark-green to tan. Distinct dark transverse bars are present on the head and dorsum. Dark bars are present on the limbs. The upper lip is broadly and conspicuously margined with yellow. The venter varies from light-gray to yellow-green and gray-brown. A distinct narrow transverse yellow line is invariably present immediately dorsal to the vent-

Province of Morona Santiago. Macas. M, UNC-W 446, Méndez. FF, UNC-W 448, 450, 452-53, 457, 461. San José. MM, UNC-W 444, 451, 458, 463. Sevilla Don Bosco. MM, UNC-W 445, 455. Sucúa. MM, UNC-W 447, 449, 454, 460, 462; FF, 456, 459.

Hyla parviceps Boulenger

1882. Hyla parviceps Boulenger, Cat. Bat. Sal. s. Ecaud. Ed., 2:393.

The small series from the Upano valley is in essential agreement with the specific diagnosis (Cochran and Goin, 1970; Duellman and Crump, 1974). Variation in the Upano specimens does not deviate from that of the Ecuadorian lowland population (Province of Napo: Santa Cecilia) delimited by Duellman and Crump (1974).

Pertinent morphometric data are as follows (UNC-W 309, 308, 307 respectively): tibia length/snout-vent length (SVL), 51.2, 51.1 (MM), 55.4 (F); head length/SVL, 30.5, 32.0 (MM), 28.8 (F); head width/SVL, 30.5, 31.5 (MM), 30.2 (F); tympanum diameter/eye length, 35.0, 39.1 (MM), 45.8 (F); SVL, 17.4 mm., 17.8 mm. (MM), 21.5 mm. (F).

Dorsolateral stripes are absent. The throat and venter are gray, white medially. The dorsum possesses a median anteriorly blotch and transverse bars posteriorly. The thigh, uniformly dark dorsally, has a single small cream spot. A single suborbital dark bar is present. A small orange spot is not present proximally on the ventral surface of the shank (present in the lowland Ecuadorian population).

The specimens were obtained at night in dense vegetation in a marshy area-

H. parviceps has not been reported from Ecuadorian localities south of the Río Pastaza drainage. It occurs at elevations similar to those in the Upano valley in the Andean cordillera.

Province of Morona Santiago. San José. F, UNC-W 309. Sevilla Don Bosco. M, UNC-W 308. 10 Kms. W. Sucúa. F, UNC-W 307.

Hyla rhodopepla GUNTHER

1859. Hyla rhodopepla Günther, Cat. Batr. Sal. Coll. Brit. Mus., 112.

The status of H, rhodopepla, tentatively referred to the H.

microcephala group, was discussed by Duellman (1972). Of the nine diagnostic adult morphological characters listed for H. rhodopepla, the Upano series is in conformity with seven: (1) head flat, broader than long; (2) tympanum present; (3) axillary membrane abbreviated; (4) fingers webbed to bases of antepenultimate phalanges; (5) toes, except fourth, webbed to bases of discs; (6) tarsal fold absent; (7) lip white.

Significant variation obtains in the other adult characters: (8) reddish-brown stripe from snout to groin; (9) dorsum creamy white with reddish-brown flecks. In six individuals (UNC-W 167, 169, 173, 183, 186, 192) the dorsolateral stripes terminate at the level of the insertion of the forearm or slightly beyond. In UNC-W 163, 168, 170, 174, 176, 178, 190 and 194, the dorsolateral stripes terminate at midbody. In the remaining individuals of the series, the stripes terminate at the level of the sacrum. In numerous individuals the dorsum is not creamy white although reddish-brown flecks are invariably present. In the aforelisted individuals, the dorsal color, anteriorly, varies from light-brown to dark reddish-brown, intensifying on the head. The posterior aspect of the dorsum is either creamy white or with a light-brown or light-red-wash.

The dorsal aspect of the shank is barred in many individuals. Flecks or spots are present on the shank in other individuals of the series. In other details of color and color pattern, the Upano series is in agreement with the specific description (Duellman, 1972)

Morphometrically, the Upano series conforms with the low-land Ecuadorian population from Santa Cecilia, Province of Napo. Variation in the Upano series (mean and range) are as follows: tibia length/snout-vent length (SVL), MM, 0.56 (0.48-0.65), FF, 0.57 (0.50-0.65); head length/SVL, MM, 0.35 (0.25-0.40), FF, 0.32 (0.29-0.36); head width/SVL, MM, 0.37 (0.29-0.45), FF, 0.35 (0.33-0.40); SVL (in mm), MM, 21.40 (19-27), FF, 25.45 (22-30).

In life, the dorsal ground color varies from tan to reddishbrown. Dorsolateral reddish-brown stripes extend to a level between the insertions of the fore- and hind- limbs. The lip is white. The venter is pale-yellow.

All individuals, in chorus, were obtained at night from emergent vegetation in aquatic environments.

H. rhodopepla has been reported from limited localities in eastern Ecuador (Duellman, 1972). To our knowledge the species is not reported from Ecuadorian localities at which the elevations are similar to those of the Upano valley.

Province of Morona Santiago. Méndez. MM, UNC-W 83, 85, 91, 94, 170-71, 173, 340; F, UNC-W 340. San José MM, UNC-W 84, 96-97, 165, 168-69, 179-80, 187-89, 193-95; FF, UNC-W 86, 181. Sucúa. MM, UNC-W 82, 87-90, 92-3, 163, 166-67, 174-75, 177-78, 182-83, 186, 190, 192; FF, UNC-W 81, 95, 164, 172, 176, 185-86.

Hyla rubra LAURENTI

1768. Hyla rubra Laurenti, Spec. Med., Synops. Rept., 35.

Hyla rubra is a not uncommon amphibian in the Upano valley and in the adjacent eastern lowlands. The majority of the individuals herein listed were discovered in or near marshy areas on emergent vegetation or in and on ground litter.

Duellman (1970) cited two characters by which *H. rubra* is invariably distinguishable from other Middle American species of the *H. rubra* group: (1) noticeable black or brown reticulation enclosing bright yellow spots on the posterior surface of the thigh; (2) pale, distinct dorsolateral stripes. Cochran and Goin (1970) commented that the vermiculations on the posterior surface of the thigh distinguished *H. rubra* from other Colombian species of the *H. rubra* group.

In the Upano series, the posterior surface of the thigh posesses dark-brown or black reticulation enclosing creamy-tan spots (fide Duellman, 1970) in preserved individuals. In life, the enclosed spots are yellow. In one individual (UNC-W 355), the reticulation is restricted to the distal ½ of the thigh. Reticulation is absent on the posterior surface of the shank in one specimen (UNC-W 376).

Dorsolateral stripes are not discernible in one specimen (UNC-W 342). In many of the Upano specimens in which dorsolateral stripes are present, a mid-dorsal stripe is absent. Neither dorsolateral stripes nor a mid-dorsal stripe are detectable in four individuals.

The venter is either immaculate in the preserved individual (yellow in life) or with small scattered black spots. In life, the dorsum varies from dark- to black- green, occasionally with scattered yellow spots. The limbs, in life, are dark-green.

Morphometrically, the Upano series is in conformity with the population from eastern Panama and the Ecuadorian Province of Napo. Selected biometric data are as follows (mean, range in parentheses): snout-vent length (SVL), MM, 32.97 (30.2-35.4), FF, 38.71 (38.0-41.8); tibia length/SVL, MM, 0.52 (0.49-0.56), FF, 0.52 (0.49-0.55); head length/SVL, MM, 0.34 (0.33-0.37), FF, 0.34 (0.33-0.36); head width/SVL, MM, 0.31 (0.30-0.34), FF, 0.31 (0.30-0.33); tympanum/eye, MM, 0.52 (0.49-0.56), FF, 0.51 (0.50-0.53). Sexual dimorphism is indicated in mean snout-vent length only in the Upano series, although Duellman (1970) notes sexual dimorphism in the ratio tympanum/eye.

H. rubra has been reported from limited localities in eastern Ecuador. The species has not been previously reported from localities south of the Rio Pastaza drainage.

Province of Morano Santiago Méndez, MM, UNC-W 358, 361, 369, San José, MM, UNC-W 341, 357, 359, 372; FF, UNC-W 364, 367-68, 378. Sucúa, MM, UNC-W 342-46, 348-54, 356, 360, 362-63, 365, 370-71, 374-77, 379-81; FF, UNC-W 355, 366, 10 Kms. W. Sucúa, M, UNC-W 373; FF, UNC-W 347.

Ischnocnema quixensis (JIMENEZ DE LA ESPADA)

1872. Oreobates quixensis Jimenez de la Espada, Anales Soc. Espanola Hist. Nat., 1:87.

1971. Ischnocnema quixensis (Jimenez de la Espada) -Lynch, Journ. Herpetol., 5(3-4):109.

The five specimens from the Upano valley exhibit significant variation, encompassing the diagnostic characters of *I. quixensis* and *I. simmonsi* Lynch. The series is arbitrarily referred to *I. quixensis*, pending additional data on individual and geographic variation in *I. simmonsi*, a species, to our knowledge, known from 2 specimens (Lynch, 1974a).

The Upano series agrees with I. quixensis in possessing conical tubercules of distinctly different size (Lynch, 1974). The palmar tubercules number three, characteristic of I. simmonsi (op. cit., 1974). The ventral coloration varies from cream with palebrown reticulation (I- quixensis) to medium-brown with large, irregular cream spots (I. simmonsi) (op. cit., 1974).

The dorsum is bicolor, varying from gray to dark-brown, with discrete black spots. The lips and the dorsal and anterior surfaces of the fore- and hind- limbs are distinctly barred. The posterior surface of the thigh is brown with small cream flecks or spots. The throat is dark-brown with numerous irregular cream spots. Except for the descrepancies in color, the series agrees with the diagnosis of *I. quixensis* (op. cit., 1971).

Maximum snout-vent lengths (SVL) are 56.2 mm (F) and 48.8 mm (M). Other morphometric data are as follows (fide Lynch, 1971): tibia length/SVL, 56.2% (52.6-59.4): head length/SVL, 38.6% (36.6-39.2); head width/SVL, 40.4% (39.9-42.0).

The Upano specimens were obtained at night in ground litter in relatively dry areas.

The species is reported from elevations higher than those in the Upano valley (Lynch, 1974).

Province of Morona Santiago. Sevilla Don Bosco. F, UNC-W 320. Sucúa. M, UNC-W 317; FF, UNC-W 318-19, 321.

Leptodactylus knudseni HEYER

1972. Leptodactylus knudseni Heyer, Contri. Sci., Los Ang. Cty. Mus. Nat. Hist., 231:3.

L. knudseni, a member of the pentadactylus group as defined by Heyer (1972), was reported previously only from the type locality (Limón Cocha, Provincia de Napo, Ecuador) (Heyer, op. cit.). Its occurrence in the Upano valley significantly increases the known geographic and altitudinal ranges. Other species of the pentadactylus group are not recorded from the Upano valley.

Morphologically, the three Upano males are in conformity with the specific diagnosis and holotypic description (Heyer, 1972)

The snout-vent length (SVL) ranges from 36.5 mm to 44.5 mm (32.8 mm-62.5 mm in the paratypic series). Other morphometric data (minimum-mean-maximum ± one standard deviation) are as follows: head length/SVL, 35.6-36.0-37.5±0.7;

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head width/SVL, 37.3-39.0-40.7±1.4; tibia length/SVL, 42.1-42.6-44.9±0.9. The range of individual measurements (in mm.) are: interorbital distance, 3.5-4.0; tympanum length, 2.5-3.3; eye length, 3.9-5.0; eye-nostril distance, 3.5-4.1. The Upano males exhibit no significant morphometric divergence from the paratypic series.

In preservative, the color and color pattern of the Upano males are in general conformity with the description of the holotype. The posterior surface of the thigh is dark-brown (black in holotype), the venter varies from light-to dark-gray to brown (profused with melanophores to black with small light dots in holotype and paratype), barring scarcely discernable on limbs (cross-bands present).

In life, the dorsal ground color is blackish-green. The prominent dorsal markings are bright yellow-green (chartreuse in Limón Cocha series). Yellow-green spots occur on the snout. The venter is gray with small white spots. The three individuals were obtained in dense underbrush in the daylight hours.

Province of Morona Santiago. San José. M, UNC-W 323-325.

Leptodactylus wagneri (Peters)

1868. Plectromantis wagneri Peters, Monatsbr. der Koeniglich. Preussischen Akad. der Wissenschaften zu Berlin, 1862:232.

1923. Leptodactylus wagneri (Peters)-Nieden, Das Tierreich, 46:479.

L. wagneri is one of the most abundant amphibians encountered in the Upano valley. The acquisition of a relatively large series from a partially isolated population permits an evaluation of individual variation of the diagnostic characters and a comparison with the adjacent lowland and other conspecific populations.

In his taxonomic treatment of the melanonotus group, Heyer (1970) evaluated 34 characters of which three differentiated melanonotus (Hallowell) and wagneri (Peters). As noted by Heyer (1970), no one character or combination of characters consistently distinguish individuals of the two species. Taxonomic allocation is based primarily on geographic grounds.

Expanded toe tips obtain in 84% of the Upano series. The digital enlargement, although pronounced, does not form distinct discs. Heyer (1970) noted a geographic gradient in which the wagneri population of the Cauca Valley (Colombia) possesses normal digits and that of the Andean slopes is characterized by expanded digits.

The venter is mottled in 94% of the Upano series. In other individuals, the mottled venter possesses distinct light spots characteristic of dantasi, podicipinus, and pustulatus.

The occurrence of a distinct longitudinal stripe on the posterior aspect of the femur is highly variable: distinct in 28% of the series, indistinct in 30%, and absent in 42% (mottled femur). These categories are recorded in all populations of wagneri except that of the Cauca Valley (Heyer, 1970). A distinct femoral stripe is not present in melanonotus.

The maximal standard lengths recorded for wagneri, 63mm (M) and 81mm (F), are notably superior to those reported for melanonotus, 46mm (M) and 50mm (F). The Upano series, 55mm (M) and 67mm (F), are intermediate. Heyer (1970), noting that the maximal standard lengths occur in the Andean populations, reported a positive correlation between increasing elevation and greater size. The Upano series was collected at elevations of 900 m. or higher in an area climatically characterized by high rainfall and a short dry season, factors hypothesized to effect greater size at higher elevations. Series of wagneri from similar elevations and precipation apparently attained greater size (Heyer, op. cit.)

The Upano series does not concur with wagneri in two of the three primary diagnostic characters: the Upano individuals do not attain the maximal standard lengths attributed to other populations of the lower Andean slopes; the condition of the femoral stripe is highly variable. The Upano series is consistently divergent from melanonorus in having an expanded toe-tip.

Morphometrically (minimum-mean-maximum), the Upano population is conspecific with other populations of wagneri: head length/SVL, MM, 34.37.0-41, FF 31-35.4-39; head width/SVL, MM, 36-38.4-40, FF, 34-37.1-41; interorbital diameter/

SVL, MM, 7-7.0-11, FF, 7-9-3-15; femur length/SVL, MM 42-46.6-51, FF 42-43.6-51.

The dorsal ground color, in life, varying from dark-green and dark-brown to gray-brown, possesses black splotches. The lateral aspect of the body and the posterior surface of the thigh characteristically exhibit yellow spotting within black reticulation. The cream-colored venter is reticulated, the color of which is dark-brown.

The greater number of the series was obtained at night. Individuals were discovered in debris-strewn cleared fields, marshy areas, and undisturbed forest.

L. wagneri, has been reported previously from the Upano valley (Heyer, 1970).

Province of Morona Santiago. Méndez. Unsexed, UNC-W 246, 254. San José. MM, 261, 265-66. Sevilla Don Bosco. Unsexed, UNC-W 235-36. Sucúa. MM, UNC-W 26, 80, 240-41, 258, 263-64, 267, 271; unsexed, UNC-W 74-78, 231-32, 237-38, 243-45, 249, 255-56, 259, 270-

Lithodytes lineatus (SCHNEIDER)

1799. Rana lineata Schneider, Hist. Amphib. Nat. et Lit., 1:138.

1843. Lithodytes lineatus (Schneider)-Fitzinger, Syst. Rept. Fasc. I: Amblyglossae, p. 31.

L. lineatus is one of the more abundant amphibians encountered in the Upano valley. All individuals were collected at night in dense underbrush either in partially cleared fields or in other disturbed habitats.

The Upano series is not morphologically divergent from the redescription of the species (Cochran and Goin, 1970).

Selected morphometric characters are as follows (mean ± 1 standard deviation ± 1 standard (range): snout-vent length (SVL) (in mm.), $27.1\pm3.6\pm0.8$ (22.8-34.5), $38.6\pm3.1\pm0.7$ (32.9-490); head length/SVL, $0.35\pm0.09\pm0.04$ (0.27-0.43), $0.34\pm0.09\pm0.03$ (0.31-0.52); head width/SVL, $0.33\pm0.02\pm0.007$ (0.33-0.38), 0.34 ± 0.003 (0.30-0.36); tibia length/SVL, $0.47\pm0.04\pm0.01$ (0.44-0.55), $0.45\pm0.02\pm0.005$ (0.43-0.51).

In life, the dorsum is dark-green. Yellow dorsolateral stripes extend from the snout to the sacral region. Red spots are present on the anterior, superior, and posterior aspect of the femur and the posterior aspect of the tibia. The venter is cream with gray reticulation.

L. lineatus is known from localities of similar elevations in eastern Ecuador (Parker, 1938).

Province of Morona Santiago. San José. F, UNC-W 149. Sucúa. MM, UNC-W 6, 18, 23, 131, 135, 137-40, 144, 147, 151-52, 155, 160-62; FF, UNC-W 132-34, 136, 141-43, 145-46, 148, 150, 153, 156-59.

Osteocephalus leprieurii (DUMERIL AND BIBRON)

1841. Hyla leprieurii Duméril and Bibron, Érp. Gen. Hist. Nat. Compte. Rept., 8:553.

1961. Osteocephalus leprieurii (Duméril and Bibron)-Goin, Ann. Carnegie Mus., 36(2):13.

The two specimens from the Upano valley are somewhat divergent from the most recent description of the species (Trueb and Duellman, 1971).

In UNC-W 545 (M, snout-vent length 37.2 mm), the dorsal ground color, in preservative, is light-brown with prominent transverse dark-brown bands, the anteriormost interorbital band being approximately triangular in shape, the apex caudally oriented. The shank, tarsus and forearm are distinctly banded. An irregular, indistinct whitish region is present on the posterior aspect of the upper arm. A narrow black band extends from nostril to eye. The loreal region is chocolate. The flanks are light-brown anteriorly and cream posteriorly with small brown spots. The venter is yellowish-white. The vent is encircled by a distinct white band.

The dorsum is moderately tuberculate. The tuberculate condition extends onto the superior surfaces of the appendages.

Morphometrically, the following proportions obtain: femur length/SVL, 0.456, tibia length/SVL, 0.537, diameter of tympanum/diameter of eye, 0.600; head length/SVL, 0.365; head width/SVL, 0.336. The proportions are in agreement with those presented by Trueb and Duellman (1971) except for the ratio of diameter of eye/diameter of tympanum.

In preservative, the dorsum of UNC-W 546, (F, snout-vent length 28.2 mm) is dark-brown with numerous distinct black

spots. The lips and the venter are cream. A large enamel-white spot is present on the posterior aspect of the upper arm. The forearm, thigh, shank and tarsus are banded. A distinct white spot is present on the tibia distally.

The dorsum is atuberculate, exhibiting a smooth aspect. The flanks are smooth.

The following proportions are exhibited: femur length/SVL, 0.443; tibia length/SVL, 0.517; diameter of tympanum/diameter of eye, 0.526; head length/SVL, 0.382; head width/SVL, 0.343. The ratio of diameter of tympanum/diameter of eye diverges from the previously reported range of variation (Trueb and

Province of Morano Santiago, San José, M, UNC-W 545, 10 kms, W. Sucúa, F, UNC-W 546.

Duellman, 1971).

Osteocephalus taurinus STEINDACHER

1862. Osteocephalus taurinus Steindacher, Arch. Zool. Anat. Fisiol., 2:79.

Two individuals, male and female, were obtained at night as they leaped from a tree in dense vegetation.

The genus Osteocephalus was extensively reviewed by Trueb and Duellman (1971). The female is unquestionably allocable to O. taurinus, conforming with the specific diagnosis (Trueb and Duellman, op. cit.). The male, however, is referred to the species with reservations.

In preservation, the dorsum of the female is dark-brown with identifiable narrow transverse stripes posterior to the tympanum. Widely dispersed white spots are present on the dorsum. The tympanum is encircled by a dark-brown band. The limbs are barred dark-brown dorsally. The inferior surface of the limbs and venter are light-brown.

In life, the dorsal ground color is rust-brown with scattered yellow spots. The limbs, lighter in color, possess dark bars. The venter is amber-red.

Morphometrically, the following data obtain (in mm.): snoutvent length, 64.3; head length, 22.0; head width, 25.5; interorbital distance, 7.8; tympanum length, 4.8; tibia length, 34.5.

In preservative, the light-brown dorsum of the male is traversed by narrow, often interrupted, dark-brown stripes. A distinct inter-orbital stripe is present. The forearm and shank, light-brown in color, are distinctly barred. The light-brown upper arm lacks distinct markings. Distinct dark spots are present on the distal extremity of the tibia. The venter and the lateral aspects of the body are unmarked.

In life, the dorsal ground color is olive-green with darkbrown bands traversing the head and dorsum, the most anterior being the interorbital. The limbs are barred. The venter is yellowish-green.

The dorsum and the superior aspects of the head, thigh and shank are rugose. The larger tubercules are spinose. The more abundant smaller tubercules are aspinose. The flanks are smooth.

Measurements (in mm.) are: snout-vent length, 44.0; head length, 16.5; head width, 16.3, femur length, 21.8; tibia length, 24.3; typanum length, 4.6; eye length, 5.0; eye-nostril distance, 5.0.

O. taurinus is known from elevations in excess of those in the Upano valley (Trueb and Duellman, 1971).

Province of Morona Santiago, Sucúa, M, UNC-W 28. San José, F, UNC-W 301.

Phyllobates parvulus (BOULENGER)

- 1882. Dendrobates parvulus Boulenger, Cal. Batr. Sal. s Ecaud., 2:145.
- 1976. Phyllobates parvulus (Boulenger) new combination—Silverstone, Nat. Hist. Mus. Los Angeles Cty., Sci. Bull., 27:36.

The Upano series, morphologically, is in complete conformity with the recent specific diagnosis (Silverstone, 1976).

In the preserved series, a light lateral stripe is not discernable. A distinct calf-spot is absent except in one individual in which a proximoventral spot is evident unilaterally. The venter and the inferior surface of the thigh vary from blue and black marbling of equal extent to uniformly black. An indistinct light-blue stripe extends from the anterior insertion of the humerus to a point on the upper lip between the eye and nostril. Axillary spots are not evident.

In life, the prominent dorsal rugosities are distinctly rust-

colored. The intervening epidermis is black. The venter and the ventral surface of the thighs, in most individuals, are of coextensive blue and black marbling.

The males range in snout-vent length (SVL) from 17.7 mm. to 22.2 mm.; the females, from 18.1 mm. to 26.1 mm. Body proportions are as follows (mean ± 1 standard deviation ± 1 standard error, range in parentheses): head width/SVL, MM, 0.31 ± 0.01 (0.29-0.32); FF, 0.29 ± 0.01 ; head length/SVL, MM, 0.36 ± 0.01 (0.35-0.38); FF, 0.33 ± 0.01 (0.32-0.38); femur length/SVL, MM, 0.46 ± 0.01 (0.45-0.48); FF, 0.44 ± 0.01 (0.42-0.48); eye diameter/greatest diameter of tympanum, MM, 0.41 ± 0.02 (0.38-0.46); FF, 0.41 ± 0.02 (0.37-0.48).

Most of the series were obtained in the afternoon in ground litter or at night during light rain.

The species is known from the Upano valley and from other areas in eastern Ecuador (Silverstone, 1976).

Province of Morona Santiago. San José. F, UNC-W 528, 533-34, 539-40, 542. Sucúa. M, UNC-W 529-30, 537-38, 544; FF, UNC-W 3, 527, 531, 535. 10 Kms. W. Sucúa. FF, UNC-W 526, 543; FF, UNC-W 525, 532, 536, 541.

Phyllomedusa vaillanti BOULENGER

1882. Phyllomedusa vaillanti Boulenger, Cat. Batr. Sal. s. Ecaud., Ed. 2:427.

P. vaillanti is an apparently uncommonly encountered species in the lowlands of eastern Ecuador. Crump (1974) reported the species from Santa Cecilia in the Ecuadorian Province of Napo. Funkhouser (1957) remarked that the geographic range of P. vaillanti extended from Santarem to the mouth of the Amazon. The five specimens collected in the Upano valley increases the known geographic distribution in eastern Ecuador and significantly increases the known altitudinal range.

The five Upano individuals, with exceptions noted hereinafter, agree in general with the morphological description of the species (Funkhouser, 1957). Bony deposits (fide Funkhouser, op. cit.) are prominent in two individuals (UNC-W 326, F, SVL 70.4 mm.; UNC-W 330, F, SVL 94.5 mm.). In the remaining individuals (UNC-W 327, F, SVL 57.0 mm.; UNC-W 328, F, SVL 41.5 mm.; UNC-W 329, F, 58.8 mm.) the dorsum exhibits no bony deposits.

The color and color pattern, in preservative, exhibits variation. The dorsum, the superior surfaces of the limbs and the three outer phalanges are slate-blue (inner two phalanges brownish-white). The dorsum possesses streaks or spots of darker color. Small, widely scattered whitish spots occur on the dorsum in two individuals (monochrome in three). Large, well-defined white spots are present laterally in three individuals, numerous small white spots in two individuals, and distinct, reddish, dorsolateral bars in one individual (UNC-W 328). Distinct barring of the same color obtains on the outer aspect of the femur, tibia and tarsus and on the inner aspect of the forelimb (UNC-W 328). The groin and the anterior and posterior surfaces of the shank are reddish in two individuals and white in one. Large white spots are present on the anterior aspect of the thigh in others. A narrow white tarsal stripe is present on four specimens. The venter is unspotted in one individual. In the others the venter exhibits gray reticulation. Prominent enamel-white pectoral spots are present in four specimens, encircled in gray in two. Smaller, scattered enamelwhite spots occur in two individuals. Paired spots of the same color, ventrolateral to the vent, are present in one specimen.

In life, the dorsum is dark-green, the anterior aspect of the hindlimb orange with maroon banding. The venter varies from cream to orange.

Morphometrically, the following proportions (range) obtain: head length/snout-vent length (SVL), 26.4-29.8; head width/SVL, 32.2-33.6; interorbital distance/head length, 33.9-38.7; tympanum diameter/eye diameter, 44.7-56.2; femur length/SVL, 41.5-45.4.

Province of Morona Santiago. San José F, UNC-W 326, 328. Sevilla Don Bosco. F, UNC-W 327, 329. Sucúa. F, UNC-W 330.

ACKNOWLEDGEMENTS

We wish to express our sincere gratitude to Drs. Ernest E. Williams and Benjamin Shreve of the Museum of Comparative Zoology, Harvard University, for the identification of the Upano species, for providing numerous literature citations, and for many critical comments on systematic problems.

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THIRD TARDIGRADA SYMPOSIUM SET FOR 1980

The Third International Symposium on the Tardigrada will be held August 3-6, 1980, at East Tennessee State University, Johnson City.

Topics include the history and future of tardigrade research, ultrastructure of tardigrades, population dynamics and ecology, cytology, species diversity, and the application of electron microscopy and other contemporary techniques to tardigrade systematics.

Invited papers, contributed papers, workshops, discussions, and field trips are scheduled.

For further information, contact the convener, Dr. Diane R. Nelson, Department of Biological Sciences, East Tennessee State University, Johnson City, TN 37601.