

STUDIES ON THE FAUNA OF CURAÇAO, ARUBA,  
BONAIRE AND THE VENEZUELAN ISLANDS: No. 16.

**FROGS FROM THE LEEWARD GROUP,  
VENEZUELA AND EASTERN COLOMBIA**

by

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The present notes deal with a small collection of frogs that was made by Dr. P. WAGENAAR HUMMELINCK during his visits to the islands of the Leeward Group, Venezuela and Eastern Colombia. I have included in this study the specimens of *Pleurodema brachyops* (Cope) already present in the Rijksmuseum van Natuurlijke Historie, Leiden, and in the Zoölogisch Museum, Amsterdam.

The amphibian fauna of the Dutch Leeward Islands is very poor indeed. It consists of a single species (*Pleurodema brachyops* (Cope)) that occurs in Aruba, Curaçao, Bonaire and Klein Bonaire. *Bufo marinus* (L.) has apparently been introduced into Aruba within the last few years (cf. p. 91). J. H. R. NEERVOORT VAN DE POLL, who visited Aruba in 1885, took a specimen of a *Leptodactylus* species. This has been mentioned by VAN LIDTH DE JEUDE (1887, p. 134) as „? *Rana copii* Blgr.” On the authority of Dr. G. A. BOULENGER the identification was changed into *Leptodactylus albilabris* (Gthr.), and as such it has been mentioned recently by BOSCHMA (1947, p. 42).

From Margarita Island, off the Venezuelan coast, MEEK (1910, p. 415) recorded *Pleurodema brachyops* (Cope). To this now may be added *Bufo granulatus* Spix and *Hyla rubra* Daud.

On Coche Island, and on the South American mainland Dr. HUMMELINCK collected a number of tadpoles. As descriptions of larvae from these regions are very scarce in literature, I have not been able to identify these specimens.

The majority of the localities in which frogs were collected are

mentioned in the lists of collecting stations given by HUMMELINCK (1940a, pp. 29–37; 1940b, pp. 22–42), and they are indicated on the maps published by that author (HUMMELINCK, 1933, 1940a). For many of the localities where larvae were collected, HUMMELINCK (1940a, p. 28) has given the water analyses, recording the content of  $\text{Cl}'$  and  $\text{HCO}_3'$  in mg per litre, as well as the hardness of the water.

Unless otherwise stated the specimens have been collected by Dr. P. WAGENAAR HUMMELINCK. The majority of the specimens collected by him are in the collections of the Rijksmuseum van Natuurlijke Historie; duplicates are in the museum of the Zoological Institute of Utrecht University and in the Museum in Curaçao.

The text-figures have been drawn by Mr. G. W. M. KURPERSHOEK.

### ***Bufo granulosis* Spix**

[Fig. 30]

*Bufo granulosis*, NIEDEN, Anura I, Tierreich, pt. 46, 1923, p. 145; LUTZ, Mem. Inst. Osw. Cruz, vol. 20, 1927, pp. 38, 42, 54, 57, pl. 8 figs. 5, 6; PARKER, Bull. Mus. Roy. Hist. Nat. Belg., vol. 12, p. 1.

*Bufo globulosus*, LUTZ, Mem. Inst. Osw. Cruz, vol. 28, 1934, p. 149, pl. 25, pl. 27 fig. 6.

MARGARITA: Guatamare, 24.V.1936, 16 specimens; Porlamar, 25.V.1936, 10 specimens; Porlamar, 28.V.1936, 28 specimens; Porlamar, 29.V.1936, 4 specimens; Porlamar, 30.V.1936, 2 specimens; Laguna Honda (Stat. 18), 16.V.1936, 1 juvenile.

The series of 60 adult and halfgrown specimens agrees well with the description of this species as given by NIEDEN (1923, p. 145), except that the Margarita toads reach a size larger than that indicated by NIEDEN. This author gives the length of head and body as 41 mm, while LUTZ (1934, p. 149) states that the species attains a length of 5–5.5 cm. Of the sixty adult and halfgrown specimens examined by me only five specimens remain below the length mentioned by NIEDEN, while eighteen specimens even exceed the length given by LUTZ. The largest male has a head and body length of 59 mm, the largest female measures 71 mm.

Instead of a distinct single parietal ridge, these specimens show a number of very narrow bony ridges radiating from the supraorbital ridge, at the point where the latter curves outwards towards the tympanum. These narrow ridges are covered with elongate warts of the skin, and thereby the ridges themselves become more or less obscured. In a few specimens one of these radiating ridges has developed somewhat better than the others, and in these specimens it may be said that a weak parietal ridge is present. In 3 out of 60 specimens the first finger is very slightly longer than the second; in all other specimens the first and second finger are of equal length. In the fully adult males the first finger bears a weakly developed nuptial callosity.

Coloration (in alcohol). The general colour is greyish brown, with markings of

blackish brown. The latter consist of blackish brown longitudinal bands and of spots. In fig. 30 a schematic drawing is given of these bands and spots. The region between the cranial ridges and that on the anterior part of the back between the inner pair of dark bands is pale greyish and somewhat lighter than the rest of the



Fig. 30. *Bufo granulatus* Spix. Schematic drawing to show the position of the dark bands and spots (natural size).

back; thus a more or less panduriform pale marking is formed. The inner pair of dark bands may be discontinuous, and in some specimens they are connected with each other across the back, so as to form a lyriform dark border to the pale panduriform patch. Along the sides a dark band reaches from the tympanum to the groin; it is interrupted in many specimens.

In the males the throat region close to the chest is somewhat more brownish than in the females.

#### ***Bufo marinus* (L.)**

ARUBA: 1945, 1 specimen, leg. Brother Antoon.

The species has not been recorded previously from the island and it probably has been introduced recently.

#### ***Hyla rubra* Daud.**

*Hyla rubra*, BOETTGER, Katalog Batr. Samml. Mus. Senckenb. Natf. Ges., 1892, p. 45; NIEDEN, Anura I, Tierreich, pt. 46, 1923, p. 311; LUTZ, Mem. Inst. Osw. Cruz, vol. 20, 1927, pp. 39, 43, 54, 59.

MARGARITA: Guatamare, 24.V.1936, 1 specimen.

*Hyla rubra* Daud. has been recorded from Venezuela (Caracas) by BOETTGER (1892, p. 45), but LUTZ (1927, pp. 39, 54) doubts this identification. As far as I can draw conclusions from this single specimen, I believe that it agrees better with *Hyla rubra* Daud. than with *H. acuminata* Cope. To enable other authors to make further comparisons I give a description of this specimen.

Tongue about circular, with a small notch behind, free posteriorly. Vomerine teeth in two small straight groups between the choanae, close to the level of the anterior borders of the choanae. Head as long as broad; the snout nearly  $1\frac{1}{2}$  times as long as the diameter of the orbit. Canthus rostralis indistinct, rounded. Interorbital space slightly broader than the upper eyelid. Tympanum very distinct, its greatest diameter about  $\frac{3}{4}$  that of the orbit. Nostrils very much nearer the tip of the snout than to the orbit.

Fingers with a mere trace of a web at their base. First finger shorter than second, which is slightly shorter than fourth. Toes not quite  $\frac{3}{4}$  webbed; about half of the first toe free of web; the web reaches the disc of the 2nd toe, and almost that of the 5th toe; of the 3rd toe only one phalanx and of the 4th toe 2 phalanges are free. No pollex rudiment. Discs of fingers smaller than tympanum, those of toes smaller than those of fingers. Subarticular tubercles well developed. The tibio-tarsal articulation reaches the eye. Length of tibia  $\frac{1}{2}$  that of head and body; breadth of tibia  $\frac{1}{4}$  its length. Heel with a transverse dermal fold, not with a triangular appendage.

Head smooth, back faintly granulate. Lower surface with a strong fold across the breast. Belly and lower surface of thighs granulate.

Colour (in alcohol). Brownish above, with a dark bar between the eyes, that is continued backwards in a dark median band. A dark band from the upper eyelid on to the back; these bands diverge posteriorly (behind the shoulders), but on the other hand they tend to anastomose with each other and with the median band. Two short irregular longitudinal bands on the posterior half of the back. A small white spot in front of the groin, and a larger whitish spot with a dark border in the groin. Posterior surface of thigh whitish with a brownish marmoration.

Colour in life, from the collector's field notes. Above greyish with a somewhat irregular network of brownish; this network is not very distinct. The greyish ground colour with a greenish tinge. Eye golden brown with venation. Lower surface yellow, especially the chest and throat (creamish yellow). Discs of fingers pink. Groins and posterior surface of thighs orange yellow with a brownish network. Inner surface of tibia yellow. Axilla yellow.

### ***Pleurodema brachyops* (Cope)**

[Fig. 31]

*Pseudis brachyops* COPE, Proc. Am. Phil. Soc., vol. 22, 1884, p. 180; HARTERT, Novit. Zool., vol. 9, 1902, p. 288; MEEK, Publ. Field Mus. (no. 148), Zool. Ser., vol. 7, no. 12, p. 415; DE ROOIJ, Bijdr. Dierk., pt. 22, 1922, pp. 248, 253; VAN DER HORST, Bijdr. Dierk., pt. 23, 1924, p. 3; WERNER, Zeitschr. wiss. Zool., vol. 125, 1925, p. 544; HUMMELINCK, Zool. Jahrb., Syst., vol. 64, 1933, p. 321.

*Pleurodema brachyops*, NIEDEN, Anura I, Tierreich, pt. 46, 1923, p. 499; PARKER, Ann. Mag. Nat. Hist., ser. 9, vol. 20, 1927, p. 473; HUMMELINCK, Studies Fauna Curaçao, etc., no. 3, 1940, pp. 114, 115; BOSCHMA, in: Ons Koninkrijk in Amerika, West Indië, 1947, p. 42 (reprint, p. 5).

? *Rana copii*, VAN LIDTH DE JEUDE, Notes Leyden Museum, vol. 9, 1887, p. 134 (part.: larvae); HARTERT, Novit. Zool., vol. 9, 1902, p. 288 (part.).

ARUBA: Hofje Westpunt (Stat. 274), 9.XII.1936, 8 juvs.; Tanki Leendert, (Stat. 100), 16.XII.1936, 13 larvae + 1 juv.; Fontein, 31.I.1885, 7 larvae, leg. J. H. R. NEERVOORT VAN DE POLL, Mus. Leiden, reg. no. 8812; Aruba, 1 specimen, purchased from W. F. H. ROSENBERG, Mus. Leiden, reg. no. 4520; Aruba, 3 specimens, don. J. TH. TER HORST, Mus. Leiden, reg. no. 8618; Aruba, 1933, 4 specimens, leg. Dr. W. G. N. VAN DER SLEEN, Mus. Amst.

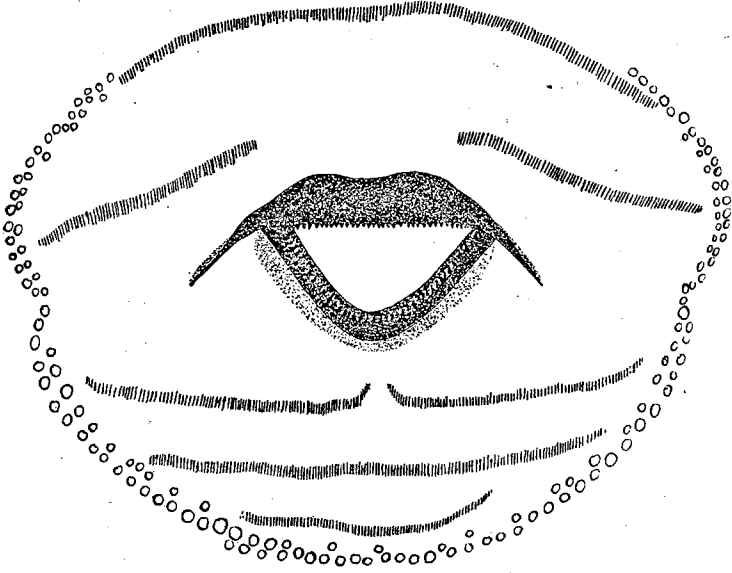


Fig. 31. *Pleurodema brachyops* (Cope). Larvae from Tanki Leendert, Aruba, Mouth ( $\times 28$ ).

CURAÇAO: Willemstad about III.1934, 1 specimen; near Willemstad?, 14. VIII.1930, 5 specimens, don. St. Thomas College; near Willemstad, 1936, 13 specimens, don. St. Thomas College; Piscadera, 1.IX.1936, 1 specimen; Hato, 28.IV.1920, 1 specimen, leg. Dr. C. J. VAN DER HORST, Mus. Amst.; Hato, freshwater well, VI.1931, 2 specimens, leg. V. H. VAN DEN BERG, Mus. Amst.; Santa Rosa, 11.II.1939, 2 specimens, leg. H. W. C. COSSEE, Mus. Leiden, reg. no. 8811; Pos Sorsaka, Zevenbergen (Stat. 86), 10.XI.1936, 2 larvae; Curaçao, 2 specimens, leg. P. C. DE RUYTER, received 2.V.1934, Mus. Amst.; Curaçao, III.1941, 1 specimen, don. St. Thomas College; Curaçao, 1941, many larvae, don. St. Thomas College; Curaçao, 1945, 2 specimens, don. St. Thomas College. BONAIRE: Kralendijk, 17.X.1930, 1 specimen, Mus. Amst.; Kralendijk, 31. X.1930, 1 specimen, Mus. Amst.; Kralendijk, 5.XII.1930 (swimming in sea, 5 m from shore), 1 specimen, Mus. Amst.; Tanki Onima (Stat. 46), 13.XI.1936,

6 larvae; Tanki Onima (Stat. 194), 13.XI.1936, 16 larvae and juvs.; Tanki d<sup>1</sup> Nene George (Stat. 50), 25.III.1937, 1 juv.; Pos Ichi (Stat. 52), 14.XI.1936 190 larvae; Pos Baca Chikitoe (Stat. 54), 14.XI.1936, 40 larvae; Bonaire, 1930, 1 specimen, Mus. Amst. KLEIN BONAIRE: Tanki Calbas (Stat. 63), 15.XI.1936, 1 larva. MARGARITA: near Porlamar, 27.V.1936, 3 halfgrown; near Porlamar, 29.V.1936, 1 ad., 3 halfgrown, 8 juvs.; Porlamar, patio of Hotel Central, 1.VI. and 27.VI.1936, 2 specimens; Pampatar, 1.VII.1936, 7 specimens; Laguna Honda (Stat. 18), 16.V.1936, 10 juvs. VENEZUELAN MAINLAND: Poza de Chapata, Araya (Stat. 7), 27.VI.1936, 5 larvae. LA GOAJIRA (COLOMBIA): Pozo de Macaralpao, Castilletes (Stat. 111), 14.I.1937, 2 juvs; Sirimana, E. of Ipapure, 16.I.1937, 1 specimen.

Nom. indig.: Dori (Dutch Leeward Islands), Warikki (Margarita).

In the Dutch islands of the Leeward Group this species originally was known from Aruba only. Thus VAN KOOLWIJK (1882, p. 224) mentions its occurrence in Aruba, and its absence in Curaçao and Bonaire. About 1910 *Pleurodema brachyops* has been introduced inadvertently into Curaçao, when Aruban sand was transported there. In 1928 specimens were brought to Bonaire (HUMMELINCK, 1940a, p. 115), and at present the species is common in all three islands; it occurs also in Klein Bonaire. It further is found on the mainland, and it has been recorded from Margarita Id. by MEEK (1910, p. 415).

VAN KOOLWIJK (1882, p. 224) remarks that this frog is often figured on the pottery of the Indians; the figures given by this author (VAN KOOLWIJK, 1882, pl. figs. 11, 12, 13) are not very convincing. Fig. 11 may be a very crude drawing of a frog, but fig. 12 is that of the head of a mammal, while fig. 13 shows a human face.

Besides a number of adult and halfgrown specimens, that do not call for further comment, the collection contains a number of larvae, that may be described at some length.

Larvae. Head and body 1.4–1.8 times as long as broad; about  $\frac{2}{3}$  the length of the tail. Nostrils nearer to the eyes than to the tip of the snout, i.e., their distance from the eyes is contained about 1.3–1.7 times in their distance from the snout. The distance between the eyes is about 1.6–1.8 times that between the nostrils, and  $\frac{3}{4}$  to once the breadth of the mouth. The distance between the nostrils is  $\frac{3}{4}$  to once the distance from the nostril to the eye.

Spiraculum sinistral, directed obliquely upwards; its horizontal distance from the posterior border of the eye is contained 2.9–3.4 times in the distance from the spiraculum to the vent. Vent median, its opening at the lower border of the lower tail membrane. Tail 2.1–3.2 times as long as high; the height of its muscular part contained 2.1–2.9 times in its total height. The tail remains of about equal height in its basal half, but its margins gradually converge towards the tip, which is pointed. In a great number of larvae the original tail tip apparently is lost, and in these the tail has a broadly rounded tip. The dorsal fin does not extend on to the back.

Lips with two rows of papillae, in some places reduced to a single row. The papillae are present along the lower lip, and on the sides of the upper lip (fig. 31). Where two rows are present the papillae are often placed alternately. Median part of upper lip without papillae.

Tooth rows  $\frac{1}{1} \frac{1}{2} \frac{1}{1}$  or  $\frac{1}{3} \frac{1}{1} \frac{1}{1}$ , the inner row of the upper lip widely inter-

rupted in the middle; the inner row of the lower lip either continuous or narrowly interrupted. The outer row of the upper lip along the border of the lip. The outer row of the lower lip about half as long as the second row. The edges of the horny jaws blackish brown, finely denticulated. In the larvae with more or less developed hindlimbs the strong metatarsal tubercle is already distinct.

The larvae are transparent; in many specimens the contours of the brain are clearly visible through the skin; in ventral view the intestinal spiral is also clearly visible. Head powdered with blackish brown. Body much darker, more blackish.

Length of head and body of larvae with hindlimbs up to 13 mm, total length to about 31 mm.

In the very young frogs, which have already passed through metamorphosis, the lumbar ocellus is represented by a black spot only; the pale centre has not yet developed.

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I On the left: *Garypus bonairensis bonairensis* ♂ (no 15) from Zuidpunt, Bonaire. On the right, above: *Garypus bonairensis withi* ♀ from Mustique Island; below *Garypus bonairensis realini* ♀ (no 89) from the Baranca Alto,

A r u b a.

II *Garypus bonairensis realini* ♂ from the Seroe Plat, A r u b a.