



Killi-Data Wassup n°2

Overview of Killifish research output

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EDITORIAL

With Killi-Data Wassup n°2, a new approach to research for killifish is used by an author (namely Wilson Costa) for the first time (i.e., bringing no new molecular data, but exclusively using public data by other authors from Genbank) for the genetic matrix of characters, in a new research paper with descriptions of new (here generic) names. From that point of view it is a milestone in research output and it can be forecasted that future papers will use that model, pushing to incremental improvements based on molecular data. Obviously the move is not revolutionary, but what may be seen as a milestone is the fact that any researcher that is able or not able to access to molecular techniques (because of the needed sequencing machine and because of the cost of the primers) can use selected data in GenBank from different sources, introduce them in his-her matrix and produce a new tree (combined or not with morpho-osteological data, those being new characters or not). This means that one of the barriers to entry with molecular techniques (aligning sequences from different sources and from different sequences is now vanished or better said reduced, for any scientist with good IT knowledge and with access to freewares of systematic phylogeny –today easy). Good news! Of course, the novelty is not radically new because already papers using available sequences in GenBank have been published for Cyprinodontiformes but that was without new taxa names and that was for higher levels of systematics (family-group names) or that was for morpho-osteological matrixes (not genetic), or lately that was with the principle of using a published molecular tree (not Genbank sequences) with new morphological characters in order to mimic its results, openly or not. In total, GenBank becomes now truly public and research is genericized, and that is truly a revolution for the future and evidence-based output : in practical terms, any researcher can bring incremental “better” results on a topic (phylogenetic assemblage) by a better selection of public molecular data from various authors, maybe with a larger sample of sequences or populations or species (or a more targeted, maybe even reduced, selection of them), better hereby meaning with a more solid tree, with bootstraps of all branches incrementally moving to the theoretical 100% (which it is not clearly not the case today, far of it!).

VIEW FROM THE CHAIR

Killi-Data Wassup n°2 contains several features that push to some comments raised from some of the selected publications in view of the translation of their results into Killi-Data, and not as opinions or judgments on the quality of those research papers.

First, an initial attempt to understand the annual tendency for non annual *Rivulus* sp. by Furness et al. is published, after some sporadic un-controlled observations by biologists (and recurrent intuitive and informal

observations by aquarists !). *Rivulus tecminae* and a few closely related undescribed species exhibit mid-embryonic diapause (i.e. diapause II) lasting from 14 to 142 days. This likely represents a single independent origin of this trait within the otherwise non-annual group. The phenomenon of delayed hatching was also studied in *Rivulus*, subgenus *Laimosemion*, and here the story is a bit more complicated. The embryos of all studied species have the ability to delay hatching for longer than 10 days when incubated on peat moss, but when water incubated there were big differences among species in the length of this delay before hatching occurred. For example *Rivulus rectocaudatus*, noted annual sp. in aquarium, does not show any diapause II state, but the related *tecminae* does! But *rectocaudatus* shows a medium-long duration of delayed hatching {*tecminae*, not studied}. On the other hand, *Rivulus hartii*, with some populations having long delayed hatching in artificial conditions, is shown in the present work no diapause II and a short (not long!) duration of delayed hatching {the very related *Rivulus igneus* could not be studied which shows in “scientific” aquarium very long diapause-like states, as per Brosset, pers. comm., like the compared components of *Raddaella* in Africa}. And finally *Rivulus gransabanae* from savannahs (and periodically dried-up creeks) and *Rivulus xiphidius* from deep forest permanent creeks {but not living in damp leaves like the *geayi* group, not studied} don't exhibit diapause II and have a short delayed hatching. The outgroup species *Kryptolebias marmoratus* didn't have diapause II but exhibited very long delayed hatching. A number of questions remain. How much of this variation is due to phenotypic plasticity / incubation conditions versus fixed differences among species due to adaptation to specific ecological conditions? Are those diapause-like states time-dependent (season, year)? Are they influenced by wild stock? What happens after several generations in aquarium in artificial conditions? Table 2 mirrors that complexity for each of studied species and the 2 mechanisms, present or absent (and the variations for each mechanism). Anyway, this work brings another milestone in the understanding of general tendency for annualism of killifish ! And a lot more research is necessarily in front of us.

Second, a new molecular study published by Bragança et al. (Bragança within his Ph.D. process, and including Wilson Costa, as senior author) reviews the position of *Pantanodon* within Poeciliidae based on new molecular data. The atypical position of *Pantanodon* first shown by Pohl et al. (2015) is confirmed and even more précised as the most basal group of Cyprinodontoidei, then outside family Poeciliidae. Monophyly of the Poeciliidae as inferred from morphological data (Parenti, 1981, Costa, 1998, Ghedotti, 2000) is refuted. Using available family group names, the authors propose to dramatically change the systematics of family Poeciliidae by splitting it into 5 families, Pantanodontidae (1 genus), Procatopodidae (all African lampeyes), Fluviphylacidae (1 genus), and Poeciliidae (then with a meaning similar to before 1981). However the molecular sample concerns only 7 lampeye taxa (one species of *Pantanodon*, one species of *Fluviphylax* and only 5 species of African lampeyes (out of nearly 70), all from West Africa (none from East Africa) and that is quite small for such a change. Even if the external position of *Pantanodon* alone seems solid (and the move is acknowledged in the updated file of family-group names in Killi-Data at <http://www.killi-data.org/list-names-familygroup.php>), the in-depth analysis of that paper raises several questions that push to post-pone the other changes to further confirmations and let time to time : (1) too few species of lampeyes are included in the study, notably none from East Africa, only one from Central Africa, (2) no species of lampeyes outside the deep-bodied group (*Procatopus* and related genera, *Aplocheilichthys*) are included in the study, (3) no species of Cubanichthyinae is included in the study (while following morpho-osteology, they would be positioned exactly in-between *Pantanodon* and Cyprinodontidae, (4) the authors do not consider alternative (more lumping) strategies, in a more parsimonious process, to define families with new components diagnosed and with subfamilies, ending up with less numerous families (and new diagnoses), (5) philosophically if the authors claim a splitting strategy for their 5 families (moving the previous 7 or 8 families in Cyprinodontiformes to 13), which is respectable, they contradictorily propose a lumping strategy for Aplocheilidae, in one family without explanation, instead of 2, well, separated by previous molecular data {the explanation can be found in a previous publication by Costa alone in 2016 as a quotation : «instead of using a new name at the family rank

to New World aplocheiloids, I herein follow Nelson (1994) in considering all aplocheiloids in a single family, the Aplocheilidae, which in this broad sense is well-supported by both morphology (Parenti, 1981; Costa, 1998b, 2013) and DNA sequences (Murphy & Collier, 1997; Pohl et al., 2015). Aplocheilidae is a well-established family-group name (Laan et. al., 2014), making its use as a single aplocheiloid family more stable along time, besides avoiding the impact of a new name at the family rank for a popular aquarium fish group. Following this proposal, Aplocheilidae includes three subfamilies: Aplocheilinae Bleeker, 1859, equivalent to Aplocheilidae sensu Costa (2004), Cynolebiinae Hoedeman, 1961, equivalent to Rivulidae sensu Parenti (1981), and Nothobranchiinae Garman, 1895, equivalent to Nothobranchiidae sensu Costa (2004)»}.

Third, a new combined molecular and morpho-osteological study published by Costa proposes to redefine genus *Nothobranchius* with 6 subgenera and about 80 species of small to very large size (sexually dimorphic, with larger colourful male and smaller drab female): *Adiniops* {with today, *Aphyobranchius* as a synonym}, *Cynobranchius* (new subgenus) , *Nothobranchius s.s.*, *Paranothobranchius*, *Plesiobranchius* (new subgenus), and Killi-Data follows that latest evidence, but since a dedicated question has been raised in FAQ of the website and since the answer contains an analysis of that work it is best to refer to that link at [http://www.killi-data.org/faq.php#Q\(49\)](http://www.killi-data.org/faq.php#Q(49)): . Minor note : the author states that monotypic *Paranothobranchius* comprises the largest Aplocheiloidei species, but that is an error {according to Killi-Data, several *Moema* or *Trigonectes* sp. are much larger, many species in subgenus *Megalebias* are much larger, *Rivulus igneus*, *cajariensis* are much larger, some species of *Cynolebias* or *Pterolebias* are of equal size or larger, *Aphyolebias wischmanni* too, *Aphyosemion splendidum*, *sjoestedti*, *schwoiseri* reach the same size or slightly more}.

Fourth, a new combined molecular and morphological study published by Katwate et al. resurrect *Aplocheilus andamanicus* based on morphological and molecular data (material variable according to localities and apparently unclear in text). This study raises the issue of the incomplete reviewing process in some journals because the authors do not discuss all references and select an option on personal, apparently subjective reasons. The authors present and comment 2 alternative external nomenclatural evaluations, one by Eschmeyer {previous ICZN Commissioner} et al.(online, 2017) for the Catalogue of Fishes (indicating Eschmeyer 's translation of Köhler's is incorrect {which is not true}), with *andamanicus* as an unavailable name, the other by Kottelat {current ICZN Commissioner} (2013) for another catalogue and core bibliography of the fishes of southeast Asia, as available, with a preference for the latter. Actually Huber (2006) shows that in Köhler's paper the name is given as hypothetical and is not to be considered as available (a nomen nudum), like Eschmeyer. The authors give a fine definition of the species with studied "syntypes" collected by Day, independently from the article by Köhler and catalogued at BMNH in the years 1870 and 1889. If they had designated a lectotype or named one of their specimens as holotype and claimed the work as for a new name, the description could have been credited as new to them, according to ICZN code. But they did not and temporarily their name falls in a legal (ICZN-wise) emptiness. It is regrettably impossible to revalidate *andamanicus* with such a situation.

Fifth, a new review of the *Aphanius dispar* group published by Teimori et al., with description of new *hormuzensis*, adds a milestone to the knowledge of Iranian killifish fauna and neighboring regions (enriching publication by Freyhof et al. describing *Aphanius kruppi* from Oman, cf. Killi-Data Wassup n°1). As a consequence online Infoweb page, at <http://www.killi-data.org/infoweb18.php> , has been updated.

SELECTION OF PUBLICATIONS

- Teimori, A., H.R. Esmaeili, N. Hamidan & B. Reichenbacher. [The Reichenbacher team reviews *Aphanius dispar* complex in 4 clades including fossils with description of *hormuzensis* from southern Iran. The 4 clades are (1) Red Sea clade, oldest, with for example as valid *Aphanius dispar* {and probably others to be revalidated and *stiassnyae*, not studied}, (2) Dead Sea clade, with for example as valid *Aphanius richardsoni*, (3) Hormuzgan clade in South Iran with as valid *hormuzensis* and *ginaonis* and (4) Persian Gulf and Gulf of Oman clade with as valid *stoliczkanus* {note : in Killi-data, the *dispar* superspecies is composed of *dispar*, *furcatus*, *ginaonis*, *hormuzensis*, *kruppi*, *richardsoni*, *sirhani*, *stiassnyae*, *stoliczkanus*}. The new species is described by morphology, osteology (otoliths), pattern and distribution in Hormuzgan province of southern coastal Iran, diagnosed from related species. It is collected sympatrically to *furcatus*. It is replaced westerly and easterly by *stoliczkanus*. 2018. JZSER, <https://onlinelibrary.wiley.com/doi/abs/10.1111/jzs.12228>] {Jean Huber, 15-May-2018} <°))>< <°))>< <°))><
- Reshma R.S., J. Joelin, S. Sandeep & M.A. Mano. [Reshma et al. disclose detailed karyotype of a population of *Aplocheilus lineatus* from interior India with n=25, A=35 and variability of arms. 2018. IJZS, <http://www.zoologyjournals.com/archives/2018/vol3/issue2/3-2-59>] {Jean Huber, 11-May-2018} <°))>< <°))>< <°))><
- Furness, A.I., D.N. Reznick, A. Tatarenkov & J.C. Avise. [Furness et al. (2018) show that embryos of some species of *Rivulus* exhibit embryonic diapause, similar to that observed in annual killifish. *Rivulus* species are generally considered to be non-annual killifish exhibiting typical embryonic development (i.e. no diapause) even though they have the remarkable ability to live at the land–water interface and to migrate between water bodies by jumping. The authors studied 8 *Rivulus* species in subgenus *Laimosemion* (including *Owiyeye* group), some undescribed, (plus 2 outgroup species – *Rivulus hartii* and *Kryptolebias marmoratus*) and observed that embryos of some of the selected species exhibit a short dispersed cell phase separating epiboly and the formation of the embryo axis, which is a feature of development observed only in annual killifish. Furthermore, a subset of the selected species that exhibit the dispersed cell stage also exhibit prominent mid-embryonic diapause (i.e. diapause II) at the 38-42 somite stage. The authors incubated embryos in both water and peat moss and observed that on peat moss, embryos of all species are capable of delaying hatching for more than 10 days, but when water incubated there are significant differences among species in the duration of this delay before hatching. The authors hypothesize that their preferred spawning microhabitat (very small savannah and forest pools and streams) may expose their embryos to periodic desiccation, creating selection in favour of embryonic diapause. Based upon the observed patterns, the authors propose dividing killifish into 4 broad categories: (1) species with typical teleost development exhibiting no diapause and limited capacity for delayed hatching, (2) species that exhibit more prominent delayed hatching and/or diapause III, (3) species that exhibit the dispersed cell phase (and possibly the potential for diapause I) and delayed hatching/diapause III, and (4) species that exhibit the dispersed cell phase (and possibly the potential for diapause I), diapause II and delayed hatching/diapause III. Lastly, combining a molecular phylogeny (evolutionary tree) of *Laimosemion* with the diapause data and performing ancestral state reconstructions suggests that this has been an independent origin of mid-embryonic diapause within this clade of *Rivulus* {systematic precision: according to the authors, *Laimosemion* and some other generic names «are today better considered as valid subgenera of *Rivulus*, not genera, until the higher-level taxonomy of *Rivulus* is put on

more solid footing»}. 2018. ZJLS, <https://academic.oup.com/zoolinnean/advance-article-abstract/doi/10.1093/zoolinnean/zly021/4992590?redirectedFrom=fulltext>] {Jean Huber, 8-May-2018}

- Chung, D.J., T.M. Healy, J.L. McKenzie, A.J. Chicco, G.C. Sparagna & P.M. Schulte. [Chung et al. show increased respiratory capacity of liver mitochondria in *F. macrolepidotus* (northern subspecies) compared to *heteroclitus* s.s. (southern subspecies, in addition to already known faster development, more rapid growth, higher routine metabolic rate, and higher activity. 2018. I.C.B., <https://academic.oup.com/icb/advance-article-abstract/doi/10.1093/icb/icy013/4990407>] {Jean Huber, 7-May-2018}
- Velazquez, E.V. [Velazquez reports on new localities of endangered *Tlaloc* {K-D maintained in *Profundulus*} *hildebrandi*, not anymore microendemic from San Cristobal endorheic basin, Chiapas, Mexico. 2018. Lacandonia, <http://cuid.unicach.mx/revistas/index.php/lacandonia/article/view/1443>] {Jean Huber, 7-May-2018}
- Matamoros, W.A., S.-E.C. Dominguez, E.V. Velazquez & C.D. McMahan. [Matamoros et al. describe cryptic *Profundulus parentiae* from Oaxaca state, diagnosed by morpho-osteology, dedicated to Lynne Parenti (curator of fishes, at USNM, Washington D.C.), famous for her pivotal cladistic reviews of Cyprinodontiformes (1981), *Orestias* (1984) and for a book chapter on Poeciliids (1989) ; the new species is distributed in a pocket area of Pacific slope of Mexico at footsteps of highlands, and is separated from related species by osteo-morphological characters and molecular data, i.e., from *balsanus*, *oaxacae* and *mixtlanensis* by a long epiotic processes extending beyond epipleural ribs of first vertebra (vs. absence), from *guatemalensis* and *kreiseri* by rows of dark dots along sides (vs. none), from *punctatus* by dorsoventrally compressed Meckel's cartilage with a relatively straight ventral edge and a narrow and strongly concave sesamoid articular (vs. dorso-ventrally expanded). 2018. Copeia, <http://www.bioone.org/doi/10.1643/Ci-17-677>] {Jean Huber, 6-May-2018}
- Pillet, D. & S. Barhoumi [Collecting trip to Bolivia in February 2018 (2 weeks) ; there were three of us, my grand-daughter (Shéïma Barhoumi, Ph.D. student in ecology) and an American guy (Joe, an aquarist who lives in Quito) ; the initial goal was to collect at the Brazilian border in the Bolivian Pantanal but the area was dry like the San José de Chiquito area ; it is amazing because there was a lot of water in Santa Cruz ; towards Pozo del Tigre, we found the *Papilliolebias* sp. "Pozo del Tigre BFB 12-01" that we fished on road N4 in 2012, maybe it's *Papilliolebias francescae* (?) ; we then collected to the South: Abapo and Villamontes on the right bank and the left bank of Rio Pilcomayo ; for those two areas, Abapo and Villamontes had very good conditions, lots of water in the pools and fairly passable tracks. Towards Abapo, the beautiful *Neofundulus* sp. was collected that we had already fished in 2014: *Neofundulus* sp. "Campo Militar 14-5" ; in 2018 it was not in Campo Militar, but it was caught on the track between Campo Militar and Abapo ; then, starting from Yacuiba, we traveled along the border of Argentina but our way towards Rio Pilcomayo was stopped by a collapsed track ; it seems to me that we fished the same species in very distant pools : it would be necessary that they are studied by scientists to confirm that hypothesis (or not). Chaco is an area where there are many temporary pools, not less than 7 genera or subgenera are represented (*Austrolebias*, *Papilliolebias*, *Pterolebias*, *Moema*, *Neofundulus*, *Spectrolebias*, and *Trigonectes*), but in my opinion there are not many species per genus, because this area is very unstable geologically and hydrographically ; from Santa Cruz to Argentina, the road goes through the foothills of the Andes ; the Chaco is limited westerly by small mountains mainly composed of very friable rocks (sandstone) ; the mountain foot produces many sediments that spread into the Chaco region ; this influx of sediments permanently disrupts the topography, as a result the fish are not isolated for long periods, these conditions are unfavorable for speciation ; this is the opposite in the Brazilian plateau : high geological stability and many different species for only 2 generic names (*Melanorivulus* and *Simpsonichthys*) ; the temporary pools of Chaco are difficult to access, the forest consisting mainly of small thorny shrubs and Cactus is almost impenetrable; muddy tracks are impassable when it rains; the building

of tracks and their elevation in the low areas favor the presence of temporary pools on their edges; a close reading of the satellite photos shows that these ponds are often on the edge of the runway whenever it cuts a temporary stream, obstructing its flow; in 2014 when I first saw the temporary pools of “Campo Militar” around Abapo, the water level was very low, on this site we did find no less than 4 different species, *Austrolebias accorsii*, *Neofundulus* sp. (identical to sp 13 “Gran Chaco BBP 18-13”), *Spectrolebias bellidoi* and *Trigonectes* sp., whereas in 2015 at the same place while the level of the pools was at maximum we only found 2 species: *Austrolebias accorsii* and *Trigonectes* sp. ; this year, the Campo Militar ponds are overflowed with only two species: *Austrolebias accorsii* and *Trigonectes* sp., and it is likely that the fish that live in the temporary streams of the forest will take refuge in deeper ponds near edges of the runway at the end of the rainy season ; from this trip, 6 species are known alive, 2 in genus *Papiliolebias* (sp 1 “Poza Del Tigre BBP 18-1” and sp 5 “Ibibobo BBP 18-5”), 2 in genus *Austrolebias* (sp 5 “Ibibobo BBP 18-5” and *accorsii* “Campo Militar BBP 18-5”), 1 in genus *Neofundulus* (sp 13 “Gran Chaco BBP 18-13”), 1 in genus *Simpsonichthys* (aff. *chacoensis* 5 “Ibibobo BBP 18-5”), all but 1 are still unidentified ; in total 13 killifish localities, all but two with water pH over 7.0 and all with water temperature above 26°C (with one locality with 36°C and 4 sympatric killifish sp.). 2018. Didier Pillet pers. comm., unpublished] {Jean Huber, 6-May-2018} <°))>< <°))>< <°))><

- Volcan, M.V., Neto, F.S. & Lanés, L.E.K. [Volcan et al. describe *amambaiensis*, *interruptus*, *ivinhemensis* in *Melanorivulus* {K-D maintained in *Rivulus*} with key to *pictus* species group from rio Paraná, Tocantins and Araguaia basins, now with 21 names out of total 63 in *Melanorivulus*. The 21 species, and notable the 3 new ones, are separated by details of live color pattern in mainly male, rarely female (notably in Caudal fin and sides), meristics, cephalic squamation pattern (etc.). Species of the *pictus* species group generally present a high degree of endemism, occurring in small stretches of basins of their distribution and each is known for a few localities only. As a consequence, the development of conservation strategies are recommended to avoid the loss of their vulnerable habitats in the Cerrado biome. 2018. ZSE, <https://zse.pensoft.net/articles.php?id=24406>] {Jean Huber, 18-April-2018} <°))>< <°))>< <°))><
- Yogurtçuoğlu, B. & J. Freyhof. [Yogurtçuoğlu + Freyhof describe *Aphanius irregularis* from Anatolia, Turkey, with irregular, often fused, dark bars on male sides. 2018. Zootaxa, <http://www.mapress.com/j/zt/article/view/zootaxa.4410.2.4>] {Jean Huber, 17-April-2018} <°))>< <°))>< <°))><
- Lanés, L.E.K., Reichard, M., Moura, R.G. de, Godoy R.S., Maltchik L. [Lanés, Reichard et al. disclose negative correlation of annuals presence and altitude, or water depth or predators in 82 sampled localities. 2018. EBF, <https://link.springer.com/article/10.1007%2Fs10641-018-0751-1>] {Jean Huber, 9-April-2018} <°))>< <°))>< <°))><
- * Jaap Vlaming, Joop Van Eck, Jaap Knol, Jan Willem Hoetmer & Heinz Ott. [Collecting trip to Cameroun, November/December 2017 (18 days) ; Code: JVC 2017 (Jaap Vlaming Cameroon) ; it was a hobbyist’s travel, therefore no preservation of specimens in alcohol ; 41 collecting points, in total ; the trip started in the area around Bertoua and Betare Oya to collect different *Aphyosemion bualanum*. Then there were several collecting points on the way to Yaounde and around Eseka, followed by biotopes in the coastal plains between Kribi, Edea and Douala ; the last part was a trip towards Bafoussam to collect *Aphyosemion bamilekorum* and *Procatopus* species between Douala and Nkongsamba ; the fishes that were brought to Europe: *Aphyosemion bualanum* (9 locations), *dargei*, *exiguum*, *wildekampi*, *raddai*, *amoenum*, *obscurum*, *cameronense*, *calliurum*, *ahli*, *lividum*, *bamilekorum*, *volcanum*, *omega*, *loennbergii*, *Epiplatys grahami*, *infraciatus*, aff. *rathkei*, *Procatopus* species (4 locations) ; however no success in finding *Epiplatys esekanus*. 2018. Heinz Ott pers. comm., unpublished] {Jean Huber, 7-April-2018} <°))>< <°))>< <°))><
- Vrtilek, M., J. Zak, M. Polacik, R. Blazek & M. Reichard. [The Reichard team, from 13 locs with up to 3 sympatric *Nothobranchius (furzeri)*, the shortest-lived vertebrate, and when sympatric, *pienaari*,

orthonotus), evaluates over time, pond dynamics, fish density, hatching time, ratios. Detailed life history traits of 13 sites are disclosed : (1) population size and population density dynamics (recapture probability), (2) seasonal dynamics in adult sex ratio (varied among species), (3) species ratio (varied across pools for *furzeri* caught in all pools). Pools dwelt by killifish populations typically desiccate 1 to 4 months after filling but killifish sometimes disappear from pool well before the terminal habitat deterioration. Density and abundance of *Nothobranchius* sp. populations decline considerably during the course of season. Estimates of adult population size are an order of magnitude lower than for subadults. Duration of aquatic phase varies among pools (depending on local rainfalls), but with no relation to geographic location of the site (e.g. highland vs. lowland). Limit imposed by pool existence is the ultimate selection force shaping annual killifish life history that is shown by fast growth, early sexual maturation, high investment into reproduction and rapid ageing. Male-biased mortality is clearly demonstrated in *furzeri* (the reverse for *pienaari*, but only on 2 populations). Natural *Nothobranchius* sp. populations decline strongly in abundance and are subjected to considerable mortality throughout the period of pool existence (i.e. not only at the end of water availability in pools). Future research should address the functional aspects of condition-dependent mortality in wild populations of *Nothobranchius* species. 2018. NSR, <https://www.nature.com/articles/s41598-018-22878-6>] {Jean Huber, 20-March-2018} <°))>< <°))>< <°))><

- * Vermeulen, F. & D. Mejia [Collecting trip to Colombia from March 4. to March 25., 2018 ; an International Colombian Expedition took place in the Guainia- and Vaupes Departments from eastern Colombia ; the goal was to document the availability and local spreading of taxa in the genus *Rivulus*. Field code: (ICE 2018-xx with 22 collecting localities in 3 different regions) ; the travel was initiated and financed by Frans Vermeulen and on his request organized locally by Daniel Mejia, Bogota who accompanied him on this travel (and in parts with other people and with wives) ; the first part of the travel started by a flight to Inirida and from there by boat to reach Huesito ; from Huesito, a small settlement at the right bank of the Inirida River 60 km south from Inirida, a 12 hours tractor overland transport made it possible to collect at normally unreachable places in the savannah where we found several never recorded *Rivulus* in the *rectocaudatus* group ; with the tractor we could reach the Alto Rio Negro in the south where our boat captain waited for us and brought us, crossing Venezuelan territory, to Porto Colombia, later to San Filipe and finally more south to La Guadeloupe where Colombian, Venezuelan and Brazilian border come together ; many creeks were visited and, among several other *Rivulus* representatives, *Rivulus staecki* was collected near or at the type locality ; near the village La Guadeloupe 3 possibly new species of *Rivulus* were discovered ; after returning to San Filipe we went back to Bogota and with a connecting flight to Mitu at the Rio Vaupes ; here we collected at least 2 species possibly new to science found earlier in 2016 already ; the third part of the expedition was a visit to the remote Amerindian village Pana Pana, also known by the name Campo Alegre ; here we collected other *Rivulus* sp. that need determination ; after 2 days of organization and packing this expedition came to an end. 2018. Frans Vermeulen pers. comm., unpublished] {Jean Huber, 29-March-2018} <°))>< <°))>< <°))><
- Reichard, M., L.E.K. Lanés, M. Polacik, R. Blazek, M. Vrtilek, R.S. Godoy & L. Maltchik. [Reichard et al. field experiment bird predation on *Austrolebias minuano* to show linked high sex-dependent size-specific mortality. 2018. BJLS, <https://academic.oup.com/biolinnean/advance-article-abstract/doi/10.1093/biolinnean/bly022/4937541>] {Jean Huber, 19-March-2018} <°))>< <°))>< <°))><
- Polacik, M., M. Reichard & M. Vrtilek. [Polacik et al. by comparing Notho pops show fish from more arid regions (erratic rains) produce much more short-developing embryos. 2018. JFB, <http://onlinelibrary.wiley.com/wol1/doi/10.1111/jfb.13591/abstract>] {Jean Huber, 15-March-2018} <°))>< <°))>< <°))><
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extraction ability. 2018. JEB, <http://jeb.biologists.org/content/early/2018/03/01/jeb.168039>] {Jean Huber, 10-March-2018}

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African tribe Nothobranchiini with included genera (*Fundulosoma*, *Pronothobranchius* and *Nothobranchius*) is proposed based on molecular data published by other authors and new morpho-osteological data (138 morpho-osteological characters). Several new micro-osteological characters are disclosed to diagnose names. The analysis confirms *Fundulosoma* position as most basal group to all other Nothobranchiini, and *Pronothobranchius* is confirmed as a valid genus, in-between positioned with genus *Nothobranchius*, as a cascade tree. *Cynobranchius* is described as new for a group of 3 deep-bodied, zooplankton-feeding species (*microlepis* et al.), diagnosed by 16 morphological synapomorphies, of which nine are probably related to their specialized feeding habits. The clade containing *Cynobranchius* and the monotypic subgenus *Plesiobranchius* (containing *virgatus*, plus maybe the not studied *occultus*) is supported as the sister group to a clade containing all other subgenera of *Nothobranchius*.

Paranothobranchius is diagnosed by 17 apomorphic conditions, most of them related to specialized piscivorous habits (the study suggests that predator jaw morphology arose independently 3 times in *Nothobranchius*). Subgenus *Aphyobranchius*, formerly including specialized surface-dwelling species, is considered to be a synonym of *Adiniops*. However, the heteromorphic subgenus *Adiniops* is supported by a low bootstrap value (60). The other valid subgenus *Zononothobranchius* is not well supported {but a limited number of components is studied} and not fully diagnosed from *Paranothobranchius*. The nominotypical subgenus is diagnosed by only (osteological) character. 2018. JLS,

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