

A new Cyprinodont species with a uniquely-colored female, *Aphyosemion hera* n. sp. (Cyprinodontiformes, Pisces), from northwestern Gabon

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A new Cyprinodont species with a uniquely-colored female, *Aphyosemion hera* n. sp. (Cyprinodontiformes, Pisces), from northwestern Gabon.- A new species of *Aphyosemion* is described from a single locality about 45 km northeast from Lambaréné, within the primary forest of northwestern Gabon. Together with some distinctive characters (the opposite insertion of dorsal fin to anal fin, a non mood-dependant broad dark longitudinal band), present in both sexes, the new species exhibits, in the female, a bright apple yellow to gold yellow coloration on belly and strong red pigments on sides and fins. On the contrary, females of the genus, encompassing over 120 species, are usually drab light brown with few markings. The systematic position is discussed: it is rather obscure since it does not fall into one of the eleven subgenera, as presently diagnosed.

Key-words: Pisces - Cyprinodont - *Aphyosemion* - new species - N.-W. Gabon.

INTRODUCTION

The prospection of the species of the West African genus *Aphyosemion* can be today regarded as satisfactory, numerous expeditions, mainly by enthusiastic aquarists, having been organised throughout its range since the late sixties. For example, in Gabon, a small equatorial country of 268 000 square kilometers, more than 210 localities for *Aphyosemion* have been registered (HUBER 1996). The main obstacle, then, to discover a new species is the inaccessibility of large regions, like the northern Du-Chaillu mountains in central Gabon. Another factor is obviously hazard and this is what happens in the present case: the concerned area has been prospected several times, including by Radda and ourselves in 1976 and only *A. gabunense* Radda, 1975 was collected.

The new species has been discovered by two Swiss experienced killi-hobbyists (i.e. aquarists specialized in oviparous Cyprinodonts), Mr Hermann Romer and

Mr René Krumenacker in July 1996: the fish were rare in their biotope. Further, because of the raised interest, it has been recollected at the same place by two Americans, Mr Peter Tirbak and Mr Vladimir Derugin and one German, Mr Andreas Kliesch, also keen aquarists, in February 1997, even in smaller numbers (only 3 fishes about 15 mm long: Kliesch, comm. pers.). However, the fish were not found despite strong efforts by a third expedition in August 1997 at the same location and in the surroundings.

DESCRIPTION OF *Aphyosemion hera* n. sp.

(male, fig. 1 and female, fig. 2: not preserved topotypes).

M a t e r i a l : Holotype: MHNG 2590.64, a male of 31.4 mm S.L. and 37.5 mm T.L., R. Krumenacker and H. Romer, coll. July 27, 1996.

Paratypes: MHNG 2590.65, a female of 29.2 mm S.L. and 35.4 mm T.L.; MNHN 1997-184, 2 males, MNHN 1997-185, 4 females, USNM 347463, 3 specimens and BMNH 1998.1.21: 1-2-3, 3 specimens, all collected with the holotype; all maintained a few months in aquarium, except the USNM and the BMNH material which is from the F1 aquarium generation.

TYPE LOCALITY: Gabon, 45 km northeast of Lambaréné (starting point: the bridge over the Ogooué river in the city) on the road to Bifoun, near Benguié, lower Ogooué basin. Geographical coordinates in degrees and hundredths: 0.47S, 10.32E. At this point, the Ogooué river flows less than 10 km away to the east; the Mbiné river, one of its tributary is about the same distance away to the west.

DIAGNOSIS: *Aphyosemion hera* is a medium-sized species with a strong sexual dimorphism and dichromatism: the female is not subdued, as usual in the genus, but well specifically colored. The new species is besides diagnosed by the opposite insertion of the vertical fins ($D/A = +0.4$, average), by the asymmetrical pattern of the vertical and caudal fins in male, by the rare, in non annual species, trilobate caudal shape in male and by the deep anal fin in female; in addition, the longitudinal dark mid-band of the young male and the female at all stages is permanent and does not depend on mood, like the one seen in some other species, especially those of the subgenus *Kathetys* Huber, 1977.

Methods of measurements and counting have been detailed in HUBER (1992). Morphomeristic data of the first quoted eight types, the holotype first in bold (after confirmation by radiophotographs): sex= male, female, male, male, female, female, female, female.

D= 11, 11, 12, 11, 11, 11, 12, 11 (mean: 11.25; S.D.: 0.43). A= 12, 12, 12, 12, 12, 12, 12, 11 (mean: 11.88; S.D.: 0.33). $D/A = +1, +2, +1, 0, -1, +1, +1, 0$ (mean: $+0.62$; S.D.: 0.86). LL= 28+2; 28+4; 29+2; 27+4; 28+3; 28+4; 28+3; 29+3 (mean: 28.12+3.12; S.D.: 0.6). Predorsal scales= 14, 15, 13, 13, 14, 13, 14, 14 (mean: 13.75; S.D.: 0.7). Transversal scales (TRAV.)= 9, 9, 10, 10, 10, 9, 10, 9 (mean: 9.6; S.D.: 0.5). Circumpeduncular scales (CIR)= 15, 14, 16, 16, 17, 16, 17, 16 (mean: 15.9; S.D.: 0.9). S.L. (in mm)= 31.4; 29.2; 36.7; 28.0; 25.4; 23.8; 22.4; 20.4. T.L. (in % of S.L.)= 119, 121, 125, 129, 118, 121, 120, 125 (mean: 122.3; S.D.: 3.5). P.D. (predorsal length)= 62; 64, 60, 61, 63, 65, 64, 69 (mean: 63.7; S.D.: 2.8). P.A.

(preanal length)= 64, 61, 59, 61, 61, 63, 62, 66 (mean: 62.2; S.D.: 2.0). P.V. (preventral length)= 50, 49, 50, 53, 52, 52, 52, 53 (mean: 51.3; S.D.: 1.3). Height at Anal level= 22, 19, 21, 21, 19, 21, 19, 22 (mean: 20.4; S.D.: 1.2). Height at peduncle level= 13, 13, 15, 14, 13, 14, 13, 13 (mean: 13.4; S.D.: 0.6). Head length= 27, 28, 25, 27, 27, 26, 28, 29 (mean: 27.2; S.D.: 1.2). Interorbital= 16, 17, 17, 14, 15, 15, 14, 15 (mean: 15.4; S.D.: 1.0). Eye diameter= 9, 9, 8, 9, 7, 8, 8, 9 (mean: 8.4; S.D.: 0.7). Snout= 7, 6, 6, 8, 6, 6, 6, 7 (mean: 6.4; S.D.: 0.6).

The caudal fin of the dominant male is strongly trilobate, with short streamers on upper and lower tips; the dorsal and, less so, the anal fins bear short streamers; the female is having an unusual deep anal fin and a somewhat pointed dorsal.

The D/A deviation has been checked on the radiophotographies of 6 additional specimens with the following results: +1, -1, -1, +1, 0, +1; for the total 14 specimens, the mean value is +0.43 and the standard deviation, 0.80.

Vertebrae (abdominal+caudal), on 8 specimens= 13+15, 12+15, 11+15, 12+15, 11+15, 12+15, 12+15, 12+16 (mean: 27.0; S.D.: 0.71).

The hypural plate is fully divided in the middle, an unusual situation.

The frontal scalation is of the G-type, but less regular than usual, one female being F-type. The frontal neuromast pattern is open, like in all *Aphyosemion* from Gabon: the channels are unusually wide, not protected by fleshy lobes. A few ctenoid scales are available on the old male sides.

Colour in life: male, little pigmented on a blue green metallic background; the "shield" pattern (red lines, longitudinal below lip, oblique on operculum) is not conspicuous; only a few red blotches on the upper part of sides and near the basis of the dorsal, ventral and anal fins can be noticed; the middle of the dorsal, pectoral and caudal fins are flamed with red along rays; in addition, two submarginal red bands, the lower being wider, occur on the caudal but not on the dorsal fin; light blue margins are seen on dorsal, pectoral, and caudal fins, but not on ventral and anal fins, which are yellow-green overall, except their basis. Female, strongly pigmented with red spots over upper sides and with red flames on all fins; the dorsal fin and the upper part of the caudal fin is black margined, like the lower lip and the area below the eye; besides, a broad conspicuous dark band is present (also in the juvenile male) from behind the eye (in prolongement of the lower lip black line) until the tail; below this band, the entire belly is colored with a contrasting apple to gold yellow, like all paired and unpaired fins.

Colour in alcohol: male, with around 20 light big spots on upper sides over a dark brown background; the lower mid-sides are less dark; head, dark with two darker lines on lower lip and somewhat below the first one; dark shield, well marked; dark rays on vertical fins, except a light broad margin at lower caudal and a light edge at its upper part; the dorsal fin bears a streamer and reaches, like anal, the caudal peduncle level. Female, with a broad dark longitudinal band from snout until the caudal peduncle where it ends larger by a blotch; a second dark thinner line, parallel to the lower lip, goes beyond the rear part of eye, underlying it; above the broad band, the region of upper sides is mottled with grey markings, while below it, it is unmarked

and yellow; all fins, except pectorals, irregularly and discontinuously flamed with black, especially on mid-caudal following the band; in both sexes, a dark thin line on back from the A-scale to the dorsal fin insertion.

Ecological data (Romer, pers. comm., June 14, 1997): the biotope is similar to that of other *Aphyosemion* species: a shady primary forest creek ("marigot"); the water was, in summer 1996 i.e. during the long dry season, very shallow, 1-2 m wide and 20 cm deep, with lots of dead leaves; the water was clear, of low conductivity, slightly acid, very similar to rain water as usual for *Aphyosemion* (a single measurement: conductivity= 20 μ S; pH= 6); at 2 p.m., the water temperature was 21°C. A dozen of specimens only could be caught, whereas the other sympatric species, *A. gabunense* was much more abundant. In the same locality, TIRBAK *et al.* (1997) were also able to collect two other Cyprinodonts: *Epiplatys sexfasciatus* Gill, 1862 and *E. singa* (Boulenger, 1899), the typical fauna of the area between Bifoun and Lambaréné.

Aquarium experience (Romer, pers. comm.): a typical non annual species which prefers dark parts of the tank, furnished with lots of plants; fairly easy to breed, despite unbalanced sex-ratios (first generation in favor of males; second in favor of females); the pair spawns on perlon mops with the standard Z-type position of *Aphyosemion*; no aggressivity displayed; incubation time: 20 days at room temperature; first food: *Artemia nauplii*; growth: relatively slow. Sexual differentiation may appear at 5 months and first breeding at 7. Grell (pers. comm.) reports that the sexual maturity is reached at 7 months and the adult size, at 12 months.

Derivatio nominis: hera (the Greek Goddess), an invariable noun in apposition, the name refers to the beauty of the female, probably the most beautiful in *Aphyosemion*, if not in Cyprinodonts, but this is subjective.

DISCUSSION

The main morphomeristic characters and the colour pattern of the new species places it undoubtedly within the genus *Aphyosemion* among the tropical West African Cyprinodonts: average dorsal and anal fin basis ($D < 16$; $A < 16$), dorsal and anal insertion, not too far from each other ($D/A < +8$), lyre-shaped caudal fin, red pigments on sides and fins, and notably on head (the "shield"), no dark vertical bars; its low meristics ($D = 11.3$, $A = 11.9$, $D/A = +0.4$, on average) can only relate it to two taxa (HUBER 1996: average data): the subgenus *Chromaphyosemion* Radda, 1971 ($D = 11.8$; $A = 13.6$; $D/A = 2.4$) and the related genus *Diapteron* Huber and Seegers, 1977 ($D = 10.7$; $A = 11.3$; $D/A = -2.3$). However the new species is distinguished from the *Chromaphyosemion* components by the absence of the two longitudinal mood-dependant dark bands on sides of both sexes, by the shape of the vertical fins (pointed without long filaments, not trapezoid), by the shape of the caudal fin (without long filaments). It is distinguished from the *Diapteron* components by the shape of the vertical fins (pointed, not rounded), by the larger size (1 cm larger) and by the completely different colour pattern of male (standard red pigments on blue background, versus the reverse).

No other *Aphyosemion* species combines a low anal fin count and superimposed vertical fins.

The colour pattern of the adult male of *A. hera*, so important in *Aphyosemion* speciation (the female chooses the conspecific male among sympatric species!) and systematics, reminds that of the *A. gabunense* superspecies from the same region. This superspecies encompasses three isomorphic allopatric valid species, separated by their colour patterns and by their caryotypes: *A. gabunense* (a blue symmetrical phase), *A. marginatum* Radda & Huber, 1977 (a yellow symmetrical phase), *A. boehmi* Radda & Huber, 1977 (a yellow phase, with an asymmetrical pattern in the caudal fin). All show, unlike *A. hera*, strong and regular series of spots on male sides and inner fins, plus a broad symmetrical red margin on dorsal and anal fins; dominant males exhibit long filaments on caudal fin upper and lower streamers; females are grey brown, without any conspicuous dark band (Radda 1975).

The colour pattern of the adult male of *A. hera* and its body and fin shapes remind also another species with two subspecies (probably valid species): *A. pascheni pascheni* (Ahl, 1928) and *A. p. festivum* Amiet, 1987 from the Kribi area in south-western Cameroun, i.e. over 350 km from our locality, with no other population in-between. The *festivum* male pattern agrees especially with that of *hera*: red flamed colour pattern of the inner caudal fin, distinctive patterns at dorsal and anal fins (a rare feature in *Aphyosemion*); however, like the nominal subspecies, the male is heavily pigmented with red longitudinal lines and bears a red submargin at anal; and the female is gray brown with few red and yellow markings and without the characteristic longitudinal dark band.

Indeed, the five just quoted taxa share with *A. hera* paucity in biotope and very isolated location: all are known only from their type localities and eventually one or two more places (Huber 1981; Amiet 1987); on the other hand, caryotype studies (Scheel 1990) suggest that *pascheni* is related to the *calliurum* superspecies (with *australe* and *ahli*), whereas *gabunense* and its allied are related to the *striatum* superspecies: these two superspecies are similar in fin shape, but not in body depth; they share a large part of their distribution (in Equatorial Guinea, Gabon, Congo), although the former is more restricted to near the coast; and they are reported sympatrically in a number of localities (in that case, it appears that the former chooses more open parts of the biotope).

Finally, the position of *A. hera* remains unclear with our present morphological and field knowledge: no direct relationship can seemingly be derived from isomorphic features and the new species appears to be a distinctive morphospecies, a rare case in the genus; an attractive relationship exists with *A. pascheni*, but the position of the dorsal fin is very different, more advanced and there are several reported cases of colour convergence in *Aphyosemion* between two species belonging to two different phylogenies; at last, a putative relationship with the sympatric *gabunense* cannot be rejected, although related species are extremely rarely found in the same biotope in *Aphyosemion* and in Cyprinodonts in general.



FIGS 1-2

1: male topotype *Aphyosemion hera* in aquarium. 2: female topotype *Aphyosemion hera* in aquarium. Photos Wolfgang Grell.

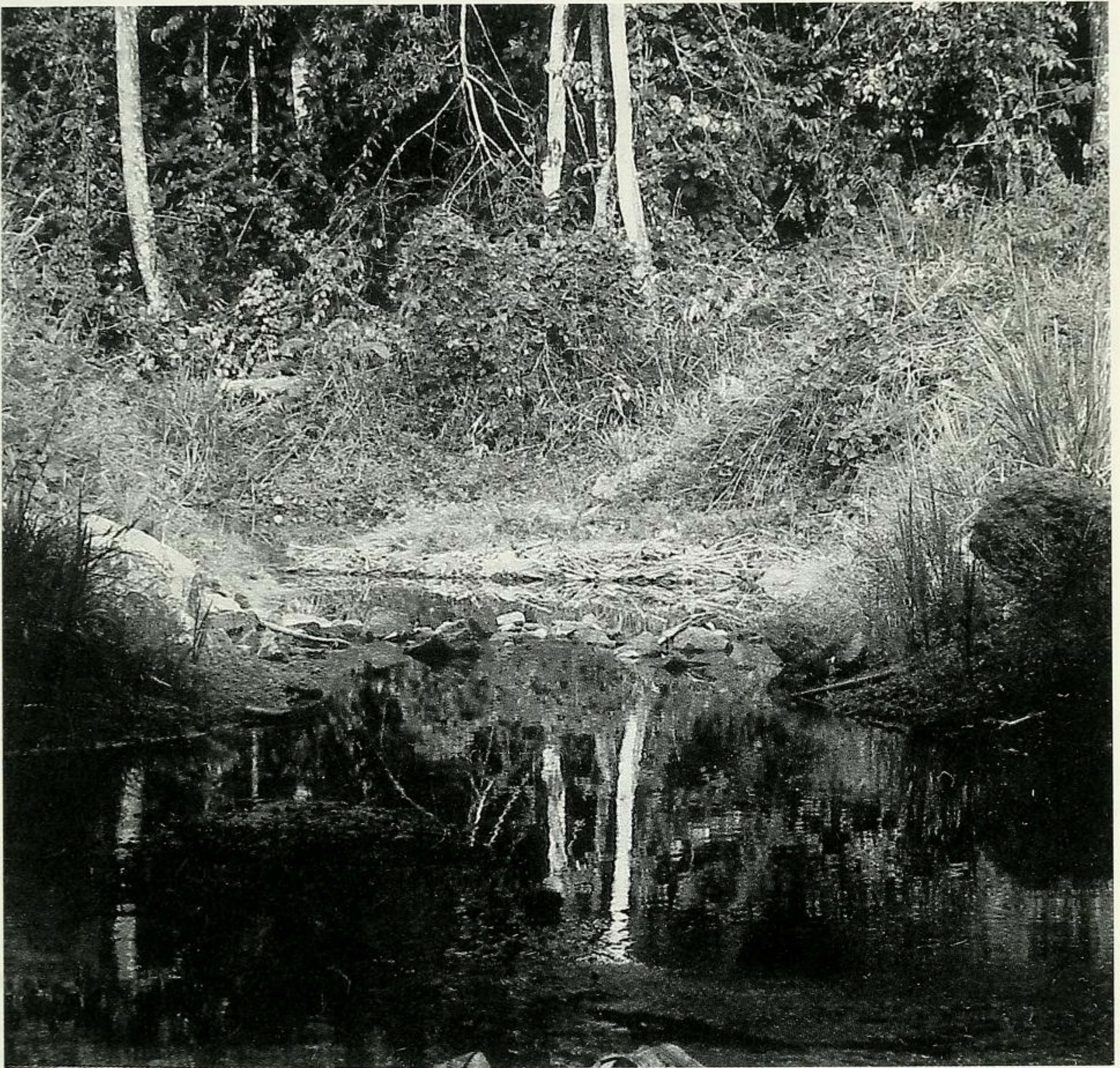


FIG. 3

The biotope of *A. hera*, *A. gabunense*, *E. sexfasciatus*, *E. singa*, a shady creek crossing the road. Photo René Krumenacker.

CONCLUSION

Low meristics and superimposed vertical fins, a colorful female, the presence of a black longitudinal band in the juvenile male and in the female, characterize *Aphyosemion hera* which lies apart in the phylogeny of its large genus: is it a primitive species linked with the species occurring in the same region?

Is it a relict species, like *pascheni*, of a formerly well distributed group which suffered considerable extinction? Is it an offshoot of a species living in the nearby yet unknown northern Du Chaillu mountains?

It is expected that the DNA techniques will bring clues: no doubt that they will help to sort out the puzzle of speciation that is seen in the genus, especially in primary forest equatorial hilly regions, such as that of *A. hera*!

It is hoped too that the nice beauties of this species and notably of the female will be appealing to killi-hobbyists for new collections, so that new places are discovered and this so different species better known.

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