Killi-Data Wassup n°8

Overview of Killifish research output

May 13. 2020 – November 6. 2020

Dated 2020-11-26

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EDITORIAL : the species concept to be revisited?

With Killi-Data Wassup n°8, this editorial tackles another very old –old as taxonomy- issue, i.e. the species concept, and an old issue that materializes differently along time.

In preceding editorial, for the genus-subgenus concept, the conclusion comes as there is no objective solution, that the only solutions are artificial and that solutions following authors' proposals along time and progressive new evidences can only be heterogeneous. Today's available 3 international databases on Cyprinodontiformes claim to present an objective picture of valid generic names (and each does its best), but the outcome may be (rarely) distinct and this is not 'arbitrarism', but a direct consequence of rules-practices of working : different ways simply induce different results. And for the species concept, the outcome can be (also rarely) similarly distinctive and the reasons are the same but in addition there may be other reasons : if for the genus concept everybody agrees that the solution whatever proposed is artificial, for the species concept everybody thinks it is not artificial (or would like to) and still the outcome in databases can be distinctive!

First, the species concept is today based on a biological determination since the revolutionary approach by Ernst Mayr in the early 1950ies whom I have known quite a bit and who has proposed to consider a biological species as a group of populations that is genetically homogeneous and separated (at that time by hybridization) from another such group of populations. Fine but the devil is in details and soon for Cyprinodontiformes whom, after pioneering works by Joergen J. Scheel, are shown as made of a multitude of genetically separated populations without major and stable differences (in male live pattern), the devil comes up to a more practical solution (a group of populations with at least a stable distinguishing character, mostly in male live pattern, from other isomorphic groups), at least in Killi-Data… but for fish (only) and not singly Cyprinodontiformes, authors have tried to accommodate the biological complexity with nomenclatural constraints by… proposing not less than 2 dozens definitions of the species concept, each varying a little bit from the others depending on the characteristics of the studied group. In those days and still now those described species with little deviation from a well-known species (say morphospecies to make things simple) have been named cryptic species ('hidden' species) with more and more complex combined diagnoses (and less and less manageable separations, most of them lacking variability studies, then at stake of becoming un-significant). But that's the way it goes and nobody can seriously oppose such a wave (the number of cryptic species is much greater than morphospecies of the old times). No critics, just simple stubborn facts.

Second recently (from say the year 2000) molecular techniques have brought additional knowledge on the natural relationships or phylogenies between groups of populations (an even more 'biological' conceptualization)… and no surprise biological complexity for Cyprinodontiformes appears even greater than anticipated during karyology times with their cryptic species (J.J. Scheel) and another layer is added in the biological concept of species (genetic molecular separation) to describe new biological species that cannot be separated even by stable male live pattern from others (or then with very detailed diagnoses, again with no variability study) and those species are named molecular species (and indeed biological in Mayr's sense, they

are due distinct species even if researchers, after published description, cannot reasonably separate them say in a small glass tank). Again no critics. To oppose this wave would be as illusory as for cryptic species (see for example species descriptions in many killifish genera, with annual or non-annual habits, with live bearing or not habit and some extreme like in *Simpsonichthys* or *Nothobranchius* or *Aphyosemion* or *Poecilia*.

Third, if that wave cannot be opposed (still knowledge on the whole is increasing even if in practical terms it is not obvious) there is an indirect unforeseen consequence that emerges : the value of binominal names is losing more and more of its interest (compared to, let's be a bit provocative, using alphanumerical codes and having, say, several hundreds of such codes for a group used to be named *Aphyosemion*). Future will tell (but the issue is already in front of us with *Melanorivulus* (a genus or a subgenus depending on authors) with nearly already some 90 'species' all diagnosed and not more than 3 or 4 morphospecies (and no variability study). An alternative to that possible non practicality of naming molecular species is sometimes proposed with the ESU concept (ESU ist short for 'Evolutionarily Significant Unit' with each unit expressing an isolated population with different genetic characteristics within one so-called species). ESU spares creating new names and it is used in some groups of fishes including in Cyprinodontiformes (for Goodeidae and not more than 40 species in total) but it requires an already solid and detailed knowledge of a group of populations (vs. others) and we are very far of it for all other Killifishes. However the ESU concept is not universally even among Goodeidae researchers and some molecular species have been named recently (*doadrioi*, *lyonsi*, in heterogeneous genus *Xenoophorus*), departing from ESU's.

Fourth, none the less, all 3 databases on names follow that molecular wave (without paranoid consequences on the future), up to a point where Killi-Data behaves differently : Killi-Data does not accept the revalidation of an old molecularly distinctive species without a new diagnosis of that old synonym (and similarly for synonymizations)… simply because it is a minimal ICZN rule for any new species and, if the case for a new species, then it must be the case too for an old species. Authors are aware of that and usually comply with that constraint (after all it is not that difficult to produce a combined diagnosis for a revised old name if it is not too difficult (even) for a new molecular species, whenever that diagnosis is to remain stable overtime or not is another question… but again Killi-Data is not judging published evidence, this is the job, hopefully, of the editor of the concerned journal, its review board and the reviewers of the submitted manuscript). As a result this explains nearly 100% of differences at species level between the 3 databases), on top of exceptional cases of nomenclatural availability between K-D and California database vs. Fishbase.

Fifth there remains a last minor issue of discrepancies, but, there, differences are not among the 3 databases but between old knowledge and modern knowledge : it concerns the subspecies concept and for Cyprinodontiformes nobody is going to argue that it has still a value and everybody is going to agree that subspecific names should be moved to full species status with new diagnoses or to synonymy… the only problem is to tackle old subspecific taxa never studied since description (mainly today in *Epiplatys*) but that is not as simple as it looks (e.g., in genera *Empetrichthys* and *Crenichthys*, there are well segmented subspecies names by morphology and not separated genetically by hybridization… but alas, surprise, molecular data segment the species differently than with morphology).

VIEW FROM THE CHAIR

Killi-Data Wassup n°8 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, the major paper by Freyhof and Yogurtçuoglu on *Aphanius* corresponds to an earthquake move with 'bold' (in a neutral meaning) changes that would be automatically followed as new evidence (even if destabilizing strongly nomenclature with no new findings) by Killi-Data but this is not the case because their results are directly conflicting with another paper published only a few months before by another team (this time based on new findings) [Esmaeili, H.R., A. Teimori, F. Zarei & G. Sayyadzadeh. 2020. DNA Barcoding and species Delimitation of the Old World tooth-carps, family Aphaniidae Hoedeman, 1949 (Teleostei: Cyprinodontiformes). PLoS ONE, 15 (4): 17 pp.]. In practice the new authors propose (strictly speaking they write 'a proposal') to split genus *Aphanius* into 8 distinct genera (*Anatolichthys*, *Aphaniops*, *Aphanius*, *Apricaphanius*, *Esmaeilius*, *Kosswigichthys*, *Paraphanius*, *Tellia*).

Five key remarks : (1) It must be stressed that the present analysis is objective and formal. No subjective feelings in favor (or against) the Iranian team and the 2 new authors, German and Turkish, have influenced it. The new paper is long, serious, comprehensive and detailed that might have been prepared (submitted?) before Iranian paper on *Paraphanius* is published (then possibly with another new genus).

(2) The first issue concerns *hormuzensis* and *teimorii*. The 2 authors claim that the museum where holotype of *hormuzensis* is deposited, ZM-FISBUK, is not detailed enough, hence their move. This is indirectly erroneous. In the world-reckoned list of institutions online published by Sebaj (edition), this is listed as ZMSBUK Zoological Museum of Shahid Bahonar University, Kerman. Current as: ZMSBUK (fishes), ZMSBUK.HD (herps). Kerman Iran {note : this is confirmed by Teimori, A., H.R. Esmaeili, N. Hamidan & B. Reichenbacher. 2020. Comment on A proposal for a new generic structure of the killifish family Aphaniidae, with the description of *Aphaniops teimorii* (Teleostei: Cyprinodontiformes)" by Jörg Freyhof & Baran Yogurtçuoglu, Zootaxa. Fishtaxa , 17: 15-16.}. Besides such minor missing details if it were the case should not justify a new replacement name. Anyhow the 2 authors could have informed ahead the describers of *hormuzensis* to let them do the correction themselves for the missing detail.

(3) The next issue is on the split of *Aphanius* into 8 genera. The 2 authors clearly state they prefer compact genera (i.e., they are strong splitters) and this is respectable. But this is just an option that can be changed any time by further studies (with the new genera, 8 in total and 20-30 valid sp., the pyramid looks very similar to Goodeidae but in that family molecular branches are long and old). As a researcher I have studied *Aphanius* s.l. sp. and as the 2 authors state morphology is uniform and speciation is recent. Therefore the move is not imperious unless on philosophical-psychological basis (splitting) and it is detrimental to the stability of nomenclature because, like the 2 authors state correctly, as a result of the split, *farsicus*, today well established as a valid cryptic species, becomes a synonym of *persicus*, always considered as a synonym of *sophiae* along history up to recent data, just before the needed replacement because of an homonymy with a fossil. And if an author reunites the genera under a single umbrella as *Aphanius* with 8 subgenera (as a lumper), *persicus* would be a junior synonym of *farsicus* back again (which would be against stability of nomenclature and usage according to ICZN general principles). Anyway the split of *Aphanius* into 8 genera is not followed in Killi-Data because it is not based on new evidence (unlike the Iranian paper), and likewise for the revalidation of *persicus* because *Aphanius* is not split herein (pending further evidence). Next is the description of the 2 genera, *Apricaphanius*, *Esmaeilius* : they are valid but downgraded to subgenera of

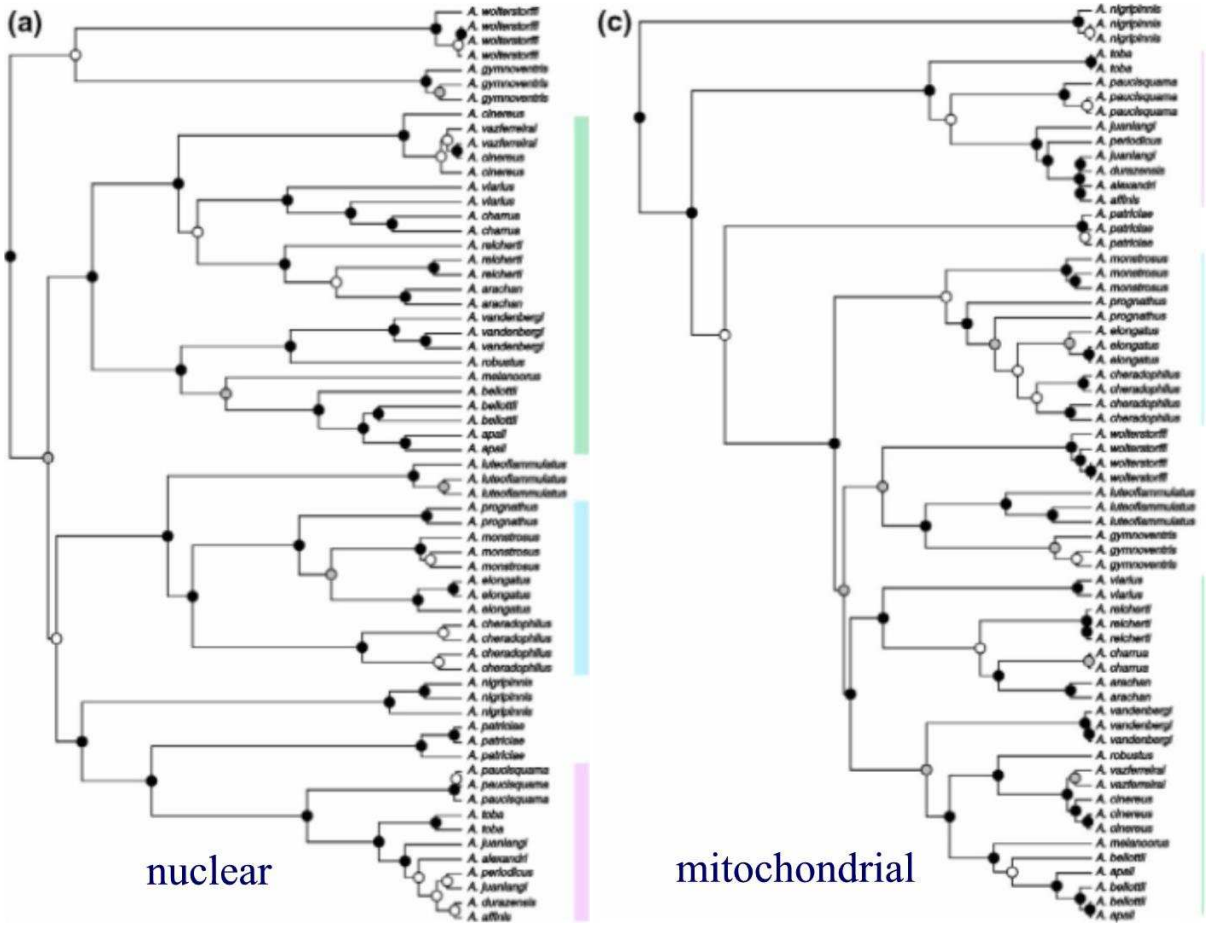
Aphanius herein {since *Aphanius* is not split}. *Tellia* and *Apricaphanius* belong to the same lineage, morphologically, molecularly and palaeogeographically and the latter is at stake of synonymization (which would reduce their contribution to a single genus-subgenus, *Esmaeilius* whom everybody had seen the need for after the Iranian description of *Paraphanius*). To sum it up : the proposal on *farsicus*/*persicus* is ICZN-wise correct for a case after 1960 but worthless if *Aphanius* is not split {the fossil types of *persicus* in *Brachylebias* must be restudied urgently to determine to which (sub)generic name they belong to ; again the split or not of *Aphanius* in several (how many?) genera is artificial… Killi-Data selects the latest published evidence from the Iranian team because the Germano-Turkish team proposes a full split based on no new research outcome, but in the past and why not in the future, there may be new findings proposing a single genus with several subgenera or the Germano-Turkish team will propose new evidence to sustain a full split, then other genera will be at similar stake, say *Fundulus* or *Gambusia* in America where trees are similarly sub-branched}.

(4) The last issue concerns revalidations and new synonyms, i.e., revalidations of *alexandri*, *boulengeri*, *mentoides*, *orontis*, *similis*, *striptus* (vs. *mento*) [in a list, like-the Iranian team- just previously] and, newly, the synonymizations of *arakensis*, *kavirensis*, *mesopotamicus*, and *pluristriatus* into *sophiae*. The 2 authors are obviously respectable in proposing those changes. In Killi-Data, rules are that those types of changes are followed when only a new diagnosis is given (revalidation) or when a new evidence is given (synonymization), and those are not the cases here (no rediagnoses for revalidations, and synonymizations seem opinion-wise). Understanding not only the text but also the spirit of ICZN code means a rediagnosis is mandatory for a revalidation with new definitions (just like it is the rule for any new species to define it properly). If no rediagnosis is given then old names are just revalidated because they are molecular species and some people would easily tease that ICZN naming is garbage and names would better be replaced by codes or numbers. If all molecular species are automatically named, as new or by revalidating old synonyms, then thousands of valid names are ahead of us in Cyprinodontiformes. Besides, if solid synonymizations are scrutinized {like for *apaii* (*Austrolebias*) or *multidentata* (*Jenynsia*)}, the sentences by the 2 authors are just opinions (on minimal molecular divergence, on otoliths value) and they should not be taken into account since they did not even propose a new diagnosis of the redefined *sophiae* (and others). Besides I do not see, but I may be not followed by other databases, the rationale to revalidate most *mento* cryptic sp. while parallelly to synonymize most *sophiae* cryptic sp. : taxonomic changes of course are welcome provided they are based on evidence.

(5) In total, the new paper is very serious but cannot be followed in most results and it is suggested that the 2 authors deepen their study with new evidence (not the synthesis of evidence by others)and new diagnoses for synonymizations-revalidations of cryptic species in a future paper.

Second, the major paper by Helmstetter et al. reviewing molecular systematics of genus *Austrolebias* with both nucleus and mitochondrial genes is very important because it includes most known taxa of the genus and because results are similar to previous paper by Loureiro et al. [Loureiro, M., R. de Sa, Serra S.W., F. Alonso, L.E.K. Lanés, M.V. Volcan, P. Calviño, D.T.B. Nielsen, A. Duarte & G. Garcia. 2018. Review of the family Rivulidae (Cyprinodontiformes, Aplocheiloidei) and a molecular and morphological Phylogeny of the annual fish genus *Austrolebias* Costa 1998. Neotropical Ichthyology, 16 (fully online at http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1679-62252018000300202&lng=en&nrm=iso&tlng=en)] for the mitochondrial part ; however, the new nuclear tree (see fig. a, hereafter) is very distinct from the mitochondrial tree shading some uncertainties on molecular phylogeny based only on mitochondrial sequences (one or a few selected sequences) or on combinations of nuclear and mitochondrial sequences together, pending future trees based on full genome (only a few killifish species known yet) ; while the mitochondrial tree (see fig. c) promotes a new subgenus based on *nigripinnis* (with *toba*, like in Lourenço et al., or, without *toba* like in the new study) and a cascade of branches more or

less (rather less) in line with the many morphological subgenera described by Costa (2008), the nuclear tree apart from the *wolterstorffi* and *gymnoventris* branches (subgenera, respectively) shows 2 or 3 branches apart that include all other known species.



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Third, the major paper by Merwe et al. {an international team comprising professional molecularists, renown biologists and expert collectors} reviewing molecular systematics of genus *Nothobranchius* with multiple mitochondrial genes is very important because it includes most known taxa of the genus with new sequences and because results are broadly similar to previous pioneering paper by Dorn et al. [Dorn, A., Z. Musilova, M. Platzer, K. Reichwald & A. Cellerino. 2014. The strange Case of East African annual fish: Aridification correlates with Diversification for a Savannah aquatic Group? BMC Evolutionary Biology , 14: 210-235, figs., tabs., suppl.]. The new study reports a phylogeny of *Nothobranchius* with completely new sequences using 5 genetic markers (3 nuclear, 2 mitochondrial) of 79 taxa (seven undescribed and 73 of the 92 recognized species) and it is a major milestone of knowledge ; these 2 state-of the art major studies (until full genome studies) are rather congruent on the sub-branches of the tree but differ on the proposed explanations of radiation-speciation along history of the genus {and it seems the latter, based on tectonics, is a bit more convincing than local aridity, even if probably both complex patterns may have played a role} ; the majority of *Nothobranchius* species have very restricted distributions, and of the total 92 known distributions, only a few (e.g., *melanospilus*, *furzeri*, *orthonotus*, *pienaari*) occur over 2 or more adjacent drainages. Again (repeatedly), the proposed new molecular evidence is not congruent and not supporting latest morphological evidence (Costa, 2018 : synonymization of *Aphyobranchius*, redefinition of *Adiniops*) : the new phylogenetic hypothesis retrieves a monophyletic *Aphyobranchius*, albeit including *fuscotaeniatus*, but is unable to define a monophyletic *Adiniops* subgenus.

SELECTION OF PUBLICATIONS (last in, first out)

- Nagy, B. & A. Chocha Manda. [Nagy and Chocha Manda describe *Lacustricola nitida*, from upper Lualaba in Zaïre, with 3 supraorbital neuromasts close to *matthesi* (4) ; the new species, is known only from a small temporary stream in the Lufupa River system, a left bank tributary of the upper Lualaba drainage in Lualaba province in the Democratic Republic of Congo {southeastern Zaïre} and it is cryptic to *matthesi* (only distinguished from *matthesi* by little live pattern details, minor morphometrics and a distinct number of exposed neuromasts in supraorbital sensory system. 2020. I.E.F., https://pfeil-verlag.de/publikationen/lacustricola-*nitida*-a-new-species-of-lampeye-from-the-upper-lualaba-drainage-democratic-republic-of-congo/] {Jean Huber, 25-October-2020} <°))))>< <°))))>< <°))))><
- Romand, R., J.-F. Agnèse & W.J.E.M. Costa. [Romand, Agnèse and Costa, after re-review of holotype, remove *maeseni* from *Epiplatys* and consider *leucopterygius* as its junior synonym {the move of *maeseni* to *Epiplatys* by Sonnenberg & Busch is since long seen as discussed, already by Huber, 2011 (ref. Huber, J.H.2011b. Comments on the Identification of Poll's type of *Aphyosemion maeseni* by Sonnenberg & Busch, 2009. Killi-Data Series 2011, 10-12.) who after an old study of single type does not agree it is an *Epiplatys* sp. and hypothesizes an erroneous swap of specimen along time, as the single possibility to align with the 2 authors} ; the present 3 authors osteologically restudy that type using comparison of 3D reconstruction images of holotype of *maeseni* with cleared and stained specimens of several African Aplocheiloid taxa and they show that epineural ribs and neural processes of vertebrae 5-7 are typical of *Callopanchax* related genera and not like those of *Epiplatys* and that neural process of second vertebra is fan-shaped, typical of *leucopterygius* ; therefore they move back *maeseni* to *Nimbapanchax* {like Huber, however not referenced which is inexplicable by professional standards} and consider *leucopterygius* to be a junior synonym of *maeseni* {they do not discuss however the status of *Nimbapanchax*, either as a distinct genus from *Archiaphyosemion* as per description or as a mere subgenus like in Killi-Data, because the molecular and morphological separation between *Nimbapanchax* and *Archiaphyosemion* is too limited, only by lower vertebrae counts, hence more a matter of opinion by Sonnenberg & Busch, 2009 ; besides *melanopterygium* becomes a molecular species with dark margins on male unpaired fins and its status should be re-evaluated}. 2020. Cybium, http://sfi-cybium.fr/fr/identity-west-african-killifish-aphyosemion-*maeseni*-poll-1941-cyprinodontiformes-aplocheilidae] {Jean Huber, 19-October-2020} <°))))>< <°))))>< <°))))><
- Merwe, P.D.W. De Wet van der, F.P.D. Cotterill, M. Kandziora, B.R. Watters, B. Nagy, T. Genade, T.J. Flügel, D.S. Svendsen & D.U. Bellstedt. [The Belstedt lab molecularly studies 79 % *Nothobranchius* species from Nilo-Sudan at 13 MYA with no support for *Adiniops* subgenus ; this study reports a phylogeny of *Nothobranchius* using 5 genetic markers (3 nuclear, 2 mitochondrial) ; the fossil dates of sister clades used to constrain a chronometric tree of all sampled *Nothobranchius* points out origin of that genus at ca. 13.27 MYA, northeasterly in extant distribution, then followed by radiations of 6 principal clades (with high bootstrap values) through the Neogene which corresponds more or less accepted subgeneric names (*Adiniops*, *Aphyobranchius*, *Cynobranchius*, *Nothobranchius* s.s., *Paranothobranchius*, *Plesiobranchius*, *Zononothobranchius*), except for *Adiniops*, the large subgenus encompassing most small sized species in coastal East Africa ; most diversification events occur through peripatry and allopatry driven by tectonism (East African Rift System, along with eruptions of at least 615 volcanoes), as the principal engine for invasions and speciation in *Nothobranchius*) {in contrast to Dorn et al. (2014) who propose an aridification hypothesis as a driver of speciation of the genus over Late Cenozoic}. 2020. M.P.E., https://www.sciencedirect.com/science/article/pii/S1055790320302608] {Jean Huber, 14-October-2020} <°))))>< <°))))>< <°))))><

- Moral, L.F.F. Del, Segovia, E.L., & Hernandez, T.A. [Moral et al. describe cryptic *Profundulus chimalapensis* from rio Coatzacoalcos, Caribbean slope of Mexico, with a broad band of spots ; the authors name the species from a small area in upper reaches of rio Coatzacoalcos, highlands Mexico and they hypothesize that the species has extended {a bit} distribution from standard distribution of closely related *punctatus* in Pacific slope through dispersal ; the species is known, though, since Regan (1907) ; it is separated from congeners in *Profundulus* {excluding *Tlaloc* considered as a distinct genus, today by Mexican researchers} by a more marked broad band of discontinuous dark spots on sides and a greater Anal fin base ; a key to the species of *Profundulus* is also given {article in Spanish with some parts translated into English}. 2020. RBT, https://revistas.ucr.ac.cr/index.php/rbt/article/view/40340] {Jean Huber, 2-October-2020} <°))))>< <°))))>< <°))))><
- Dekker, M.L., A. Hagmayer, K.M. Leon-Kloosterziel, A.I. Furness, B.J.A. Pollux. [Dekker et al. confirm multiple paternity in very fecund *Poecilia gillii*, with number of fathers per brood correlated to brood size ; aquarists will not be surprised that *Poecilia gillii*, a related species to the very common *sphenops* and *mexicana* mollies, is similarly fecund (mean brood size of 47.2 embryos, ranging from 4 to 130 embryos) and that the number of fathers per brood is positively correlated with brood size, but they may be surprised that it is not correlated with female size ; multiple paternity is a common phenomenon within the live-bearing fish family Poeciliidae and to set many males (but not too many because of conflicts) is a key to breeding success in the long run (genetic variability maintained) ; what makes the value of this work is that it compares brood characteristics with molecular data (key microsatellites) taking into account sizes of female to show that diversity and plurality of males (more different sires), only, more that the number of copulations (more gonopod successful intromissions by any male) enlarges brood size, in fish from 9 locations in Costa Rica. 2020. FIEE, https://www.frontiersin.org/article/10.3389/fevo.2020.579105] {Jean Huber, 29-September-2020} <°))))>< <°))))>< <°))))><
- Ywamoto, E.V., D.T.B. Nielsen & C. Oliveira. [Ywamoto et al. describe *Melanorivulus larissae* {K-D maintained in *Rivulus*}, *pictus* group, from a Rio Grande tributary (SP, Brasil) ; the authors diagnose the new species (based on collection in a single location) from other components of the *pictus* superspecies (*pictus*, *egens*, *faucireticulatus*, *scalaris*, *rutilicaudus*, *litteratus*, *ofaie*, *planaltinus*, *vittatus*) by sides of body of males light bluish gray with 10-12 oblique red bars, 8 of which chevron-like, bifurcated and complete, i.e., running from dorsum to ventral area, and 2-4 incomplete, with vertices of the chevron-like bars along midbody, pointing forward ; however, according to the authors, although *larissae* is found on the left bank of Rio Parana, it is more similar to some species from the right bank of Rio Parana, namely, *apiamici*, *linearis* and *ofaie*, with which it shares a similar overall color pattern and red bars at the Anal and Caudal fins with the same arrangement ; another species, *leali*, is collected more upstream (easterly) in the same drainage but it is distinct by color pattern {notes : there are 61 or 62 valid species, not 52 as stated, in *Melanorivulus* subgenus -or genus depending upon authors, but none is well known in terms of live pattern variability and distribution and it is one of the major future field of work for researchers in Brasil, besides the molecular data of most species, Brasilian experts agree that there are 4 groups in *Melanorivulus*, the *pinima* species group, the *zygonectes* species group, the *pictus* species group, and the *dapazi* species group, but no publication yet allocates all known taxa to any of the 4 groups}. 2020. Zootaxa, https://www.biotaxa.org/Zootaxa/article/view/zootaxa.4852.1.6] {Jean Huber, 14-September-2020} <°))))>< <°))))>< <°))))><
- Tinguely, S.M., A. Lange & C.R. Tyler. [Tinguely et al. detail embryogenesis and gestation in *Xenotoca eiseni* {K-D maintained in *Xenoophorus*} (sex ratio on birth as strict 1:1) ; the Goodeidae species exhibits external secondary sex features including a modified Anal fin and a distinctive orange Caudal fin in male which show at 4 weeks after birth (sex dimorphism) ; gestation normally takes 6 weeks, with up to 27 offspring for a single pregnancy ; sexual maturity occurs at approximately 12 weeks of age. 2020. S.D.,

https://www.karger.com/Article/Abstract/507646] {Jean Huber, 12-September-2020} <°))))>< <°))))>< <°))))><

- Firpo, F.L., J.B. Andreoli & L. Fernandez. [Lacoste et al. first discover non *Orestias* cyprinodontiform in Andean plateau of Argentina, *Jenynsia obscura*, at 3400-3900 m altitude ; this is the first record of the genus *Jenynsia* in the High Andean Plateau of northwestern Argentina {and it is a remarkable discovery, even if other congeners are reported at the feet of the Andes, above 2000 m, e.g., *maculata*, at its type locality, also in Argentina, because that dispersal is thought to be recent} {note : that presence of a *Jenynsia* species in young very high altitude non-marine saline wetlands should be confirmed in similar niches, hence refuting a putative translocation, natural or artificial}. 2020. JFB, https://onlinelibrary.wiley.com/doi/abs/10.1111/jfb.14525] {Jean Huber, 11-September-2020} <°))))>< <°))))>< <°))))><
- Teimori, A. & H.R. Esmaeili. [Teimori and Esmaeili exemplify hotspot in Hormuz area (1.8 MYA), with *Aphanius darabensis*, *Aphaniops furcatus*, *ginaonis*, *hormuzensis*…The Hormuz river system (Mehran and Kol) is a coastal drainage located in the southern plain of the Zagros Mountains (flowing into see of Persian Gulf) ; the authors show that region as a hot spot of highest diversity and speciation by having 4 species (22% of the Iranian tooth-carps) and all 4 are endemics {notes : availability of recently described *hormuzensis* is challenged by Freyhof and Yogurtçuoglu, a few weeks before, read below, and natural hybrids are reported between several pairs of species} ; according to the authors, last connection of neighboring Makran basin with Hormuz river system dates back to late Pliocene and lower Pleistocene about 1.8 MYA ; from then, other vicariance-based events like those events related to the last glacial maximum (LGM : 21000-18000 BP), population migration during the Early Holocene sea-level rise, and the Holocene to present-day, besides to geological specificities with extreme environmental conditions, have promoted the intra- and interspecific differentiation of Aphaniidae in Hormuz river system, explaining the hot spot concept 2020. I.J.I., http://www.ijichthyol.org/index.php/iji/article/view/7-2-6] {Jean Huber, 29-August-2020} <°))))>< <°))))>< <°))))><
- Teimori, A., N. Iranmanesh, M. Askari Hesni & M. Motamedi. [Teimori et al. report variability of *Aphaniops hormuzensis* within and between 3 pops, sulphuric spring, high-salinity river, urban canal ; the active geology and ecological diversity in Persian Gulf coastal drainages create a rich source of biodiversity for Aphaniidae fishes of southern Iran ; the authors study its morphological differentiation in 3 ecologically diverse habitats (Khurgu sulphuric spring, Shur high-salinity river and an urban canal) in the Hormuz riverine system ; they show evidence of sexual dimorphism in fish and otolith traits mainly in the Khurgu spring probably due to extreme conditions of Khurgu spring (isolation of micro-populations subsequently mixed) ; however, the most diverged population (infra-population variability of various measurement) is found in the urban canal with higher food availability and hybridization events {note : availability of recently described *hormuzensis* is challenged by Freyhof and Yogurtçuoglu, a few weeks before, read below}. 2020. A.Z., https://onlinelibrary.wiley.com/doi/abs/10.1111/azo.12350] {Jean Huber, 25-August-2020} <°))))>< <°))))>< <°))))><
- Berbel-Filho, W.M., A. Tatarenkov, H.M.V. Espirito-Santo, M.G. Lira, C. Garcia de Leaniz, S.M.Q. Lima & S. Consuegra. [Berbel-Filho et al. separate *hermaphroditus* from not selfing but androdioecious *ocellatus* {K-D as *ocellatus* and *caudomarginatus*, respectively}; this is the first attempt to distinguish on both genetic and behavioral grounds the 2 species that are collected often sympatrically in mangroves of southeastern Brasil and are very close by morphology {up to inducing a systematic Gordian knot, the 2 species being named differently depending on authors, Killi-Data naming corresponding to latest evidence} ; the authors suggest the presence of 2 species in identical biotopes can be explained by different evolutionary histories when colonizing the same mangrove areas, by time of colonization, by dispersal-establishment capacity ; remarkable molecular and behavioral data show that the androdioecious species is distinct by reproduction (mainly by outcrossing, with no current evidence of selfing) and by a pattern of a stronger

subdivision between populations than the hermaphroditic species. 2020. Her., https://www.nature.com/articles/s41437-020-00356-y] {Jean Huber, 23-August-2020} <°))))>< <°))))>< <°))))><

- Gabriel, K. & G.E. Collier. [Gabriel and Collier detail ecology of *Rivulus isthmensis* in headwater streams of order 0-1, La Selva Biological Station, Costa Rica ; the senior author has visited that ecological protected area several times during recent years in northeastern part of the country, limited by the confluence rio Puerto Viejo and rio Sarapiqui, northerly ; both authors, from a 2015 survey, detail the ecology of *Rivulus isthmensis* in streams of order 0-1 (not more), La Selva Biological Station, Costa Rica, collected in 23 localities ; it is dominant in those upstream biotopes, with only 3 livebearing sympatric Cyprinodontiformes usually as juveniles and in limited numbers, being prevailing in small rivers, order 2-3, *Brachyraphis holdridgei*, *Phallichthys amates*, *Priapichthys annectens* ; other authors (1988, 2011) report other livebearers, *Alfaro cultratus*, *Poecilia gillii*, *Xenophallus umbratilis* {as *Neoheterandria*}, *Hiatirhaphis parismina* {as *Brachyraphis*} but in streams of order above 3, with standard ichthyofauna ; ecological conditions are forwarded. 2020. JAKA, http://www.killi-data.org/registration.php] {Jean Huber, 23-August-2020} <°))))>< <°))))>< <°))))><
- Abrantes, Y.G., L.S. Medeiros, A.B.A. Bennemann, D.M. Bento, F.K. Teixeira, C.F. Rezende, T.P.A. Ramos & S.M.Q. Lima. [Abrantes et al. report new localities of *Hypsolebias martinsi* {K-D maintained in *Simpsonichthys*}, *antenori* {K-D as *heloplites*}, *Cynolebias microphthalmus* ; this sampling study reports on 21 localities of annual killifish in the mid-northeastern Caatinga ecoregion of Brasil, of which 9 are new localities, expanding the distribution of the 3 species ; the 4th known annual species in that region, *Hypsolebias longignatus* {K-D maintained in *Simpsonichthys*} is still only known from its type locality in Ceara ; the authors stress that all 4 species are at risks of endangerment due to human activities except when a population is located in a natural reserve. 2020. NBC, https://neotropical.pensoft.net/article/51738/] {Jean Huber, 4-August-2020} <°))))>< <°))))>< <°))))><
- Charmpila, E.A., A. Teimori, J. Freyhof, A. Weissenbacher & B. Reichenbacher. [Charmpila et al. show differences in skeleton and median fin osteology of *dispar*, *hormuzensis*, *kruppi*, *stoliczkanus* (genus *Aphaniops*); *Aphaniops dispar*, widespread around Arabian Peninsula, has recently been split into 4 species {the present study is the first for *kruppi*, outside the description) by molecular results and color patterns, but according to the authors, interspecific morphological differences are thought as small ; this is not the case as evidenced by the authors for a few caudal vertebrae that are not directly associated with caudal ray support : *Aphaniops hormuzensis*, an endemic species to southern Iran, shows a significantly higher number of modified caudal vertebrae compared to more widespread *stoliczkanus* and *dispar*, and also to *kruppi* {note : the attempt to use terminal precaudal vertebrae is unfrequent at the systematic level -e.g., by Brasilian researcher Costa, but it is always at intergeneric level}. 2020. JAI, https://onlinelibrary.wiley.com/doi/10.1111/jai.14074] {Jean Huber, 3-August-2020} <°))))>< <°))))>< <°))))><
- Berkenkamp, H.O. [Berkenkamp describes *Rachovia fransvermeuleni*, a cryptic species to *maculipinnis* from foothills of Cordillera in south Venezuela ; a new seasonal fish species, *Rachovia fransvermeuleni*, is named after renown collector and amateur Dutch scientist, Frans Vermeulen ; the species is known from a single remote locality ; another putatively new species with a similar remote origin close to mountain is reported but un-named (in prep.) ; the author is of the opinion that *Rachovia splendens* needs to be revalidated from its synonymy status (also in prep.). 2020. VDA-Suppl, https://vda-bezirk25.de/publikationen/Heft_12.pdf] {Jean Huber, 1-August-2020} <°))))>< <°))))>< <°))))><
- Garcia, D. & M. Reichard. [Garcia and Reichard show in the field that high density impacts growth rate and survival of *Austrolebias bellottii* in male (not in female) ; indeed results {not surprisingly} show differences between sexes with males at high densities reaching a smaller final size and experiencing a higher

mortality while no such effects observed in females {note : the smaller size effect has already been monitored in species of African genus *Nothobranchius*}. 2020. JFB, https://onlinelibrary.wiley.com/doi/abs/10.1111/jfb.14357] {Jean Huber, 29-July-2020} <°))))>< <°))))>< <°))))><

- Chavez, R.L., A.R. Rocha & A.S. Moran. [Chavez et al. report first natural collection of *Poecilia mexicana* in Mexican hypersaline estuary with similar fecundity and feeding ; the species is recorded for the first time in laguna El Llano estuary, Veracruz department, Mexico, and life history data are detailed that are not different from those of populations from coastal inland (and higher altitudes) for this very opportunistic livebearer {that is also unfortunately artificially introduced in many parts of the world}. 2020. BIMC, http://boletin.invemar.org.co:8085/ojs/index.php/boletin/article/view/916] {Jean Huber, 29-July-2020} <°))))>< <°))))>< <°))))><
- Freyhof, J. & B. Yogurtçuoglu. [Freyhof and Yogurtçuoglu split further *Aphanius* into 8 genera, 2 as new, *Esmaeilius*, *Apricaphanius*, and synonymize most Iranian sp. ; the authors reshuffle completely the systematics of Aphaniidae, following an exhaustive review of published molecular data and morphological characters {but without bringing new personal evidence} ; recently, in 2018, *Aphanius* genus is raised to family level {Bragança, P.H.N., P.F. Amorim & W.J.E.M. Costa. 2018. Pantanodontidae (Teleostei, Cyprinodontiformes), the sister group to all other cyprinodontoid killifishes as inferred by molecular data. Zoosystematics and Evolution, 94 (1): 137-145, 3 figs.}, the present German and Turkish authors propose to go further and split the genus itself, based on own strategy of reasonable compactness for monophyletic generic unit {they explain why they favor compactness, i.e. many genera each with few similar species, it is respectable but it is opinion based only} into 8 genera: *Anatolichthys*, *Aphaniops*, *Aphanius*, *Kosswigichthys*, *Paraphanius*, and *Tellia*, in addition to 2 new genera *Esmaeilius* {for the *sophiae* species group} and *Apricaphanius* {for the *iberus* species group} ; according to them, the original description of *Aphanius hormuzensis* does not fulfil the minimum criteria of ICZN, therefore the name is replaced and this taxon is re-described as *Aphanius teimorii* ; besides, *Esmaeilius arakensis*, *kavirensis*, *mesopotamicus*, and *pluristriatus* are treated as synonyms of *sophiae* {opinion based only} and *Esmaeilius farsicus* is a junior synonym of *persicus* (Jenkins, 1910) following the separation of genus *Esmaeilius* from *Aphanius*, because *persicus* is not anymore pre-occupied (in fossil genus Brachylebias) and *farsicus* becomes a useless replacement name for *persicus* ; finally *alexandri*, *boulengeri*, *mentoides*, *orontis*, *similis*, *striptus* (vs. *mento*) are revalidated {opinion based only} {note : most changes of this important paper are unfortunately not followed in Killi-Data because of either no new evidence, no new diagnoses or no nomenclatural need, as explained in the chapter «view from the chair», herein, or because of a specific issue with publisher of Zootaxa for *hormuzensis-teimorii* : Zootaxa editor (Zhi-Qiang Zhang) is part of current ICZN Commission and he may be radical and his journal faces tempest because its international ranking has been downgraded in 2019 with petitions along on the one hand and, on the other hand, an apparently very similar case has just arisen lately with *Seminemacheilus dursunavsari* Çiçek, 2020: 69, Figs. 2-6 [Iranian Journal of Ichthyology v. 7 (no. 1) published in May (Hamid Esmaieli is the current editor)] and *Seminemacheilus tubae* Yogurtçuoglu, Kaya, Geiger & Freyhof, 2020: 494, Figs. 15-18, Zootaxa (also with 2 of the present authors and also in Zootaxa and also with published Comments and Errata regarding *Seminemacheilus dursunavsari*, a new nemachelid species (Teleostei: Nemacheilidae) from Turkey: 68-77)}. 2020. Zootaxa, https://www.mapress.com/j/zt/article/view/zootaxa.4810.3.2] {Jean Huber, 13-July-2020} <°))))>< <°))))>< <°))))><
- Ruppel, D.S. & T.H. Bonner. [Ruppel and Bonner report LHT of *Fundulus zebrinus* from Red River basin (breeding March-September, multiple batches, life span of 2-3 years) ; Plains Killifish, the common name of the fish (including cryptic sp., *kansae*) are sexually mature at age 1 and has an estimated life span of 2-3 years. 2020. WNAN, https://scholarsarchive.byu.edu/wnan/vol80/iss2/5/] {Jean Huber, 13-July-2020} <°))))>< <°))))>< <°))))><

- Torres-Dowdall, J., S.J. Rometsch , A.F. Kautt, G. Aguilera & A. Meyer. [Torres-Dowdall et al. suggest that common left and right asymmetric genitalia in *Anableps* and *Jenynsia* sp. are results of hazard (no evidence for a simple genetic basis of direction of genital asymmetry, no evidence for loci associated with the direction of genital asymmetry, no evidence of population structure between individuals differing in the direction of genital asymmetry) ; Anablepsidae (extant genera *Anableps* and *Jenynsia*) are internally fertilizing fish where Anal fin of male is modified into an intromittent organ that transfers sperm into gonopore of female ; for not well-understood reasons, males exhibit polymorphism with asymmetric genitalia and both left- and right-sided individuals are commonly found at similar proportions within populations (50-50, i.e. anti-symmetry) ; the authors show morphology of all offspring is asymmetric and independent of parental morphotype ; besides, in some species females have also asymmetric gonopores and thereby can only be fertilized, at least in theory, by compatible asymmetric males i.e., left or right), but with molecular analyses they show that direction of asymmetry does not bear a strong genetic component, therefore they conclude that the phenomenon should be stochastic {and the mysteries of the morphological emergence and usefulness of that dual and equilibrated dimorphism remain unclear}. 2020. P.R.S.B, https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0969] {Jean Huber, 11-July-2020} <°))))>< <°))))>< <°))))><
- Helmstetter, A.J., A.S.T. Papadopulos, J. Igea & T.J.M. Van Dooren [Helmstetter et al. present nuclear and mitochondrial trees (divergent) of 26 *Austrolebias* sp. with new patterns of speciation ; this a comprehensive study of most described species (63 specimens analyzed, most both for nuclear and mitochondrial sequences, a still rare approach) ; results show that large size (namely the *elongatus* and woltersorffi species groups) has principally arisen within a single area subsequently spread to 2 other areas ; a second assemblage may have been shaped by adaptation to a new environment without an associated increase in size divergence ; a third assemblage, which has the smallest size range and the most recent origin, is phylogenetically clustered, and no evidence of environmental filtering is found ; with mitochondrial sequences only (usually high bootstrap values), *toba* is not closely related to (isomorphic) *nigripinnis* {and this should be confirmed because the subbranch has a low bootstrap value}, *patriciae* is isolated {but the subbranch is poorly supported}, *apaii* is heterogeneously positioned within the *bellottii* species group {and synonymy is again evidenced} {note : although the authors study most species to-date, they do not tackle the issue of subgenera because it is out of their focus and a new study will be needed to propose new systematics of the genus and present subgenera -and future subgenera- to accommodate with the molecular evidence, even if nuclear data are quite dissimilar to mitochondrial data}. 2020. JBiogeog., https://onlinelibrary.wiley.com/doi/full/10.1111/jbi.13912] {Jean Huber, 10-July-2020} <°))))>< <°))))>< <°))))><
- Innal, D. [Innal collects *Aphanius fasciatus* in only 5 out 15 suitable biotopes of southern Turkey due to human alterations and alien fishes ; the species is still known from many brackish water habitats along most Mediterranean coasts {except Spain, apparently, unless artificially introduced} ; the present study focuses on conservation issues along river estuaries and lagoon systems of Mediterranean coast of Turkey and although still abundant the species is decreasing in number of suitable sites, due to human activities (including pollution) ; length-weight relationship data are also provided. 2020. IJGMS, http://nopr.niscair.res.in/bitstream/123456789/54659/1/IJMS%2049%284%29%20553-558.pdf] {Jean Huber, 5-July-2020} <°))))>< <°))))>< <°))))><
- Watters, B.R., B. Nagy, P.D.W. van der Merwe, F.P.D. Cotterill & D.U. Bellstedt. [Watters et al. revalidates *Paranothobranchius* as subgenus, redescribe *Nothobranchius ocellatus* and name new cryptic *matanduensis* ; the description of *Nothobranchius ocellatus* is based on a single type, an immature male apparently lost in ZFMK [Bonn], and on a photograph of a female ; following the field collections of many populations in recent years, it appears that molecularly (with combined nuclear and mitochondrial sequences) there are 2 groups of genetically distinct populations, one referable to *ocellatus* (herein

redescribed, with neotype designation from a site near initial type locality {but unfortunately it seems not identical}, the other to a new species, *matanduensis* {note : if the authors solidly list differences between the 2 groups of populations including in a detailed table of male live color pattern characteristics and with 2 separated diagnoses, the provided color photographs are so close that they superficially are indistinguishable, and it seems better to speak of a molecular species for *matanduensis*, rather than a cryptic species} ; according to the authors, *matanduensis* is distributed at significantly higher altitudes than *ocellatus*, within the same river basin ; in the resulting tree within genus *Nothobranchius*, those 2 subcongeners are deeply rooted, thereby also confirming the valid status of *Paranothobranchius*, as a subgenus. 2020. I.E.F., https://pfeil-verlag.de/publikationen/redescription-of-the-seasonal-killifish-species-nothobranchius-*ocellatus*-and-description-of-a-related-new-species-nothobranchius-*matanduensis*-from-eastern-tanzania/] {Jean Huber, 28-June-2020} <°))))>< <°))))>< <°))))><

- Rojas, P., S. Scott, I. Tobar, U. Romero & I. Vila. [The enlarged Vila team studies head morphology of Altiplano *Orestias* species along feeding specializations within extreme climate ; the 7 valid species already described in Chile plus a Peruvian species related to *agassii* (*chungarensis*, *parinacotensis*, *piacotensis*, *laucaensis*, *puni* and cf. *agassii*, northerly, and *gloriae* and *ascotanensis*, southerly) inhabit (allopatrically) different freshwater systems with extreme climatic characteristics and different ecological conditions, factors that would have enhanced speciation ; the authors list head differences in terms of jaw morphology (putatively in line with different feeding habits), but, none of the external measurements by themselves allows systematic separation of any of the species or populations. 2020. EBL, https://link.springer.com/article/10.1007/s10641-020-00997-2] {Jean Huber, 24-June-2020} <°))))>< <°))))>< <°))))><
- Scott, S., P. Rojas & I. Vila. [The Vila team reviews morphomeristics of Altiplano *Orestias* species (7 valid) with possibly new sp. for Isluga, Huasco, Chuviri populations ; *Orestias* is an endemic fish genus of lacustrine and lotic systems distributed on the Andes highland region (Altiplano) of Peru, Bolivia and Chile (9°S to 22°S), at exceptionally high altitudes (ca. 400 m) ; based on morphological characters, previous authors recognize 7 species (*chungarensis*, *parinacotensis*, *piacotensis*, *laucaensis*, *puni*, northerly, and *gloriae* and *ascotanensis*) on the Chilean western southern Altiplano region (17°S to 22°S) ; the new morphological study is performed on 10 populations of *Orestias* in the southern Altiplano and 8 possible groups of populations appear distinct {cryptic} species, the new one being restricted to Huasco saltpan, but the authors refrain from naming it pending further trophic and genetic analyses. 2020. EBL, https://link.springer.com/article/10.1007/s10641-020-00995-4] {Jean Huber, 23-June-2020} <°))))>< <°))))>< <°))))><
- Cohen, S. & A. Silberbush. [Cohen and Silberbush show reduced mosquito oviposition due to kairomones by *Paraphanius mento* and (more) by introduced *Gambusia affinis* ; this lab and field study compares Culex responses to 3 fish, the invasive larvivorous *Gambusia affinis* (livebearer, Poeciliidae), native larvivorous *Aphanius mento* (oviparous {today in newly erected genus *Paraphanius*}) and native algivorous Garra rufa (non killifish, family Cyprinidae) ; the authors confirm previous results that introduced livebearers, because of similar feeding habits, compete with their oviparous counterparts in Cyprinodontiformes, phasing them out, and show that ovipositing mosquito females are significantly repelled only by cues originated from *affinis*, while developing larvae response is a more general one (note : this is a follow-up study but only with *Gambusia affinis* of Silberbush, A. & W.J. Resetarits. 2017. Mosquito female Response to the Presence of larvivorous fish does not match Threat to Larvae. Ecological Entomology, 42: 595-600). Predator-released kairomones indicating the presence of predatory fish are known to alter the behaviour and life-history traits of several aquatic herbivores. Culex mosquitoes (Diptera: Culicidae) respond to such cues by altering oviposition habitat selection and larval development time. These responses differ among fish species indicating composition differences among fish-released cues, but the recognition pattern is not clear. This study tested the dependence of fish recognition to co-

evolution and the level of threat to larvae. 2020. MVE, https://onlinelibrary.wiley.com/doi/abs/10.1111/mve.12457] {Jean Huber, 22-June-2020} <°))))>< <°))))>< <°))))><

- Frota, A., J.J. Morrone & W.J. da Graça. [Frota et al. study biogeography of *Anableps-Jenynsia* with 3 clades of which 2 in southern area related to Miocene and Quaternary ; the authors confirm that all 3 clades are marine-derived lineages and show, with area cladograms, that their present distributions are either related to Pacific {*Anableps dowii*} or Atlantic (*Anableps anableps* and *microlepis*) marine dispersals, or, to complex patterns, one in Southern Brazil + Uruguay river basin and the other in Northwestern Argentina + Midwestern Argentina, in 2 subclades mixing vicariance and dispersals (for *Jenynsia* components, all from freshwater), in those 2 cases resulting from marine transgressions and ancient connections between the Iguaçu and Upper Uruguay river basins. 2020. O.D.E., https://rd.springer.com/article/10.1007/s13127-020-00444-1] {Jean Huber, 20-June-2020} <°))))>< <°))))>< <°))))><
- Carbajal O.B., K.J.R. Olvera, G.M. Souza, O.Y.R. Duran, A.G. Ramirez & J.P.H. Ramirez. [Carbajal et al. show omnivorous feeding in 8 invasive pops of *Pseudoxiphophorus bimaculatus* in urban, reserve, dam, agricultural, mining landscapes ; this life-history study focuses on collections in the Lerma-Chapala and Panuco river Basins during dry season where industrialization and urbanization strongly impacts water faunas (but are considered as water reserves in Mexico) ; the diet of usually is composed of terrestrial, aquatic insects and bony fish, but can be widened according to opportunities (then as a specialist and secondary consumer) ; in total, this very opportunistic species changes its diet according the alterations in the habitat structure, water quality, and biotic integrity, probably a reason of its invasive nature {including after its artificial introduction in other regions of Mexico and other countries of its range, making difficult to separate natural and planted populations}. 2020. N.I., https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1679-62252020000200201] {Jean Huber, 16-June-2020} <°))))>< <°))))>< <°))))><
- Garcez, D.K., M.O. Fernandes, G.R. Ozorio, M.V. Volcan & L.J. Robe. [The Robe team molecularly discloses 8-10 clusters in genus *Cynopoecilus* (6 known taxa, 1 to be synonymized, 5+ putative new species) ; the present molecular study combines both nuclear and mitochondrial sequences for a sample of 280 and 275 specimens, respectively, plus DNA barcoding {it is a remarkable work, unusually very comprehensive for collecting localities, notably in southern Brasil, but not for Uruguay, and it is yet not known if speciation in Brasil is to be seen in Uruguay too} ; results show a subdivision of the studied specimens into 8-10 clusters, which comprise the previously described species (*feltrini*, *intimus*, *melanotaenia*, *nigrovittatus*, *notabilis*, while *multipapillatus* is already considered as a junior synonym of *melanotaenia* by describer himself, Costa), and suggest one new invalid taxon (*fulgens*, also as a junior synonym of *melanotaenia*) and at least 3–5 putative new species, presently only considered as new ESUs {to be named, in the near future, Lizandra Jaqueline Robe, personal communication to editor, June 2020}. 2020. JZSER, https://onlinelibrary.wiley.com/doi/abs/10.1111/jzs.12389] {Jean Huber, 15-June-2020} <°))))>< <°))))>< <°))))><

DATA WASSUP : PRINCIPLES, DISCLAIMERS AND LIMITED RESPONSIBILITY

Killi-Data Wassup is a service of information to members that does not aim to be comprehensive of whole Killifish research output (it presents only a subjective selection of articles, primarily those being coherent with Killi-Data focus on names, systematics and nomenclature), that is not regular, that separates clearly, the "selection of publications" (listed as last-in first-out) with (1) a full neutral synthesis for each major publication, (2) a quick snapshot of contents for other publications, (3) the results of new collecting trips (if

any reported to editor), AND, within a paragraph titled “View from the chair”, personal, but impartial and balanced comments raised from some of those 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.

Killi-Data Wassup is not a published document (there is no ISSN number). Hence this publication is disclaimed for purposes of Zoological Nomenclature, in accordance with I.C.Z.N. code, 4th edition, articles 8.3 and 8.4. (no new names, or nomenclature changes are available from statements in this publication, no systematic changes may be purported from statements in this publication, no statements in this publication may be quoted in any other media without prior formal permission. The section titled “View from the Chair” in this publication contains no criticism (and obviously no offense) whatsoever to authors by any means.

Conventions : everywhere in Killi-Data analyses, present form of verbs is used (not preterit), style synthetically restricts grammar (e.g., avoiding articles), names of countries are exclusively local (not English), standard parentheses as ‘()’ have their normal meaning while brackets ‘[]’ corresponds to attributions and accolades as ‘{}’ correspond to personal comments by K-D author-editor.