The Case of *fallax-gularis-deltaensis-schwoiseri-kribianus* reviewed, after two visits to the Natural History Museum (London)

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Abstract

Following two visits to the Natural History Museum in London in order to review various type material in their collections, the status of *Fundulopanchax fallax* (Ahl, 1935) is reviewed: the taxon could not be confirmed as identical to *schwoiseri* as per Seegers (1988), the species appears to be more related to *Fundulopanchax deltaensis*, and the taxon should stay as a nomen dubium pending further collections; from the newly available radiographs, it seems far from certain, even if it cannot be excluded, that the designated neotype may be identical to the fish described in various publications by Ahl, Schreitmüller and/or Arnold. The status of the other *Gularopanchax* species (*gularis/deltaensis, schwoiseri/kribianus*) is also discussed and it is proposed to provisionally maintain their validity, pending additional studies. Further observations are given on types of *Epiplatys ansorgii* (Boulenger, 1911), *Epiplatys multifasciatus* (Boulenger, 1913), *Aphanius danfordii* (Boulenger, 1890), *Aphanius chantrei* (Gaillard, 1895), *Laciris pelagica* (Worthington, 1932).

Résumé

Suite à deux visites au Muséum d'Histoire Naturelle de Londres en vue d'étudier divers matériels typiques dans leurs collections, le statut de *Fundulopanchax fallax* (Ahl, 1935) est révisé : le taxon n'a pas pu être confirmé comme identique à *schwoiseri* selon Seegers (1988) ; l'espèce apparaît davantage proche de *Fundulopanchax deltaensis*, et le taxon devrait rester un nomen dubium, dans l'attente de nouvelles récoltes ; d'après les nouvelles radiographies disponibles, il semble loin d'être certain -même si cela ne peut être exclus- que le néotype désigné puisse être identique au Poisson décrit dans diverses publications par Ahl, Schreitmüller et/ou Arnold. Le statut des autres espèces de *Gularopanchax* (*gularis/deltaensis, schwoiseri/kribianus*) est également discuté et il est proposé de maintenir provisoirement leur validité, dans l'attente d'études nouvelles. Des observations additionnelles sont proposées sur des types de *Epiplatys ansorgii* (Boulenger, 1911), *Epiplatys multifasciatus* (Boulenger, 1913), *Aphanius danfordii* (Boulenger, 1890), *Aphanius chantrei* (Gaillard, 1895), *Laciris pelagica* (Worthington, 1932).

I. FOREWORD

During two congress trips to London, the opportunity was offered to us to visit the premises of the ichthyological department in the Natural History Museum (ex-BMNH). Oliver Crimmen, Tony Gill, then James Maclaine were very kind to welcome us, with very short notice, and to show us the place where the types of the Cyprinodont species are kept (close to their offices, in a brand new air-cooled room). They are warmly thanked for their courtesy and the preparation of radiographs and they are also congratulated for the way collections are neatly organized and kept (to find a given type does require a few seconds at best and no more than three minutefor a neotype with a name change!). The scope of our visits was to take a look at several types which, for a long time, we had strong interest in or for which other authors had stated observations that appeared at first sightly puzzling.

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These are the types of the following 12 species, with their descriptions names.
Aphyosemion fallax Ahl, 1935
Haplochilus ferranti Boulenger, 1910
Haplochilus lujae Boulenger, 1910
Haplochilus multifasciatus Boulenger, 1913
Haplochilus ansorgii Boulenger, 1911
Cyprinodon danfordii Boulenger, 1890
Cyprinodon chantrei Gaillard, 1895
Haplochilus christyi Boulenger, 1915
Haplochilus schoutedeni Boulenger, 1920
Haplochilichthys pelagicus Worthington, 1932
The cases of the types of *Haplochilus ferranti* and *Haplochilus lujae* have been dealt separately by the author (Huber, 2005a,b), like those of *Haplochilus christyi* and *Haplochilus schoutedeni* (with Zee, submitted).

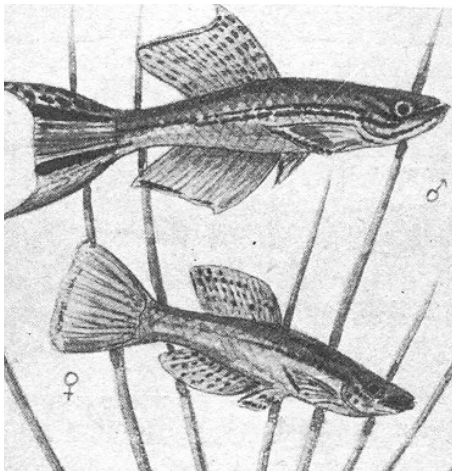
Although *Aphyosemion fallax* (fig. 1) is the latest taxon named in this list, it appears to be an old taxon among the names today included in the genus *Fundulopanchax*, hence the importance of its proper identification and definition in comparison to more junior names of related fishes.

II. INTRODUCTION TO THE CASE OF *FUNDULOPANCHAX FALLAX-GULARIS DELTAENSIS - SCHWOISERI - KRIBIANUS*

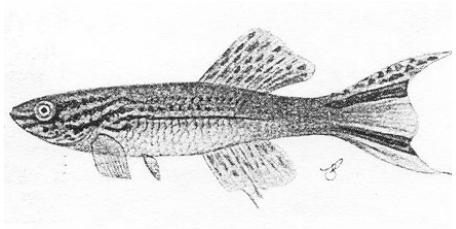
The oviparous Cyprinodont fishes included in *Fundulopanchax* comprise 28 species and subspecies in its present sense within 5 sublineages (Amiet, 1987, Zee & Wildekamp, 1994, Costa, 1998, Huber, 1998, 2000, Murphy & Collier, 1999, Wildekamp & Zee, 2004): *Fundulopanchax* s.s. Myers, 1924 (type species: *Fp. caeruleus*, a junior synonym of *Fp. sjoestedti*), *Paraphyosemion* Kottelat, 1976 (type species: *Fp. gardneri*), *Gularopanchax* Radda, 1977 (type species: *Fp. gularis*), *Paludopanchax* Radda, 1977 (type species: *Fp. arnoldi)* and *Pauciradius* Wildekamp & Zee, 2005 (type species: *Fp. scheeli*). All its components, but one, are well known from morphological, osteological and/or molecular studies: the exception is the species *Fp. powelli* Zee & Wildekamp, 1994 that has only been described from preserved juveniles and is only tentatively assigned to *Fundulopanchax* s.s., as a primitive form (Huber, 1998).

Not long ago (Amiet, 1987, Huber, 1998), *Fundulopanchax* was considered only as a subgenus of the related genus *Aphyosemion* from tropical western Africa. However several external characters, most of them grading into *Aphyosemion*, have been disclosed which characterize the *Fundulopanchax* lineage and its sublineages (Zee & Wildekamp, 1994): larger size (except *Paludopanchax*), annual mode of reproduction (except some components of *Paraphyosemion* and except *Pauciradius*), swimbladder not extending beyond the first haemal spine (only studied for a few components), extended rays (number 3-4 to 8) in the second quarter of the Anal fin of males (except *Pauciradius* and some components of *Paludopanchax* and *Paraphyosemion*) and the larger number of circumpeduncular scales (above 16, except *Paludopanchax*, *Pauciradius* and some components of *Paraphyosemion*). In addition, chorionic punctii have been reported, which seem to be absent in all studied species of *Aphyosemion*. Today, *Fundulopanchax* is considered as a full genus within the general splitting trend in systematics and because the available molecular data on the group clearly show that it is monophyletic: however, a better diagnosis with clear cut characters from *Aphyosemion* should be proposed, which is beyond the scope of the present paper.

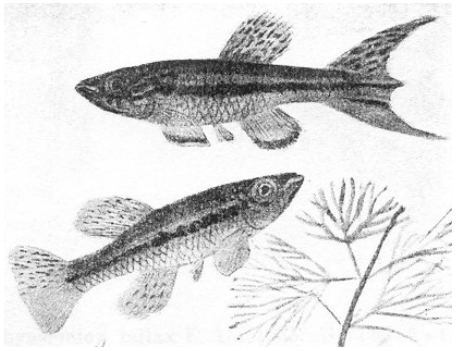
The subgenus *Gularopanchax* is composed of very large species, like *Fundulopanchax* s.s., and is separated from the latter by the colour pattern of males which is never fasciated and which lacks a prominent post-opercular dark-red blotch, and by the lack of filamentous rays in the mid-dorsal fin of dominant old male, like for mid-anal fin. Its four described components are in historical order: *Fp. gularis*



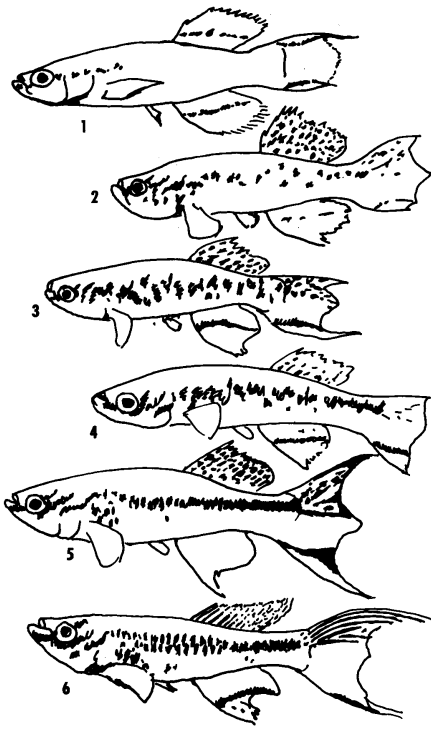
(1a) *fallax* Schreitmüller



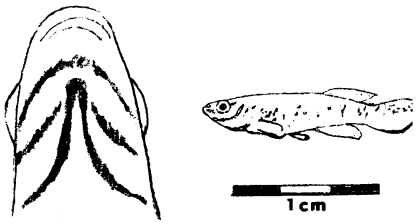
(1b) *fallax* Arnold & Ahl



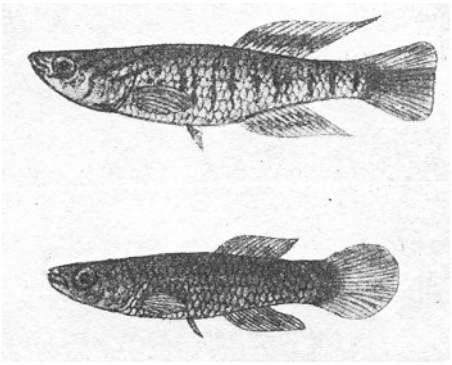
(1c) yellow *gularis* (*deltaensis*) Arnold



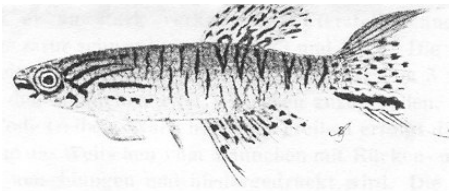
(1d) *gularis* group Radda (N°1: *gularis* Blgr)



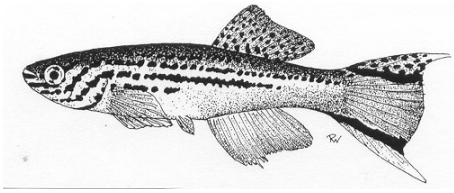
(1e) BMNH spm : *fallax* sensu Seegers (drawn by Radda)



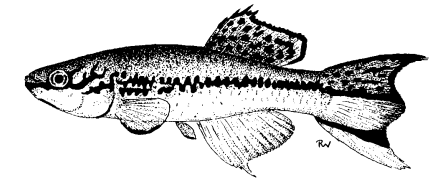
(1f) *spurrelli* Arnold (male, above)



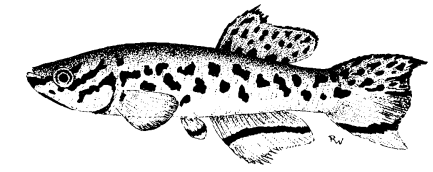
(1g) *filamentosus* Arnold & Ahl

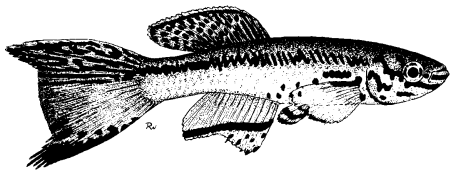


(2a) *fallax* Arnold & Ahl (redrawn by Wildekamp)

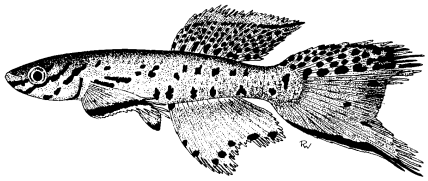


(2b) *deltaensis* and below *2c gularis* Western Popularion Wildekamp

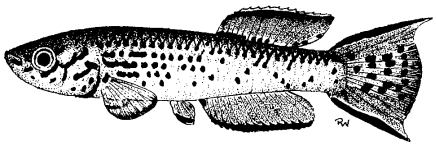




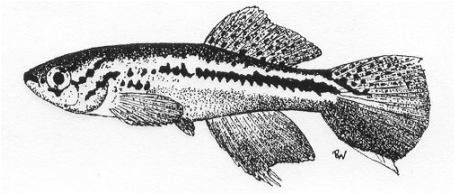
(2d) schwoiseri Wildekamp



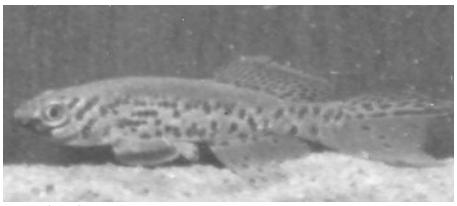
(2e) *kribianus* Wildekamp



(2f) *walkeri* Ghana Wildekamp



(2g) *avichang* Wildekamp



(3) *kribianus* F.W. Harvey

Illustrations:
fig. 1. Reproduction of (a) Schreitmüller's drawing for fallax, of (b) Arnold & Ahl's drawing for fallax, of (c) Arnold's drawing for

"yellow" gularis (= aff. *deltaensis*), of (d) Boulenger's drawing of *gularis* type and of (e) Radda's drawing of ventral head and body of BMNHN *fallax*, of (f) Arnold's drawing for *spurrelli*, of (g) Arnold & Ahl's drawing for *filamentosus*.

fig. 2. Idealised sketches of the *Gularopanchax* taxa drawn by R.H. Wildekamp: 2a *fallax*, redrawn after Schreitmüller and Arnold & Ahl, 2b *deltaensis* (= type area of *gularis*), 2c *gularis* (western populations), 2d *schwoiseri*, 2e *kribianus*; and for comparison, 2f *Fp. walkeri* (a senior synonym of *spurrelli*) from Ghana, a component of *Paraphyosemion* (?) and 2g *Fp. avichang* from Ecuatorial Guinea, a component of *Paludopanchax* (?).

fig. 3. *Fundulopanchax kribianus* Pre-war strain. Photo by F.W. Harvey

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(Boulenger, 1902), *Fp. schwoiseri* (Scheel & Radda, 1974), *Fp. kribianus* (Radda, 1975) and *Fp. deltaensis* (Radda, 1976) (see fig. 2). All these taxa cannot be separated with certainty by morphometric and meristic characters, but they are indeed distinct by the colour pattern of the male and, for some of them, by the karyotype. However, one important feature of those fishes is their above-average pattern variability within a single pond, within a single progeny in aquarium and between generations in aquarium (which complicates even more their study). The validity of some of them is hence disputed (see discussion, here after) and the question of the inclusion of *Fp. fallax* (Ahl, 1935) in *Gularopanchax* is a key issue of the case.

All known *Gularopanchax* species are, till present, distributed in swampy areas near the coast and the neighbouring inland plain from Benin to southern Cameroon, in the Kribi area (Huber, 1998).

III. HISTORY AND DISCUSSION ON THE CASE

The systematic status of *Fp. fallax* has been regarded very differently by three authors (Radda, 1975; Seegers, 1986, 1988; Scheel, 1990) : Radda as a junior synonym of *spurrelli* (= *walkeri*), Seegers has a senior synonym of *schwoiseri* and Scheel as a senior synonym of *deltaensis*! It is then unavoidable to objectively study all data at disposal, step by step, in order to gain a clearer view of that complicated case.

Aphyosemion (*Fundulopanchax*) *fallax* has been described under that original name by the German ichthyologist Ernst Ahl, in 1935. The species was based on specimens of probably several aquarium imports of the early thirties (Schreitmüller, 1933: 209, 1935: 339; Arnold, 1934: 100 with the same drawing) that were said to originate either from Gold Coast (presently Ghana) by Schreitmüller or from Niger Delta by Arnold. The morphomeristics were taken from two old aquarium specimens (2 syntypes: a male of 70 mm T.L. and a female of 53 mm T.L.), both donated by the aquarist Schreitmüller to Z.M.B. (Berliner Museum) and in Ahl's description, the life colour pattern was reproduced from Schreitmüller's own observations on younger fishes (op. cit., see fig. 1). Apart from the fact that these two types are lost in Berlin (Seegers, 1988), Schreitmüller and Arnold, both, sent to BMNHN in London fish from several imports as material for identification (together with other specimens of different species) and Radda (1975) and Seegers (1988), after having studied them, referred them to *fallax*, and the latter even designated a neotype for *fallax* after them. After having been informed by two older aquarists that a strain similar to *kribianus* (see fig. 3) was available in Germany and the UK in 1936 up to before the second world war, Seegers (1988) became convinced that that strain was identical to *fallax* and after having synonymised *kribianus* (spotted on sides) and *schwoiseri* (lineated on sides), because of their variability, synonymised both into *fallax*, hence resurrected as a valid species.

Apart from *fallax* and the fish today identifiable as *kribianus*, several other strains were

Table 1: Comparison of pattern and shape characteristics of the discussed fishes (note : Scheel's "blue" *gularis* is not the "blue gularis" of aquarists that is identifiable as *Fp. sjoestedti*).

Male, except last item	Schreitmüller, 1933-35 "*fallax*"	Arnold & Ahl, 1936 "*fallax*"	Arnold, 1934 "yellow-*gularis*"
Pattern, sides	2 thin parallel median lines (possibly 1)	1 thin line, plus 2 shorter discontinuous parallel series, above	1 broad median line (extending into Caudal)
Pattern, shield	4 continuous lines (curved)	3 continuous lines (oblique)	3 continuous lines (oblique)
Pattern, Dorsal fin	red sub-edge, transversal red spots	irregularly spotted, no sub-edge	irregularly spotted
Pattern, Anal fin	red sub-edge, plain	irregular spots (innerly),	broad red submargin
	color (or weakly dotted)	no sub-edge	
Pattern, Caudal fin (top to bottom)	spots, band, plain color, band, narrow plain color, contrasting color	= 1933	spots, band, plain color, band, plain color, band, contrasting color
Pattern, Paired fins	marked, edged Pectorals	unmarked (or weakly marked)	marked, submargined Pectorals
Shape, Dorsal	trapezoid, first rays pointed	trapezoid, no rays pointed	rounded
Shape, Anal	trapezoid, first rays pointed	trapezoid, mid-anterior rays extended	rounded
Shape, Caudal	bilobate	trilobate	trilobate
Shape, Pectorals	pointed	pointed	pointed
Female, sides pattern	1 median thin line, not extending into Caudal	irregular spots	1 median broad line, not extending into Caudal

available in European aquariums in the early to mid thirties. Notably, the yellow-*gularis* (Arnold, 1934), a fish very similar to *deltaensis* (a broad lateral band on sides of both sexes), but distinctive because of the extension of that band on the caudal fin in male only and because of the availability of a red submargin on male Anal fin (see fig. 1). And also, an irregularly fasciated-*filamentosus* (Arnold & Ahl, 1936), a fish similar to the present spotted strain of *filamentosus*, with the typical anterior extension at male Anal fin (not median, like in Arnold's drawing of *fallax*) (see fig. 1): although the fish is not a member of *Gularopanchax*, its drawing is critical because it shows that aquarists in those days had the intuition of the importance of the extended rays at male Anal fin.

In table 1, a synoptic comparison shows the major characters in pattern and fin shape for the two drawings of *fallax* and for the related *Gularopanchax* fishes (first part, the old prewar strains; second part, the modern post-war strains).

With these characteristics in mind it is easier to discuss the information available to us on *fallax* and to separate the discussion into three items, "hard" data, weak data and uncertain data, and further to better analyze the BMNH material.

What are the "hard" data on the taxon *fallax*?

- the description of *fallax* conforms to the ICZN rules of after1930 and the name is available,
- the two types are lost in Berlin,
- the colours of the male pattern and the male pattern are detailed in Ahl's description and are coherent with Schreitmüller's drawing of 1933: male (reproduced in 1935 and by Arnold in 1934, see fig. 1), with two red parallel thin lines on mid-sides, with red spots on Dorsal fin, more or less arranged in transversal series (and a red thin sub-edge), with a plain-coloured Anal fin (except a red thin sub-edge), and with a distinctive Caudal fin (from top to bottom: first, red spots, like Dorsal fin, second, a broad longitudinal red band, third, a plain coloured median zone, fourth, another broad longitudinal red band, symmetrically to the upper band and slightly diverging, fifth,

Scheel, 1968 "blue-*gularis*"	Radda, 1976 "*deltaensis*"	Scheel & Radda, 1974 "*schwoiseri*"	Radda, 1975 "*kribianus*"
fully scattered with spots, usually not numerous, big and irregular (but no "x" markings)	1 broad median line (not extending into Caudal)	1 upper zigzag line, plus 2-4 shorter discontinuous irregular series, below	fully scattered with spots, maybe fused into "x" markings
vestigial (may be 1 or 2 broken oblique lines)	3 continuous lines (oblique)	2 continuous lines (oblique), plus 1 line around lower eye	2 continuous lines (oblique), plus 1 line around lower eye
irregularly spotted (sometimes a median band)	irregularly spotted	irregularly spotted	irregularly spotted
irregularly spotted (sometimes a median band or plain)	irregularly spotted or plain color	irregularly spotted (few)	irregularly spotted
0, 1 or 2 upper and lower submargins, according to populations	= 1933	edge, spots, no band, plain color, no band, narrow plain color, spots	= 1974, but no upper edge
marked, submargined Pectorals	marked, submargined Pectorals	marked, submargined Pectorals	marked, submargined Pectorals
trapezoid, no rays pointed	trapezoid, no rays pointed	trapezoid, no rays pointed	trapezoid, no rays pointed
trapezoid, mid-anterior rays extended	= 1936	with a median disruption	with a median disruption
trilobate	trilobate	bilobate	bilobate
pointed	pointed	pointed	pointed
irregular spots	1 median broad line, not extending into Caudal	no longitudinal band (spotted)	spotted

another narrow plain coloured zone, then finally a coloured margin; female, with a single line on mid-sides and with red spots on paired and unpaired fins, arranged transversally, except Caudal (more or less unmarked, except a faint dark vertical sub-border) [note: Arnold & Ahl's drawing of 1936 is very similar in terms of colour pattern, although it looks less artistic and more scientific, notably the red opercular shield: slight differences may be noted, such as the lack of red subedges at Dorsal and Anal, the more distant position of the two longitudinal bands at Caudal, and the presence of red spots also in Anal fin, and the single thin red line on mid-sides with two shorter series of discontinuous parallel red spots above it; there are also major differences in terms of fin shapes, see below under "weak data"],

- the unique characteristics of *fallax* are the thin continuous median line on male and female sides and the 2 broad diverging bands on Caudal of male (the basic characters, common to Ahl, Schreitmüller, Arnold and Arnold & Ahl who all visually knew *fallax*) [note: these characters are missing in *schwoiseri/kribianus*].

What are the weak data on the taxon *fallax*?

- the shape of male unpaired fins in Schreitmüller's drawing shows two pointed anterior rays at Dorsal and Anal with a trapezoid form and a lyre-tailed Caudal (bilobate, not trilobate), whereas in Arnold & Ahl's drawing in 1936 (see fig. 1, redrawn by Wildekamp: fig. 2), the shape of male unpaired fins shows no extension at first rays of Dorsal and Anal, but the typical mid-anteri or rays extension at Anal fin only, and a trilobate Caudal fin [note: again Arnold & Ahl's drawing of 1936 is more accurate, notably in comparison to their drawing of *Fp. filamentosus* in the same page that shows the typical disruption on Anal fin for that species and also for *schwoiseri* and *kribianus*; besides, it is

well known, today, that the trilobate Caudal only appears among old dominant males of *Gularopanchax*, being bilobate in young adults as per types of *fallax*],
- the ventral region of male head is mentioned as uniquely patterned by Radda (1975) on BMNH. material [note: this is coherent with Schreitmüller's drawing of continuous red lines], but unfortunately this could not be confirmed by Seegers (1988) and us, respectively 15 and 25 years later,
- the size of the male type, 70 mm in total length, is a bit too large for a fish related to *spurrelli* (according to Radda) and a bit too

small for a fish related to *gularis* et al. [note: this may only be solved if it is considered as not a fully developed fish, like BMNH material (30-40 mm); however, Arnold & Ahl state 60mm as normal total length, therefore not a *gularis*-like fish, or if a member of *Gularopanchax*, then *fallax* would correspond to a less large species or population than usual (100 mm in aquarium)]
- the fin meristics as given by Ahl are D= 13-14 and A= 15-16, much more in line with *walkeri/spurrelli* (D=15 and A= 16) than with *gularis/schwoiseri/kribianus* (D=16-17 and A= 17-18) [note: both Seegers (1988) and ourselves have counted a little bit more than Ahl in the BMNH material, but not as much as characteristic of the Cameroonian populations],
- the type locality is imprecise as "Gold Coast" (today Ghana) and very unlikely: More probably the fishes originate from Nigeria and the Niger delta, because this is an aquarium trade import and because several imports have been undertaken by several import traders [note: Arnold does state the Niger delta as origin, but there is a risk of a confusion with the other imports that occurred in Germany in those years].

What are the uncertain data related to the taxon *fallax*?
- the material in BMNH may or may not be identical to *fallax* Ahl in full (it had been sent on several occasions; it cannot be the original types because the size does not fit and there are more than 2 specimens; it encompasses several species, notably 1 specimen of the lot 1986.11.24.4-5 clearly belongs to another species; the labels have been corrected by several hands, such as for Seegers's neotype the German label "*Fundulus spurrelli*" is crossed out, over-titled by "*gularis*", also crossed out, with the final not crossed out mention of *Aphyosemion fallax*),
- the availability in Germany (and also the UK) of several strains of *gularis*-like fish from different trade imports at the same time shades doubts on the overall picture: while it is clear from Harvey, Radda & Tabatt (1979) that the fish both Harvey and Tabatt had in their aquarium before the second world war is truly identifiable to *Fp. kribianus*, nothing may induce that that fish is identical to *fallax* and nothing may preclude the availability at the same time (or in the early thirties only) of *fallax* (1933-1935), *gularis* (blue, since 1907) and a fish similar to *deltaensis* (yellow "*gularis*" sensu Arnold, 1934, with the median band completely extending into Caudal fin) [note: Harvey has kindly confirmed to us, pers. comm. 2002, that he had had in his aquariums, during those years, specimens referable today to *gularis* and *kribianus*, hence the risk of amalgamation, not to speak of crossings].

What are the characteristics of the so-called *fallax* in BMNH, as newly studied by the present author?
Seegers (1988) has designated a neotype (BMNH 1986.11.24.1) from a set of two lots of preserved material sent separately by the two mentioned German aquarists to London, for identification.
Meristics have been derived from the study of radiographs.
- BMNH 1986.11.24.1 (Seegers's neotype); Country: Ghana; Locality: Gold Coast "Gelber *Fundulus* Heimat?" (Yellow *Fundulus*, Origin?) [ex BMNH 1933.3.28.11-12]. The specimen has D= 15, A=16, D/A=-4, LL=34 and Vertebrae= 14+18. No major pigments are

today left, except a vague darker submargin on upper Caudal fin (total length: 34 mm)
- BMNH 1986.11.24.2-3 [ex 1933.3.28.11-12, 2 lots]. Same "superimposed" Dorsal and Anal fins, LL= 32, 33 (total length: 32-35 mm).
- BMNH 1986.11.24.4-5 [ex 1933.3.28.11-12, 2 lots]. In this series, one specimen is not identical to the others: D=15, A=18, positive D/A deviation, lower peduncular depth and distinctive shape of Caudal fin (standard length: 29.1 mm, Caudal fin, damaged). Specimen number 4 is similar to the "neotype" with D=15, A=16, D/A= -5, Vertebrae = 13+18.

All "neotypic" specimens are young (T.L., about 35 mm) and in poor condition today. Seegers has rightly selected the single - today poorly - coloured male (some dots on upper third of Caudal fin, dark submarginal lower band on Caudal fin, broken flames along rays of Dorsal fin, which is tipped with a dark band, but no trace of colour on body or Anal fin). The neotype has no extension on mid-anterior Anal fin rays or Caudal fin rays, whereas one of the two other specimens seems to have a mid-anterior Anal fin rays extended and upper and lower Caudal fin rays acuminated. It is important to note that one of the specimens at least is a female with ovules, which is extremely surprising for a *Gularopanchax* juvenile and sheds another doubt on the identification. Except if the specimens condition were much better some 15 years ago, it is extremely difficult to ascertain that they, and notably the neotype, are from the same strain than the one which served for Ahl's description of *fallax*, especially if one has in mind the two quite distinct available drawings in terms of fin shapes (see supra) and the size of the types (70 mm for the lost types vs 35 mm T.L. for the BMNH specimens). Besides, one of the specimens belongs to another species. However, if this is right, then Radda's view may not be kept as valid, because one of the five specimens seems to show a mid-anterior extension of Anal fin, which is never encountered in *walkeri* s.l. And if this is right, the meristics of the radiographed specimens are low (dorsal and anal rays) and the negative D/A deviation is not found in *schwoiseri/kribianus*, then Seegers's view appears fragile.

All these specimens are quite small, i.e. not fully adults. Their meristics fall within the variation of all *Gularopanchax* species. From the aquarium populations available before the second world war, they cannot easily be separated from *fallax* Ahl, from yellow *gularis* sensu Arnold (1934), from the blue *gularis* (1907 and later strains) and, if already imported in Germany in 1933, from *kribianus* sensu Harvey, Radda & Tabatt (1979). They - or some specimens only - might be identical to *fallax* Ahl, like Seegers proposed, but this is far from 100% sure. Alternatively, they may represent one of the other species that were sent to BMNH specialists (by several aquarists, including Schreitmüller) for identification, as it was routinely the case in those days. Besides, the size of the mature female and the meristics and relative position of Dorsal and Anal fin push rather in favour of western populations (from and west of the Niger delta). And Seegers's designation of a neotype for one of the BMNH specimens appears risky and maybe inappropriate.

Then, with the above considerations in mind, the three interpretations of the identity of *fallax* can be presented and better commented on the basis of key stable characteristics (see also Fig. 2):

- Radda (1975) regards *fallax* as to represent a junior synonym of *spurrelli*, a usually recognized component of *Paraphyosemion* (recently placed closer to *Paludopanchax* by Murphy & Collier, 1999, following DNA-experiments, but without a diagnosis). In favour of that view, are first the said origin in Ghana where no *Gularopanchax* is known (however Arnold mentioned Niger delta for *fallax*); second, the absence of extended mid-anterior rays at the Anal fin of males, as to be seen in Schreitsmüller's drawing (even, the first rays are pointed) and as to be read in Ahl's descrip-

tion (just as in *spurrelli*, and to the contrary to all known *Gularopanchax* species); and third, the more conspicuous red lines on lower head, up to the opercle. Against that view are first the lineated colour pattern of the sides which is undisclosed in any male of Ghanaian *Paraphyosemion* (usually vertically dotted or barred); second, the asymmetrical pattern of the unpaired fins (notably Caudal) which is absent in *Paraphyosemion* and very characteristic of the *Gularopanchax* sublineage; third, the two conspicuous broad red lines on male inner caudal fin, far from its upper and lower margins, a condition which is absent in *Paraphyosemion* and so characteristic of *Fp. (Gul.) deltaensis.*

- Seegers (1988) regards *fallax* as to represent a senior synonym of *schwoiseri*, a Cameroonian component of *Gularopanchax*. In favour of that view are the bilobate shape of the male Caudal fin, the lineated pattern of the sides of male, the conspicuous red lines on male head. Against that view are the geographical origin (even Arnold mentioned Niger delta for *fallax*, not Cameroon), the non extended mid-anterior anal fin rays in male, the lineated pattern of female and the continuous (not zigzag shaped) upper median position of that line in both sexes, plus the two broad red diverging bands in male Caudal, on Schreitmüller's drawing and on Arnold's drawing (and if BMNH material belongs to fallax Ahl, the smaller size of mature female, the D/A deviation and the fin ray counts).

- Scheel (1990) regards *fallax* as to represent a senior synonym of *deltaensis*, a component of *Gularopanchax* from the Niger delta in Nigeria. In favour of that view, is the nearly perfect match of the male and female colour pattern in life, which is so important for Killifish (some details are though distinct, such as the already mentioned three red lines on head and the width of the median line, but these might be considered as within intraspecific variability limits). Against it are the geographical origin given by Ahl, the smaller size, and the Anal and Caudal fin shapes of male (respectively straight and bilobate in Schreitsmüller's sketch and extended and trilobate in *deltaensis*). However, as Seegers (1988) pointed out, the Ghanaian geographical origin of *fallax* may well be erroneous, in line with the current secretive commercial strategies of fish importers in those days, all the more that Arnold (1934) mentions the Niger delta as a possible alternative. Besides, the fin shapes, as drawn in Schreitmüller (1933) may well correspond to younger, not fully developed, adults as it has been also pointed out by Seegers (1988); Ahl should have seen these characters in the fins of his old specimens (70 mm), but regrettably his observations have proved to be inaccurate on many occasions. Further, Arnold & Ahl (1936) presents another drawing of a male with extensions in mid-anterior Anal fin rays. However, the maximum size of *fallax* is clearly too small for a fish identical to *deltaensis* (100 mm).

Seegers's point of view is the last published one (it is well known that Scheel's book was finished in the early mid eighties and only published after his death in 1989) and, more importantly, Seegers's point of view has been accepted by Wildekamp in his reference book series reviewing all Killifish (1996). Then it must not be overlooked.

Apart from the pros and cons that are listed above, Seegers's move suffers several weaknesses :
- it does not address the low meristics, the D/A deviation, the smaller size and the shape of the Anal fin (as featured by Arnold & Ahl) of *fallax* if it were to be identical with *schwoiseri*,
- the probability that a trade import could occur in Germany in those days from the region of *kribianus* (Kribi, southwestern Cameroun) was much lower than from the northwestern region close to the Nigerian border (*schwoiseri*) but nevertheless that was what actually happened with the Harvey and Tabatt report ; on the other hand, from the Fungé area, *Aphyosemion bivittatum* (*hollyi*

type) was imported, but not *schwoiseri*,
- the possible synonymization of *schwoiseri* and *kribianus* does not make the availability in Germany of a *schwoiseri*-type fish, in those days,
- the possible identity of *fallax* and *deltaensis* is not at all analysed and discussed, surprisingly, while on the one hand, the colour pattern of both taxa bears several striking similarities (as pointed out by Scheel) and reversely on the other hand the 2 fishes are mentioned separately as respectively aff. *spurrelli* and "yellow" *gularis* (hence probably seen as different) by Arnold (1934).

Two final considerations are worth adding, in line with the *fallax* case:
- Wildekamp (1996) importantly mentions that a fish, identical to *deltaensis* in colour pattern, had been collected close to Agberi, within the Niger delta, which is the type locality of *Fp. gularis*. This induces the synonymy of *deltaensis*, and then of *fallax* sensu Scheel, with *gularis*, the older taxon, and leaves unnamed the western populations of *gularis* with a different karyotype (Scheel, 1990), with an apparently different colour pattern and with a probably different climatic history (Huber, 1998). However, the matter is probably more complicated again. In favour of Wildekamp, are the high variability of these fishes and the fertile crossing (up to F2) of fishes of the lineated pattern (namely *deltaensis*) with fishes of the broken pattern (namely *gularis*). Against it, are the stability of the pattern of the offspring in aquarium generations when pure strains are kept separate, the presence of a *gularis* broken pattern (as per Boulenger's description for Agberi) also in the Niger delta and the karyotypic (Scheel, 1990) and DNA separations (Murphy & Collier, 1999) of *deltaensis* and *gularis*. In conclusion, it appears to us that, although Wildekamp may well be right (see also the following example), it is better to maintain conservatively the name *deltaensis* as valid and of a limited interest to erect a new taxon for the available western populations, until they are better known and their limits of distribution are disclosed.
- Chauche and Poliak (1987) have shown from field observations and crossing experiments that in Cameroun, the northern, lineated, populations (namely *schwoiseri*) and the southern, irregularly dotted, populations (namely *kribianus*) exhibit an unusual variability in colour pattern, even in specimens from the same pond and that these colour patterns largely overlap (but not up to be confused); and that they are interfertile (at least the Malendé strain of the former and the Mouanko strain of the latter, up to the F2 generation). Then, since Scheel (1990) has demonstrated that their karyotypes are very close, it appears that the two names could be either synonyms, despite the presently disjunct collection regions; or that they can be conservatively kept valid until a thorough field survey of their characteristics according distribution.

From the above considerations, the *Gularopanchax* sublineage may be divided into two series of populations, provisionally separated by Biafra where no component has yet been recorded. Both series exhibit characteristic patterns with an unusually high range of variation in colour pattern and in details of morphomeristics, even within a single pond (Chauche & Poliak, 1987). First, the Nigerian series with a dominantly trilobate caudal fin in male and with side colours, made of red lateral blotches (*gularis*) or a median line in male (brown in female) (*deltaensis*). Second, the Cameroonian series with a dominantly bilobate caudal fin (sometimes *filamentous*) in male and with side colours, made of red lateral scattered dots (*kribianus*) or a supra median line in male (absent in female) (*schwoiseri*).

In total, the present evidence strongly promotes the following conclusions:
1. from Ahl's description, from Arnold & Ahl's and Schreitmüller's drawings common characteristics, it appears that *fallax* is best described as a member of *Gularopanchax*, of smaller or at least medium size (not reaching 100 mm, like most populations, but some pop-

ulations of *gularis* remain smaller), with a thin median single or doubled continuous line in both sexes (like *deltaensis*, but thinner; and unlike the zizag-line of *schwoiseri*, only present in male), with mid-anterior rays extended at Anal fin in male (like *deltaensis* and *gularis*, but unlike *schwoiseri* and *kribianus*, with a disruption), with the 2 diverging bands in male Caudal (like *deltaensis* and unlike *schwoiseri* and *kribianus* that show no band on transition from spots to plain orange colour), and with low meristics (like some populations of *gularis*) and probably originating from the Niger delta area (not from Ghana like *spurrelli*, and not from Cameroun like *schwoiseri* and *kribianus*),

2. from those characteristics, it can be inferred that *fallax* is closer to *deltaensis* and *gularis* than to *schwoiseri* and *kribianus* and that it is not close to *spurrelli*,

3. if the origin within the Niger delta is confirmed, it comes even closer to *deltaensis* and may be identical to it or it may be an aberrant population of *gularis*, distinct or not, within the high variability of that taxon; if that origin is not confirmed, *fallax* may originate from the western border of *gularis* distribution, or alternatively from the eastern border of *gularis* distribution (e.g. in Biafra, vicariant to *schwoiseri* in northwestern Cameroun),

4. if detailed field collections reveal within the *gularis* distribution in Bénin-Nigeria that a phenotype identical to *fallax* is having a distinct range and that it is geneticall-ly distinctive, then *fallax* may be revalidated,

5. if detailed field collections reveal within the *gularis* distribution in Bénin-Nigeria that *gularis* is very variable, with blue (*gularis* s.s.) phase and yellow (*deltaensis*) phase being hazardly mixed, then the most probable consequence will be that there is only one polymorphic species, identifiable to *gularis*, with 2 junior synonyms (*deltaensis* and *fallax*) [note: however, Scheel has shown heterogeneity in karyotypes of *gularis* and DNA-experiments have unexpectedly concluded on the separation of *gularis* and *deltaensis*],

6. if detailed field collections reveal within the Cameroonian distribution and notably between Kribi and Kumba that *schwoiseri* and *kribianus* are very variable, with lineated (*schwoiseri*) phase and spotted (*kribianus*) phase being hazardly mixed, then the most probable consequence will be that there is only one polymorphic species, identifiable to *schwoiseri*, with *kribianus* as a junior synonym; if not, then the 2 names may be usefully kept valid and separate (unless DNA experiments show a genetic identity, in line of the similar karyotypes and the preliminary crossings).

Therefore, at this stage, unlike Seegers, Radda and Scheel, we prefer to maintain *Fp. fallax* as a nomen dubium, putatively identical with *deltaensis* or to an aberrant *gularis* phenotype (distinctive species or simple variation), and to keep provisionally valid both *gularis* and *deltaensis* on the one hand, and, *schwoiseri* and *kribianus* on the other hand. Besides, according to Radda (pers. comm. May 2005), the validity of *deltaensis* and *schwoiseri* seems to be demonstrated by the sympatric distribution areas of the superspecies *filamentosus/arnoldi/rubrolabialis* respectively, in *Paludopanchax*, and as shown in his paper of 1975, *kribianus* is separated by two big river systems (Sanaga and Nyong) from the abovementioned phenotypes.

Based on the available hard data on *fallax*, on the analysis of the BMNH specimens and the new radiographs, on the very poor situation on collecting localities in the *Gularopanchax* distribution, and on the palaeo-biogeographical situation of the region from Bénin to southeastern Cameroun with several refugia and many today relict species, we believe it is reasonable and realistic.

This is a conservative view until possible contradictory findings, especially from collections in Biafra or western Nigeria, Bénin, or eventually Ghana. In such cautious respect, it is worth remembering that with modern phy-

logenetic tools (DNA/RNA, radiographs, computerized matrix of characters), researchers have at hands more and more power to differentiate available taxa and then premature synonymizing strategies today may appear to destroy added value.

IV. STUDY OF ADDITIONAL BMNH TYPE MATERIAL

Laciris pelagica (Worthington, 1932)

Among 3 series of syntypes (244-252, 253-262 and 263-269), all collected by Dr. E Worthington Lake Edward in Zaire/Uganda, BMNH 1932.6.13.244-252 has been studied: we confirm the unique vestigial frontal neuromast pattern that was disclosed on MRAC material for the description of the genus (Huber, 1981): two slightly winding indistinct grooves (notably at the orbits level) without sensitive neuromasts or sensitive buttons. The frontal region underneath the "A" pineal scale is darkened with a heart shape. Size is large, largest in lampeyes, but *Lamprichthys tanganicanus*. Body outline is deep, without disruption. Sides are without ctenii, unlike *Lamprichthys tanganicanus*. A median line on sides is weakly available, but along the lower body base, unlike most lampeyes. The Ventral fins are extremely short, far from reaching the Anal fin insertion (one length of Ventral is left as an interspace). Dorsal fin insertion is not as far behind, as it was earlierly anticipated (remote, but not beyond Anal fin ending, however the D/A ratio is variable). Finally all males show a conspicuous broad dark vertical border on Caudal fin. All these combined characters are unique among lampeyes and confirm the original diagnosis. On nomenclature grounds, as mentioned in Killi-Data online (Huber, 2001-2002, *Laciris pelagica*, Ed. 1.1, 2003), the genus is not masculine like in the description, but feminine (Eschmeyer, pers. comm.), hence the species new ending with an "a", not with "us".

Epiplatys multifasciatus (Boulenger, 1913)

The six types seen (BMNH 1913.5.11-16) are in very good condition, but the fish are not fully developed adults and rather slender; nonetheless, they correspond very well to the description and the drawing by Boulenger. This species, today as *Epiplatys multifasciatus,* is very important in systematics because it is the oldest taxon of the so called *multifasciatus* superspecies which includes *berkenkampi, boulengeri, mesogramma, phoeniceps, ansorgii* and *huberi*; notably, these preserved types are separated from *boulengeri* from eastern Congo by the conspicuous presence of the intermediate dark bars on sides and by the missing extension of the bar above anal into that fin. No lectotype is hereby designated because no large male can be found in these syntypes and the adult preserved pattern of the species cannot be ascertain, which hopefully may be the case of the 75 other syntypes, located in Tervuren [MRAC 1848-49 (2), 1850-52 (3), 1853-55 (3), 2701-27 (27), 2728-33 (6), 3310-19 (10), 3320-26 (7), 15307-17 (11), 15318-23 (6)]. Similarly to *ferranti* and *lujae* (Huber, 2005a,b), it is of utmost importance that live material can be obtained from the type locality to fix the phylogeny and the evolution of these fishes and the status of taxa described later.

Epiplatys ansorgii (Boulenger, 1911)

The two types (BMNH 1908.5.25.123-124) are in correct condition. The typical lineated pattern on sides is still visible and corresponds well to the recently discovered Massana aquarium population (and to the remarkable drawing by Boulenger). The frontal neuromast pattern is closed, like *berkenkampi* and *singa*, but unlike that of the vicariant *sexfasciatus*. The fin meristics are similar to *berkenkampi* and *sexfasciatus* (D= 10-11, notably), and distinctive from singa (D= 8-9). The size is not large and indeed specimens of *singa* of that size (50 mm) can be collected in larger bodies of water. In conclusion, unlike our previous thinking (with Radda), we confirm that *ansorgii* is distinctive from *singa*, it belongs to the *multifasciatus* superspecies (Wildekamp & Zee, 1995), it is a valid species, and a distinctive phenotype from *berkenkampi* (Neumann, 2004).

Aphanius danfordii (Boulenger, 1890) and *Aphanius chantrei* (Gaillard, 1895)
The syntypes of both taxa are available in BMNH and in rather good condition: for this case, we only checked if the two series look alike.
For *Cyprinodon danfordii* Boulenger, 1890, there are 8 syntypes (BMNH 1879.6.7.5-12) collected at Elbistan, East central Turkey (38.200N; 37.200E) by C.C. Danford.
For *Cyprinodon chantrei* Gaillard, 1895, there are 5 syntypes (BMNH 1896.1.29.1-5) collected at Sandaremek, near Everek, central Turkey (38.367N; 35.500E), by Ernest Chantre.
Both series include adult specimens that are very similar and the two type localities are distant by less than 100km, without apparent biogeographical border.

Therefore the synonymy of *chantrei* into *danfordii* as hypothesized by Kosswig (1953) and formally proposed by Wildekamp et al. (1999) is herein confirmed. The possibility of a DNA separation cannot, however, be ruled out, because Hrbek et al. (2002) have shown high genetic variability among Anatolian Killifish.

V. PHILOSOPHICAL CONCLUSIONS

My recent papers (1994 for *Aphyosemion decorsei*, 1998 for *Aphyosemion bualanum/elberti* and *microphtalmum /escherichi*) out of a total of about 70, in which I marked a disagreement regarding the identification of species based on types, have resulted in little emotional feedback from aquarists: this is a remarkable proof of maturing, compared to the polemics (e.g., for *Roloffia* or the case *oeseri/santaisabellae*) that were routines during the seventies with groups of aquarists backing some "scientists" (themselves current or past aquarists).
To mark a disagreement (and an agreement) with someone is a fact of life, but it does not mean emotional dispute, notably when the argumentation is rational, objective and evidence-based.

If past descriptions were all complete with deposited types, with a precise type locality and with a good diagnosis, then very few debated cases would have been raised; just if, but human reality is far from ideal and we have to deal with these cases while trying to assign them to a given fish (with risks that the revalidation is being challenged) or provisionally keeping them in the dark as a nomen dubium or incertae sedis (with risks that this conservative attitude is seen as blocking obscurantism).

The key issue is that things evolve: first, radiographs are today routine processes and help very much in the identification of old, usually in poor condition types (this is the case of BMNH "*fallax*" here); second, our knowledge has improved dramatically and many cases have been solved due to new field collections or simply following the study of types; for example, we know now that a specific colour pattern is not unique of a specific region: Lineated specimens referable to *Fundulopanchax schwoiseri*, as described in Scheel & Radda, 1974, have been later disclosed similarly from the west, in the Niger delta, as *deltaensis* and from the south, as *avichang* (Castello, 1995), and it is not known if new material, more in line with the original drawings of *fallax* will not be discovered in the future in the Biafra region, in southeastern Nigeria, or in the extreme southwestern part of Nigeria or neighbouring Bénin-Togo or even, isolated somewhere in the Niger delta.
That key issue makes things never granted for ever and still surprises are to be expected when, in the hopefully not too far future, genetic identity cards will be drawn from type specimens, even old ones with no more distinguishing external characters... but there must be types available (not like *fallax*!).

A good example, and a lesson to all of us, is *Epiplatys berkenkampi* that had been synonymised into *ansorgii* by Wildekamp & Zee (1995) on reasonable and objective grounds (collections from nearby the type localities

showing high variability and proximity of the two type localities). However, recent collections from Massana, i.e. even closer to the type locality of *ansorgii*, show a male fish with a lineated pattern that is identical to Boulenger's description and beautiful drawing, and that is distinctive from *berkenkampi*, hence the relevant revalidation of the latter taxon by Neumann (2004). And that example is not mentioned by chance: both fish live in the Ogooué delta region, a major refugium and speciation centre for Killifish, just like the Niger delta for *gularis*, *deltaensis*, and (?) *fallax* !

It would be myopia to stress on disagreements among researchers while forgetting agreements. Disagreements push to go deeper. Agreements show how much we landmark improvements. And consensus agreement between researchers concerns 95% of the Killifish names.

Let's finish with a "pirouette" by quoting Tristan Bernard, a French humorist and ironic philosopher: "I am definitely right and you are of course wrong altogether, but we'll all die". Killifish, without knowing of course, teach us how to be and stay modest !

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