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A new species of the genus *Rivulus* from Ecuador with additional records of *Rivulus* from the Upper Amazon and Ucayali rivers *)

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During August 1961 I received from Mr. E. ROLOFF (Karlsruhe, Germany), a well-known aquarist, three specimens of an unidentified *Rivulus*. The specimens were collected by Mr. ROLOFF during his journey to Ecuador early 1961. The sampling place is described by him in the following words: „Die Rivulus stammen aus einem kleinen, sehr schattigen Bach, der in die Lagune von Limoncocha mündet. Das Wasser ist sehr weich (etwa 1° DH) und hat eine Temperatur von etwa 26° Celcius, die sich natürlich zeitweilig noch erhöht. Der Bach ist nur etwa 1 Meter breit und hat einen geringen Wasserstand, oft nur 20 bis 25 cm. Die Rivulus halten sich hauptsächlich zwischen den Baumwurzeln und den hineingefallenen Zweigen auf. Büsche und Bäume überschatten diesen Bach sehr stark.”

This first sample, 1 male and 2 females, was tentatively identified as closely related to or identical with *Rivulus peruanus* (Regan, 1903), though they did not agree in several technical features with that species. In my key to the genus *Rivulus* I placed *peruanus* in the *isthmensis*-complex, though the frontal pattern of this species is not known. Moreover it has as many as 45—47 rows of scales. The male of our sample had only 37 scales in lateral direction, whereas the females were both damaged and in bad state of preservation. I could not make out the proper number of scales.

I wrote Mr. ROLOFF for more specimens and particulars, and in May past he sent 22 more specimens, all in the finest state of preservation. The details

*) Received June 25, 1962.

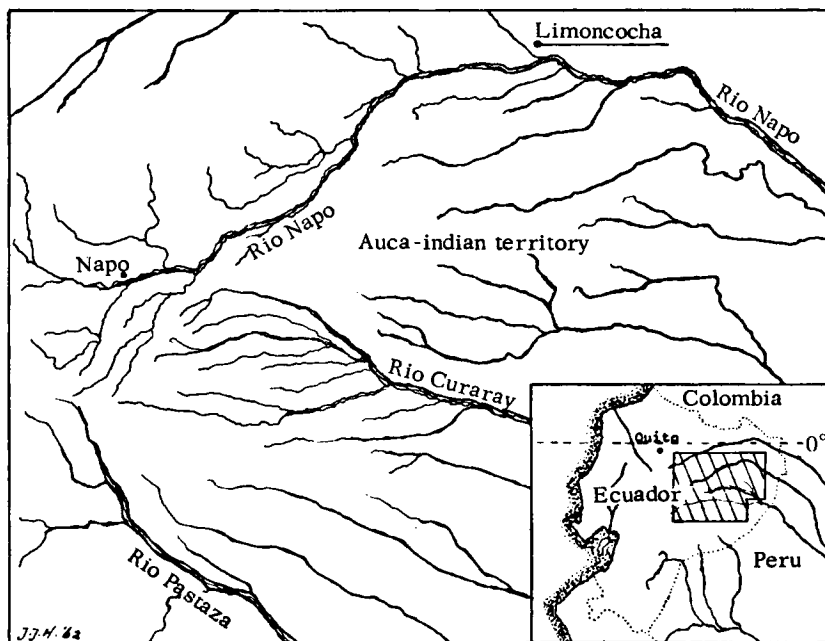


FIGURE 1. Map showing location of sampling place, Limoncocha, Ecuador, Rio Napo system.

about the habitat are given above. All specimens, next to a single male specimen of another form (or species) originate from the territory of the Auca indians in the Rio Napo area, not very remote from the Peruvian Amazon (fig. 1).

From the now 25 specimens of the species it became soon clear that it was an undescribed form of the *urophthalmus* series, which all show the typical pattern of frontal scales of *urophthalmus* s.s. (cf. HOEDEMAN, 1958: fig. 3b and 1961: fig. 1f).

Rivulus limoncochae new species (fig. 2).

Ecuador: Limoncocha, Rio Napo tributary, rivulet emptying into lagoon. Coll Roloff, Feb. 1961. Holotype ZMA 100339, ♂, 43.2 mm standard length, and paratypes ZMA 100339, 2 ♀♀, 29.0 and 34.0 mm st.l., ZMA 101504, 12 ♂♂ and 10 ♀♀, 31.2 to 49.6 mm st.l.

Diagnosis: A *Rivulus* species of the *urophthalmus* complex (e-type frontal pattern). D ii7-ii8, A ii13-ii14, V i5, P ii2-ii3. Scales 36-37 + 2-4/9-10, predorsal 25-26 (27), 16 around caudal peduncle.

Proportion rates (in 1000ths of the standard length): snout 65-82, eye 75-88, postorbital length 121-132, head 268-295, preventral length 496-541,

preanal length 596-625, predorsal length 754-758, greatest depth of body 219-226, depth of caudal peduncle at end of hypural 127-137.

Description-coloration: The present new species is very much like ordinary *urophthalmus* of the lower Amazon in general appearance, but much more colourfull. In alcohol the males are bluish-grey with 6 tot 8 longitudinal rows of dark dots, which are confluent horizontally for a large part, thus forming true longitudinal markings or streaks. The body is suffused with orange-yellow. The dorsal, anal and ventral fins are also provided with rows of darker speckles. The caudal fin is plain, in some specimens with a few

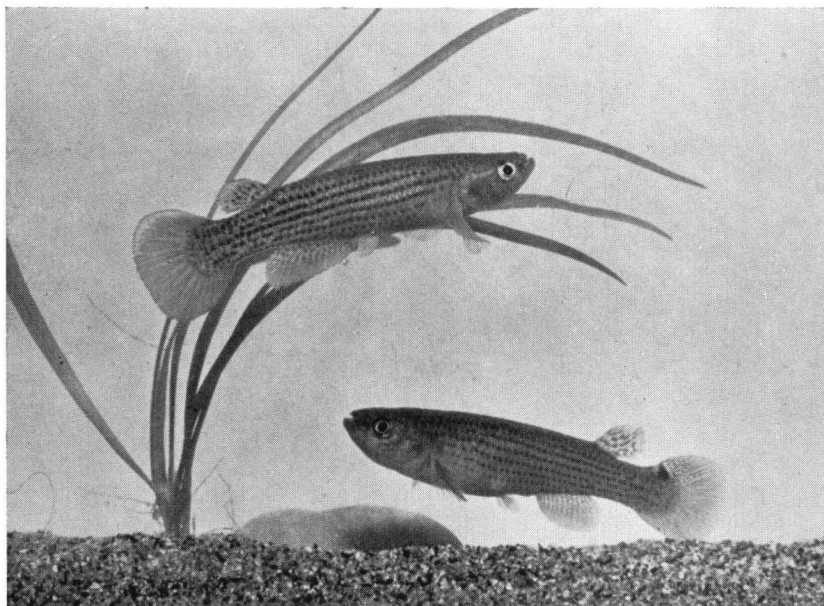


FIGURE 2. Pair of *Rivulus limoncochae* new species. Male upper, female lower.

Photo E. Roloff.

faint speckles (juvenile character), especially in the upper lobe. All fins are more or less orange-yellow; the pectorals are almost colourless. The females are a little duller in general coloration, and show the conspicuous caudal ocellus, which is often not quite ocellated.

In life (from colour-slides by Mr. Roloff and own observations on living specimens) the males are brilliantly coloured; the body is purplish-blue changing into blue-green toward the tail region. There are 6 to 8 longitudinal rows of bright carmine-red dots and a few rows in the fins. The females are again a little duller, but altogether nicely coloured, and moreover show the golden ocellated caudal spot.

Taxonomic position: The technical data for the single specimen secured by Mr. ROLOFF together with our new species read: coll. nr. ZMA 101503,

♂, 40.2 mm st.l., D ii5, A ii10, scales $35 + 5/8$, predorsal 28, caudal peduncle circumference 18. Proportion rates: snout 59, eye 77, postorbital length 113, head 249, depth of body 224, preventral length 525, preanal length 650, predorsal length 745. It has an e-type frontal pattern, similar to that of the new species.

This specimen runs down my key (1961 : 69-71) to the species *urophthalmus* exactly, and according to Mr. ROLOFF's colour-slides it agrees in life with *urophthalmus* proper, though perhaps it is a little more colourfull. *Rivulus urophthalmus* was known to occur in the lower Amazon and the Guiana lowlands (cf. HOEDEMAN, 1959 : 82, fig. 35). It has also previously been recorded from the Peruvian Amazon by ALLEN (in EIGENMANN & ALLEN, 1942), but the present record appears to be the most western one, probably also from the highest altitude.

This single specimen made me decide to describe the other 25 specimens from the same habitat as a new species. However, when some time we know the fauna of that particular area better, it may prove to merely represent another subspecies of the *urophthalmus* series, not necessarily of *urophthalmus* s.s.

In my key to *Rivulus* (1961 : 66-74, fig. 1), I have given entries for all known species of that genus. However, the present new species does not fit in any of the primary entries, but in a way links the *isthmensis* with the *urophthalmus* complex (cf. entries 17b, 21a and 21b). It appeared to be difficult to decide between those two complexes, but than I found that there is an essential difference between the e-type frontal patterns of the two groups (cf. fig. 3a and b). In *urophthalmus* (fig. 3a) the pattern is open posteriorly, which means that scale pair *cc'* is not only covered by the scales of pair *dd'*, but also by a lateral pair which does not strictly belong to the pattern. Moreover pair *ff'* in front is only posteriorly covered by pair *ee'*, and midrow scale *g* is thus covered laterally by both *ee'* and *ff'*. In *isthmensis* the situation is rather different. First the pattern is fully closed, which means that no other (lateral) scales outside the pattern play a role in covering part of the pattern scales. Secondly the pair *ff'* is covered by scale *g* laterally and by

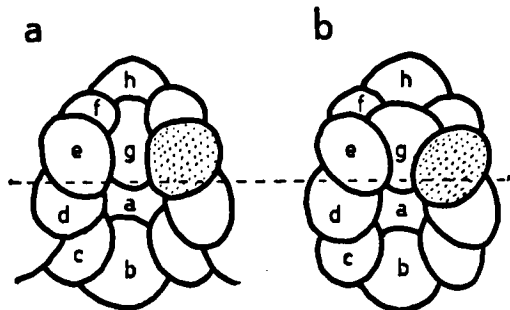


FIGURE 3. Arrangement of scales of the frontal patterns of a *Rivulus limoncochae*, and *urophthalmus*, b *Rivulus isthmensis*.

pair *ee'* posteriorly.

Since all patterns (except minor deviations and irregularities in a few specimens) in the specimens referred to our new species show the *urophthalmus* frontal pattern (fig. 3a), I will range it among those forms. *Rivulus limoncochae* differs especially from the various populations of *urophthalmus* s.s. in the following characters: dorsal rays (including 2 unbranched anterior rays), 9-10 (6-8 in *urophthalmus*); anal rays (+ 2 unbranched) 15-16 (11-14); predorsal scales 25-26 (28-33); length of snout (in 1000ths of the standard length) 63-82 (28-61); diameter of eye 75-88 (58-76); length of head 268-295 (219-262).

In "Tropical Fish Hobbyist, Jersey City" of January 1962, vol. 10 (5): 5-9 Mr. Klaus MECKE of 'Aquarium Hamburg' describes and unidentified *Rivulus* from the Peruvian Amazon (no locality), which seems to be close to *urophthalmus* (cf. l.c. colourphoto and black/white photo).

In February past Mr. MECKE sent me a male and a female of that species for identification. The counts and proportions rates of these two specimens are:

D ii6, A ii12 (iii11), snout 48, 52, eye 68, 69, postorbital 118, head 235, 236, preentral length 532, preanal length 585, 610, predorsal length 735, 796 (♀), standard length in mm. ♂ 39.6, ♀ 36.0. Caudal peduncle circumference scales 14, predorsal scales 29, 31, lateral 41 + 3/9, 39 + 3/10.

There thus is every reason to identify it as a form of *urophthalmus* proper. Another sample of *Rivulus* came in during April 1961, collected by Dr. K. H. LÜLING (Museum Alexander König, Bonn) during his Amazon-Ucayali expedition in 1959-1960. There were three specimens, captured "in kleinen Rinnsalen, die in der Quisto Cocha fließen (15 km von Iquitos)". One male specimen could be identified as a *Rivulus urophthalmus*, 34.4 mm st.l. D ii6, A ii10, snout 61, eye 69, postorbital 111, head 241, preentral length 493, preanal length 614, predorsal length 740. Caudal peduncle circumference scales 14, predorsal 30, lateral 38 + 2/9.

Rivulus urophthalmus certainly is one of the most widespread species of the genus.

The second specimen of Dr. LÜLING agrees with the description of *Rivulus beniensis* Myers, 1927 (Rio Beni, Bolivia), and the third is similar to *Rivulus micropus* (Steindachner, 1862) from the Rio Negro. Larger samples are of course needed to confirm these identifications.

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