*Caribbean Journal of Science*, Vol. 27, No. 1-2, 1-22, 1991


# New Ecuadorean *Colostethus* (Amphibia, Dendrobatidae) in the Collection of the National Museum of Natural History, Smithsonian Institution

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ABSTRACT. – Ten new species of *Colostethus* deposited at the National Museum of Natural History, United States, are described from Ecuador. The new species include seven members of group IX, one of group VI, one of group IV and one of group L This elevates the number of described Ecuadorean *Colostethus* to 23 species.

RESUMEN. – Se describen diez especies nuevas de *Colostethus* de Ecuador depositadas en el Museo Nacional de Historia Natural de los Estados Unidos. Las nuevas especies incluyen siete miembros del grupo IX, uno del grupo VI, uno del grupo IV y uno del grupo I. Esto eleva el número de *Colostethus* descritos de Ecuador a 23 especies.

## INTRODUCTION

Among the *Colostethus* species from Ecuador studied by the author in the collections of the National Museum of Natural History (USNM) there are ten new species, seven of which are from the Amazonian region and the eastern slopes of the Andes, two from the Pacific coastal area and the western slopes and from the interandine valley of Quito.

Miyata (1982) listed 16 species of *Colostethus* from Ecuador, but *C. pratti* (Boulenger), one of the listed species, is not likely to occur in that country, and *C. taeniatus* (Andersson) and *C. pulchellus* (Jiménez de la Espada) may be synonyms. The *Colostethus* fauna of Ecuador is thus elevated here to about 23 species (nine more have been mentioned but not described by Edwards, 1974b). Group IV (Rivero, 1988) which was known from only one species and was thought to be restricted to the northwestern part of Ecuador, is increased by one species, from the same general area. Another species from Cuenca is being described elsewhere.

The new species include seven members of group IX, one of group VI, one of group IV and one of group I. A few annotations are made, however, on *C. kingsburyi* and its closest allies in Ecuador.

Most of the species described here were collected by James A. Peters, to whose efforts we owe much of the knowledge about Ecuadorean herpetology. A species from the areas of the capital city is dedicated to his memory.

## MATERIALS AND METHODS

All measurements were made with a Helios caliper with an accuracy of 0.005 mm and following Rivero's (1961) "Explanation of Terms and Measurements" except that description of webbing follows Myers and Duellman (1982). The foot was measured from a point between the two metatarsal tubercles to the tip of the fourth toe while the third disk was measured between the two broadest points. Length of first finger in relation to the second was not determined by direct measurement but by pressing the two fingers in the middle and determining which one extended beyond the other.

Proportions such as "head broader than long" or "tympanum ½ the eye diameter" are not given as they can be easily determined from the measurements. Natural history information was extracted from the collector's field notes.

The shape of the tongue varies with the degree of contractedness, and the inden-

tation or undulation on its free end may or may not show up. The choanae are small and slightly oval in practically all *Colostethus,* and the outer metacarpal and metatarsal tubercles are usually rounded, flat, and larger than the inner, which are usually elongated and more prominent than the outer. The subarticular tubercles are generally moderate in size and degree of prominence. When they are not, it will be pointed out.

The species are not considered in alphabetical order but in the order considered best for permitting comparison of the various figures. Groups are, however, considered in sequential order, starting with group IX which is the most speciogenic.

Drawings of hands and feet were made from photographs and are accurate for comparing the length of the digits, the extension of the web and the size of the disks in relation to the width of the digital segments. They may not be accurate in other details.

Diagnoses are short, concise, as they only serve to distinguish the described species from the other members of the group to which it belongs. If a species has two pectoral spots, it belongs to group I and there is no reason to distinguish it from those species that lack pectoral spots. When specific comparisons are required they are given under Relationships.

Relationships and distribution of the various species and groups are discussed in a separate, forthcoming paper.

*Description of Species*

*Colostethus jacobuspetersi* sp. nov.
(Fig. 1A-D)

*Holotype.* —USNM 282893, adult female from Quito, Barrio Villa Flora, S. part of the city, 2800 m, Provincia de Pichincha. Collected 31 May 1959 by J. A. Peters and R. Copping. *Paratypes.* —USNM 282889-92, 282894-9 and 282900-09, all with the same data as the holotype.

*Etymology.* —*Jacobus,* from the Latin for James, in honor of James Peters, one of the collectors of the species, former Curator of Herpetology at the National Museum of Natural History and distinguished student of the Ecuadorean herpetofauna.

*Diagnosis.* —A large *Colostethus* ($n$ = 7 ♀ 27.0-33.2, $\bar{x}$ 30.38; $n$ = 1 ♂ 26.9) belonging to group IX, with no dorsolateral or ventrolateral stripes but with a narrow, not too distinct lateral stripe extending from eye to groin, whitish dots on thighs, first finger shorter than second, a short basal web between toes, disks not broader than distal digital segments and greenish yellow venter, usually with some infuscation on the throat, chest and anterior belly and sometimes with greenish tan dots.

*Description of Holotype.* —Head elongate-subovoid; tip of snout almost truncate; convex when seen in profile; nostrils anterolateral, not protruding; eyes not protruding above head; canthus rostralis angular, not too sharp; loreal region almost vertical, slightly concave; tympanum large, covered by skin on dorsal and posterior margins; palmar surfaces smooth, with a slight ridge extending halfway along its outer edge; first finger shorter than second; second shorter than fourth; fingers with thick, not too distinct lateral fingers; finger disks narrow, not broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold very distinct, extending to inner metatarsal tubercle and along outer edge of first toe, to disk; outer metatarsal tubercle conical, prominent, inner tubercle oval, sharp; plantar surfaces with a few indistinct tubercles; toes with a short but distinct basal web that does not extend to base of first tubercle in any toe except last; toe disks not broader than distal digital segments; heel of adpressed hind limb extending anteriorly to tympanum.

Dorsal, ventral and lateral surfaces smooth; forelimbs without a line of tubercles along posterior edge of forearm; a line of four tubercles between angle of jaw and arm.

Dorsal color dark greenish brown with indistinct, darker, markings; a dark canthal streak; flanks brown with numerous brownish or tan flecks that become lighter near the groin; a thin, light greenish-brown or tan oblique lateral stripe extending from eye to groin above the brown lateral area; posterolateral aspect of dorsum (upper groins) and thighs with numerous cream or greenish-tan flecks, some of which may

form transverse lines on the dorsal aspect; thighs with several narrow, brown, irregularly margined, transverse bars; no dark longitudinal streaks along anterior or posterior borders of arm or thigh.

Ventral surfaces greenish yellow, with a slight infuscation on the throat and heavier infuscation on chest and sides of the belly; limbs greenish yellow.

*Measurements of Holotype (mm).* —Snout-vent 31.0; head length 9.8; head breadth 10.0; eye-nostril 2.8; eye-tip of snout 4.2; eye diameter 2.9; tympanic diameter 1.8; upper eyelid 2.2; interorbital space 2.8; thigh 13.9; tibia 12.6; foot 14.3; disk third finger 0.5.

*Natural History.* —"Taken in old, abandoned, irrigation ditch above river, which in several places goes through tunnels, and has abundant frog life closer to water. Call as usual, is a single beep."

*Variation.* —The basal web is always present but may extend to the base or to the middle of the first subarticular tubercle. The heel does not reach beyond the tympanum in most specimens but may extend to the posterior corner of the eye in a few. The first finger is shorter than the second in all individuals, but it may be only barely shorter.

The dorsal color is uniform or almost so in most individuals, and the light colored dots of the flanks may be very scarce, but this is seldom the case and even when they are scarce on the flanks they are usually abundant on the thighs. In some cases the thighs have the appearance of being mottled with brown and white but the transverse bars are always present. In some cases, the brown lateral area, together with its light flecks, may penetrate into the lateral portions of the belly and may even cross it at the anterior end. In some individuals the anterior part of the venter may be dotted with whitish or tan on a darker background, but the pattern described for the holotype, in various degrees of intensity, is the most common.

*Relationships. —Colostethus jacobuspetersi* is very similar, and is undoubtedly related, to a species collected by Edwards (1974b: 244) in Alóag, South of Quito. It is distinguished from that (undescribed) species by the presence of a short web, by the apparently larger size (the largest of Edwards' 52 specimens was 28.0 mm), by having the disks narrower than the fingers and by having a distinct fringe on the fourth toe.

*Colostethus jacobuspetersi* does not have pectoral spots. Yet, it is similar to species of the *sylvaticus-elachyhistus* group, which have pectoral spots and belongs to group I. Its ventral coloration, particularly, is very similar to the ventral coloration of an undescribed species from the region of Zamora, in the Province of Zamora-Chinchipe (Edwards, 1974b:257). In addition to the lack of pectoral spots, *C. jacobuspetersi* is distinguished from the Zamora species by the presence of a short web, by the differently shaped head and by having differently colored thighs.

*Colostethus marmoreoventris* sp. nov.
(Fig. 2A-D)

*Holotype.* —USNM 282979, an adult male from Río Negro, 4100 ft (1225 m), Provincia Tungurahua. Collected July 6, 1962 by M. Olalla and J. Spilley.

*Etymology.* —From the Latin *marmoreous,* marbled, and *ventris,* venter, in reference to the ventral color of this species.

*Diagnosis.* —A medium sized *Colostethus* belonging to group IX, without dorsolateral, oblique lateral or ventrolateral stripes, a marbled abdomen, free toes, disks broader than distal digital segments and a short, transverse tarsal fold.

*Description of Holotype.* —Tip of snout bluntly triangular, convex when seen in profile, and well projected beyond mouth; nostrils anterolateral, situated well behind tip of snout, protuberant; vocal slits large, elongated; canthus rostralis rounded, angular; loreal region vertical, concave; tympanum large, covered dorsally and posteriorly by skin; palmar surfaces smooth, with no apparent ridge along outer edge; first finger equal in length to second; second shorter than fourth; fingers without lateral fringes; finger disks slightly broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold a short transverse ridge, not extending to inner metatarsal tubercle; subarticular tubercles of toes not too prominent, relatively indistinct; plantar surfaces smooth, with no apparent ridge

along outer edge; toe disks broader than distal digital segments; heel of adpressed hind limb extending anteriorly to anterior corner of eye.

Dorsal, ventral and lateral surfaces smooth; no tubercles along posterior surface of forearm; one small tubercle between angle of jaw and arm or between tympanum and arm; a distinct external vocal sac.

Dorsal color solid brownish black; no dorsolateral, oblique lateral or ventrolateral stripes; lower flanks with a row of whitish spots (left side only); limbs brownish black; ventral surfaces brownish black, solid on the throat and chest, boldly marbled on the belly; a white stripe along the posterior ventral aspect of the arm; a white, tranverse, elongated spot along the posterior ventral aspect of the thigh and a smaller spot distally from this; a white streak along the posterior ventral aspect of the tibia and two or three whitish spots on the tarsal segment.

*Measurements of Holotype (mm).* —Snout-vent 21.8; head length 3.4; head breadth 2.6; eye-nostril 2.0; eye-tip of snout 3.9; eye diameter 3.1; tympanic diameter 1.6; upper eyelid 1.9; interorbital space 3.5; thigh 10.0; tibia 10.2; foot 10.0; disk of third finger 0.5.

*Relationships.* —The distinct ventral markings combined with the lack of any kind of longitudinal stripe distinguishes *C. marmoreoventris* from all other members of group IX and, in fact, from all other Ecuadorean *Colostethus.* Its closest relatives are, perhaps, *C. whymperi* Boulenger and an undescribed species from Alóag mentioned by Edwards (1974b) but in both of these species there are distinct oblique lateral stripes.

*Colostethus torrenticola* sp. nov.
(Fig. 3A-D)

*Holotype.* —USNM 282603, an adult female from 5 km N. Pallatanga, at waterfall and Saint Mary Sanctuary, 2450 m, Provincia Chimborazo. Collected 14 Feb. 1959 by J. A. Peters and A. J. Peters. *Paratypes.* – USNM 282604-29, same data as holotype.

*Etymology.* —*Torrenticola,* from the Latin *torrens,* torrent, and *incolo,* an inhabitant, in reference to the habitat of this species.

*Diagnosis.* —A medium sized *Colostethus* ($n$ = 12 ♀, 20.6-26.3, $\bar{x}$ 22.6; $n$ = 3817.4-19.8, $\bar{x}$ 18.6) belonging to group IX, with a distinctly mottled venter on an orange background, no dorsolateral or ventrolateral stripes, a not too contrasting oblique lateral stripe from eye to groin, a dark brown stripe margining the lateral streak above, a brown flank, with light colored flecks, disks only slightly broarder than the distal digital segments, and with a distinct tympanum and free fingers and toes, without lateral fringes.

*Holotype.* —Habitus of *Elachistocleis;* snout subovoid; tip of snout triangular, not truncate, slightly concave when seen in profile; nostrils anterolateral, little protruding; canthus rostralis not too sharp, almost straight between eye and nostril; loreal region little inclined, not concave; tympanum indistinct, only the anterior and lower rims exposed; palmar surfaces smooth, with no apparent ridge along outer margin; first finger slightly shorter than second; second equal to fourth; fingers without lateral fringes; finger disks small, slightly broader than distal digital segments; first disk smaller than others; disk of third finger nearly ¾ size of tympanum; tarsal fold distinct, extending to inner metatarsal tubercle; plantar surfaces smooth, with a slight ridge along outer edge; toes free, without lateral fringes; disks of toes slightly broader than distal digital segments; first and last disk smaller than others; heel of adpressed hind limb extending anteriorly to tympanum.

Dorsum, flanks and venter smooth; no tubercles along posterior aspect of arm or between tympanum and arm.

Dorsal color grayish brown, with obscure, longitudinal, darker spots; an oblique lateral stripe, slightly lighter than the dorsum, from eye to groin; above the lateral streak, a black streak from behind eye to groin; flanks brown with lighter dots; a canthal streak; loreal region brownish; anterior aspect of arm with a black, longitudinal streak; posterior aspect of arm without a well defined longitudinal streak; anterior aspect of thigh with an undulating, dark, longitudinal streak; thighs with three or four crossbars; posterior aspect of thighs with brown spots on a whitish back-

ground; tibia, tarsus and foot with dark brown crossbars. Ventral surfaces orange-yellow, with distinct brownish black mottling on the anterior and lateral portions of the belly; throat and chest with greenish tan dots on a brownish background, the brown being more intense on throat than on chest. The background ventral color of the living animal was described as "bright orange in the belly."

*Measurements of Holotype (mm).* —Snout-vent 25.5; head length 8.2; head breadth 8.1; eye-nostril 1.9; eye-tip of snout 3.9; eye diameter 2.1; tympanic diameter 1.0; upper eyelid 3.2; interorbital space 2.6; thigh 10.3; tibia 10.8; foot 10.8; disk of third finger 0.8.

*Natural History.* —"Collected around a small pool at foot of waterfall. Active during day. Small-chorus voice a single beep."

*Variation.* —Only in one specimen is the first finger equal in length to the second; in all the others it is shorter, but it can be slightly to more considerably shorter. The tympanum may be almost totally covered or exposed on the anterior margin. The heel may extend anteriorly to the eye in a few specimens, especially the young ones.

Whatever markings exist on the dorsum, they are obscure and not easily detected when the specimens are out of liquid. They consist, sometimes, of elongated spots on the anterior part of the back but there may be spots all over the dorsum, centrally placed, paired spots or no spots at all, although this is unusual.

The oblique lateral stripe is never white or whitish; it is lighter than the dorsal color but sometimes not much lighter. The black streak above the light oblique lateral stripe may start behind the eye or at a distance behind the eye, but it usually widens as it approaches the groin.

The crossbars on the thighs may not extend to their posterior aspect, which may be marbled or spotted, on a background color which may vary from whitish to brownish.

The ventral coloration shows the greatest amount of variation. Practically all specimens are distinctly mottled with dark brown but the mottles may be limited to the anterior and lateral portions of the belly and the borders of the limbs, or cover almost the entire belly, although a small immaculate area is always left on the posterior third. When the mottles are very close together, the anterior part of the belly offers the appearance of being brownish black with greenish flecks. Yet, the dark color never extends to the chest and throat and there is always a distinct separation between the belly color and the throat and chest.

The throat and chest are greenish with brown mottles or brownish with greenish specks, but the mottles or specks are always smaller than those of the belly.

The three males available are considerably smaller than the females but apart from this, there is little sexual dimorphism. However, two of the males are almost immaculate on the belly, a condition not seen in any of the females.

*Relationships.* —*Colostethus torrenticola* is most closely related to a still undescribed species collected at 3700 m on the road from Guaranda to Riobamba (Edwards, 1974b: 121). According to Edwards, the first finger of this form is longer than the second, the disk of the fourth toe is not wider than the diameter of the toe, there is a lateral fringe on the fourth toe and the ventral color is sexually dimorphic, the ventral color of the male being black with green flecks and of the female grayish yellow to dull orange with green flecks.

For comparison with *C. torrenticola* the author had two specimens from Guaranda, 3800 m (USNM 282662-63, see Fig. 4) and 22 from Pilaló, 3200 m. Pallantanga, 2450 m, the type locality of *C. torrenticola* is south of Guaranda while Pilaló is north of Guaranda, at about double the air distance between Pallantanga and Guaranda.

The Pilaló specimens were collected "under rock in open, shrubby, swampy area"; the Guaranda specimens come from "well above tree line, in páramo, under rocks on bank of rapidly flowing mountain stream." There is no data on the Guaranda specimens reported by Edwards but they are undoubtedly from the páramo.

The most noticeable difference between the Pilaló–Guaranda specimens (which may correspond to Edwards form, although the first finger is shorter and not longer than the second, as stated by him) and *C. tor-*

*renticola* is the color of the venter (see Figs. 3, 4). In *C. torrenticola* the black mottles or black area with greenish specks starts sharply at a line just in back of the pectoral area and extends posteriorly toward the hind portion of the belly, but do not reach the posterior end, leaving an immaculate or almost immaculate, semilunar area of variable extension on the posterior third or half. In the Guaranda-Pilaló material the throat and belly colors are not separable (except in two or three individuals) and the impression one gets is that of a general infuscation with green flecks.

Apart from this, the disks of *C. torrenticola* are bigger and the tympanum less distinct than in the Guaranda-Pilaló material. No transverse bars are noticeable on the thighs of the latter form.

It is possible that these two forms (*C. torrenticola* and the Guaranda-Pilaló populations) may qualify as subspecies of each other, *C. torrenticola* being the lower elevation form of the species, but until more is known about their respective ranges and the Guaranda form is described, a specific status is preferred.

The indistinct lateral stripes, the small disks, the brown lateral coloration and the indistinct tympanum relate *C. torrenticola* to *C. jacobuspetersi,* which is also a member of group IX. It can be distinguished from that species by the different ventral coloration, smaller size and shorter snout. The ventral color of *C. jacobuspetersi* is similar, however, to the Guaranda-Pilaló material and all of them may be found to belong to the same artenkreis.

*Colostethus tergogranularis* sp. nov.
(Fig. 5A-D)

*Holotype.* —USNM 282638, an adult female from Faldas, S. of Sumaco, Provincia Nape. Collected June 1952 by Jorge Olalla. *Paratypes.* —USNM 282637, 282639-43, all adults with the same data as the holotype, and USNM 282644-45, all adults from Loreto, Provincia Nape, Ecuador, collected by Jorge Olalla in June 1952.

*Etymology.* —*Tergogranularis,* from the Latin *tergum,* the back, and *granulus,* small grain, granule.

*Diagnosis.* —A small *Colostethus* ($n$ = 8 ♀ 16.9-20.7, $\bar{x}$ 18.4; $n$ = 3 ♂ 17.05-18.0, $\bar{x}$ 17.4) belonging to group IX, with a granular and tubercular dorsum, no dorsolateral or ventrolateral stripes, a cream, oblique lateral stripe from eye to groin, above the cream stripe; a black dorsolateral stripe that meets the contralateral stripe at the tip of the urostyle, and with the first finger equalling or slightly longer than the second.

*Description of Holotype.* —Head narrow; tip of snout almost truncate, inclined inwards towards the lip when seen in profile; nostrils anterolateral, slightly protuberant; eyes moderately protruding; canthus rostralis sharp, angular, almost straight between eye and nostril; loreal region vertical, barely concave; tympanum large, distinct, its dorsal and posterior margins covered by skin; palmar surfaces smooth, with a slight ridge along outer edge; subarticular tubercles small; first finger equal in length to second; second slightly longer than fourth; fingers without lateral fringes; finger disks a little broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold a triangular lappet continuing as an indistinct line to inner metatarsal tubercle; plantar surfaces smooth, with a slight ridge along outer edge; toes with an insignificant web not extending beyond base of first tubercle in any toe except last; third toe with a lateral fringe; toe disks small, but broader than distal digital segments; heel of adpressed hind limb extending anteriorly to tympanum.

Dorsal surfaces granular and tubercular, the tubercles limited to a couple just behind each eye and a few on the post-sacral area and hind limbs; eyelids granular; upper flanks granular; three small tubercles along posterior aspect of forearm; belly finely granular.

Color above light brown or tan, with a large, indistinct spot behind the eyes, a central, elongated, diamond-shaped marking at the level of the arms, two or three rounded, post-sacral spots and small dark brown spots crowning the post-ocular tubercles; a dark dorsolateral streak from scapular region to tip of urostyle, meeting the contralateral streak at urostyle; a cream, oblique lateral stripe from tip of snout and along margin of upper eyelid to groin; upper eyelids blackish; a black canthal streak

continuing in back of the eye to the level of the arms, where it becomes less distinct, especially along the lower margin; loreal and lower temporal area, including most of the tympanum, white, immaculate; lower flanks light brown with cream areas and spots; anterior and posterior surface of arms and anterior surface of thighs, with a black, longitudinal streak; dorsal aspect of thighs with dark markings on a lighter background and with abroad, longitudinal posterodorsal streak; hind limbs with dark, transverse spots. Ventral surfaces whitish or cream, immaculate except for an indistinct line margining the lower jaw.

*Measurements of Holotype (mm).* —Snout-vent 20.6; head length 7.5; head breadth 6.6; eye-nostril 1.7; eye-tip of snout 3.2; eye diameter 2.2; tympanic diameter 1.3; upper eyelid 1.9; interorbital space 2.6; thigh 9.2; tibia 8.8; foot 8.8; disk third finger 0.5.

*Variation.* —The dorsum is granular in all specimens but the amount of tuberculation varies and in some specimens the tubercles may cover the whole body; the venter, on the other hand, may be distinctly granular, imperceptibly granular or non granular *(n* = 4). One of the two males is smooth and the other imperceptibly granular below.

The first finger may be shorter than the second, the heel may reach to the eye, and the tarsal fold may have a fairly distinct extension to the inner metatarsal tubercle.

The dorsum may be tan or light brown and the dorsal pattern may vary from elongated, diamond shaped spots to elongated streaks, inverted V's or irregular spots.

There seems to be some degree of ventral sexual dichromatism. The two males are darker on the throat and anterior belly than the females and one of them has grayish brown, ventral specks. There are specks in one of the females but in much less abundance and restricted to the anterior part of the throat.

*Relationships.* —*Colostethus tergogranularis* has the size and general appearance of some members of group II *(brunneus)* but it differs from all members of that group by lacking a dorsolateral stripe and a black lateral band and by having a complete oblique lateral streak that extends from groin to eye (actually to nostril). The granular and tubercular dorsum and the usually granular belly are distinctive features of *C. tergogranularis.*

So far, *C. tergogranularis* is one of the only two members of group IX found in lowland Amazonía. *Colostethus taeniatus* is also a member of group IX but it occurs at higher elevations and is distinguished by the smooth dorsum and venter, the usually spotted venter and, in most cases, by having parallel dark streaks along the back.

*Colostethus ranoides,* from Villavincencio, Colombia has a granular and tubercular dorsum and may have a granular venter but it has a more ovate snout, a more extensive web and a spotted or marbled venter.

*Colostethus cevallosi* sp. nov.
(Fig. 6A-E)

*Holotype.* —USNM 282648, an adult male from Palanda, E. of Sarayacu, Río Bobonaza (around 700 m), Prov. Pastaza. Collected March 1948 by Ramón Olalla.

*Etymology.* —*Cevallosi,* in honor of Don Gabriel Cevallos, distinguished Ecuadorean writer and thinker, and great student of the history of his country.

*Diagnosis.* —A small *Colostethus (n* = 1 ♂ 18.2 mm) belonging to group IX, with complete oblique lateral and ventrolateral stripes, inconspicuous, incomplete, dorsolateral stripes, toes almost free and without lateral fringes, non granular dorsum and venter, a very large tympanum, and with disks broader than distal digital segments.

*Description of Holotype.* —Tip of snout almost truncate, convex when seen in profile; nostrils anterolateral, not protuberant; canthus rostralis sharp, angular, almost straight between eye and nostril; loreal region vertical, barely concave; tympanum very large, distinct, its dorsal and posterior margins covered by skin; palmar surfaces smooth, without an apparent ridge along outer edge; subarticular tubercles relatively small, larger in first two fingers; fingers long, the first shorter than second; second shorter than fourth; fingers without lateral fringes; finger disks slightly broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold an oblique lappet continuing as an

indistinct ridge to inner metatarsal tubercle; plantar surfaces smooth, with no apparent ridge along outer edge; toes, with a rudimentary web, without lateral fringes; toe disks broader than distal digital segments; heel of adpressed hind limb extending anteriorly to middle of eye.

Dorsal surfaces shagreened, with scattered tubercles on posterior half; two tubercles between tympanum and arm; no distinct tubercles along posterior border of arm; venter smooth.

Color above brown with scattered whitish spots; a canthal streak; a not too well defined dorsolateral stripe from midbody to groin; a cream, oblique lateral stripe from tip of snout and along margin of upper eyelid to groin; a white, narrow, ventrolateral stripe; loreal region creamish; flanks brown, uniform; a black streak along anterior and posterior aspects of forearm; no black streak along anterior aspect of thighs; thighs with a few dark spots, one of them elongates, forming a longitudinal streak along the center; rest of hind limbs with indistinct, transverse spots. Ventral surfaces brownish, immaculate.

*Measurements of Holotype (mm).* —Snout-vent 18.2; head length 6.7; head breadth 6.2; eye-nostril 1.8; eye-tip of snout 3.4; eye diameter 2.5; tympanic diameter 1.4; upper eyelid 1.65; interorbital space 2.6; thigh 8.6; tibia 10. 1; disk of third finger 0.5.

*Relationships. —Colostethus cevallosi* is very similar and is closely related to *C. tergogranularis,* from which it can be distinguished by the" presence of a ventrolateral stripe and by the non granular dorsum. The dorsolateral stripe of *C. cevallosi* is rather ambiguous and it is not evident on the anterior part of the back. If it is found to be present in all individuals, it will serve as another distinguishing feature of the species, as very few *Colostethus* have the full compliment of stripes (dorsolateral, complete oblique lateral and ventrolateral). *Colostethus cevallosi* can also be distinguished by its shorter snout and by the better defined and more uniformly colored, brown lateral band. The absence of a well defined dorsolateral stripe and the presence of a complete oblique lateral stripe that extends to the nostril separates *C. cevallosi* from members of group II.

*Colostethus parcus* sp. nov.
(Figs. 7-9)

*Holotype.* —USNM 282819, an adult male from Limón and Gualaceo, on trail between Agua Rica and San Juan Bosco, 6800 ft (1981 m), Provincia Zamora-Santiago. Collected 19 Aug. 1962 by P. D. Spoecker. *Paratypes.* —USNM 282818, with the same data as the holotype, and USNM 282532-36, from Plan de Milagro, a tambo on the trail between Limón and Gualaceo, ca. 10 km WSW of Limón, 5600 ft (1707 m), collected 18 Aug. 1962 by P. D. Spoecker.

*Etymology. —Parcus,* from the Latin *parcus,* little, moderate, thrifty, frugal, slight, in reference to the small size of this species.

*Diagnosis.* —A small *Colostethus* ($n$ = 4 ♀ 20.3-25.3, $\bar{x}$ 22.46; $n$ = 2 ♂ 18.5-20.0) belonging to group IX, without dorsolateral or ventrolateral stripes but with an indistinct oblique lateral stripe of variable extension, digital disks broader than the distal digital segments, free toes without lateral fringes and males with a distinct, blackened vocal sac on each side of the throat.

*Description of Holotype.* —Tip of snout almost truncate; inclined inwards towards lip when seen in profile; nostrils anterolateral, slightly protruding; vocal slits well separated from mandible; canthus rostralis not too sharp, angular, slightly curved between eye and nostril; loreal region vertical, a little concave; tympanum large, covered posterodorsally by skin; palmar surfaces smooth, with no apparent ridge along outer edge; subarticular tubercles of fingers large, distinct; first finger much shorter than second; second shorter than fourth; fingers without lateral fringes; finger disks broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold a short oblique ridge; plantar surfaces smooth, with no apparent ridge along outer border; toes free, without lateral fringes; toe disks broader than distal digital segments; heel of adpressed hind limb extending anteriorly to anterior corner of eye.

Dorsal skin mostly smooth; one or two tubercles and rugosities scattered over dorsal surfaces; two or three tubercles between tympanum and forearm; hind limbs mostly smooth; ventral surfaces smooth; a pair of external vocal sacs.

Dorsal color dark brown with obscure darker markings between and behind the eye and in the scapular and sacral areas; dorsolateral and ventrolateral stripes absent; an indistinct oblique lateral stripe fusing with the basic dorsal color anterior to the forelimbs; a dark canthal streak; loreal region brownish; hind limbs with black cross-bars followed by white or whitish bands; flanks black, with distinct white dots on the lower side; throat and anterior chest blackened, especially along the sides. The ventral coloration of the living animal was described as bright reddish orange.

*Measurements of Holotype (mm).* —Snout-vent 20.0; head length 7.1; head breadth 6.3; eye-nostril 1.7; eye-tip of snout 3.2; eye diameter 2.5; tympanic diameter 1.4; upper eyelid 1.3; interorbital space 2.9; thigh 9.0; tibia 8.7; foot 8.0; disk of third finger 0.5.

*Variations.* —In the only other male available (USNM 282533), the throat and chest are also much darker than the belly, especially along the sides, and there are two indistinct oblique lateral stripes that do not seem to extend anteriorly beyond the level of the arms.

Females in the 282534-36 series are similar in appearance: very dark brown above and with indistinct oblique lateral stripes that do not extend anteriorly beyond the level of the arms. In USNM 282534, however, the stripes extend to the eyes (Fig. 9A). In all specimens there are whitish spots or areas on the flanks and thighs and transverse spots on the tarsal segments and feet. The throat and chest are spotted or marbled in all specimens but one, where only the lower jaw is margined with brown. In all specimens the tarsal fold is a distinct oblique ridge but in most there is an indistinct extension to the inner metatarsal tubercle. The posterior ventral aspect of the thighs is granular, but not the belly, and the first finger may be shorter or equal to the second.

USNM 282818 from the same locality as the holotype, is a little different from the other females in that the dorsal color is lighter and there are distinct darker brown markings (Fig. 8A). The canthal streak continues behind the eye, narrowing and becoming less conspicuous as it passes the level of the forearm. The flanks are brownish, without white spots or areas and the venter is immaculate except for a slight infuscation on the chin. The oblique lateral stripe is very inconspicuous; it is margined dorsally along the posterior two thirds by a blackish streak, and fuses with the dorsal color at mid-flank. The hind limbs are light brown, almost tan, with darker markings.

*Relationships.* —*Colostethus parcus* is very closely related to *C. anthracinus* and females of the two species are not easily distinguished (see Figs. 7-10). There is no problem with the males, however. Those of *C. anthracinus* are solid black or brown above, and the throat, chest and ½ to ¾ of the belly are also black (gray in young individuals).

Characters distinguishing females are not absolute, and all of them have to be used for proper identification. The following comparison may be helpful *(C. anthracinus* in parenthesis).

The color of the face (loreal region) is brown, sometimes very dark brown, but USNM 282818 is an exception (cream, sometimes with a light brown infuscation, well separated from the color above and extending posteriorly to the forearm); the oblique lateral stripes are indistinct and do not usually extend to the eyes (well defined and extending to the eyes), usually there is spotting or marbling on the throat and chest (throat and chest almost always immaculate except for a fine line margining the lower jaw); the dorsal color is usually very dark brown, almost black (usually greenish brown).

The disks of *C. parcus* are larger than in *C. anthracinus* and definitely broader than the distal digital segments, while in *C. anthracinus* they are not broader or are only slightly broader than the distal segments.

USNM 282661 is a 21.5 mm female from 3353 m between Sevilla de Oro and Méndez (Prov. Azuay), and thus, well within

the range of *C. anthracinus.* It differs from that species, however, in that the finger disks are very narrow, not broader than the distal digital segments, an oblique lateral stripe is only evident on the left side, the loreal region is brown and the venter is light orange brown, somewhat darker on the throat.

*Colostethus pumilus* sp. nov.
(Fig. 11A-D)

*Holotype.* —USNM 282816, an adult female from 3 km W. (by road) of San Vicente, slightly south of W. of Limón, and ca. 35 km E. (by road) of Gualaceo, 9800 ft (2987 m), Provincia Azuay. Collected 27 Aug. 1962 by J. A. Peters, P. D. Spoecker, R. K. Mullen and M. Olalla. *Paratypes.* — USNM 282812-15, adults with same data as holotype.

*Etymology.—Pumilus,* from the Latin *pumilus,* dwarf, small, in reference to the small size of this species.

*Diagnosis.* —A very small *Colosthetus (n* = 4 ♀, 12.4 16.6; *n* = 1 ♂, 16.8) belonging to group IX, with a slight dorsolateral fold but no dorsolateral, ventrolateral, or oblique lateral stripes, toes free and without lateral fringes, first finger shorter than second, tubercular tibiae and tarsii, and smooth dorsum and venter.

*Description of Holotype.* —Tip of snout truncate; slightly convex when seen in profile; nostrils anterolateral, slightly protruding; eyes moderately protuberant; canthus rostralis angular, sharp, slightly curved between eye and nostril; tympanum large, flushed with the surface; palmar surfaces smooth, with no apparent ridge along outer edge; subarticular tubercles of fingers large, distinct; fingers short, the first shorter than second; second shorter than fourth; fingers without lateral fringes; finger disks small, not broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold distinct, extending to inner metatarsal tubercle; a distinct tubercle opposite the upper end of tarsal fold; outer metatarsal tubercle conical, prominent; plantar surfaces smooth, with no apparent ridge along outer edge; toes free, without lateral fringes; disks of toes narrow, not broader than distal digital segments; heel of adpressed hind limb extending anteriorly to tympanum.

Dorsal surfaces mostly smooth; three flat tubercles on sacral area; a pair of dorsolateral folds margining the upper eyelids and continuing posteriorly to above groin; tibial segment with a few scattered tubercles on distal end; flanks smooth. Ventral surfaces smooth; no distinct tubercles along posterior margin of arm; one small tubercle between angle of jaw and base of arm.

Dorsal color light brown, with an extensive, darker spot between and behind the eyes, a roughly triangular marking behind this and an obscure streak from the triangle to the sacral area; no light colored dorsolateral, oblique lateral or ventrolateral stripes, but the dorsolateral fold may be slightly lighter than the dorsal color; a narrow, dark streak margining the dorsolateral streak below; lower flanks brownish, lighter than dorsal color; a canthal streak continuing behind eye to level of shoulders; loreal area and tympanum brownish; a black longitudinal streak along posterior border of arm and another along anterior border of thigh; thighs brownish, becoming lighter toward anterior border; two or three rounded, dark spots on distal end of tibiae. Ventral surfaces immaculate on belly; some brown specks along margin of lower jaw and in center of throat; posterior aspect of thighs mottled with brown.

*Measurements of Holotype (mm).* —Snout-vent 18.1; head length 5.65; head breadth 5.7; eye-nostril 1.5; eye-tip of snout 2.9; eye diameter 1.7; tympanic diameter 1.4; upper eyelid 1.3; interorbital space 2.8; thigh 7.5; tibia 7.8; foot 7.7; disk of third finger 0.5.

*Variation.* —The slight dorsolateral fold is present in all specimens but may not be lighter than the body color. In those cases it can best be located by the clear separation existing between the dorsal color and the black streak occurring below the fold. The tarsal tubercle opposite the tarsal fold is not apparent in all specimens.

All animals are light brown above and all have the dark spot between and behind the eyes, but markings on the dorsum may simulate a Y (with a prolonged, posterior branch) or a large X. Some markings on the throat are present in all individuals

and all have tubercles and spots or bars on the posterior half of the tibial segments. USNM 222813 and 222814 are males. They seem to be slightly darker and more speckled on the throat than females, but the difference is not significant.

*Relationships.* —*Colostethus pumilus* seems related to *C. tergogranularis* but it can be immediately distinguished by its smaller size, smooth dorsum, presence of dorsolateral folds and absence of an oblique lateral stripe. The same characters distinguish *C. pumilus* from members of group II *(brunneus).*

Females of *C. anthracinus* are very similar to *C. pumilus* but they are larger (20-21 mm), have a well defined oblique lateral stripe, and lack an ill defined dorsolateral fold and a dark streak along the anterior border of the thigh (not too well defined in some *C. pumilus).* The ventral color of the males is totally different. Both *C. pumilus* and *C. anthracinus* occur sympatrically in the region of San Vicente.

*Colostethus citreicola* sp. nov.
(Fig. 12A-C)

*Holotype.* —USNM 282687, an adult male from the immediate environs of Limón (General Plaza), 3600 ft (1097 m), Provincia Azuay. Collected 15 Aug. 1962 by J. A. Peters and R. K. Mullen. *Paratype.* —USNM *282686,* female, same data as holotype but collected by P. D. Spoecker.

*Etymology.* —*Citreicola,* from the Latin *citreum,* lemon, and *incolo,* to inhabit, in reference to the type locality (El Limón = The Lemon) of this species.

*Diagnosis.* —A medium sized *Colostethus* belonging to group VI, with almost fully webbed toes, uniform, very dark dorsal coloration, no dorsolateral or ventrolateral stripes, an incomplete, oblique lateral stripe, large finger disks, the third of which is as large as the tympanum and male with a blackish ventral coloration.

*Description of Holotype.* —Tip of snout a very open triangle; almost truncate, inclined inwards towards the lip when seen in profile; nostrils anterolateral, slightly protruding; vocal slits present; canthus rostralis sharply angular, curved between eye and nostril; loreal region vertical, concave; tympanum moderately distinct, posterodorsally covered by skin; palmar surfaces with a few small supernumerary tubercles on inner side; no apparent ridge along outer edge of hand; first finger much shorter than second; second shorter than fourth; third finger broad at the base; fingers without lateral fringes; finger disks large, much broader than distal digital segments; disk of third finger as large as tympanum; tarsal fold indistinct, not prominent; plantar surfaces smooth, with no apparent ridge along outer edge; toes fully webbed except fourth, where three phalanges are free; unwebbed portions of toe IV with distinct lateral fringes; disks of toes smaller than those of fingers; heel of adpressed hind limb extends anteriorly to between eye and nostril. Dorsum and upper flanks slightly shagreened; venter smooth; no tubercles along posterior border of arm or between tympanum and arm.

Dorsal color very dark brown, almost black; no dorsolateral or ventrolateral stripes; a short, barely evident, oblique lateral stripe from groin to level of arm (left side only); loreal and temporal areas including exposed part of the tympanum, grayish white; limbs uniformly dark brown; no noticeable dark streaks along anterior or posterior aspect of arms or thighs. Venter blackish on throat, chest and limbs; lighter gray on belly.

*Measurements of Holotype (mm).* —Snout-vent 22.7; head length 8.6; head breadth 8.2; eye-nostril 2.1; eye-tip of snout 3.6; eye diameter 3.0; tympanic diameter 1.2; upper eyelid 1.5; interorbital space 2.5; thigh 11.9; tibia 12.6; foot 10.6; disk third finger 1.2.

*Natural History.* —"Found under rocks and logs, either on the immediate bank of river or very close, in grassy, swampy meadow. "

*Variation.* —The only paratype is a 21.3 female in which the ventral color is greenish gray on the throat, chest, anterior part of the belly and limbs and grayish cream on the belly. The oblique lateral stripes are more distinct than in the holotype and extend to the level of the shoulders. There are dark transverse bars on the thighs, followed by brownish white areas, and obscure dark spots on the rest of the hind limbs.

*Relationships.* —The extensive toe webbing, the distinctly short first finger, the lack of dorsolateral and ventrolateral stripes, the presence of a short, oblique lateral stripe and the absence of those characters that distinguish other groups, easily identifies this species as a member of group VI. In Eastern Ecuador, the only other members of this group are *C. fuliginosus* (Jiménez de Espada) (and *C. bocagei* in case they are not synonyms), *C. sauli* Edwards, *C. nexipus* Frost, an undescribed species from Río Azuela collected by Edwards (1974b:l17), and a species from Puyo being described elsewhere by Rivero.

The name *C. fuliginosus* as currently known, probably includes several species. Specimens vary from fully webbed to about ⅔ webbed, but it is not known if the amount of webbing shows individual variation within a species or if it corresponds to two or more species (in which case, *C. bocagei* could be a valid name). The most distinctive feature separating *C. citreicola* from *C. fuliginosus* is the presence of very large disks and an indistinct tarsal fold and from most *C. fuliginosus,* the more extensively webbed toes and the apparently smaller size. *Colostethus nexipus* is a well differentiated species with two short dorsolateral streaks, while in *C. sauli* the toes are only ⅓ webbed.

The undescribed species from Río Azuela is extensively webbed, but the dorsum is spotted or variegated, the limbs boldly patterned, the tarsal fold well defined and there is an ill defined oblique lateral streak (not described by Edwards, 1974b).

The species from Puyo being described by Rivero is only ⅔ webbed, the dorsum is distinctly spotted, there is a vesicular inflammation at the base of the third finger and the tarsal fold is very distinct.

*Colostethus fallax* sp. nov.
(Fig. 13A-D)

*Holotype.* —USNM 282670, an adult male from 3 km W. Pilaló, on Quevedo-Latacunga Rd., 1760 m, Provincia Cotopaxi. Collected 19 Jan. 1979 by J. A. Peters. *Paratypes.* —USNM 282668-69, 282671-2, same data as holotype.

*Etymology.* —*Fallax,* from the Latin *fallax,* deceptive, for the deceptive similarity of this species to an undescribed species from Quevedo, Ecuador (Edwards, 1974b:150).

*Diagnosis.* —A small *Colostethus* ($n$ = 2 ♀ 16.9-18.7, $\bar{x}$ 17.8; $n$ = 3 ♂ 16.6 -17.5, $\bar{x}$ 17.2) belonging to group IV, with no dorsolateral or ventrolateral stripes but usually with a short, incomplete, oblique lateral stripe, free toes without lateral fringes and disks about as broad as distal digital segments.

*Description of Holotype.* —Tip of snout a very open triangle, almost truncate; convex when seen in profile; nostrils anterolateral, slightly protruding; vocal slits well separated from mandible; canthus rostralis angular, not too sharp, curved between eye and nostril; loreal region vertical, flat; tympanum large, flushed with the surface on posterior half; palmar surfaces smooth, with no apparent ridge along outer edge; first finger shorter than second; second shorter than fourth; third finger swollen; subarticular tubercles of fingers not too distinct; fingers without lateral fringes; finger disks small, not broader or barely broader than distal digital segments; disk of third finger considerably smaller than tympanum; tarsal fold moderate, extending to inner metatarsal tubercle; outer metatarsal tubercle conical, prominent; plantar surfaces smooth, with no apparent ridge along outer edge; subarticular tubercles of toes not too prominent or distinct; toes free, with slight lateral fringes; disks of toes not broader or barely broader than distal digital segments; heel of adpressed hind limb extending anteriorly to middle of eye.

Skin above, below and on flanks, smooth; a line of tubercles along posterior border of arm; no apparent tubercles between angle of jaw and arm; a few scattered tubercles on tibial segment; a pair of small, indistinct tubercles between and in back of, metatarsal tubercles.

Dorsal color light brown with two darker, obscure, longitudinal streaks along the center of the back; a dark brown, narrow lateral stripe from behind eye to groin; dorsolateral and ventrolateral stripes absent; a short, whitish, oblique lateral stripe extending inside the brown stripe, from groin to level of sacral hump; lower flanks marbled brown and tan; an ill-defined

blackish streak on the anterior border of arm; posterior aspect of thighs with whitish dots; anterior color of thighs well separated from whitish ventral color; limbs not noticeably barred except on tarsii and feet; venter immaculate except for a few indistinct specks on the throat and chest and a few more distinct ones on outer borders of belly.

*Measurements of Holotype (mm).* —Snout-vent 17.5; head length 6.4; head breadth 5.5; eye-nostril 1.4; eye-tip of snout 2.7; eye diameter 2.3; tympanic diameter 1.4; upper eyelid 1.9; interorbital space 2.1; thigh 8.2; tibiae 8.1; foot 7.7; disk of third finger 0.5.

*Variation.* —The paratypes are very similar to the holotype in morphology but the oblique lateral stripes are absent in two specimens and is only apparent on one of the flanks of another. In USNM 282671 the flecks on the throat are more intense and those on the sides of the belly extend more into the belly, producing a marbled or spotted whitish on brown pattern. USNM 282669 has distinct whitish points on the lower flanks and USNM 282672 is almost immaculate below.

In USNM 282672 there are two elongated X's on the dorsum, the most anterior at the level of the scapular region and the more elongate and ill-defined one, posterior to this. The two females in the group (USNM 282668 and 282669) are equal to the males in coloration but their third finger is not dilated.

*Natural History.*—Collected "in a small chorus, calling by day. Voice is a single sharp peep."

*Relationships.* —*Colostethus fallax* is very similar to a species belonging to group IV reported by Edwards (1974b:146) from an elevation of 140 m near Quevedo, in W. Ecuador. Pilaló, the type locality of *C. fallax,* is on the road from Quevedo to Latacunga, but 1620 m higher than Quevedo. It is possible that the two forms may be found to be nonspecific, *C. fallax* being derived from the Quevedo form, from which it can be distinguished by the presence of an incomplete, oblique lateral stripe (complete, and extending from eye to groin in the Quevedo form).

*Colosthetus peculiaris* sp. nov.
(Fig. 14A-D)

*Holotype.* —USNM 282664, an adult female from Pailas, a tambo between Sevilla de Oro and Méndez, on E or NE facing slope, 7200 ft (2195 m), Provincia Morona-Santiago. Collected 6 Aug. 1962 by J. A. Peters and P. E. Spoecker. *Paratype.* —USNM 282665-67, same data as holotype.

*Etymology. —Peculiaris,* from the Latin *peculiar,* distinct, in reference to the presence of a short web between the fingers of this species.

*Diagnosis.* —A medium sized *Colostethus* ($n$ = 2 ♀ 29.0-29.8, $\bar{x}$ 29.4; $n$ = 1 ♂ 26.5) belonging to group I, with a very dark and uniform dorsal coloration, no dorsolateral, ventrolateral or oblique lateral stripes, extensively webbed toes with distinct lateral fringes and a short web between fingers II and III.

*Description of Holotype.* —Tip of snout truncate; vertical when seen in profile; nostrils antero-lateral, very slightly protruding; canthus rostralis angular, not too sharp, slightly curved between eye and nostril; loreal region vertical, concave; tympanum large, covered dorsally by skin; palmar surfaces rugose, with one or two flat, indistinct warts and without a ridge or fold along outer edge; a short, but distinct basal web between fingers II and III; first finger shorter than second; second shorter than fourth; fingers flat and with a lateral fringe; finger disks large, much broader than distal digital segments; disk of third finger about 2/3 size of tympanum; tarsal fold distinct, extending to inner metatarsal tubercle and continuing to disk of first toe; three metatarsal tubercles, the central tubercle more proximal than others; plantar surfaces smooth, with no apparent ridge along outer edge; toes about ½ webbed (from first to fifth, with the following webbing formula: I 1-2¼ II 1¼-3 III 2-3¼ IV 3½-2 V) and with distinct lateral fringes; toe disks broader than distal digital segments; heel of adpressed hind limb extends to tympanum.

Dorsal, ventral and lateral surfaces, smooth; no apparent tubercles along posterior surfaces of forearm; a tubercle between tympanum and arm.

Dorsal color dark brown, almost black; no apparent dorsolateral, ventrolateral or oblique lateral stripes; loreal and temporal regions, including tympanum, brown; no dark streaks along anterior or posterior aspect of arms; flanks dark brown, slightly darker than dorsum; a light colored ring around base of arm; a series of indistinct, dark spots along anterior surface of thighs; rest of thighs dark brown with obscure, lighter markings; rest of limbs brown. Ventral surfaces brownish yellow with brown marbling and spotting on throat and anterior part of belly; two extensive pectoral spots.

*Measurements of Holotype (mm).* —Snout-vent 29.8; head length 10.2; head breadth 9.5; eye-tip of snout 5.1; eye diameter 3.3; tympanic diameter 1.7; upper eyelid 1.8; interorbital space 3.2; thigh 15.2; tibiae 13.5; foot 12.6; disk third finger 1.3.

*Natural History.* —"Collected in fairly heavy forest."

*Variation.* —USNM 282666 is a 29.0 mm female with a more or less uniformly infuscated anterior portion of the ventral surfaces, but the large pectoral spots are noticeable when the animal is submerged. USNM 282667 is a 26.5 mm male, very similar to the holotype in dorsal and ventral coloration. In USNM 282665, an immature 14.5 mm specimen, the anterior part of the venter is not appreciably infuscated and the pectoral spots are very distinct.

*Relationships.* —*Colostethus peculiaris* is a member of group I but the short web between fingers II and III, the lack of longitudinal stripes and the extensively webbed toes make it a very unique and easily distinguishable member of that group. The ventral coloration is similar to that of an undescribed member of the same group collected by Duellman (Edwards, 1974b:257) near Zamora, but there is no web between the fingers in that species, the toes are only slightly webbed and there is an oblique lateral stripe.

## *Colostethus kingsburyi* (Boulenger) 1918 and its Allies

*Specimens Examined (all from Ecuador).* —USNM 282492-95 (4), 2 km S. Sucúa, 2700 m, Prov. Morona-Santiago. USNM 282495-500 (6), Méndez, 1900 m, Prov. Morona-Santiago. USNM 282500 (1), Plan Grande and Rosario, trail between Méndez and Limón, 3000-3700 ft (914-1127 m), Prov. Morona-Santiago. USNM 282501-09 (9), Limón (Gral. Plaza), immediate environs of, 3600 ft (1097 m), Prov. Morona-Santiago. USNM 286457 (1), Veracruz, ca. 9 km SE of, along the Río Puyo, 950 m, Prov. Pastaza. USNM 282510 (1), Puyo, 2.5 km SE of, 3200 ft (975 m), Prov. Pastaza. USNM 282511 (1), Veracruz, ca. 10 km E of Puyo, 3300 ft (1006 m), Prov. Pastaza. USNM 282512 (1), Río Pindo, Prov. Pastaza. USNM 282513-22 (10), Río Negro, 4100 ft (1249 m), Prov. Tungurahua.

*Colostethus kingsburyi* (Boulenger, 1918) was based on four specimens from El Topo, 4200 ft (1296 m). Silverstone (1971) thought that two species were represented among the syntypes and restricted the name to the three specimens with webless feet and a ventrolateral stripe. The specimen with basal webbing, a complete diagonal stripe and a fat body did not fit Boulenger's description and was considered a separate species. Since then, only two more specimens have been referred to *C. kingsburyi:* one from Río Pastaza described under the name of *Phyllobates intermedius* (Andersson, 1945) but referred to *C. kingsburyi* by Edwards (1971, 1974b), and another from Cordillera de Dué, above Río Coca, 1150 m (Edwards, 1974b).

Boulenger described the presence of dorsolateral and ventrolateral but no oblique lateral stripes in *C. kingsburyi.* The lower parts were described as "white, uniform on the throat and breast mottled with greyish brown." However, Edwards (1974b: 203) states that there is an oblique lateral stripe in the only specimen, a female, available to him. Although his description is apparently based on the Dué specimen, he claims to have examined two specimens, one from Dué and one from Río Pastaza (p. 360).

The latter is the holotype of *Phyllobates intermedius* Andersson, a male specimen with a "whitish brown venter. " No mention is made by Andersson of a ventrolateral or an oblique lateral stripe but Edwards (1974a) examined the type and claims it has ventrolateral stripes and a creamy yellow venter.

Edwards (1974b:264) also mentions a species from Cochabamba, Bolivia, 260 m, and one from Veracruz, Ecuador, 970 m (p. 146). He only had one male and one female of the Bolivian form and no reference is made to a black or blackish ventral color, although the species is described as having ventrolateral and oblique lateral stripes (the latter in only one of the specimens). The Veracruz form was webless, had "solid dark infuscation on the belly," and lacked ventrolateral and oblique lateral stripes.

All the above mentioned specimens have a dorsolateral stripe and they all belong to group II (Rivero, 1988). Yet, Edwards never compared his proposed species with *C. kingsburyi,* its probably closest relative.

The USNM Morona-Santiago specimens reported here have a ventrolateral stripe, no oblique lateral stripe and a yellowish venter. There are several males in the group but no black or blackish color can be detected in any of them. Specimen 282508, a female, shows a slight infuscation of the throat but nothing that can be described as black or even gray. All of them have "perfectly free feet" and agree in all respects with Boulenger's description of *C. kingsburyi.*

Boulenger's "mottled breast" may have referred to the other species among the syntypes, or perhaps to *C. kingsburyi,* but considering the ventral coloration of the twenty specimens reported here, this seems unlikely.

MCZ has a number of specimens (MCZ 91611-17, 99058-59) from the neighborhood of Puyo and Rosario Yacu (around 920 m), on Río Pastaza. Most of them are males and black or blackened on the ventral surfaces. They do not have a ventrolateral stripe, but four out of nine have an oblique lateral stripe. In all probability they represent the species from Veracruz reported by Edwards, and so do USNM 286457 from Veracruz and USNM 282510, from Puyo, both females without ventrolateral or oblique lateral stripes. Veracruz

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FIG. 1. USNM 282893, holotype of *Colostethus jacobuspetersi.* A. Dorsal view, B. Ventral view. C. Hand. D. Foot.

FIG. 2. USNM 282979, holotype of *Colostethus marmoreoventris.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

FIG. 3. USNM 282603, holotype of *C. torrenticola.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

FIG. 4. USNM 282663, *Colostethus* sp. from 20 km E. Guaranda, on road from Río Bambato, Guaranda, 12,500 ft. A. Dorsal view. B. Ventral view. Compare with *C. torrenticola* above.

FIG. 5. USNM 282638, holotype of *Colostethus tergogranularis.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot

FIG. 6. USNM 282648, holotype of *Colostethus cevallosi.* A. Dorsal view. B. Lateral view. C. Ventral view. D. Hand. E. Foot.

FIG. 7. USNM 282819, holotype of *Colostethus parcus.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

FIG. 8. USNM 282818, a female *Colostethus parcus* from Plan de Milagro, between Limón and Gualaceo, Provincia Morona-Santiago, to show uncommon dorsal pattern of females.

FIG. 9. USNM 282534, a female *Colostethus parcus* from Plan de Milagro, between Limón and Gualaceo, Provincia Morona-Santiago, to show common dorsal pattern of females (although dorsolateral stripes do not usually extend anteriorly beyond the level of the arms).

FIG. 10. *Colostethus anthracinus* A. USNM 281933, female from Limón and Gualaceo, trail between Sapote and Suro Rancho, 8600 ft to show common dorsal pattern of females. B. Ventral view of USNM 281994, female from San Vicente, 10,200 ft to show uncommon ventral pattern of females (2 in 22) but most common ventral pattern in *C. parcus* (3 in 5). C. USNM 281935, male from same locality as USNM 281933, to show common dorsal pattern of males. D. Ventral view of USNM 281935 to show common ventral pattern of males. E. Ventral view of female USNM 281933 to show general ventral pattern of females.

FIG. 11. USNM 282816, holotype of *Colostethus pumilus.* A. Dorsal view. B. Ventral view. C. Hand, D. Foot.

FIG. 12. USNM 282687, holotype of *Colostethus citreicola.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

FIG. 13. USNM 282670, holotype of *Colostethus fallax.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

FIG. 14. USNM 282664, holotype of *Colostethus peculiaris.* A. Dorsal view. B. Ventral view. C. Hand. D. Foot.

is midway between Puyo and Rosario Yacu and all these localities are relatively close together.

*Phyllobates intermedius* Andersson, is also from Río Pastaza. Its whitish brown venter (black alive?) and apparent absence of ventrolateral or oblique lateral stripes militate in favor of considering this species identical to the Veracruz-Puyo-Rosario Yacú species (but see Edwards, 1974a, opinion, as expressed above) in which case, the name *Colostethus intermedius* (Andersson) would be the proper one to use.

USNM 282513-22 from Río Negro, almost exactly from the same elevation as the holotype of *C. kingsburyi* and from very close to its type locality, and USNM 282511 and 282512 from Veracruz and Río Pindo, respectively, are very similar to *C. kingsburyi* but they have a short, distinct, basal web. They all have dorsolateral and ventrolateral, but no oblique lateral stripes. The ventral color of the males is not blackened.

As other specimens from Veracruz and Puyo lack webs, it appears, either that *C. kingsburyi* is variable in respect to the presence or absence of web or that there are three closely related species along the same river system; one with a black or blackish venter (males), usually with no ventrolateral stripe and occasionally with an oblique lateral stripe, which has been reported from up to 970 m, *(C. intermedius* or undescribed), *C. kingsburyi,* which has a yellowish venter, a ventrolateral stripe and no oblique lateral stripe, and which has been reported from 1296 m along the Pastaza River System and up to 2700 m in "the Provincia de Morona-Santiago, and a webbed form with dorsolateral and ventrolateral but no oblique lateral stripes and a yellowish venter, which is sympatric with both of them along the Pastaza River System between 900 and 1250 m.

Edwards' Dué specimen is difficult to allocate. It is a female (it is not known if the venter of the male is blackish) and it has a ventrolateral stripe (like *C. kingsburyi)* and an oblique lateral stripe (unlike all the *C. kingsburyi* known so far). If it is *C. kingsburyi,* as the presence of a ventrolateral stripe seems to indicate, then *C. kingsburyi* may occasionally show an oblique lateral stripe.

The Bolivian species with yellow venter, a ventrolateral stripe and, in one specimen, an oblique lateral stripe, would fit the description of *C. kingsburyi* (if an oblique stripe is found to be present in some specimens of that species) but the elevation of the locality where it was collected is not right for that species. As suggested by Edwards, it may represent a new species.

*Acknowledgments.* —The author wishes to express his appreciation to Ronald Heyer, George Zug and Roy McDiarmid for all the courtesies and attentions received during his two visits to the National Museum of Natural History and for the load of specimens, and to José Rosado for reexamination of specimens deposited at the Museum of Comparative Zoology.

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