ON THE IDENTITY OF SOME TOADS OF THE GENUS *BUFO* FROM ECUADOR, WITH ADDITIONAL REMARKS ON *ANDINOPHRYNE COLOMAI* HOOGMOED, 1985 (AMPHIBIA: ANURA: BUFONIDAE).

by

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Study of the type specimens of *B. caeruleostictus* Günther, 1859 and *B. chanchanensis* Fowler, 1913, and of fresh material showed that *B. chanchanensis* is a junior subjective synonym of *B. caeruleostictus*. Probably it is a member of the *B. guttatus* group. *B. caeruleocellatus* Fowler, 1913 is a junior subjective synonym of *B. haematiticus* Cope, 1862. New material of *B. hypomelas* Boulenger, 1913 is reported from NW Ecuador, the species is redescribed, and it is shown that this is a valid taxon, not the juvenile of *B. blombergi* Myers & Funkhouser, 1951 as suggested by Lynch, in Frost (1985). It is doubted whether *B. intermedius* Günther originates from Ecuador. It probably is a Central American or Mexican species of the *B. valliceps* Wiegmann, 1833 group. A short overview of the described species of *Bufo* in W. Ecuador and comments on the contents of the *B. typhonius* group are given. Additional material of *Andinophryne colomai* is reported and discussed.

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RESUMEN

Basandose en estudio de los ejemplares típicos de *B. caeruleostictus* y *B. chanchanensis* y en material recien recojido, se infiere que *B. chanchanensis* es un sinónimo subjetivo más reciente de *B. caeruleostictus*. Posiblemente *B. caeruleostictus* es un miembro del grupo *B. guttatus*. *B. caeruleocellatus* es un sinónimo subjetivo más joven de *B. haematiticus*. Se informe sobre material recien coleccionado de *B. hypomelas* del Noroeste del Ecuador, se describe la especie, y se muestra que es un taxon valido y que no es el joven de *B. blombergi* como sugiere Lynch. Se duda si *B. intermedius* es originario de Ecuador. Probablemente es un especie del America Central o de Mexico del grupo *B. valliceps*. Se presenta un sumario de las especies escritas del Oeste de Ecuador y se discuta el contenido del grupo *B. typhonius*. Tambien se discuta material adicional de *Andinophryne colomai*.

INTRODUCTION

Günther (1859: 415) described *Bufo caeruleostictus* on the basis of two adult specimens from the "Andes of Western Ecuador". The description was short but precise. Boulenger (1882b: 291) gave a short diagnosis and a good picture of the species. He added that the male has a subgular vocal sac, placing this

information between brackets, probably because it was not based on BMNH material, but on material he had reported earlier (Boulenger, 1880: 46). Since, the status of the species was never discussed and the name was used in several checklists, most recently by Hoogmoed (1985a: 39), as a valid taxon. Cei (1968: 12; 1972: 89) considered it a member of the '*typhonius* complex' and Hoogmoed (1985a: 39) placed it in the *Bufo typhonius* group, on the basis of published comments by Cei (1968: 12; 1972: 89).

Fowler (1913) described *Bufo chanchanensis* on the basis of material collected in the Chanchan River valley on the western slopes of the Andes in Ecuador. The description was short and did not give rise to any doubts as to its being a member of the genus *Bufo*, but the drawings accompanying the description showed a rather peculiar, slender toad with elongate parotoids. Since its description it was treated as a valid species (Nieden, 1923: 140) or as a synonym of *Bufo typhonius* Linnaeus, 1758 (Barbour & Loveridge, 1929: 231), until Leavitt (1933: 8) considered it a subspecies of *Bufo typhonius*. Leavitt made the cryptic remark that "*Bufo chanchanensis* has also been long relegated to the synonymy (!)....", but did not provide any literature reference to back up this statement. To the best of my knowledge, between 1913 and 1933 *Bufo chanchanensis* was only mentioned in published literature by Nieden (1923: 140) who did not synonymise it with any species, and by Barbour & Loveridge (1929: 231) who indeed did synonymise it with *Bufo typhonius*. Anyway I would not call a period of four years "long". Perhaps Leavitt meant that it had been "common" practice (but by whom?) to consider *B. chanchanensis* a synonym of *B. typhonius* (?). Anyway, he was followed by e.g. Peters (1954-55) and Kluge (1983), but Lutz (1971), Malnate (1971), Miyata (1982) and Hoogmoed (1985a) again treated *chanchanensis* as a separate species, whereas Gorham (1974) also considered it a synonym of *typhonius*. In several recent works dealing with South American *Bufo* (Cei, 1968; Blair, 1972; Harding, 1983), there is no reference at all to *chanchanensis* and it remains unclear what those authors exactly thought about it, if they were aware of its existence at all. Hoogmoed (1985a: 40) placed it in the *Bufo typhonius* group on the basis of published comments and on actions by Leavitt (1933) and Kluge (1983: 24).

During an ongoing study of the South American toads loosely referred to as the "*Bufo typhonius* group" (Hoogmoed, 1985a), I studied fresh material of a species collected on the westflank of the Andes in Central Ecuador, which contained both juveniles and adults and which stood out by its narrow parotoids and dark coloured belly. Upon comparing this material with the type series of *Bufo chanchanensis* and with the two syntypes of *B. caeruleostictus* it soon became evident that the juveniles corresponded well with the type series

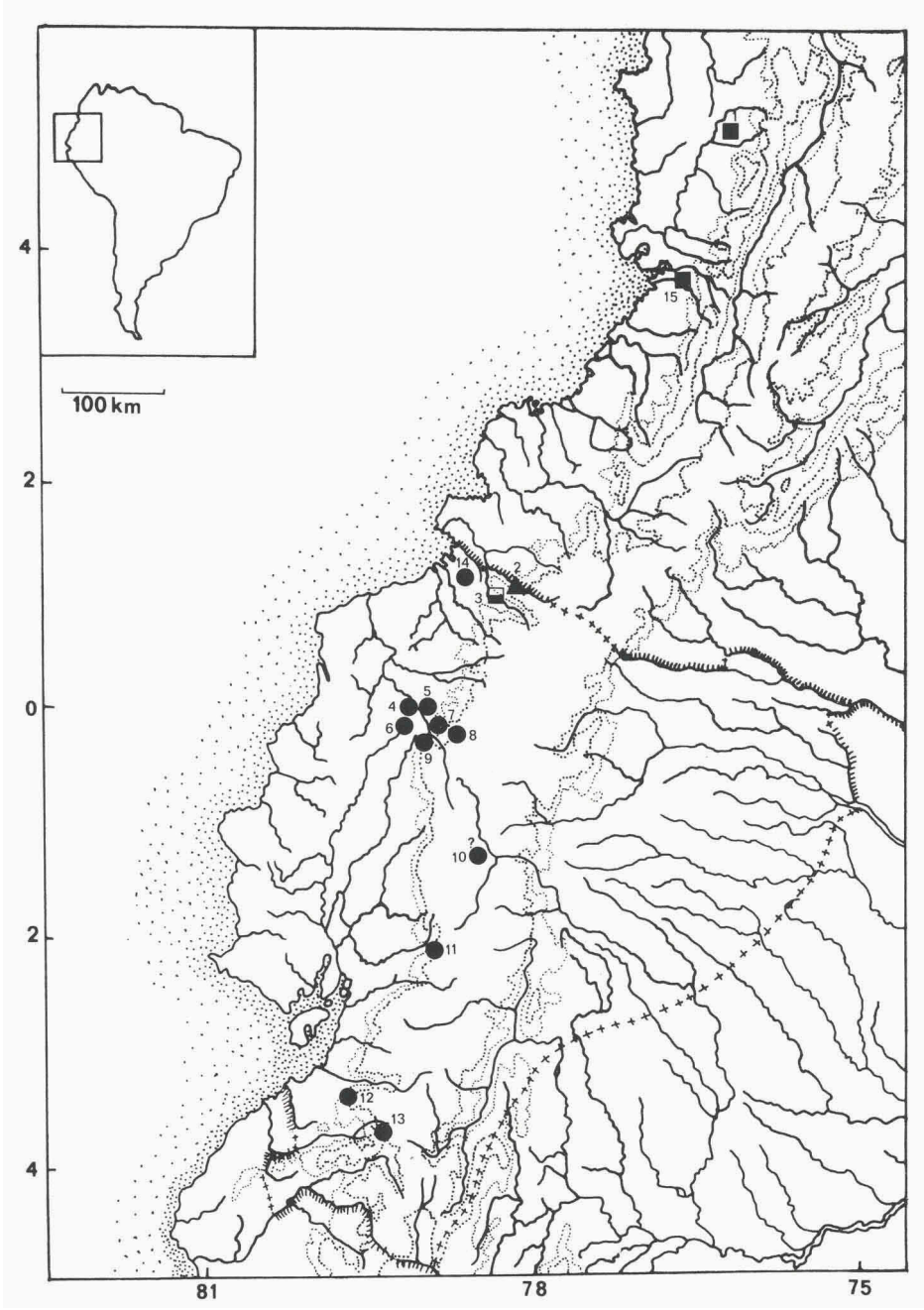

Fig. 1. Map of Ecuador and adjacent countries (adapted from Hoogmoed 1987: 211). Dots: *Bufo caeruleostictus*; squares: *Bufo hypomelas*; triangle: *Andinophryne colomai*; half open square: locality where *B. hypomelas* and *A. colomai* both occur. 1. Condoto, 2. Chical, W. of Maldonado, 3. Trail Lita-Río Baboso, 4. Río Blanco, near mouth of Río Yambi, 5. Mindo, 6. Santo Domingo de los Colorados, 7. Faisanes and Highway 28, 14.4 km from Highway 30, 8. Tandapi = M. Cornejo Astorga, 9. (San Francisco de) las Pampas, 10. Chontapamba, 11. Camp Chiguancay, Chanchan River valley, 12. W. of Pinas, 13. E. of Portovelo, 14. Carondelet. 15. Dept. Valle del Cauca.

of *B. chanchanensis* and the adults with the syntypes of *B. caeruleostictus*. Consequently, these two names should be synonymised and the taxon further has to be referred to as *Bufo caeruleostictus* Günther, 1859, with *Bufo chanchanensis* Fowler, 1913 becoming a junior subjective synonym. Based on the types and on the new material, a redescription of the species is given.

Bufo caeruleostictus Günther, 1859
(figs. 1-7)

B. caeruleostictus Günther, 1859: 415; Boulenger, 1882b: 291; Nieden, 1923: 140; Peters, 1954-55: 351; Gorham, 1974: 78; Miyata, 1982: 3; Harding, 1983: 60, 226, Hoogmoed, 1985a: 39.
B. coeruleostictus (incorrect subsequent spelling): Boulenger, 1880: 46; 1882a: 466; 1882b: pl. 21; Cei, 1968: 12; Lutz, 1971: 457; Cei, 1972: 89.
Bufo chanchanensis Fowler, 1913: 155; Nieden, 1923: 113; Malnate, 1971: 349; Miyata, 1982: 3; Hoogmoed, 1985a: 40.
Bufo typhonius (partly): Barbour & Loveridge, 1929: 231; Gorham, 1974: 85.
Bufo typhonius chanchanensis: Leavitt, 1933: 8; Peters, 1954-55: 340; Kluge, 1983: 24.
Bufo caeruleostrictus [sic!]: Vellard, 1959: 36.
Bufo chanensis [sic!]: Lutz, 1971: 457.

Material. — Ecuador. "Andes of W. Ecuador": 2 ♀, BMNH 1947.2.20.48-49 (syntypes of *Bufo caeruleostictus* Günther, 1859) leg. Fraser.

Provincia de Chimborazo. Camp Chiguancay, Chanchan River Valley: hgr.[1]♀, ANSP 21095 (holotype of *Bufo chanchanensis* Fowler, 1913), 1 hgr. ♀, 1 hgr ♂, 4 juv., ANSP 21096-98, 1 juv., MCZ 3217 (paratypes of *Bufo chanchanensis* Fowler, 1913), 1911, leg. S.N. Roads. (Peters (1954-55: 340) considers this locality to be in Guayas province).

Provincia de Pichincha. "Santo Domingo de los Colorados": 1 ♀ MHNG 2278.46, ii-1984, 1 hgr, MHNG 2278.47, v-1985, both leg. G. Onore. Tandapi, 1500 m (= Cornejo Astorgas): 1 ♂, MHNG 2278.45, ix-1984, 5 hgr., MHNG 2278.40-44, xii-1983, leg. G. Onore; 4 hgr., KU 111453-56, 1560 m. Faisanes, 1250-1300 m: 1 hgr., MHNG 2278.48, leg. G. Onore. Mindo: 2 hgr., USNM 284343-4, Hacienda San Vicente, 11-ii-1985, leg. M.S. Foster. Río Blanco, near mouth of Río Yambi, ± 700 m: 1 hgr., USNM 196939, ii-1959, leg. M. Olalla. Chontapamba: 4 hgr., USNM 196940, 238356-58, iv-1955, leg. M. Olalla. Highway 28 (old Quito Road), 14.4 km from Highway 30, 1380 m: 2 hgr., 1 juv., MCZ 91544-6, 3 juv., MZUSP 56251-3, 11-vii-1976, leg. K. Miyata et al.

Provincia de Cotopaxi. Las Pampas 1800 m: 1 ♂, 1 ♀, 7 hgr., MHNG 2278.20-28, 1984, 10 hgr., MHNG 2278.29-38, iii-1985, 1 hgr., MHNG 2278.39, 30-viii-1985, 1 juv., 4 hgr., MHNG 2278.11-15, i-1986, 1 juv., MHNG 2280.05, xii-1984, 2 hgr., MHNG 2401.32-33, iv-1986, 3 hgr., MHNG 2401.34-36, iv-1986, 6 hgr., MHNG 2401.37-42, x-1986, 4 hgr., MHNG 2401.43-46, i-1986, 1 ♀, RMNH 24033, vi-1988, all leg. G. Onore; 1 hgr., MHNG 2278.16, x-1985, leg. Kramer.

Provincia El Oro. 12.2 km W. of Pinas by new road: 2 juv., USNM 260775-6, 8-x-1979, leg. E.W. Schupp.

Provincia de Loja. Punta Santa Ana, 6 hrs. E. of Porto velo, 1100 m: 4 juv., AMNH 13732, 13735-37, 23-xii-1920, leg. H.E. Anthony.

Provincia de Esmeraldas. Carondelet; 1 hgr., 2 juv., MZUSP 15584-6, ii-1952, leg. M. Olalla.

Diagnosis. — A large toad with a wide, flat head and occipital ridges, a short, slightly projecting (halfgrowns) to truncate (adults) snout, margin of

[1] hgr.= half grown

upper eyelid warty, weakly scalloped, projecting. Parotoids distinct, elongate. Flanks with a distinct (adults) oblique row of tubercles. Limbs long and slender with long fingers (rudimentarily webbed) and toes (moderately webbed, with fringe extending to the tips). First finger shorter than second. Dorsum and top of head in females smooth, with rounded to conical warts on upper eyelids, flanks and legs. Entire dorsal surface in males with sharply tipped warts, giving males a rough appearance. Ear present, tympanum externally hardly visible. Entire temporal region and side of neck with large, rounded warts, especially near the corner of the mouth.

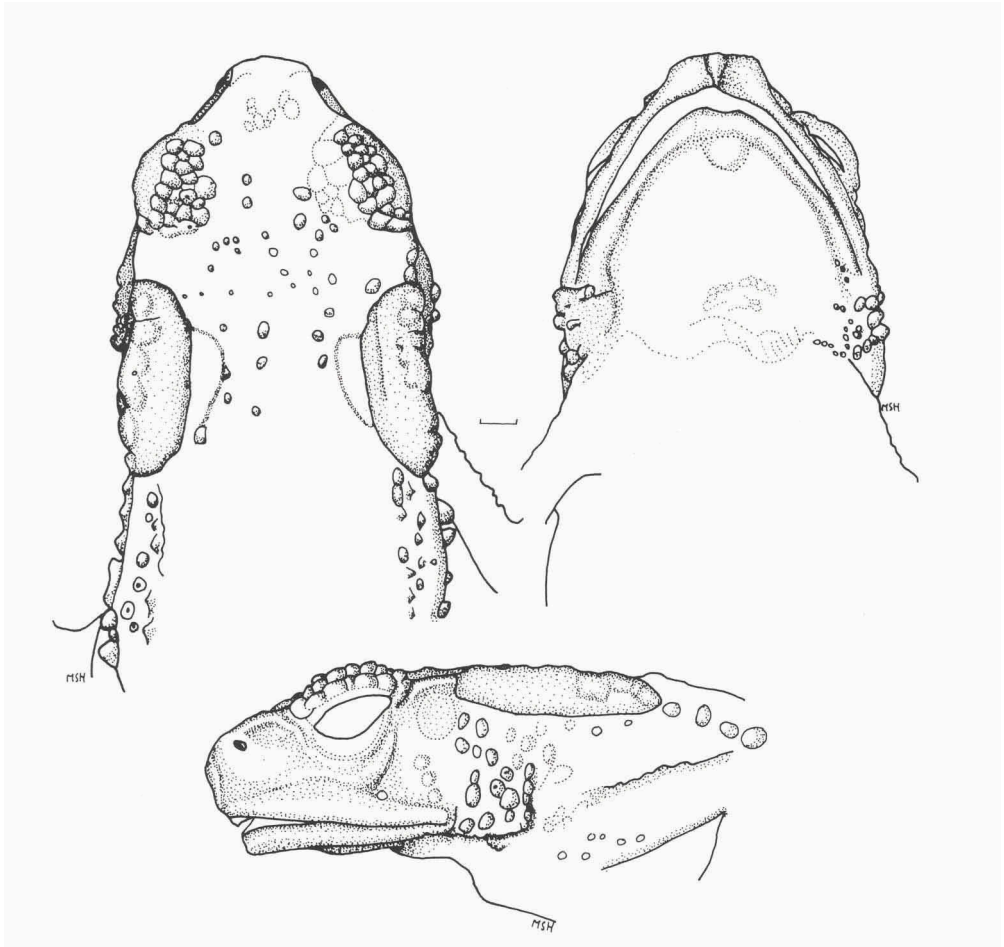

Fig. 2. Head of *Bufo caeruleostictus* Günther. Holotype of *B. chanchanensis* Fowler (halfgrown, MCZ 21095) in dorsal, ventral and lateral view. The line equals 1 mm.

Description. — Snout-vent length of females 71.6-92.3 mm, of males 75.8-80.9 mm, of halfgrowns 22.8-38.4 mm. Juveniles measure between 14.4 and 16.7 mm. Head slightly longer than wide, as wide as adjacent part of body. Slightly more than half as deep as wide. Width of head at corners of jaws slightly wider than width at supratympanic level, which again is slightly wider than width at tympanum level. Eyelids distinctly projecting from the head. Snout broadly rounded in dorsal and truncate to sloping in lateral profile, slightly projecting beyond the upper jaw in halfgrowns, sloping to the jaw in adults. Tip of snout with low, fleshy, vertical ridge. Distance between nostril and tip of snout in halfgrowns 51-79% ($\bar{x}$ = 64.4, n = 16), in adults 38-88% ($\bar{x}$ = 58.2, n = 14) of the distance between nostril and eye. Nostrils situated posterior of the anterior rim of the mouth, below the canthus rostralis in a slightly swollen area. Nostrils oblique, oval, directed laterally. Distance between nostrils in halfgrowns 85-103% ($\bar{x}$ = 90.6, n = 16), in adults 100-135% ($\bar{x}$ = 117.1, n = 14) of that between nostril and eye, 65-81% ($\bar{x}$ = 71.9, n = 10) of the interorbital distance in halfgrowns, 48-60% ($\bar{x}$ = 53.1, n = 7) in adults. Internarial area concave. Top of head flat to slightly concave in the occipital area, with numerous bluntly conical to rounded tubercles. In adults with distinct occipital ridges. Interorbital area 1.1 - 1.6 ($\bar{x}$ = 1.3, n = 39) times as wide as an upper eyelid. Upper eyelid with numerous rounded tubercles, covering the inner and central part. Outer rim of upper eyelid without tubercles but with scalloped edge, which projects beyond the eye. Canthus rostralis distinct, rounded, shallowly S-shaped, not projecting over the loreal region, which is concave and slopes almost vertically to the upper lip, but is distinctly visible from above. Lips not flaring. Eyes with horizontally oval pupil. Lower eyelid translucent. Temporal region sloping steeply, with numerous rounded warts, more or less arranged in vertical rows, most prominent towards the area over the articulation of the jaws. Tympanum very small, indistinct (virtually invisible externally), vertically oval. In both adults (MHNG 2278.20-21) that were X-rayed, the columella is well developed, in the three halfgrowns (ANSP 21095, MHNG 2278.22-23) that were X-rayed no columella can be seen. Musculus adductor mandibulae posterior subexternus not visible externally. Supratympanic fleshy ridge distinct, rounded, hardly projecting over the temporal area, running in a straight line, slightly sloping upward in lateral view, those from both sides nearly parallel in dorsal view, from posterior corner of eye to parotoid with one or two bulbous swellings. Parotoids swollen, distinct, elongate, 2.0 - 3.5 ($\bar{x}$ = 2.5, n = 46) times as long as wide, of the same width throughout, extending on the side of the neck slightly less than on the dorsal surface, median margin smooth, outer margin irregularly indented.

Side of neck spinulous with a few rounded tubercles, more or less arranged in vertical rows, in the anterior part. Flanks spinulous, with a not very prominent oblique row of bluntly conical tubercles from parotoid to groin. Flanks above this row with indistinct short rows of flat, round tubercles. Skin of back and top of head smooth in females, spinulous with many low, bluntly conical tubercles in males and juveniles. In males the warts are close together, in juveniles they are widely dispersed. In juveniles the skin is densely covered with minute spines in the area between warts. Skin of limbs spinulous with

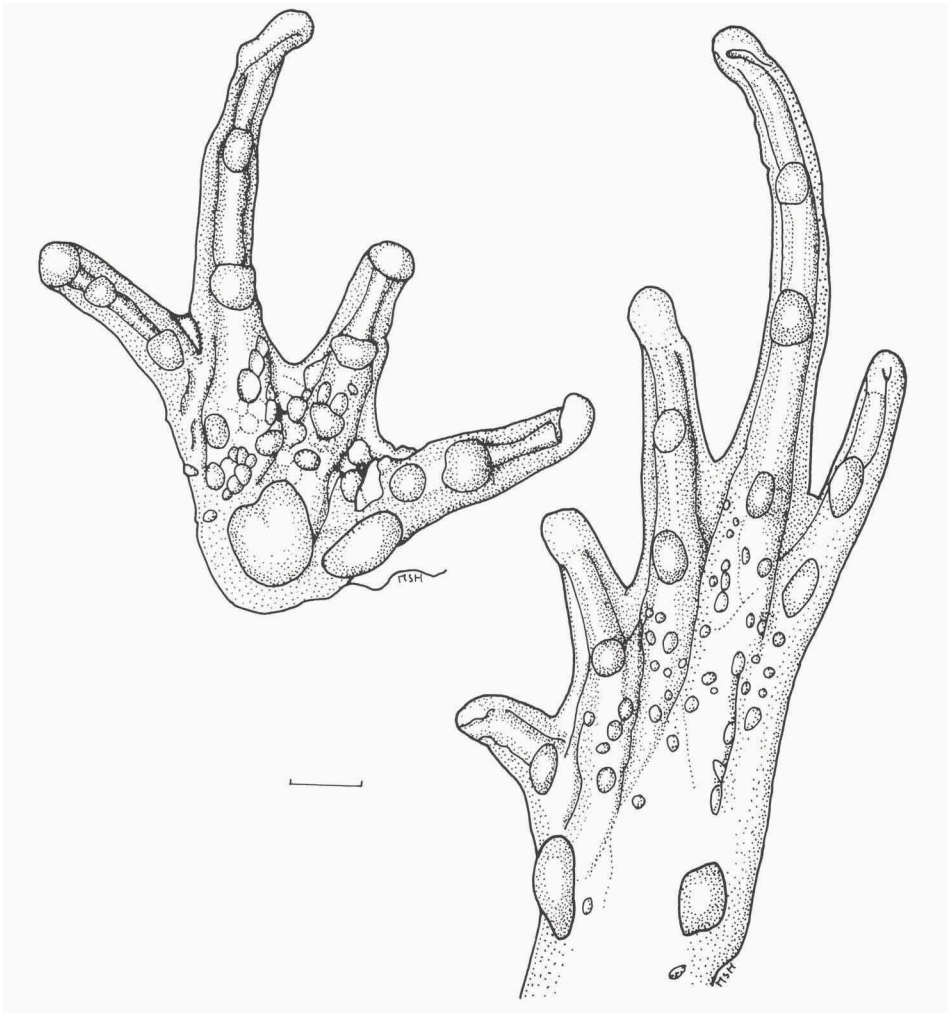

Fig. 3. Ventral surface of hand and foot of *Bufo caeruleostictus* Günther. Holotype of *B. chanchanensis* Fowler, halfgrown, MCZ 21095. The line equals 1 mm.

many pointed, bluntly conical or rounded tubercles, more on the forearm than on the upper arm. Males much more pustulous than females, with sharper and often more tips per wart than in females. This agrees with Boulenger's (1880: 46) observation that two males in breeding condition differed from the specimens described by Günther (1859) in having numerous tubercles on the back. Males with nuptial asperities on the median surface of the very prominent inner metacarpal tubercle, on the median and dorsal surface of fingers I and II and sometimes even on a narrow area on the median surface of finger III. Nuptial asperities brown. Warts on arms with brown tips. Arms in males shorter and thicker than in females.

Hand with distinct, large, undivided, rather prominent, oval to tear-shaped outer and smaller, but prominent (especially in males), oval, inner metacarpal tubercle. Subarticular tubercles single, present on all fingers, prominent, less distinct towards the tip of the fingers, absent under the most distal articulation. Supernumerary tubercles present, forming a reticulum of furrows on the plantar surface and on the base of the fingers. Fingers only with rudimentary webbing, depressed with a fleshy rim; tips rather bulbous, rounded. Dorsal side of articulation between ultimate and penultimate phalanges with a transverse fold of skin. Length of fingers: I<II<IV<III. Phalangeal formula: 2-2-3-3. In males the first finger is distincly thicker than the other fingers.

Tarsus with tubercles, concentrated near outer border in irregular longitudinal rows. Inner edge of tarsus with distinct, low, smooth tarsal fold. Distinct, prominent, oval outer and inner metatarsal tubercles of about equal size. Toes with distinct subarticular tubercles, less distinct towards the tip of the toes, absent under the most distal articulation. Supernumerary tubercles present, small, low, arranged in irregular longitudinal rows. Toes depressed with rather bulbous rounded tips. Toes moderately webbed, web thin, edges smooth; formula I (1 3/4) - (2) II (1 1/4) - (3) III (2) - (3 1/3) IV (3 1/3) - (2 1/4) V, web extending as a fringe along the toes to the tips. Dorsal side of articulation between ultimate and penultimate phalanges with a transverse fold of skin. Length of toes: I<II<V<III<IV. Phalangeal formula: 2-2-3-4-3. Musculus adductor longus present (fig. 4B).

When the hindlimbs are flexed at right angles to the sagittal plane, the heels are barely separated; when carried forward along the body, the heel approximately reaches the posterior corner of the eye. Tibia in females 37-42% ($\bar{x}$ = 39.8, n = 10), in males 42-46% ($\bar{x}$ = 43.8, n = 4), in halfgrowns 39-45% ($\bar{x}$ = 41.4, n = 26) of the snout-vent length.

Eight presacral vertebrae, seven of which bear moderately long transverse processes. There is a distinct difference in the shape of the processes: those of vertebra 2 are distinctly expanded, those of vertebrae 3 and 4 are stout, rod-

shaped, slightly expanded towards the tip, slightly curved (convexity directed anteriorly), those of vertebrae 5-8 are more slender, of equal width throughout and straight. The processes of vertebra 2 are directed anteriorly, those of 3-6 posteriorly and those of 7 and 8 are transverse. Transverse width of the processes 2<3<4<5<8<6<7. The line formed by the ends of the transverse processes is convex.

The two adult males studied, each only have one, well-developed vocal slit, MHNG 2278.20 only has it on the right side of the tongue, MHNG 2278.45 only has it on the left side.

In preservative the back is brown to grey and blackish, with small, indistinct dark brown spots, darker chevron-shaped spots or uniform; an indistinct creamish line or a row of white-tipped warts from eyelid along supratympanic ridge and edge of parotoid to end of parotoid. Side of neck and flanks brown with some cream-coloured or grey tubercles on temporal region and side of neck. The KU specimens from Tandapi have a triangular dark area extending from the side of the head to the groin, this area is distinctly darker than the back. The two juveniles USNM 260775-6 from W. of Pinas have white parotoids, a light grey band between the eyes, a variegated back, and a pattern of narrow transverse, light lines on the limbs. Limbs as back. Throat, chest and belly brown with small creamish spots in the typeseries; recently collected juveniles and halfgrown with black throat and a large black central area on chest and belly, side of belly and underside of thighs with creamish spots, with a large black subanal spot under the thighs. Palms white, soles grey, with inner three toes white. Palms and soles distinctly lighter than rest of underside. Metacarpal and metatarsal tubercles white, contrasting with surrounding area. Tarsal ridge white. Toes and fingers in halfgrowns with alternating dark and light brown or grey bands. Ventral parts in adult males cream with black spots and coarse reticulations, underside of thighs black. In females the ventral parts are less distinctly patterned: throat grey or cream, belly grey with vague indication of reticulation. In adults palms and soles are dark grey, with lighter tips of fingers and toes.

Günther (1859: 416), when describing the syntypes, noted that the colour of the upper parts was a uniform brownish-black, of the lower parts a dirty greyish-brown; the upper eyelids of the trunk, and the extremities exhibited small smooth, bluish tubercles. In general, this agrees with the colours I noted in the recent material, except for the bluish tubercles.

Colour in life of two half grown specimens (USNM 284343-4, fieldnumber H 1740-41, fieldnotes M.S. Foster) was described as: "All dark brown above. Hands and feet orange. Below: black chin. Breast very lightly mottled white.

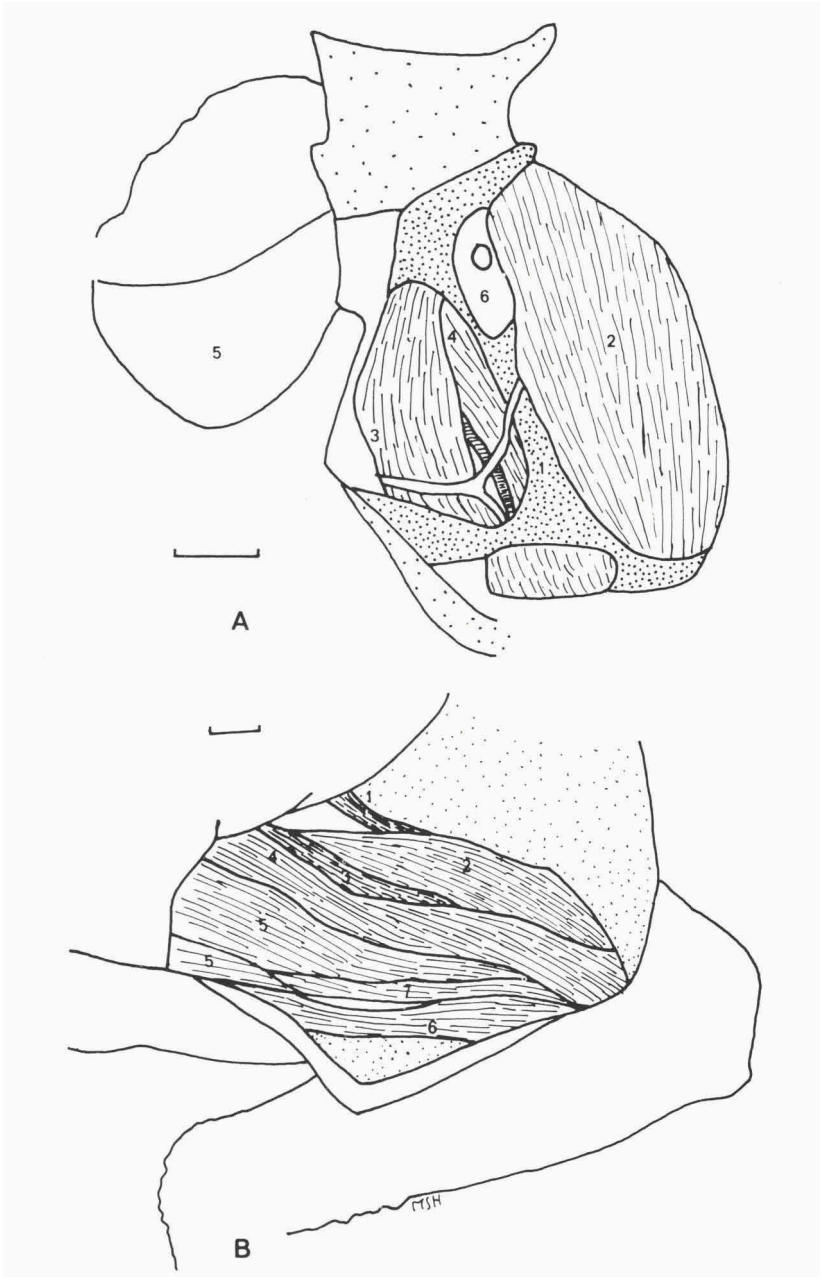

Fig. 4. *Bufo caeruleostictus* Günther. A. Ear region, left hand side, skin removed, halfgrown, MNHG 2278.23. 1. squamosal, 2. musculus depressor mandibulae, 3. musculus adductor mandibulae externus superficialis, 4. musculus adductor mandibulae posterior subexternus, 5. lower eyelid, 6. tympanum; horizontally hatched: nervus trigeminus. B. Ventral view of muscles of left thigh, halfgrown, MHNG 2278.22. 1. musculus tensor fasciae latae, 2. musculus cruralis, 3. musculus adductor longus, 4. musculus sartorius, 5. musculus adductor magnus (two heads), 6. musculus gracilis major, 7. musculus semitendinosus. For both figures: densely stippled areas: bone; lightly stippled areas: inside of skin flaps; striped areas: muscles. The lines equal 1 mm.

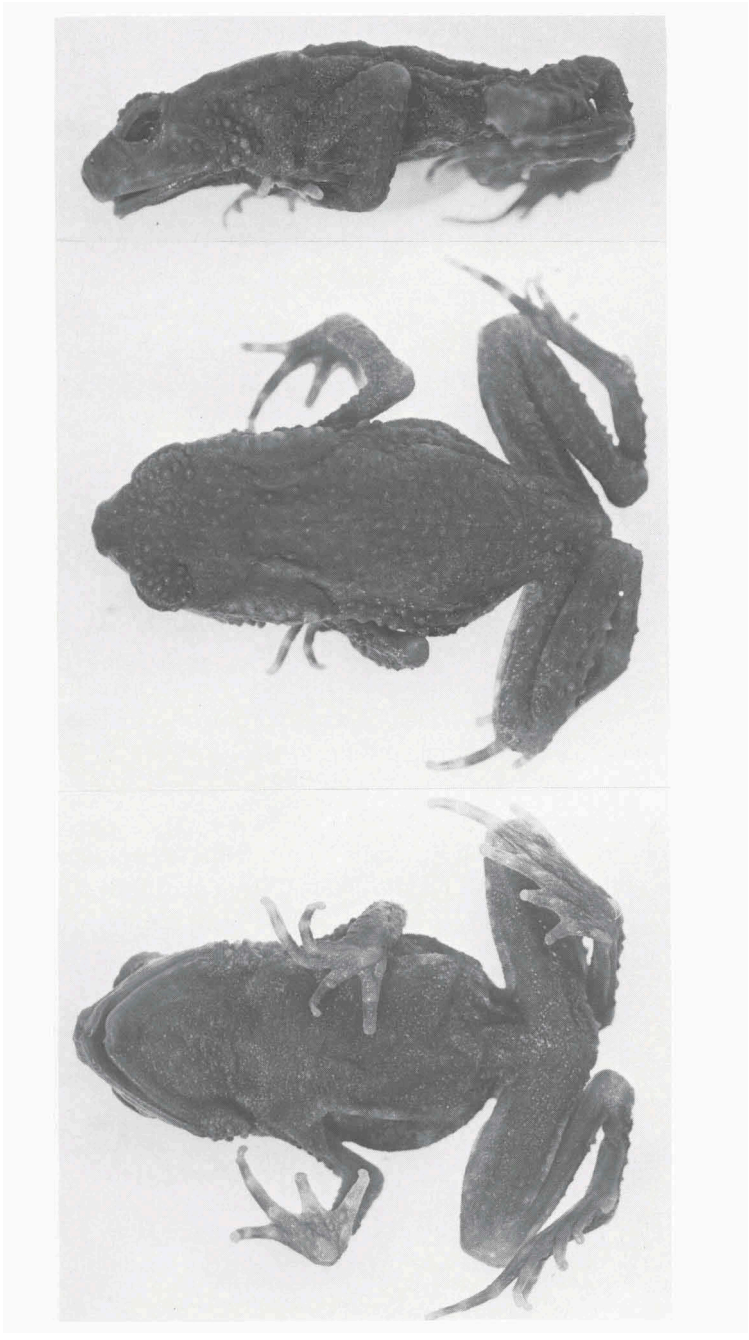

Fig. 5. *Bufo caeruleostictus* Günther. Holotype of *B. chanchanensis* Fowler (halfgrown, MCZ 21095) in lateral, dorsal and ventral view. Snout-vent length 29.8 mm.

Belly and under legs: greyish, mottled with black. Reddish on side of head and body. Few white dots at corners of mouth and on posterior edge of forelimb. Posterior thighs and band through anus: pale grey-whitish".

Natural history. — An adult male (MHNG 2278.45) with well developed nuptial pads is known from September. One female (MHNG 2278.21) without known collecting date and another (RMNH 24033) which was collected in early June, have numerous small eggs (with a black and a brown pole), whereas a smaller adult female (MHNG 2278.46), collected in February has no enlarged ovaries. In the holotype (ANSP 21095) and one paratype (ANSP 21097) of *B. chanchanensis* with snout-vent lengths of respectively 29.8 and 26.3 mm the oviducts are recognisable. Juveniles were found in January and December, halfgrowns in January, March, April, May, August, October and December. These data seem to suggest that breeding may take place throughout the year under favourable conditions. Considering the fact that the area whence the species is known has a very high rainfall (1300-3000 mm/year), this does not come as a surprise.

According to fieldnotes of M.S. Foster on two halfgrowns (USNM 284343-4) this species moves about on the forest floor in day time. The habitat of this species in Las Pampas was described as being close to rivers/creeks at 1500 m in low 'bosque nebloso montano'. The local population distinguishes this species from *B. marinus* L., 1758 and according to them its call is different (pers. comm. G. Onore).

Distribution (fig. 1). — The species is known from several localities on the Pacific slopes of the Andes in Ecuador, from Carondelet, Prov. Esmeraldas in the north to W. of Pinas, El Oro Prov. in the south. Known localities are situated between (less than 300 m, Carondelet) 700 m (Rio Blanco) and 1800 m (San Francisco de las Pampas). According to a pers. comm. of G. Onore in the San Francisco de Las Pampas area it would occur between 1500 and 2000 m. The locality Santo Domingo de los Colorados at an altitude of 350 m is unreliable as regards altitude, because this name is a "catch-all" for the entire region between Santo Domingo de los Colorados, Tandapi and San Francisco de las Pampas, where altitudes can be very different (pers. comm. G. Onore on October 4, 1987). For the locality west of Pinas no altitude is given, but judging from the map, it probably is between 600 and 900 m. The altitude of the type locality of *Bufo chanchanensis* is unknown, but again judging from the map it must be around a 1000 m. Topographically speaking Carondelet as a collecting locality, is slightly out of the ordinary, compared to other localities from where this species is known. According to the map it has an altitude of

Fig. 6. *Bufo caeruleostictus* Günther. Ventral view of halfgrown (MHNG 2278.23) to show the distinctive ventral pattern.

less than 300 m, and it is located well west of the Andean slopes. There is no reason to doubt the correctness of this locality, as the Olalla-family collections generally are reliably labelled. However, recent collectingwork done by the Escuela Politecnica Nacional, in the same area, failed to turn up this species and it might be that the MZUSP specimens were collected around Carondelet, which in that case would represent a much larger area, possibly encompassing higher altitudes as well. As it is now, I tend to the latter possibility. New

investigations on the lower Andean slopes and the adjacent Pacific lowlands could answer this.

The locality Chontapamba to me appears doubtful, as the only locality with that name I could locate, is situated on the Atlantic slopes of the Andes in the upper reaches of the Pastaza river, in the general area of Baños. It would be rather strange for a species to be distributed on both sides of the Andes in Ecuador, as this would be in contradiction with all the distribution patterns we know for frogs occurring on the Andean slopes. In none of these does the distribution encompass both flanks of the Andes, and considering the ecological requirements of these species and the geological history of the area, it would certainly be rather astounding to find such a distribution. Of course, I do not consider here the case of tropical lowland species like e.g. *Bufo marinus* which does occur on both sides of the Andes, but at low, tropical, elevations.

There are two possibilities: either there is another Chontapamba on the W. flank of the Andes, or the material has been wrongly labelled. For the time being I would prefer to leave this locality out of the distribution area for this species.

Faisanes could not be found in the gazetteer of Ecuador, but it was found on the 1:50000 map of Alluriquín (ÑIII-A3, 3893-III) as Río Faisanes. According to the collector (G. Onore), it is on the old road between Quito and Santo Domingo de los Coiorados, at an altitude of 1250-1300 m. Apparently this locality is identical to or close to "Highway 28 (old Quito Road), 14.4 km from Highway 30, 1380 m".

Remarks. — The syntypes of *Bufo caeruleostictus* are adult females in breeding condition with mature oviducal eggs. The type series of *Bufo chanchanensis* consists of halfgrowns and juveniles. X-ray photographs of the holotype of *B. chanchanensis* showed that this was not an adult specimen, as the long bones show rather large epiphyses, and condyles have not yet been formed. X-ray photographs of MHNG 2278.20-21, which on the basis of external characters clearly were adults, showed no traces of epiphyses and condyles were well developed. The recent acquisition by the MHNG of series of toads from western Ecuador containing all stages between juveniles and breeding adults first allowed to conclude that the juveniles and halfgrowns of this taxon agreed with the types of *Bufo chanchanensis* and that the species grew much larger than was thought on the basis of type material. Upon comparing the adults with the syntypes of *Bufo caeruleostictus* it soon became clear that these were identical as well, and thus the connection *Bufo caeruleostictus* - *B. chanchanensis* could be made, *B. chanchanensis* representing the juvenile of *B. caeruleostictus*.

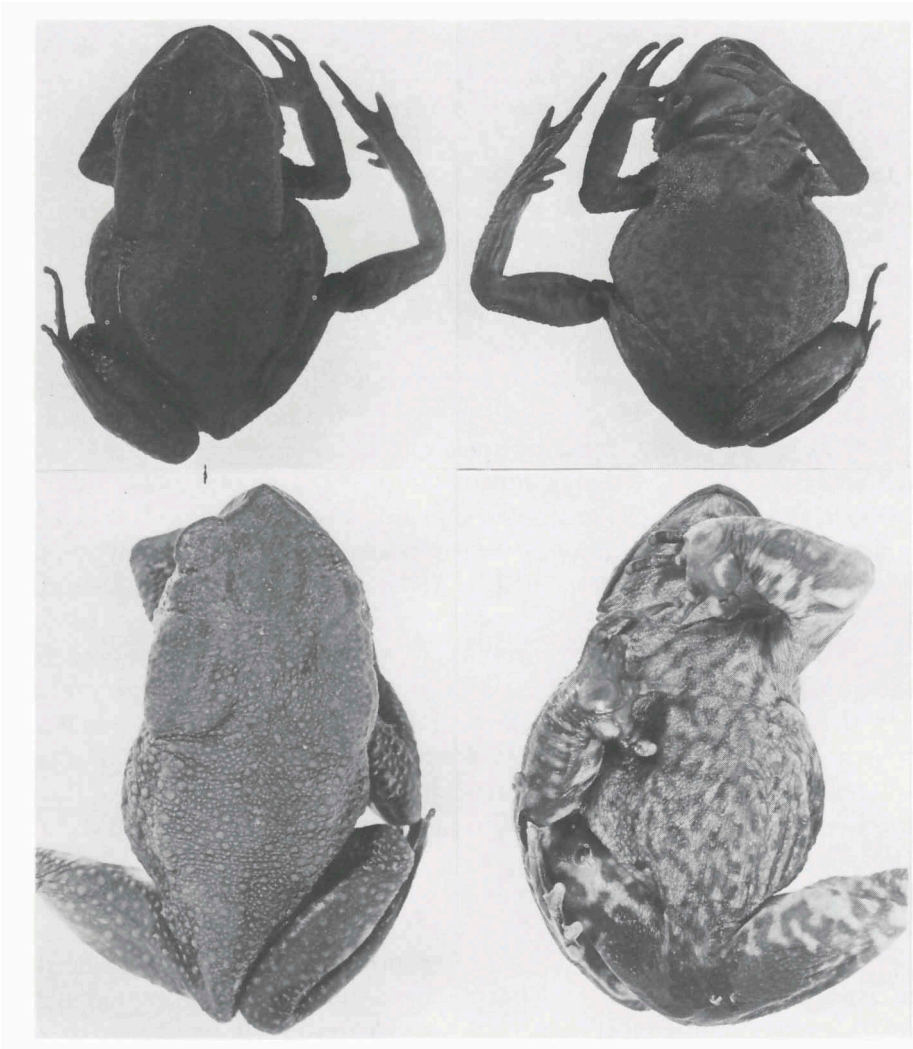

Fig. 7. *Bufo caeruleostictus* Günther. Upper row: dorsal and ventral view of ♀ (MHNG 2278.21), snout-vent length 91.9 mm. Lower row: ditto of ♂ (MHNG 2278.20), snout-vent length 80.9 mm.

Strangely enough both these names have been associated with *Bufo typhonius* in one way or the other, *chanchanensis* as a subspecies (Leavitt, 1933) or as a synonym (Barbour & Loveridge, 1929: 231; Gorham, 1974: 185) of it, *caeruleopunctatus* as being a member of the *B. typhonius* group/complex (Cei, 1968, 1972; Hoogmoed, 1985a). These associations apparently were based on hearsay only, or at the best on the basis of a wrong interpretation of the original descriptions.

Vellard (1959: 5) gave a short diagnosis of the *B. typhonius* group and included *B. ockendeni* Boulenger, 1902, *B. inca* Stejneger, 1913, *B. leptoscelis* Boulenger, 1912, *B. caeruleostictus* and *B. ceratophrys*, Boulenger, 1882 in it. At the same time he admitted that *B. typhonius* was a rather polymorphic species, both in colour-pattern and in development of the cephalic crests.

Tihen (1962), on the basis of the skeletal characteristics only, defined species groups within New World *Bufo*. He listed *typhonius* as a member of the Caribbean section of the *valliceps* group, characterised by a normal or depressed skull with extensive dermal ornamentation, and by some other osteological characters.

Cei (1968: 12-14, 1972: 89) again used the name *typhonius* group/complex and included *B. typhonius*, *B. ockendeni*, *B. inca*, *B. leptoscelis*, *B. fissipes*, *B. quechua* Gallardo, 1961, *B. caeruleostictus*, *B. ceratophrys*, *B. dapsilis* Myers & Carvalho, 1952, *B. sternosignatus* Günther, 1859, *B. intermedius* Günther, 1859, *B. manicorensis* Gallardo, 1961 and *B. ocellatus* Günther, 1859. Cei's concept of the group was accepted by Hoogmoed (1985a), because of purely administrative reasons: information in ASW would be based on published literature only.

Now that I have had the opportunity to investigate the types of both *B. chanchanensis* and *B. caeruleostictus* it is completely clear that the taxon under consideration has nothing to do at all with the *B. typhonius* group, whichever contents is given to it. No osteological material has been examined, but on external morphological characters alone, this taxon can be distinguished from species of the *B. typhonius* group by its indistinct tympanum, shape of snout, elongate parotoids, absence of bony dermal headcrests, and by having the first finger shorter than the second. Thus, *B. caeruleostictus* and its synonym *B. chanchanensis* can be eliminated from the *B. typhonius* group.

As osteological material of this species is still lacking, it cannot be assigned to a species group on a firm basis, but based on external morphology and such few data that are available, I would be inclined to consider *B. caeruleostictus* as a member of the *B. guttatus* group as defined by Martin and Cei in Blair (1972). It agrees with toads of that group in having a broad skull, a small omosternum, long legs, elongate parotoids and in lacking cranial ridges, but it differs from them in having a rather warty skin instead of a smooth one.

Bufo hypomelas Boulenger, 1913
(figs. 1, 8-10)

Bufo hypomelas Boulenger, 1913: 1022; Cochran & Goin, 1970: 116; Kattan, 1984: 328; Hoogmoed, 1985a: 48.

Material. — Colombia, prov. Choco, Condoto: 1 juv., BMNH 1947.2.20.85 (holotype), leg. H. Spurrell.

Ecuador, prov. Carchi, trail from Lita to headwaters of Río Baboso: 1 ex. RMNH 24034, 13 ex. MECN 0013-15, 0018-19, 0021-27, 5-ix-1984, 1 ex. RMNH 24035, 5 ex. MECN 0154, 0156-59, 11-ix-1984, all leg. L. Coloma. Prov. Imbabura, Lita, 7 ex. MECN 0222, 0227, 0241-42, 0244, 0246, 0261, ix-1984, 600 m, leg. R. Cisneros & D. Bastidas.

Though Boulenger's (1913) description of the species is good, it is not very detailed and only based on one specimen. Therefore it seemed useful to make a modern description, which will enable comparison with other species.

Diagnosis. — A small (?) species of *Bufo* with a wide, slightly convex head, snout truncate, projecting beyond the mouth. Limbs long and slender with rather long fingers (no webbing), and toes (slightly webbed). First finger shorter than second one. Skin of dorsum finely shagreened without tubercles. A glandular ridge, encompassing the straplike parotoids from eye to flank. Ear present, tympanum visible externally, but not very distinct. Back boldly patterned, with white rings or vermiculations, with three pairs of black spots, side of head and flanks black. Ventral parts black with ventral surface of arms white, posterior part of belly and underside of thighs with whitish spots; a few spots on the chin.

Description. — Snout-vent length 15.1-19.5 mm. Head slightly longer than wide, as wide as adjacent part of body, its depth two thirds of its width. Width of head at corners of mouth slightly less than to equal to width at tympanum level, which is equal to width at supratympanic level. Eyelids slightly, but distinctly projecting from the head. Snout bluntly pointed in dorsal and pointed in lateral profile, distinctly projecting beyond the upper jaw. Tip of snout without fleshy ridge. Distance between nostril and tip of snout 50-66% of the distance between nostril and eye. Nostrils situated just posterior of the anterior rim of the mouth, below the canthus rostralis in a distinctly swollen area. Nostrils obliquely oval, directed laterally. Distance between nostrils about equal to that between nostril and eye, 63-82% of the interorbital distance. Internarial area flat. Top of head slightly convex with few dispersed small conical tubercles (smooth in type). Interorbital area as wide as an upper eyelid or slightly wider. Upper eyelid with few, widely separated, small, conical tubercles. Outer rim of eyelid smooth, not projecting beyond the eye. Canthus rostralis distinct, rounded, concave, not projecting over the loreal region, which is only slightly concave and falls vertically to the upper lips; barely visible from above. Lips not flaring. Eyes with horizontally oval pupil. Lower eyelid translucent. Temporal region vertical. Tympanum medium-sized, visible through the skin, vertically oval.

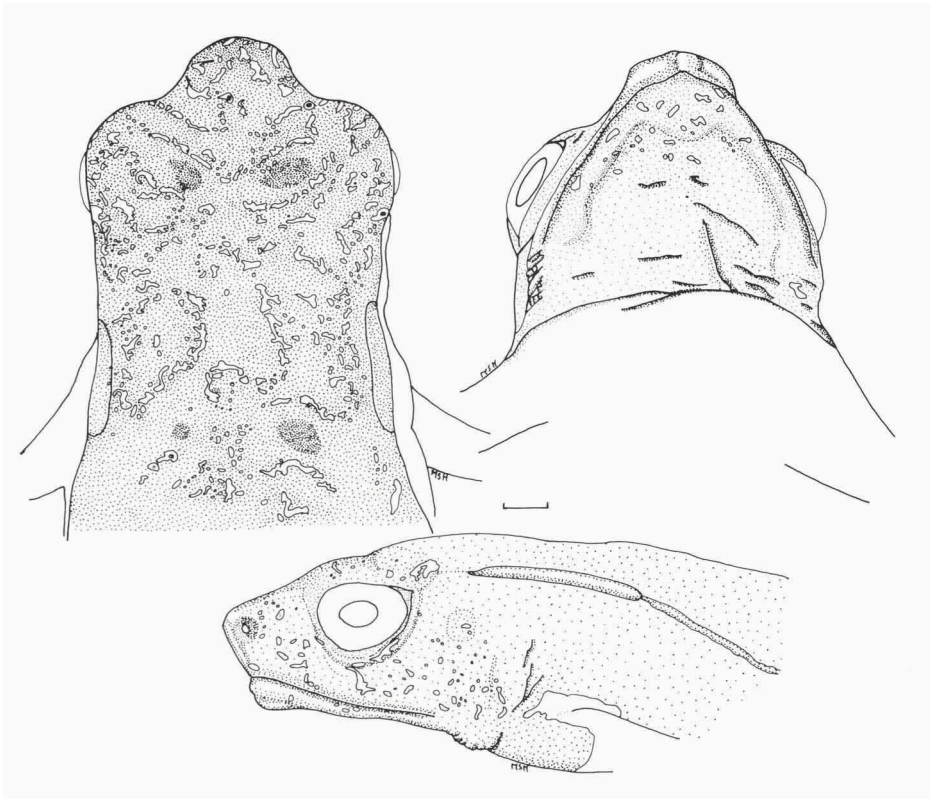

Fig. 8. Head of *Bufo hypomelas* Boulenger (juv. RMNH 24034), in dorsal, ventral and lateral view. The line equals 1 mm.

Supratympanic ridge not fleshy, distinct, rounded, not projecting over temporal area, running in a straight line, horizontal in lateral view, those from both sides parallel in dorsal view, from posterior corner of eye to parotoids and beyond. Parotoids strap-like, very long and narrow (3-6 times as long as wide), not very distinct, incorporated in glandular ridge from posterior corner of eye and continued posteriorly on flanks obliquely to groins, fading halfway between axils and groins. Margins of parotoids smooth.

Skin of back, forelimbs, ventral parts, side of head, neck and flanks rough to the touch, finely shagreened, without tubercles, that of top of head and hindlimbs with few widely dispersed conical tubercles.

Hand with distinct, but flat, undivided round outer and a smaller oval inner metacarpal tubercle. Subarticular tubercles single, low but convex, undivided, under the basal articulations. A second flat one, only indicated as such, under

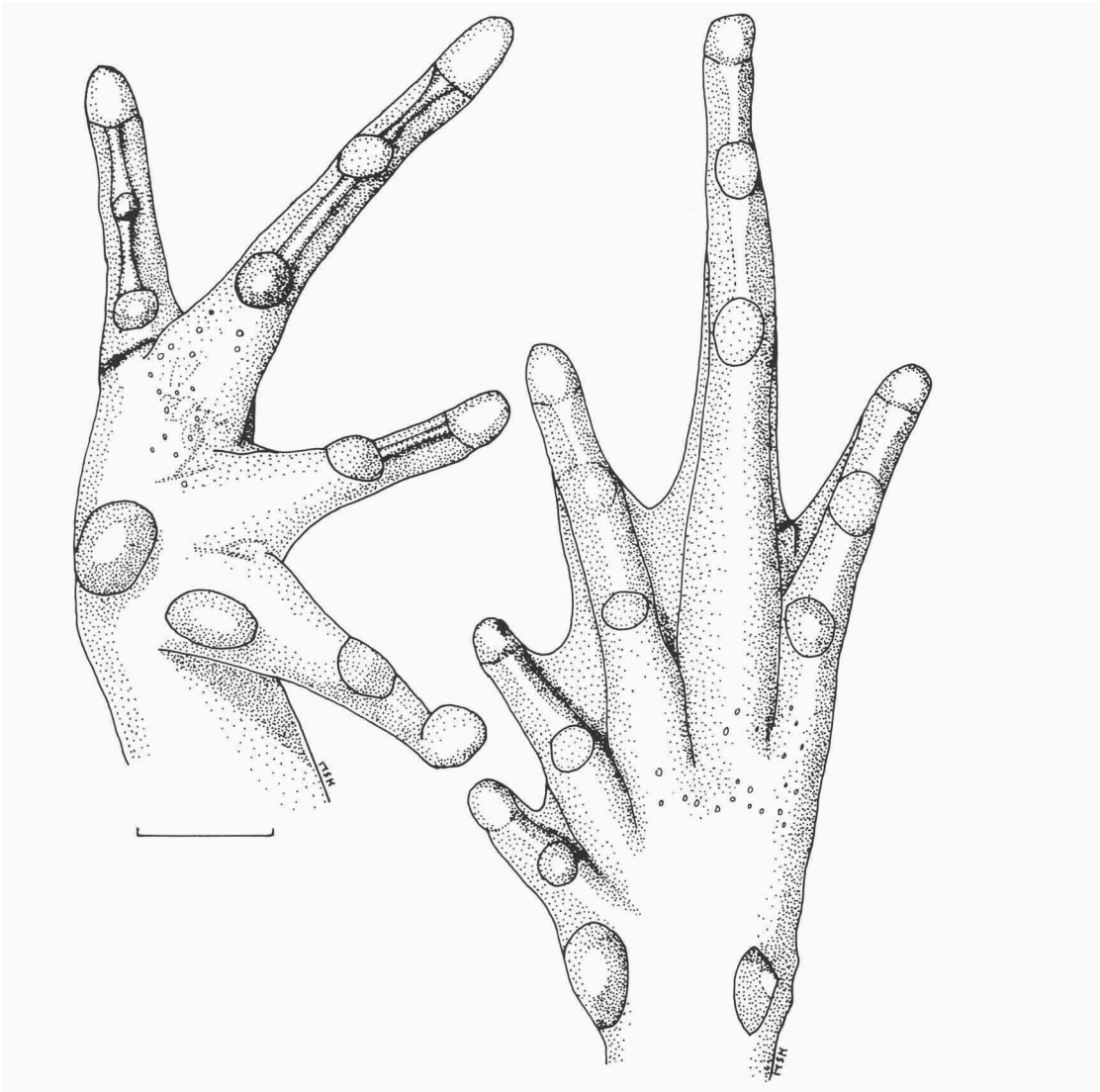

Fig. 9. Ventral surface of hand and foot of *Bufo hypomelas* Boulenger (juv., RMNH 24034). The line equals 1 mm.

the third finger, distal articulations without tubercles. No supernumerary tubercles. Fingers without web, cylindrical with rounded tips. Dorsal side of articulation between ultimate and penultimate phalanges with a transverse fold of skin. Length of fingers: I<II<IV<III. Phalangeal formula 2-2-3-3.

Tarsus smooth, without fold. A row of five or six small conical tubercles along outer edge, in specimens from Rio Babosa, absent in holotype. Rather prominent, oval outer and indistinct, low, oval inner metatarsal tubercle. Subarticular tubercles flat, single, undivided, very distinct. No supernumerary tubercles. Toes slightly depressed, with slightly bulbous, rounded tips. Toes moderately webbed, web thin, edges smooth; formula: I (1-1 1/4) - (1 1/2-2) II (1-1 1/4) - (2 1/2-3) III (1-2) - (2 1/2-3 2/3) IV (2 1/2-3 2/3) - (2) V, web not extending to the tips as a lateral fringe. Length of toes: I<II<III = V<IV. Phalangeal formula: 2-2-3-4-3.

When the hindlimbs are flexed at right angles to the sagittal plane the heels slightly overlap; when carried forward along the body the heel reaches the eye. Tibia 46-49% of the snout-vent length.

Eight presacral vertebrae, seven of which bear moderately long transverse processes (vertebra 1 lacks these). There is a distinct difference in the shape of the processes: those of vertebrae 2 and 3 are stout, rod-shaped, slightly expanded towards the tips, slightly curved (convexity directed anteriorly); those of vertebrae 4-8 are more slender, of equal width throughout, with those of vertebra 4 nearly straight and those of 5-8 curved (convexity directed posteriorly). The processes of vertebrae 2, 6, 7 and 8 are transverse, those of vertebrae 3-5 are directed posteriorly. Transverse width of the processes: 2<8<7<3<6<5<4.

In preservative the back is dark grey with an intricate pattern of narrow bluish grey lines, irregular in the Río Babosa specimens, forming rings in the holotype, a pair of large black spots on the sacrum, another pair just behind the shoulders and a third pair between the eyes (absent in the holotype). Dorsal surface of hindlimbs and forearms, hands and feet dark grey with narrow bluish grey, oblique transverse lines. Side of head black with a few bluish grey spots. Side of neck and flanks below the oblique dorsolateral fold black. Ventral surface of arms plus proximal part of upper arm white, sharply contrasting with surrounding areas. Chin, throat and chest black. Chin with small white spots. Belly black with increasingly larger white spots posteriorly. Ventral surface of hindlimbs mottled black and white, with the white tending to form a central line except on tarsus, where central area is black, underside of fingers grey with white subarticular spots and metacarpal tubercles. Soles and fingers black with white tip and white metatarsal tubercles.

Distribution (fig. 1). — *Bufo hypomelas* is now known from the type locality in Chocoan Colombia, from localities between Cali and Buenaventura in the department Valle del Cauca, Colombia (Kattan, 1984: 328), from the Andes of Antioquia, Colombia (Cochran & Goin, 1970: 116) and from the area

Fig. 10. *Bufo hypomelas* Boulenger. Upper row: dorsal and ventral view of holotype (BMNH 1947.2.20.85), snout-vent length 18.4 mm. Lower row: ditto of RMNH 24034, snout-vent length 19.5 mm.

around Lita in northwestern Ecuador. Whether the specimens of MECN said to have been collected in Lita in september 1984 really are from this village or from higher up on the mountain slope still remains unclear.

Natural history. — Most specimens were collected along a trail from Lita to the headwaters of the Río Babosa, where they were amongst leaf litter on the forest floor. All specimens were collected in September in the daytime. From X-ray pictures of RMNH 24034 it is clear that it is a halfgrown with distinct epiphyses and without condyles on the long bones.

During a recent fieldtrip to Ecuador in 1987 I had the opportunity to follow the trail from Lita to the Río Babosa with L. Coloma, the collector of most specimens. During this trip, on October 15, 1987 not a single specimen of *B. hypomelas* was found. The trail climbs a steep mountain slope from the railway station at Lita. In its lower part it traverses meadow, higher up it is at the edge of a meadow in a narrow strip of forest and in its highest parts traverses primary forest. In September 1984 *B. hypomelas* was found here, on a ridge covered with primary forest at an altitude of 1100 m. The primary forest here, as elsewhere, is under threat of encroaching agriculture, with new fields being opened regularly.

The fact that in September 1984 the species was extremely abundant and on October 15, 1987 was not found, seems to suggest some seasonality, though both dates are in the rainy seasons, or it may be a collecting artifact based on pure bad luck during the most recent trip.

Remarks. — From other species of *Bufo*, *B. hypomelas* can be distinguished by its smooth appearance, the absence of enlarged warts, its strap-like, small parotoids, its first finger being shorter than the second and by its pattern of white upper arms joining the black chest, and with three pairs of black spots on the back which is otherwise dark grey with an intricate pattern of narrow bluish grey lines.

Strangely enough this species was not mentioned by Nieden (1923), Cei (1968), Blair (1972) or Gorham (1974).

Lynch (in Frost, 1985: 37) under *Bufo blombergi* Myers & Funkhauser, 1951 remarks that this name is "A junior synonym of *Bufo hypomelas*". This remark was based on Lynch seeing juveniles of *Bufo blombergi* (Lynch in litt.; May 10, 1988). These show a superficial resemblance to specimens of *B. hypomelas*, by having a grey back with irregularly shaped black spots (not surrounded by a light line) and by having the hind limbs barred in nearly the same way as in *B. hypomelas*. This pattern has been described by Burchfield (1975: 90), Schmidt (1975), Smith & Fischer (1975: 89) and Vogt (1974: 89-90). Schmidt (1975)

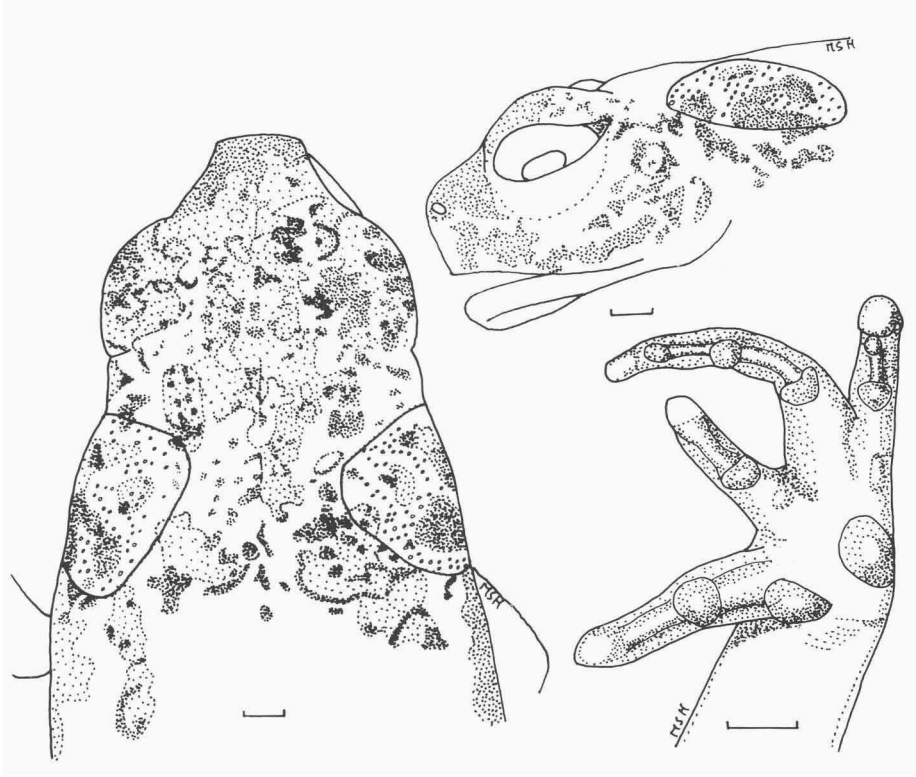

Fig. 11. Head of *Bufo blombergi* Myers & Funkhauser (MCZ 25630) in dorsal and lateral view, and ventral view of hand. The line equals 1 mm.

provided good photographs showing the spotted pattern of the recently metamorphosed toadlets. Apparently this pattern disappears after five (Smith & Fischer, 1975: 89) or six (Vogt, 1974: 89) months. Differences between *B. hypomelas* and (juvenile) *B. blombergi*, however, soon become evident in the size of the first finger (longer than second one in *B. blombergi*), the shape and size of the parotoids (distinct, large, oval, in *B. blombergi*) (fig. 11) and the colour of the ventral parts (whitish in *B. blombergi*). Comparing the holotype of *B. hypomelas* with juveniles, halfgrowns and adults of *B. blombergi* (RMNH 4483, 4490, MCZ 25630-39, BMNH 98.4.28.123-131)[2] I come to the

[2] 1 hgr., RMNH 4483, 1 juv., 4 hgr., 1 ad., BMNH 98.4.28.123-128, Cachabi, Ecuador, 1 juv., 2 hgr., BMNH 98.4.28.129-131, Paramba, Ecuador, 1 hgr. RMNH 4490, Rio Sapayo, 150m, Ecuador, all leg. W.F.H. Rosenberg. 9 juv., 1 hgr. MCZ 25630-39, Rio Anchicaya, Colombia, 1942, leg. C. Miles.

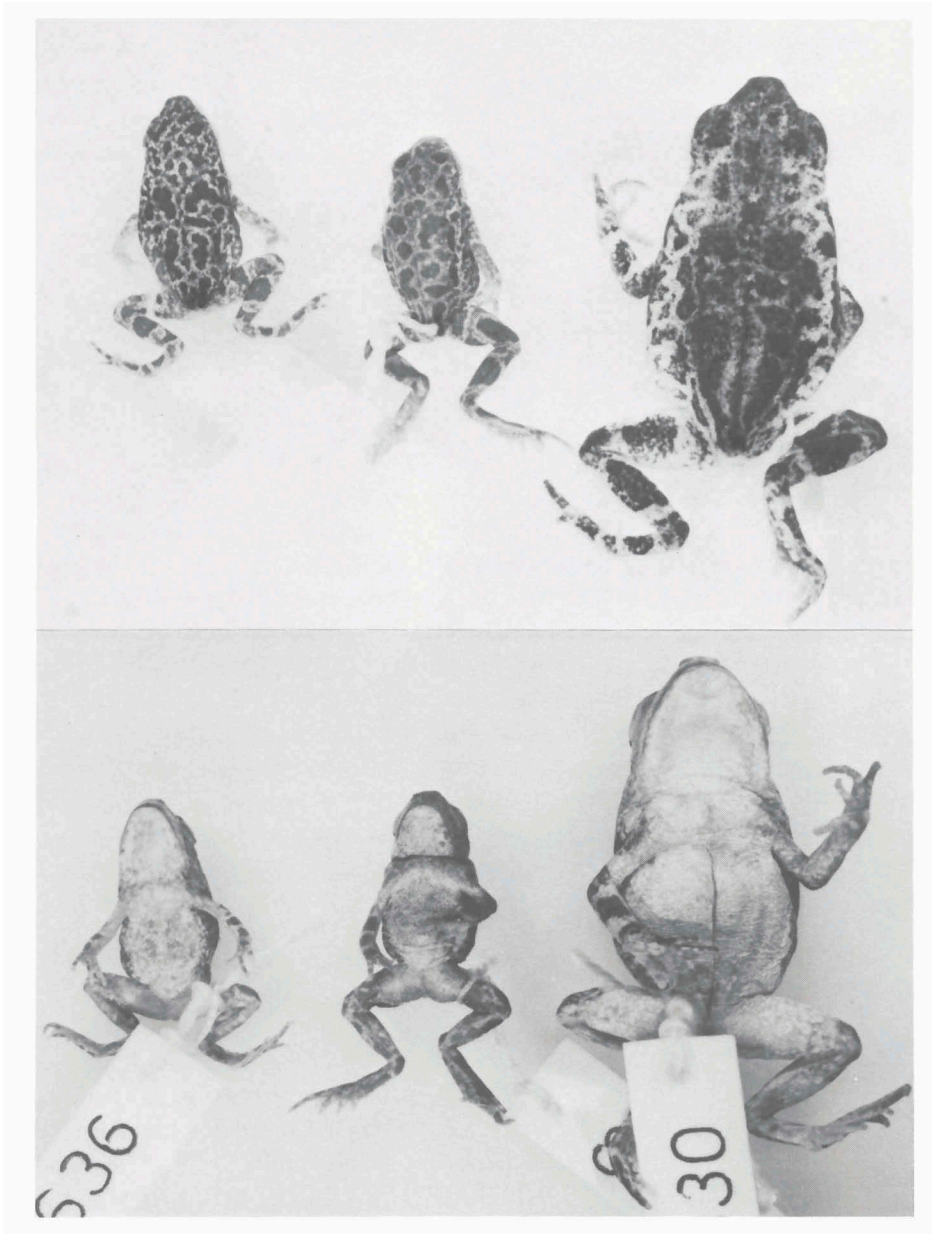

Fig. 12. *Bufo blombergi* Myers & Funkhauser (MCZ 25636, 25633, 25630 from left to right) in dorsal and ventral view. Snout-vent length of MCZ 25630 23.4 mm.

conclusion that these are two perfectly well distinguishable taxa and that Lynch's (1985) remark should be disregarded.

Boulenger (1898: 123) mentioned specimens of *B. glaberrimus* Günther, 1868 from Paramba and Cachabi. Upon investigation they turned out to form a series from recently metamorphosed young to full grown adults, of the at that time yet undescribed *B. blombergi*.

Because of lack of osteological data it is not possible to assign this species to a certain species group.

Bufo haematiticus Cope, 1862

Bufo haematiticus Cope, 1862: 157; Nieden, 1923: 110; Barbour & Loveridge, 1929: 231; Cochran & Goin, 1970: 114; Gorham, 1974: 80; Miyata, 1982: 3; Hoogmoed, 1985a: 47.
Bufo caeruleocellatus Fowler, 1913: 154; Nieden, 1923: 113; Malnate, 1971: 349; Miyata, 1982: 3; Hoogmoed, 1985a: 38.

Remarks. — Barbour & Loveridge (1929: 231) already synonymised *Bufo caeruleocellatus* with *B. haematiticus*. They were followed in this by Gorham (1974: 80), but Malnate (1971: 349), Miyata (1982: 3) and Hoogmoed (1985a: 39) again treated *B. caeruleocellatus* as a valid taxon. After studying fresh material of *B. haematiticus* and having studied the original description, I come to the conclusion that Barbour & Loveridge (1929: 231) were correct and that *B. caeruleocellatus* Fowler, 1913 is a synonym of *B. haematiticus*.

Bufo intermedius Günther, 1859

Bufo intermedius Günther, 1859: 140, Boulenger, 1882b: 307; Brocchi, 1882, 78; Günther, 1885-1902: 255; Nieden, 1923: 133; Peters, 1954-55: 351; Cei, 1968: 15; Cei, 1972: 89, Gorham, 1974: 81; Hoogmoed, 1985a: 49.
Bufo simus: Smith & Taylor, 1948: 42 (partly).

Material. — 2 ♀, 2 ♂, BMNH 1947.3.6.43-6, Andes of Ecuador, Guayaquil, Mr. Fraser's Colln. (syntypes of *Bufo intermedius* Günther, 1859).

Remarks. — *Bufo intermedius* is said to be from the Andes of Ecuador in the original description, but labels on the bottle of the four syntypes also give 'Guayaquil'. The status of this species is not quite clear. In the original description (Günther, 1859: 140-141) it was already compared to *B. lentiginosus* Shaw, 1802 (= *B. terrestris* Bonnaterre, 1789). Brocchi (1882: 78) and Günther (1885-1902: 255) also reported it from Mexico, a statement

repeated by Nieden (1923: 133), but not by Gorham (1974: 81) and Hoogmoed (1985a: 49) who only indicated a South American distribution. Peters (1954-55: 351) mentions it but considers it a synonym, though he does not indicate of which species. Miyata (1982: 3) did not mention the species from Ecuador. Cei (1968: 15; 1972: 89) considered it a species of uncertain affinities, but within the *B. typhonius* group. Upon studying the syntypes (BMNH 1947.3.6.43-6) and the original description by Günther (1859: 140) it soon became clear that this is another taxon that does not belong to the *B. typhonius* group, from which it differs in lacking a postorbital ridge, in having a continuous, nearly straight canthal-supraorbital ridge that slightly diverges posteriorly. To me it seems a member of the *B. valliceps* group.

Smith & Taylor (1948: 42) synonymised *B. intermedius* with *B. simus* Schmidt, 1857, but according to Savage (1972: 25) the Mexican toads called *B. simus* by Smith & Taylor (1948) actually are *B. occidentalis* Camerano, 1879, a member of the *B. valliceps* group. The types of *B. simus* Schmidt, 1857 studied by Savage (1972) appear to be distinctive from *B. occidentalis* and also from *B. intermedius* and Savage supposes they are from South America.

Anyway, I strongly doubt whether the type locality given for *B. intermedius* is correct. More probably the specimens came from a Central American or Mexican locality. For completeness' sake I mentioned the species here.

Andinophryne colomai Hoogmoed, 1985

Andinophryne colomai Hoogmoed, 1985b: 264.

Material. — Ecuador, prov. Charchi, "cabeceras del Rio Babosa, cerca a Lita": 1 ♂, MECN 0141, 10-ix-1984, leg. L. Coloma & A. Yépez; 1 juv. ♀, MECN 0115, 9-ix-1984, leg. L. Coloma. 1.5 hrs walk west of Chical, W. of Maldonado: 1 juv., USNM 260760, 25-ix-1979, leg. E.W. Schupp.

Remarks. — Recently two new adult specimens of *A. colomai*, collected in the type locality, in the same period and by the same collector as the holotype, and a juvenile specimen from another locality became available to me. Essentially they agree with the holotype, but the male and the juvenile show some characters that merit notice. The male's snout-vent length is 43.3 mm; its skin is more rugose than that of the female holotype and MECN 0115, especially noticeable on the back; near the corner of the mouth there is a group of enlarged, pointed tubercles; along the edges of the lower jaw there is a zone of pointed tubercles, widest in the mental area, gradually tapering posteriorly to the corners of the mouth; there is a dark grey subgular vocal sac; on the inner

surface of the first finger (only at its base), there is an area covered with dark brown, widely spaced, poorly developed nuptial asperities; it has two small oval, vocal openings in the floor of the mouth at the base of the tongue at the level of the corner of the mouth; the testis is well developed. Macroscopically I could not find Bidder's organ, but this may be hidden in the testis, as was mentioned for other Bufonids by Dubois (1947).

The female has a snout-vent length of 36.7 mm, slightly larger than that of the holotype. Further it agrees with the holotype in most characters.

The juvenile has a snout-vent length of 16.9 mm. The back is greyish brown with a pattern of two longitudinal brown bands, an inverted U-shaped figure over the sacral area and brown bands on the legs, all bordered by narrow light lines. Belly creamish with pattern of curved brown lines, throat light brown with narrow light lines.

The quadratojugal in *A. colomai* turns out to be well developed, so in table 1, presented by Hoogmoed (1985b: 258) the character state of character 14, for the genus *Andinophryne* would be P1. In the original description (Hoogmoed, 1985b) of *A. colomai* there are some regrettable typos, which should be corrected. In the diagnosis (p. 264) "indistinct parotoids" should read "relatively indistinct parotoids", on p. 267, line 8 from above "of the same length" should read "of the same width". In fig. 1 (p. 253) the dot indicates the type-locality of *A. olallai*, the square that of *A. colomai*.

Colour in life. — After the description of *A. colomai* was published, the collector, Luis Coloma, informed me about the existence of other material collected by him and now reported here. At the same time he sent me two colour slides of specimen MECN 0115 while alive. From these slides it is clear that the back is dark reddish brown with a creamish stripe running from the snout via the outer edge of the upper eyelid, supratympanic ridge, and parotoid, via the oblique row of tubercles on the flank to the groin. Isolated tubercles on the flank also creamish. Under the eye a large creamish spot covering most of the upper lip. A creamish spot over the insertion of the fore limb.

Natural history. — The juvenile was collected at an altitude of 1180 m. The type locality is at an altitude of about 1200 m, and not at 500-600 m as was assumed in the original description. The male was collected at 21.00 h, sitting on a tree trunk in a creek, the female at 15.00 h, on the forest floor near a creek. The stomach of the female is crammed with ants.

Assuming that the nuptial asperities on the thumb of the male still have to grow further to attain full breeding condition, I would say that this male was in

an early stage of breeding condition.

The female is slightly larger than the holotype, the ovarium is in the same condition, with small white ovarian eggs, no enlarged oviducts. Apparently the holotype and the present female are only young adults, judging by the size of the adult male and assuming that females grow larger than males.

The juvenile is not recently metamorphosed, but probably is several months old.

The present new data on *A. colomai* do not change any of the considerations concerning the relationships of western South American Bufonids ventilated by Hoogmoed (1985b).

DISCUSSION

The present data concerning Bufonidae in western Ecuador hopefully at least partly clear up the rather confused situation regarding the taxonomy of this family west of the Andes. By synonymising *B. chanchanensis* with *B. caeruleostictus* and through the study of sufficient freshly collected material, it was possible to define the distribution of this taxon as the west flanks of the Andes in Ecuador at moderate elevations between 700 (possibly <300) and 2000 m. Partly this area overlaps with the distribution area of species of *Andinophryne*, partly with that of other species of *Bufo*.

Though quite a few species of *Bufo* have been described from western Ecuador, several of these proved to be synonyms of the same species or in one case (*B. intermedius*) the species most likely does not occur in Ecuador and belongs to a Central American/Mexican species group.

In my opinion the following five described species of *Bufo* occur west of the Andes in Ecuador: *Bufo marinus* Linnaeus, 1758 in the lowlands and on the lower Andean slopes, continuing into Chocoan Colombia, Central America and cis-Andean South America.

Bufo haematiticus Cope, 1862, in the northwestern lowlands and on the lower Andean slopes, continuing into Chocoan Colombia and lower Central America.

Bufo hypomelas Boulenger, 1913, in extreme northwestern Ecuador and adjacent Chocoan Colombia (departments Valle del Cauca, Choco) at moderate elevations.

Bufo blombergi Myers & Funkhouser, 1951, in the same area as *B. hypomelas* (including the specimens reported by Boulenger (1898: 123) as *B. glaberrimus*).

Bufo coniferus Cope, 1862, in the same area as *B. blombergi* and *B.*

hypomelas, where it reaches its southernmost distribution, and north to Central America.

Apart from these five species there are several other taxa in the Ecuadorian lowlands and on the westflank of the Andes (up till about 1200 m) that are considered to be related to the *B. typhonius* group, but which still have to be described. A future paper will deal with these taxa.

The genera *Andinophryne* and *Atelopus* are restricted in their distribution to the slopes of the Andes, where in their lower reaches they may be sympatric with species of *Bufo*. The genus *Atelopus* in W. Ecuador does not descend into the tropical lowlands as it does in Amazonia, where *Atelopus spumarius* Cope can be found near Puyo at an altitude of about 1000 m.

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