



INTRODUCTION

The present Wassup, with a wide bracket of dates, is not back to normal, because a solution is still not found for taxa published by Aqua editor as PDF, not prints as before, from issue 2021/2 to issue 2022/4, and 5 new taxa, not available in 2022, are still pending an ICZN-accepted publication, but it seems a solution is emerging outside Aqua (probably a defunct journal) more than 8 months after the problem is disclosed by nomenclatural experts, in favor of ICZN names (the same names) in Zootaxa journal (a first case, even if not necessary (a print version occurred in 2021/1), is just synthetically published as correspondence in Zootaxa for *Anablepsoides origuelai*. Then, now there is hope in the short term for the 5 taxa (time will tell).

Within this long time frame of present Wassup, the menu contains major new taxa : (1) 4 new genera previously in *Austrolebias* with upgrading of all its past subgenera and 1 new neotropical species, *Argolebias guarani*, (2), 1 new species in *Pantanodon*, as *propinquus*, 1 new genus *Malagodon* from Madagascar and 1 new genus *Aliteranodon* from East Africa, northerly, with 4 new species, *ndoano*, *bucinus*, *filimbi*, *rostratus*, (3), description of a new miniature *Rivulus* (subgenus *Owiye*) as *sladkowskii*, from Colombia, (4), 2 new cryptic *Rivulus*, *gomesi* and *paradiseus*, from pacific or Caribbean Colombia and redescribed *Rivulus pacificus*, (5) new viviparous species, *Phalloceros maldonadoi* with a hood-like structure in female, (6) another review of *Profundulus* with 2 new taxa (*rei*, strangely dedicated to a cat, and *emilioi*) and synonymization of recently named *adani*, (7) the possibility that Costa's taxon, *Kryptolebias gracilis*, be synonymized in the future based on nearly identical molecular data to *brasiliensis* (preliminary) which opens (just a fact) a boulevard to restudy his hundreds of described taxa now that he has left the Cyprinodontiformes arena for other groups of fishes, also with many new names.

Besides, there are some further discussions on major themes:

First is the new morphological and osteological review of Pantanodontidae since decades (after major works by Whitehead in 1962 and Costa in the 2000s) by Huber and Meinema (the latter being lead author), using both extant and fossil fishes with 4 distinct genera (instead of 1 previously) as *Pantanodon*, *Paralebias*, *Malagodon* and *Aliteranodon*, and with 5 new species *Pantanodon propinquus*, cryptic to *podoxys*, revalidated (previously a junior synonym of *stuhmanni*) and *Aliteranodon ndoano*, *bucinus*, *filimbi*, *rostratus*, along moved congener *stuhmanni* (and various still unnamed species under study), and finally *Malagodon madagascariensis*, monotypic (but another cryptic new species is expected to be described soon) ; this is a major work over many years by the authors (still ongoing) because those fish previously seen as mere brackish lampeyes have been upgraded to family level following Pohl et al.'s major molecular analysis and because they are un-noticed in collections (misidentified for standard lampeyes or neglected as juveniles in known lampeyes lots) ; parallelly fossil European Cyprinodontiformes, placed in *Paralebias* (previously synonymized, today revalidated) are re-assessed into 3 species-groups and *Haplochilichthys jeanneli* is reviewed and kept

temporarily in standard lampeyes until new collections can be surveyed and studied by the authors (types are in bad shape) ; finally the authors disclose for the first time in all Cyprinodontiformes an LHT study of larvae and juveniles (also, embryos) {this is a major field of new knowledge, also accessible to study by serious aquarists that has been repeatedly promoted by Huber in Killi-Data (with a dedicated page in database)}.

Second is the full review with complete splitting of *Austrolebias* killifishes by a team (11!) of Argentina and Uruguay researchers (nobody from Brasil) and yes, today with it, the Pandora box of splitting genera in Cyprinodontiformes is wide open (and similar moves might be unavoidable if followed in *Rivulus*, *Aphyosemion*, *Epiplatys*, *Nothobranchius*, *Fundulus*, *Cyprinodon*, *Poecilia* (etc.), i.e. generic units with presently dozens of specific units and many subgenera). For 54 species, the genus *Austrolebias* is split into 11 genera (4 new), several being monotypic (or alike, with twin species). This a brutal change,-reshuffling, but this is a consequence of detailed work. This is surprising at first sight but not so much indeed for historical reasons. The situation of taxonomy today is distinct from that in the 1970ies-1980ies (philosophical opposition between lumpers and splitters). It has changed not because human changes (just a bit, humans still want to have their names attached to taxa) but because research environments have changed, first in a more neutral way (some people would say 'laissez-faire'), second more importantly as an indirect consequence of the Nagoya agreement which tends to transfer research (also in taxonomy) to countries where the fish live (not in western rich countries e.g. Europe or USA where those (sub)tropical fish are not native), then taxonomy becomes the mirror of the culture of emerging countries where rather new researchers use modern solid tools of course (this is the case of Mexico with *Profundulus-Tlaloc* and Goodeidae, in process for Brasil with second generation ichthyologists and now with Argentina-Uruguay and soon South Africa, etc.), AND those 'national' (and younger) researchers are more splitters, increase sharply numbers of new names, and they are indeed themselves (different from previous ones)... that is a mere (and undisputable) fact and Killi-Data aligns to it and the new paper is followed herein simply as latest evidence ; of course the authors honestly alert that their splitting decision is subjective (who can be objective?), even if their argumentation is a bit biased saying that others have done the same before (they quote *Aphanius* but only one publication while there is another contemporary publication, more solid, with opposite results... from 2 emerging countries Turkey and Iran, they quote *Simpsonichthys* but only one publication while there is another publication, more recent, opposite in one -big- country Brasil, though the latest is a bit imperfect... for this changes in *Austrolebias*, time will tell!

Third is an emerging important change in publications with 2 new general trends, or at least not new but sharply increasing in numbers, for killifish publications : (1) comprehensive listings of ichthyofauna (not only killifish) by country, usually small (e.g. Guiana, i.e., ex-British Guiana, Gabon) or a part of a larger country, a biogeographical region in line with a drainage or a coherently delimited area (e.g. rio Tocantins in Brasil, rio Magdalena in Colombia, middle rivièrè Wamba in Zaire, etc.), (2) full synthesis on a given killifish group with no or little new findings (e.g., Cnesterodontini, Profundulidae, Aphaniidae), something like a state of the art at a given time (then, formal proposals, opinions and simple alignments are difficult to ascertain).

Fourth is the double thorny taxonomy issue of together *Aphyosemion escherichi* and *Plataplochilus ngaensis* which is very important because *ngaensis* is the type species, unknown live, of its genus (and its identification implies status of all past congeners and also possibly new cryptic congeners) and because the case of *escherichi* is controversial ; that dual thorny situation comes up again after recent collections in type area ; for *escherichi*, Seegers (1987, 1988), supported by Wildekamp (1993), revalidates *escherichi* and places *microphthalmum* and *simulans* in its synonymy ; oppositely, like for the systematic evaluation in Huber (1981), Huber (1998), comparing the types with material of *striatum* and *microphthalmum*, is unable to conclude with certainty and proposes to maintain the previous conservative approach, as a synonym of *striatum* {unlike Seegers in 1987 and 1988} ; on the other hand, in their description of *etsamense*, Sonnenberg & Blum (2005), confirm Seegers's position ; based on 2 characters «male color pattern of Dorsal fin and ratio of peduncle depth to length», they consider *escherichi* as valid and *microphthalmum* as its junior synonym ; however, unlike

Seegers or Huber, they do not restudy the types, leaving the case as open until live topotypes are recollected for the first time since description ; in 2022 and 2023, descriptions of cryptic molecularly distinct species in *maculatum* or in *herzogi* groups from even nearer to type locality raise more doubts on actual identity of *escherichi* up to true topotypes live collections, its type locality being identically labelled to that of *ngaensis* ; besides it cannot be ruled out that original observation by Seegers of old German literature of a striated fish refers in fact to *simulans*, itself being a junior synonym of *microphthalmum* from Congo or a molecular Gabunese counterpart (Huber, pers. observation, March 2023) ; in total, this is a very complicated case since the types can be today identified either as *striatum*, *etsamense* or *microphthalmum*, or even yet non-available name '*lorai*' or valid *mitemelense*, and only new material from type locality may clarify the question unless *striatum* is sympatric with *escherichi*, therein, or unless *escherichi* is not fully sympatric with *Plataplochilus ngaensis*, therein ; for the present the still retained systematic status in Killi-Data is the proposal by Seegers because it fits with the latest published evidence by Sonnenberg & Blum ; therefore, Huber (2013) places the species *escherichi* in the new subgenus *Iconisemion* following Sonnenberg & Blum as the latest evidence but with reservations {while if it were related to *cameronense*, it would be maintained in *Mesoaphyosemion*} ; all information in Killi-Data on morphology, ecology and color pattern of *escherichi* are sourced from its current junior synonyms, *microphthalmum* and *simulans* {it is awkward, hopefully temporary!}.

Fifth, following several questions on repeated incongruence between molecular data and morpho-osteo data on killifish, which is a fact, not an opinion, a new criterion is added to the next database where each valid (currently) sp. is tagged with a status as (1) *morpho_species* (historically first species of species group with morphomeristic specificities vs. related sp.), (2) *pattern_species* (species separated by at least a stable pattern diagnostic character even including variability), (3) *cryptic_species* (species separated by a combination of external characters, pattern or-and morph, none being sufficient singly), (4) *molecular_species* (species not clearly separable by external characters taking into account normal variability, but distinct by molecular data), (5) *incongruent_species* (species where morpho-meristical data are presently not congruent with molecular data or else), the process being historically, first, *morpho_species*, then if not, *pattern_species*, if not *cryptic_species*, if not *molecular_species*, if problem, *incongruent_species* (there is no value judgement between the 5 types, not one is better than others, and a species may change type assignment according to new evidence).

Side note: this issue of K-D Wassup is also a bit different since, among the alert analyses, there is one from an author distinct from the editor, Vasco Gomes (thanks to him, it is a good beginning, and hopefully others will follow, volunteers are welcome if Killi-Data is expected to be continued!).

SELECTION OF PUBLICATIONS (last in, first out)

- Segovia, J.C., Loureiro, M. & Garcia, D. [Segovia et al. detail, in behavioral units, male displays (lateral vs sigmoid) and female quiescence of *Argolebias nigripinnis* ; courtship behavior of some, not all, Neotropical killifish consists of a series of displays performed by males and females that ends in the total or partial burial of the couple ; the authors dedicate their study to *Argolebias nigripinnis*, a rather peaceful species, with a comparison to *Matilebias affinis* {both previously in *Austrolebias*} and they use behavioral units to quantify ; most frequent units of display in male are lateral (44%) and sigmoid displays (26%), where male exhibits morphological and color pattern to female ; on the other hand, female shows a high frequency (44%) of quiescence, suggesting that this unit may have an evaluative role during courtship ; in comparison, *Matilebias affinis* shows some differences, mainly in frequency and duration, but also in sequence terms {note: the authors use previous taxonomy of *Austrolebias*, just changed before their

publication}. 2023. A.E., <https://link.springer.com/article/10.1007/s10211-023-00426-4>] {Jean Huber, 26-July-2023} <°))>< <°))>< <°))><

- Godoy, R.S., V. Weber, L.E.K. Lanés, M.M. Pires, C. Stenert & L. Maltchik. [Godoy et al. test temperature levels and changes on 2 high vs. low altitude annual eggs, *Garcialebias nubium* and *Matilebias cyaneus* ; this a temperature lethal experiment on eggs of 2 annual sp. of the same region (bearing in mind general climate change on earth) ; methodology for incubation is standard for temperature levels (4, at 18, 24, 27 and 30°C), new for changes (heat waves of 18–30°C for 6 hours) ; results show 100% embryo mortality in both species at 30°C, that development trajectory differs between species across temperatures, embryo mortality in high-altitude species (*nubium*) being higher at 27°C and a higher number of embryos of low-altitude species entering diapause II at 18°C ; however, embryo mortality and development trajectory after exposure to heat waves are similar comparing the 2 species ; the authors suggest that persistence of populations of high-altitude annual fish species is subject to higher threat under warming scenarios {note: the authors use previous taxonomy of *Austrolebias*, just changed before their publication}. 2023. EFW, <https://onlinelibrary.wiley.com/doi/abs/10.1111/eff.12728>] {Jean Huber, 21-July-2023} <°))>< <°))>< <°))><
- Pacheco, D.V., C.E.T. Turizo & P. Eslava-Eljaiek. [Pacheco et al. separate niche of 2 sympatric annuals, in *Rachovia* (insect, plankton) and *Austrofundulus* (generalist) as valid genera ; *Rachovia hummelincki* and *Austrofundulus guajira*, in 2 temporary ponds in department La Guajira, Colombia (water temp., 31.6°C and 33.2°C, pH 7.99 and 8.10, conductivity 1464 µS and 1650 µS, luminosity 20.3 lux and 24.9 lux, oxygen 3.97 mg/l and 2.99 mg/l) are separated by food (analysis of gut content), first being as an insectivorous and zooplanktophagous species and as a specialist (breadth of trophic niches), second being as herbivorous, insectivorous, zooplanktophagous, piscivorous and opportunistic and as a generalist species with limited overlap of the trophic niche. 2023. E.A., https://ojs.ecologiaaustral.com.ar/index.php/Ecologia_Austral/article/view/2012/1399] {Jean Huber, 20-July-2023} <°))>< <°))>< <°))><
- Masoumi, A.H., H.R. Esmaili & R. Sadeghi. [Masoumi et al. disclose ontogenetic variations in otolith morphology of *Aphaniops kruppi* with differences between larva and adult ; otolith morphology in Aphaniidae is an important taxonomic character but little is known about its ontogenetic variation ; hence the authors study otolith morphology in different life stages of *Aphaniops kruppi* (member of *dispar* group) ; results show a significant correlation between standard length and otolith size (length) in larval and early juvenile stages, clear differences in otolith morphology between larvae/early juveniles and adults and a temporal link between sulcus appearance on inner face and lifestyles, that is demersal in larvae and early juveniles, and pelagic in adults ; otoliths of *kruppi* propose that otoliths of larvae or early juveniles can be distinguished from those of adults not only because of their small size but also based on their short and rounded rostrum and anti-rostrum and shallow, wide excisura {excision, slashing}; however, all above-mentioned characteristics are also found in the otoliths of juveniles and larvae of several other studied Aphaniidae, and ontogeny {development of an organism} has limited taxonomic value in that family (or group). 2023. A.Z., <https://onlinelibrary.wiley.com/doi/10.1111/azo.12476>] {Jean Huber, 19-July-2023} <°))>< <°))>< <°))><
- Alonso, F., G.E. Teran, W.S.A. Serra, P. Calviño, M.M. Montes, I.D. Garcia, J.A. Barneche, A. Almiron, L. Ciotek, P. Giorgis & J. Casciotta. [Alonso et al. upgrade *Austrolebias* subgen. to genera, describe *Amatolebias*, *Garcialebias*, *Matilebias*, *Titanolebias*, *Argolebias guarani* ; a major work by 11 authors from Argentina and Uruguay reshuffling the *Austrolebias* group, previously made of 1 genus and 7 subgenera (*Acantholebias*, *Acrolebias*, *Argolebias*, *Austrolebias* s.s., *Gymnolebias*, *Cypholebias*, *Megalebias*), today made of 11 distinct genera (all upgraded plus 4 new genera), with 54 valid species (including a new one and 2 undiscussed sp., *salviai* and *luzardo* with maybe uncertain status) ; the authors present a combined morpho and molecular tree based on 10 genes (6 nuclear and 4 mitochondrial) and 191 morphological

characters, including 90% of the total valid species of previously *Austrolebias* {however combined tree and 2 separate molecular trees show each some non-solid sub-branches with low probability, and surely a full genome or a full mitochondrial tree will be the next step of research}; an updated key and diagnosis of all genera (new and upgraded to full genus) of *Austrolebias* group is provided; finally a new species is described *Argolebias guarani* {related to *nigripinnis*} from a seasonal pond in the Middle Parana River basin, diagnosed by a said unique color pattern and data on ontogenetic changes in color pattern, chorion ornamentation of the egg and ecology are given {note: not surprisingly results are very different from first split as subgenera by Costa (2006) done by morpho-osteology and this does not concern only the tree but the reshuffling of taxa between genera and species groups}. 2023. Z.J.L.S., <https://academic.oup.com/zoolinnean/advance-article-abstract/doi/10.1093/zoolinnean/zlad032/7222101>] {Jean Huber, 11-July-2023} <°))>< <°))>< <°))><

- Fitschen-Brown M., Morris M. [Fitschen and Morris experiment that female with sneaker genotype and slower growth rate prefers in mating faster growing courter male, in *Xiphophorus multilineatus*; that livebearer in Poeciliidae, as an emblematic example of sword-tail, is further exhibiting in male alternative reproductive behavioral tactics (courter vs. sneaker); for this study, the authors analyze influence of genotype of female (either courter or sneaker lineage), growth rate, and social experience on mate preference for male whether it is of courter type, as compared to a sneaker type; results show in lab that female with a sneaker genotype and slower growth rates has stronger mate preferences for the faster growing courter male than female with a courter genotype, regardless of mating experience with one or both types of male; besides, relationship between strength of preference and growth rate depends on genotype of females, because female with sneaker genotype reduces preference as its growth rate increases (it is the opposite for female from courter genotype); this finding is better explained when male tactical dimorphism in growth rates and a mortality-growth rate trade-off, typical in genus *Xiphophorus*, is pointed. 2023. PlosOne, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0287843>] {Jean Huber, 3-July-2023} <°))>< <°))>< <°))><
- Jennings, W.B., I.C.A. Souto-Santos, P.A. Buckup & E. Zandona. [Jennings et al. show no genetic hybridization capacities in sympatric *Phalloceros anisophallos* and *leptokeras*, with distinct gonopodia; reproductive isolation of species is a fundamental part of speciation research, notably for sympatric species {and it has been biased by fashion of forced hybridization in labs or aquariums during the 1960es and 1970ies, used as a phylogenetic index}; South American species in genus *Phalloceros* are often found in sympatry with non-sister congeners, and most such species pairs have morphologically divergent female and male genitalia; due to their co-occurrence, mismatched genitalia between co-occurring *Phalloceros* species has been hypothesized to act as mechanical barriers to prevent hybridization; the authors check that hypothesis using morphological data in conjunction with mitochondrial and nuclear DNA sequence data with *Phalloceros anisophallos* and *leptokeras*, two non-sister species with large range overlap in south-eastern Brasil and mismatched genitalia; results detect no evidence of mito-nuclear discordance (hence probable historical hybridization) between those 2 focal species and are therefore consistent with the hypothesis that mismatched genitalia prevent hybridization between sympatric *Phalloceros* species {besides other mechanisms as further barriers}. 2023. Z.J.L.S., <https://academic.oup.com/zoolinnean/advance-article/doi/10.1093/zoolinnean/zlad034/7210251>] {Jean Huber, 30-June-2023} <°))>< <°))>< <°))><
- Calixto, M.R., A.N. Lira, M.G. Rubio, G.P.P. Leon & C.D.P. Pinacho. [Calixto et al. review *Profundulus* with 2 new taxa (*rei* dedicated to a cat and *emilioi*) and synonymization of recently named *adani*; this is a comprehensive molecular, distributional and morphological revision of genus *Profundulus* (outside *Tlaloc* and except *Profundulus guatemalensis* and *kreiseri*); according to the authors, accumulation of molecular data of Profundulidae fishes has led to advances in the description of new taxa, but relatively less progress

has been made estimating evolutionary and phylogenetic relationships and for this new study they adopt an integrative taxonomy approach including the use of nuclear and mitochondrial DNA sequences, morphometric and ecological data, to test species boundaries in western-most area of their known distribution range in the states of Guerrero and Oaxaca, Mexico ; the results support the delimitation of 15 valid species with, for recent names, validation of *parentiae*, synonymization of *adani* into *mixtlanensis* (following an assessment that *adani* is not compared-defined to-vs topotypes of *mixtlanensis*) {the description of *adani* is recent: Dominguez, S.-E.C., E.V. Velazquez, C.D. McMahan & W.A. Matamoros. 2021. A new species of killifish of the genus *Profundulus* (Atherinomorpha: Profundulidae) from the upper Reaches of the Papaloapan River in the Mexican State of Oaxaca. Ichthyology and Herpetology (Copeia), 109 (4): 949-957, 5 figs., then it is possible, taking into account the fame of the journal and of the authors, that there will be a reaction to that synonymy} and description of 2 new species, *rei* and *emilioi* ; the authors, with delimitation methods, examination of phenotypic variation, and ecological niche characterization, also identify 5 potentially new lineages which require further evidence to be erected as new species ; this is all the more important and crucial for the conservation of these microendemic fishes, as several species are endangered. 2023. M.P.E.,

<https://www.sciencedirect.com/science/article/abs/pii/S1055790323001562>] {Jean Huber, 27-June-2023} <°))>< <°))>< <°))><

- Berbel-Filho, W.M., S. Pirro, A. Thompson, S.M.Q. Lima, S. Consuegra & R. Betancur. [Berbel-Filho et al. publish full genome of *Kryptolebias brasiliensis*, *gracilis* and *caudomarginatus*, i.e., *ocellatus* sensu Costa 2011 ; *Kryptolebias* currently contains 7 recognized species found in freshwater and mangrove microhabitats in South and Central America, the Caribbean, and Florida ; *Kryptolebias* species have several unique features because beyond its amphibious nature, 2 species, variably identified, are the only known vertebrates capable of self-fertilization ; other species are much less genetically known in details ; here, the authors disclose complete genome sequences for 3 *Kryptolebias* species from Brasil, the 2 endangered freshwater species, *brasiliensis* and similar *gracilis*, plus the androdiecious but obligate outcrossing named *caudomarginatus* (Seegers, 1984) or *ocellatus* (sensu Costa, 2011), results show that full genome of *brasiliensis* and *gracilis* are extremely similar {and latter could be synonymized} 2023. B.G., <https://biodiversitygenomes.scholasticahq.com/article/77448>] {Jean Huber, 9-June-2023} <°))>< <°))>< <°))><
- Loayza, E., A.S. Muñoz, M. De Troch, W.H. Hendriks & G.P.J Janssens. [Loayza et al. compare the detailed whole-body nutrient composition of two omnivorous natives *Orestias* killifish from Lake Titicaca; the study shows how whole-body nutrient analysis can identify differences in feeding ecology and feeding behaviour between related species and discloses for the first time that *Orestias agassii* and *lutea*, 2 sympatric species in Lake Titicaca, both have amphipods (*Hyalella* spp) as their main food source {note: since *Orestias* genus is feminine, name must be *Orestias lutea*, not *Orestias luteus* and correct name is *Orestias agassii*, not *agassizii*} 2023. JAPAN, <https://onlinelibrary.wiley.com/doi/abs/10.1111/jpn.13831>] {Vasco Gomes, 7-June-2023} <°))>< <°))>< <°))><
- Souto-Santos, I.C.A., P.H.F. Lucinda & P.A. Buckup. [Souto-Santos et al. describe *Phalloceros maldonadoi* from drainages of Santa Catarina in Brasil with a hood-like structure in female ; the new species is distributed from the rio Tijucas, Maruim, Aririu, Cubatao do Sul, da Madre, D'Una and Tubarao basins in southern Brasil and it is over its range sympatric with other congeners {like many killifish species} ; it is diagnosed from congeners by bilateral asymmetry of a hood-like structure located immediately anterior to the urogenital papilla of female ; that hood is fused with urogenital papilla on right side, but free from papilla on left side {then it is again an asymmetric viviparous species ; it is reported for the first time in genus and also present in 5 others (*titthos*, *caudimaculatus*, heptakinos but variable, *elachistos* but variable, *mikrommatos* but variable) among 21 valid species of *Phalloceros* (some, maybe not the same, with asymmetrical gonopodium which is distinct), but the bilateral asymmetry of that hood is an exclusive

condition of *maldonadoi* ; however the left-right hood is not phylogenetic since it is unique and the new species, according to the authors, is probably related to *caudimaculatus*, whose female shows a symmetrical hood {article ICZN published only in July}. 2023. JFB,

<https://onlinelibrary.wiley.com/doi/10.1111/jfb.15404>] {Jean Huber, 11-May-2023} <°)))))>< <°)))))>< <°)))))><

- Palacios, M., A.A.D. Gonzalez, L.A. Rodriguez, M. Mateos, R.H. Rodiles, M. Tobler & G. Voelker. [Palacios et al. molecularly review *Mollienesia* components with 11 taxa, all valid plus putatively 4 undescribed sp., in 50 locations ; the authors study, within locations in Mexico as a megadiverse region with a complex geological history, populational level of genetic divergence and phylogenetic relationships of species in shortfin group (not large-fin) of subgenus *Mollienesia* (genus *Poecilia*) ; samples from over 50 locations for most species-components (*chica*, *catemaconis*, *sphenops*, *marcellinoi*, *hondurensis*, *orri*, *butleri*, *nelsoni*, *limantouri*, *sulphuraria*, *thermalis*, *salvatoris*, *mexicana*, 2, *sulphuraria* and *marcellinoi*, being insignificantly genetically defined, plus un-named populations) are genetically analyzed (haplotypes) ; results indicate that Mexican species in that group have diversified following multiple, independent invasions from Middle America ; 2 species living north of Trans-Mexican Volcanic Belt (TMVB) and one transversal species exhibit weak phylogenetic structure, likely due to the lack of physiographic barriers, recent colonization, and high dispersal rates among regions ; oppositely, 3 species living south of TMVB exhibit strong phylogenetic structure, reflecting a longer presence in the area and multiple physiographic barriers that isolated populations. 2023. N.I., <https://www.scielo.br/j/ni/a/3Ywb36MtyrHSzVvytyqSKJdb/>] {Jean Huber, 3-May-2023} <°)))))>< <°)))))>< <°)))))><
- Vermeulen, F.B.M. [Vermeulen describes miniature *Rivulus* (subgenus *Owiye*) as *sladkowskii*, from rio Vaupés, eastern Colombia and reviews *romeri* group ; the description is based on external and internal anatomical-morphological characteristics and relates the species to subgenus *Owiye*, as a member of the *Rivulus romeri* species group (including now according to the author, sp. *Anita*, *gili*, *jauaperi*, *kirovskiyi*, *leticia*, *romeri*, *uatuman*, *ubim*, while *carolinae*, *uakti*, *staecki*, *foliiscola*, and maybe *nicoi* are moved to the *Rivulus rectocaudatus* species group) ; rio Vaupés is an important tributary of rio Negro, itself a tributary of the Amazon River ; unlike its group members (*romeri* group), which occur only in shallow water bodies such as swamps filled with leaf litter, the new species is also found on banks of small creeks and mouths of larger creeks, where there is a moderate current. 2023. KDS, <https://www.killi-data.org/series-kd-2023-Vermeulen.php>] {Jean Huber, 25-April-2023} <°)))))>< <°)))))>< <°)))))><
- Huber, J.H., D.A.V. Mejia & F.B.M. Vermeulen. [Huber, Mejia and Vermeulen redescribe *Rivulus pacificus*, describe cryptic *gomesi* and *paradiseus*, from Pacific or Caribbean Colombia ; the authors review the *Rivulus* (in a large sense) fauna of northwestern Colombia along coast and the new collections allow to rededcribe *Rivulus pacificus* Huber, 1992 with live nearby topotypes, and then to describe 2 new cryptic congeners, as *Rivulus gomesi* and *paradiseus*, separated by details of color pattern in male and also female (presence or absence of supracaudal ocellus) ; the 3 species form a group of closely related species, not morphologically related and not pattern-wise related to the *elegans* species group, dominant in the Northern Colombian Andes and inter-Andean valleys and vicariant ; instead, they are morphologically more related to the *micropus* species group with a huge distribution in northern and north-eastern South America ; however the authors discuss in details (including the palaeo-history of the region) and cannot ascertain the group of 3 species is not still a member of the *elegans* group and molecular studies are eagerly expected ; finally the authors show that this *pacificus* group of 3 species is separated from vicariant *elegans* and its 3 very similar allied (*chucunaque*, *sucubti*, that taxon being formally proposed as a junior synonym of *chucunaque*, and *leucurus*) by live pattern in males {note: temporarily the authors decide to assign the 3 species in an isolated group within subgenus *Oditichthys*}. 2023. KDS, https://www.killi-data.org/series-kd-2023-Huber_Mejia_Vermeulen.php] {Jean Huber, 25-April-2023} <°)))))>< <°)))))>< <°)))))><

- Meinema, E. & J.H. Huber. [Meinema and Huber review *Pantanodon*, describe *propinquus*, *Malagodon* and *Aliteranodon*, with 4 new sp. *ndoano*, *bucinus*, *filimbi*, *rostratus* ; Pantanodontinae described by Myers (1955) with monotypic genus (*Pantanodon*) and species (*podoxys*) are recently elevated to family level in Cyprinodontiformes following molecular evidence, and parallelly fossil European cyprinodonts, previously placed in *Paralebias*, are recently reassigned to the extant East African genus *Pantanodon*, as the only genus in Pantanodontidae, with all extant and fossil species sharing the laterally placed pelvic girdle and the adaptation of the pelvic fins in males ; here the authors study the status and biogeographical distribution of all species (and all known institutional records) within Pantanodontidae and *Pantanodon* is shown to be a diversified group of related species, recent, extant or fossil ; (1) a division of Pantanodontidae into 4 genera is proposed: *Pantanodon* (nominotypical Tanzanian genus), *Malagodon* new genus (Malagasy genus), *Aliteranodon* new genus (Kenyan genus), three genera including (recent) East African species, and †*Paralebias* which includes all fossil Pantanodontidae European species, (2) *Pantanodon podoxys* is revalidated as a distinct species and a closely related species from Tanga (Tanzania) is described as *propinquus*, (3) within *Aliteranodon*, a recently collected species from Koreni (Kenya) is herein described as *ndoano* and designated as its type species and several more species are assigned to this new genus: *Haplochilichthys stuhlmanni* with which *Pantanodon podoxys* was previously synonymized is revalidated and its type locality is proposed as Pangani, in north-eastern Tanzania, after a detailed review of Stuhlmann's collecting trips between 1894 and 1901, a misidentified species from Ngomeni (Kenya) is formally described as *rostratus* and two misidentified miniature species from Tanzania are formally described as *bucinus* n.sp., from Zanzibar Island, and *filimbi*, from Bagamoyo mainland, (4) *Oryzias madagascariensis* Arnould, 1963 is designated as type species of *Malagodon* new genus, (5) *Haplochilichthys jeanneli* Pellegrin, 1935 is reviewed and a lectotype is designated following suspicions it may be placed in Pantanodontidae, (6) the revalidated fossil genus †*Paralebias* is proposed with a subdivision into 3 species-groups, (7) further studies are on-going by the authors for new species in new collections (inland and as sp. Gazi) ; finally, and for the first time, the unique larval stage of *stuhlmanni* and *ndoano* is disclosed. 2023. KDS, https://www.killi-data.org/series-kd-2023-Meinema_Huber.php] {Jean Huber, 25-April-2023} <°))>< <°))>< <°))><
- Gomes, V.M.A.R. [Gomes reviews killifish fauna of rio Magdalena, Colombia, confirms synonymization of *milesi* into *magdalenae* and precises *azurescens* ; this a comprehensive review of this group of fish following detailed collections, 12 as new locations, all over the entire range of *magdalenae-milesi*, mainly by the author (and co-collectors) ; synonymy of *Rivulus milesi* with *Rivulus magdalenae* is confirmed based on colour polymorphism and separation from vicariant congeners (and also morphometrics on a limited sample) ; several collecting localities of *magdalenae* are newly disclosed including some at higher elevations with possibly distinct phenotypes (and-or haplotypes), including one in geographically isolated Cauca valley ; a taxonomic discussion on *Rivulus milesi* vs *Rivulus azurescens*, newly collected within *milesi* range, is proposed and *azurescens* and *milesi* (= *magdalenae*) are shown as distinct by stable color pattern characters ; due to the introduction of alien Poeciliidae sp., *Rivulus magdalenae* should be seen as recessive, maybe locally at risk, thus a threat categorization according to IUCN criteria is proposed to be changed as Near Threatened (NT). 2023. KDS, <https://www.killi-data.org/series-kd-2023-Gomes.php>] {Jean Huber, 25-April-2023} <°))>< <°))>< <°))><
- Sogawa, S., R. Fukushima, W. Sowersby, S. Awata, K. Kawasaka & M. Kohda. [Sogawa et al. show in lab experiment that individual recognition is done by faces rather than body coloration in *Poecilia reticulata* male : individual recognition is a necessary cognitive ability for maintenance of stable social relationships (non-sexual and sexual) ; the authors study visual signal for individual-recognition in male of sexually dichromatic guppy (*Poecilia reticulata*) with hypothesis that fish distinguish between familiar individuals and unknown strangers by their faces rather than by body coloration ; experiments consist in randomly presenting focal fish with 4 types of composite photo-models: (1) familiar (familiar-face and familiar-body

= F/F), (2) stranger (stranger-face and stranger-body = S/S), (3) familiar face combined with stranger body (F/S) and (4) stranger face combined with familiar body (S/F) ; results show that focal male infrequently attacks familiar-face models but frequently attacks stranger-face models, regardless of body types ; then the authors conclude that guppy male discriminates between familiar and stranger male by its face, not body coloration with wide variation {leading to so many aquarium varieties and selections} ; according to the authors, importantly, male face contains clear individual-variation in white/metallic colored patches on operculum that are (of course) visible for humans, at least considering photo-models (including wild type phenotype), regardless of variation in body (sides) color, with a different genetic mechanism potentially underlying face and side colors {note: a smart approach}. 2023. Z.S., <https://bioone.org/journals/zoological-science/volume-40/issue-2/zs220088/Male-Guppies-Recognize-Familiar-Conspecific-Males-by-Their-Face/10.2108/zs220088.short>] {Jean Huber, 17-April-2023} <°))>< <°))>< <°))><

- Suarez, M.R., E. del-Val, O.D. Dominguez, A.F. Ojanguren & M.C. Camacho. [Suarez et al. show after wild re-introduction that *Zoogoneticus tequila* abundance is greater when sharing mesocosms with native species ; invasive species represent a threat to biodiversity and ecosystem diversity services and result in extirpating native species from their biotopes ; for example, viviparous Mexican fish known as the *tequila* splitfin (Goodeidae) has become extinct in the wild as a consequence of habitat loss and degradation, and interactions with invasive species ; following pertinent efforts by local researchers, extinct-in-the-wild fish are kept in captivity and reintroduced into their native distribution in 2016 ; the authors then test whether *tequila* splitfin populations would establish and increase, and how fish would behave when introduced into sites already colonized by other (alien) species, in 4 cases of biotopes, (1) empty mesocosms, (2) mesocosms where individuals of other native viviparous *Ameba splendens* is established, (3) mesocosms with individuals of the native *Goodea atripinnis* and (4) mesocosms with individuals of exotic invasive two-spot livebearer {*Pseudoxiphophorus bimaculatus*, also viviparous, but belonging to Poeciliidae} ; results show that abundance (number of individuals that survive and new individuals) of *Zoogoneticus tequila* are greater when sharing mesocosms with native species ; however, they show reduced activity levels when inhabiting mesocosms with exotic invasive two-spot livebearers, and in comparison, interactions with natives prove to be beneficial {a wonderful work and innovative study with general lessons on conservation for critically endangered species, at least viviparous}. 2023. F.B., <https://onlinelibrary.wiley.com/doi/10.1111/fwb.14057>] {Jean Huber, 17-April-2023} <°))>< <°))>< <°))><
- Guedes, G.H.S., I.D. Gomes, A.A. do Nascimento, M.C.C. Azevedo, I.C.A. Souto-Santos, P.A. Buckup & F.G. Araujo. [Guedes et al. study breeding of annual *Leptopanchax opalescens* and compare egg size (smaller in annuals vs. non-annuals Rivulidae); this is a critically endangered small annual fish, hence the need of data for conservation ; besides the authors compile egg diameter and maximum total length from 136 neotropical killifishes (family Rivulidae) for comparisons between species with different life histories (annual and non annual) ; batch fecundity ranges from 22 to 32 vitellogenic oocytes (eggs) (mean 27, S.D. 7), similar to *Cynopoecilus melanotaenia* (19, S.D. 26), *Austrolebias nigrofasciatus* (21.5, S.D. 12), maximum body size is similar between the 2 life cycles (no p value, p = 0.24), but egg size is smaller for annual killifishes (p < 0.001) ; spawning in batches, synchronous modal development of eggs, continued production of sperm in male and a complex process (diapause) of egg development are reproductive traits that favor resilience of *opalescens* and of other annual fish in temporary wetlands ; the authors suggest that body size is not related to lifespan, that embryonic diapause can result in a reduction in egg size due to unique morpho-physiological adaptations to cope with cyclic desiccation of habitats, and that differences in egg sizes between annual (smaller) and non annual (larger) strategies result (or not) from stressful habitats {discussion on annual characterization with 2 independent lineages vs. non annual, well

detailed}. 2023. Wet., <https://link.springer.com/article/10.1007/s13157-023-01680-9>] {Jean Huber, 17-April-2023} <°))>< <°))>< <°))><

- Ferreira, D.G., B.A. Galindo, T.C. de Souza, L.B. Pereira, V.A.P. Bernardes, A.J.C. Marques, W. Frantine-Silva, T. Kotelok-Diniz, C.E.G. Aggio, C. Apolinario-Silva, A.S. Zanatta & H. Silvia. [Ferreira et al. report extended range of *Cnesterodon hypselurus* in headwater of rio Cinzas basin, Brasil (with low gene diversity); previously this small fish is only known with a restricted distribution in southern Brasil, including headwaters of the Tibagi and Itararé river basins (upper rio Parana drainage) ; here, the co-authors report it in a headwater of rio Cinzas basin and use microsatellite loci and mitochondrial haplotypes for genetic analysis and identification ; a genetic comparison of 30 specimens from rio Cinzas basin (new) and 25 specimens from rio Itararé basin and 2 specimens from rio Tibagi basin shows low genetic diversity between them ; further collections are needed to define fully the species and its distribution. 2023. N.I., <https://www.scielo.br/j/ni/a/7Y9TzpFy7whNvgSpKcHmBVp/>] {Jean Huber, 17-April-2023} <°))>< <°))>< <°))><
- Fromm, D.W. [Fromm discusses extinction status of *Gambusia beebei* in Lac Miragoâne, Haiti (since 1951) and possible transplant of *hispaniolae* ; museum collection records and published trip reports show twenty-one field trips to Lake Miragoâne, Haiti between approximately 1912 and 2019, but according to the author, the most recent credible collection of *Gambusia beebei* dates of 1951 and the first record of another *Gambusia* species, one female misidentified as *Gambusia dominicensis*, from Lake Miragoâne dates of 1972 ; it appears that *Gambusia hispaniolae* (correctly identified) is introduced to Lake Miragoâne (from Santo Domingo neighboring republic) and that it has replaced *beebei* for unknown reasons, but given the level of collecting effort since 1972, it seems reasonable to conclude that *Gambusia beebei* is unfortunately extinct. 2023. J.B.L.A., <https://www.britishlivebearerassociation.co.uk/site/>] {Jean Huber, 22-March-2023} <°))>< <°))>< <°))><
- Veronesi, R., N. Pandolfi, A. Alberani & R. Bellini. [Veronesi et al. dig pools interconnection to enhance *Aphanius fasciatus* action against mosquito invasion in Sacca del Bellocchio ; even if in nature-protected coastal plain areas, such as in Po River Delta, Italy, periodic flooding has impact on LHT and conservation; in this case the authors experiment during 4 years by connecting salt marsh pools that are isolated and limit action of limiting mosquito larvae (because they are eaten by native *Aphanius fasciatus* and it is a success with a system of runnels that stimulates runnelling {sea level rise adaptation-technique} and favoring predatory action of fish. 2023. B.I., <http://www.bulletinofinsectology.org/pdfarticles/vol76-2023-029-035veronesi.pdf>] {Jean Huber, 18-March-2023} <°))>< <°))>< <°))><
- Dominguez, S.E.C., O.D. Dominguez, E.V. Velazquez & R.R. Pérez. [Dominguez et al. fully review genera and components of *Profundulus* (9 sp.) and *Tlalo* (4 sp.) with diagnostic key, all Mesoamerican ; following molecular data, while previously *Profundulus* is classified in 2 subgenera, *Profundulus* and *Tlalo*, the sole members of family Profundulidae, today the consensus {by Mexican authors} is to consider 2 distinct genera similar in morphology ; the authors present detailed morphological and osteological characters to purport such a separation and provide a new diagnose for each ; genus *Tlalo* is then based on 5 unique characters (prominent and oval-shaped mesethmoid, exceeding posterior margins of vomer, anterior portion of parasphenoid making contact with mesethmoid, its extension beyond center of mesethmoid, a reduced autopterotic fossa) ; *Profundulus* is based on 3 contrasting characters (mesethmoid, small, crescent-shaped and not extending beyond margins of vomer, anterior portion of parasphenoid just contacting mesethmoid and not extending beyond center of mesethmoid, a large autopterotic fossa) ; for each genus, description and distribution ranges are given as well as a key for identification of species {note: read also herein, another revision of *Profundulus* with 2 new sp. by Calixto et al.}. 2023. N.I., <https://www.scielo.br/j/ni/a/fNsQDJQMCgzh7Xyv6YDvHXg/?lang=en>] {Jean Huber, 20-February-2023} <°))>< <°))>< <°))><

- Frota, A., J.J. Morrone & W.J. Graça. [Frota et al. review (range, phylogeny, genes, paleontology) Cnesterodontini (livebearing *Cnesterodon*, *Phalloceros*, *Phallotorynus*); the authors review extensively the 3 genera {but not each congener, except in supplement}, notably in distributional (present and paleontological) terms including with a matrix of drainages, and finish by detailed considerations on conservation with priorities ; besides, phylogenetic proposals for Cnesterodontini are hypothesized about historical relationships among 9 areas previously recognized by endemism of freshwater fish from South America ; the authors disclose that the area relationships are strongly linked to historical patterns of evolution of the hydrographic basins {like in Huber, 1998, for oviparous tropical killifish}, showing well-defined scenarios of the formation of hydrological barriers between coastal river basins (i.e., Atlantic slope) and mainly drainages running into the La Plata River system (i.e., Inland slope) relationships between taxa and their geographic distribution to infer a sequence of area fragmentation {note: *Phalloceros reticulatus*, not discussed}. 2023. A.S., <https://link.springer.com/article/10.1007/s00027-023-00947-x>] {Jean Huber, 18-February-2023} <°))>< <°))>< <°))><
- Nielsen, M.-E., E.S. Johnson & J.B. Johnson. [Nielsen et al. show in lab *Xenophallus umbratilis* no evidence of lateralized positioning, with either dextral or sinistral gonos ; this is a freshwater livebearing fish that exhibits antisymmetry in male gonopodium (unique in Poeciliidae livebearers, but with similar convergences in Anablepsidae livebearers) ; the intromittent sexual organ ends by either a dextral or sinistral twist ; such asymmetry pushes to hypothesize that male might exhibit side-biased behavior when interacting with female to mate ; however, results of experiments are more complicated ; on the one hand, lateralized mating behavior in one test where male with sinistral gonopodial morphology interacts with a single female ; on the other hand, no evidence of lateralized mating behavior in male with dextral gonopodial morphology is found ; in other tests where a single female is placed with 5 males, all with the same morphology (dextral or sinistral, i.e., right or left morph), no evidence of lateralized body positioning is disclosed {note : first author, Nielsen, is an homonym of Dalton Nielsen, killifish Brasilain expert}. 2023. PlosOne, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0281267>] {Jean Huber, 7-February-2023} <°))>< <°))>< <°))><
- Fast, K.M., A.W. Rakestraw & M.W. Sandel. [Fast et al. disclose full mitogenome of livebearing *Poecilia parae*, as 16,559 bp long, with close phylogenetic affinity to the Guppy ; the species, a population from Suriname, is a member of {today} subgenus *Acanthophaelus* (also closely related to *Poecilia reticulata*, alias famous Guppy) ; the mitochondrial genome contains 13 protein-coding genes, 2 ribosomal RNAs (rRNAs), 22 transfer RNAs (tRNAs), and one control region (D-loop). 2023. MitDNA, <https://www.tandfonline.com/doi/full/10.1080/23802359.2023.2171246>] {Jean Huber, 6-February-2023} <°))>< <°))>< <°))><

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