



Peer Community In Paleontology

A new study on the halecomorph fishes from the Triassic of Perledo (Italy) highlights important issues in Palaeoichthyology

Hugo Martín Abad based on peer reviews by **Guang-Hui Xu** and 1 anonymous reviewer

Adriana López-Arbarello, Rainer Brocke (2024) New generic name for a small Triassic ray-finned fish from Perledo (Italy). *PaleorXiv*, ver. 4, peer-reviewed and recommended by Peer Community in Paleontology. <https://doi.org/10.31233/osf.io/bxmg5>

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Mesozoic fishes are extremely diverse. In fact, fishes are the most diverse group of vertebrates during the Mesozoic—just as during any other era. Yet, their study is severely underrepresented in comparison to other fossil groups. There are just too few palaeoichthyologists to deal with such a vast diversity of fishes. Nonetheless, thanks to the huge efforts they have made over the last few decades, we have come a long way in our understanding of Mesozoic ichthyofaunas. One of such devoted palaeoichthyologists is Dr. Adriana López-Arbarello, whose contributions have been crucial in elucidating the phylogenetic interrelationships and taxonomic diversity of Mesozoic actinopterygian fishes (e.g., López-Arbarello, 2012; López-Arbarello & Sferco, 2018; López-Arbarello & Ebert, 2023). In her most recent manuscript, Dr. López-Arbarello has joined forces with Dr. Rainer Brocke to tackle the taxonomy and systematics of the halecomorph fishes from one of the most relevant Triassic sites, the upper Ladinian Perledo locality from Italy (López-Arbarello & Brocke, 2024).

Fossil fishes were reported for the first time from Perledo in the first half of the 19th century (Balsamo-Crivelli, 1839), and up to 30 different species were described from the locality in the subsequent decades. Unfortunately, this is one of the multiple examples of fossil collections that suffered the effects of World War II, and most of the type material was lost. As a consequence, many of those 30 species that have been described over the years are in need of a revision. Based on the study of additional material that was transferred to Germany and is housed at the Senckenberg Research Institute and Natural History Museum, López-Arbarello & Brocke (2024) confirm the presence of four different species of halecomorph fishes in Perledo, which were

previously put under synonymy (Lombardo, 2001). They provide new detailed information on the anatomy of two of those species, together with their respective diagnoses. But more importantly, they carry out a thorough exercise of taxonomy, rigorously applying the International Code of Zoological Nomenclature to disentangle the intricacies in the taxonomic story of the species placed in the genus *Allolepidotus*. As a result, they propose the presence of the species *A. ruppelii*, which they propose to be the type species for that genus (instead of *A. bellottii*, which they transfer to the genus *Eoeugnathus*). They also propose a new genus for the other species originally included in *Allolepidotus*, *A. nothosomoides*. Finally, they provide a set of measurements and ratios for *Pholidophorus oblongus* and *Pholidophorus curionii*, the other two species previously put in synonymy with *A. bellottii*, to demonstrate their validity as different species. However, due to the loss of the type material, the authors propose that these two species remain as *nomina dubia*.

In summary, apart from providing new detailed anatomical descriptions of two species and solving some long-standing issues with the taxonomy of the halecomorphs from the relevant Triassic Perledo locality, the paper by López-Arbarello & Rainer (2024) highlights three important topics for the study of the fossil record: 1) we should never forget that world-scale problems, such as World Wars, also affect our capacity to understand the natural world in which we live, and the whole society should be aware of this; 2) the importance of exhaustively following the International Code of Zoological Nomenclature when describing new species; and 3) we are in need of new palaeoichthyologists to, in Dr. López-Arbarello's own words, "unveil the mysteries of those marvellous Mesozoic ichthyofaunas."

References:

Balsamo-Crivelli, G. (1839). Descrizione di un nuovo rettile fossile, della famiglia dei Paleosauri, e di due pesci fossili, trovati nel calcare nero, sopra Varenna sul lago di Como, dal nobile sig. Ludovico Trotti, con alcune riflessioni geologiche. Il politecnico repertorio mensile di studj applicati alla prosperita e cultura sociale, 1, 421–431.

Lombardo, C. (2001). Actinopterygians from the Middle Triassic of northern Italy and Canton Ticino (Switzerland): Anatomical descriptions and nomenclatural problems. *Rivista Italiana di Paleontologia e Stratigrafia*, 107, 345–369. <https://doi.org/10.13130/2039-4942/5439>

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López-Arbarello, A., and Brocke, R. (2024). New generic name for a small Triassic ray-finned fish from Perledo (Italy). *PaleorXiv*, bxmg5, ver. 4, peer-reviewed by PCI Paleo. <https://doi.org/10.31233/osf.io/bxmg5>

López-Arbarello, A., and Ebert, M. (2023). Taxonomic status of the caturid genera (Halecomorphi, Caturidae) and their Late Jurassic species. *Royal Society Open Science*, 10(1), 221318. <https://doi.org/10.1098/rsos.221318>

López-Arbarello, A., and Sferco, E. (2018). Neopterygian phylogeny: The merger assay. *Royal Society Open Science*, 5(3), 172337. <https://doi.org/10.1098/rsos.172337>

Reviews

Evaluation round #1

DOI or URL of the preprint: <https://doi.org/10.31233/osf.io/bxmg5>

Version of the preprint: 1

Authors' reply, 17 May 2024

Dear Dr. Martín-Abad,

We are very thankful for the useful suggestions made by the two reviewers and yourself, and have carefully revised the original version of the manuscript accordingly. We incorporated most of the corrections and suggestions, but we disagree on a few of points, which we refute in the corresponding sections following this message.

Thank you for your dedication to our manuscript, we hope you'll find this new version appropriate for publication!

Best regards,

Adriana López-Arbarello

Revision round #1

- Line 100: Is the spelling "ruppelli" correct? Might it be missing an "e"?

Thanks for calling our attention on this! There was actually a mistake, but not the "e". Bellotti spelled the name "PHOLIDOPHORUS RUPPELLII" The name was later 'corrected' to 'rüpelli' or 'ruepelli', but dealing with another case, I recently check The Code and found out that there is no need and it would not be right to change the original spelling in this case. This is clearly explained in the ICZN Art. 32.5 (see also the example). We now added a note to explain this issue in the Remarks subsection.

- Line 153: There seems to be something repeated: upper Ladinian, Middle Triassic late Ladinian.
Corrected.

- Lines 157 and 202: First it is stated that there is ganoin present on the tubercles, but later it is said that there is no evidence of ganoin.
Corrected.

- Line 226: I think Jugal does not need to be capitalized.
Corrected.

- Lines 370-372 and figure 5: I am not sure if the small specimen would really fit within the trend shown by the *E. megalepis* specimens. The specimen is much smaller than the *E. megalepis* specimens examined, so if it would fit their trend, I would expect it to show a much larger difference; the PreA/SL value is only slightly smaller than that of the smallest *E. megalepis* specimen, and the PreD/SL is basically the same for both specimens. Of course, it would depend on the growth pattern of the species, and it could totally be possible that it would show changes on growth throughout ontogeny and therefore fit within the trend; but that argument could also be used just the other way around. Therefore, I think that the suggestion of the small specimen possibly representing a smaller *E. megalepis* individual should be taken with a grain of salt.

We rephrased this section attending to your comment and suggestion. Although it is true that the small MSCNIO P669 is significantly smaller than the smallest studied specimen of *E. megalepis*, it still plots along the trend of ontogenetic variation, i.e. left to and roughly at the same slope than the *E. megalepis* specimens in Fig. 5a. The type of *A. ruppelii* plots very close to MSCNIO P669 in this figure, but it is significantly larger. Considering its size, if it would follow the trend, it would plot close to the 87,5 mm SL of *E. megalepis*.

- Figure 6: Following the previous comment, the small "*S. bellottii*" specimen does not seem to fit in any trend with the *E. megalepis* specimens in this figure. Also regarding this figure, I would suggest to place the two graphs side-by-side, instead of one on top of the other, to save some space. And also perhaps it would be easier to place the specimens in the same order in both graphs.

We changed the figure placing the charts side by side, and reordered the taxa following your suggestion.

- Line 388: is the spelling correct in "curioni" here? Might it be missing an "i"?

Haeckel listed the species as "Palaeoniscus curioni" with one "i" and it was taken literally by Bellotti (1873) and Bassani (1886). However, the name becomes available with De Alessandri (1910), who wrote "Pholidophorus curionii". Although this is the correct original spelling, it would not be correct to change the spelling used by previous authors. Anyway, thanks for calling our attention on this because it was necessary to delete one "i" from the name at the beginning of the paragraph.

- Lines 469-474: The enumeration of the five synapomorphies of the clade Subortichthyidae are not clear to me. Three are denoted with an asterisk in the previous paragraph. Another one, the posterior end of the maxilla located posterior to the orbit, is listed but I do not understand why it is not also denoted in the previous paragraph. And then you mention that there are two more, but only one is explained (which is in fact already mentioned at the beginning of the previous paragraph). I would suggest trying to re-write these two paragraphs so that it is more clearly explained which are the 9 diagnostic characters of the clade, which of them are present in the studied species, and which are not.

We rephrased these paragraphs following your suggestion.

Review by anonymous reviewer 1, 18 Apr 2024 15:54

Small typos or suggested changes to wording have been highlighted in yellow and comment stickers in the attached PDF of the manuscript.

Corrected.

Check the reference list versus the text, I could not find a few citations. I have left little comment stickers on the ones I could not find.

Corrected.

Terminology for Skull Roofing Bones

The authors should reconsider the use of a terminology based on tradition for the bones of the skull roof, specifically frontal and parietal. The terms parietal and postparietal should be used because it is terminology based on homology rather than tradition. If the authors do not want to change the terminology in the text because of previous publications using those terms for other halecomorph taxa, perhaps they can use parietal (frontal) and postparietal (parietal) so that both sets of terms are used. There seems to be examples of other authors describing these bones in other halecomorph fishes in this fashion (Arratia & Herzog, 2007). A description can be added to the materials and methods describing that the term in the parentheses is terminology based on tradition. If this method is not preferred, maybe an explanation can be added in the text that the terms frontal and parietal are being used in the text in the traditional sense so that comparisons to previous publications is easier, but that these bones would be referred to as parietal and postparietal if a terminology based on homology was used. Schultze 2008 and Wiley 2008 could be good citations for a review of the terminology of skull roofing bones.

Schultze's anatomical nomenclature is based on hypotheses of homology that I do not accept and therefore have never used. Similarly, Schultze's nomenclature has not been adopted by the majority of Mesozoic fish workers and most ichthyologists. The homologies of several bones in the skull of ray-finned fishes are problematic and have been debated for over a century.

As we utilize the anatomical nomenclature employed by the majority of our colleagues, there is no necessity for us to elucidate the reasons behind our divergence from Schultze's nomenclature. Were we to do so, we would be compelled to justify our rejection of other terms proposed by other authors, a process that would not only significantly extend the manuscript, but also present considerable challenges. A formal rejection of one of the alternative nomenclatures would necessitate a comprehensive analysis and discussion, which would

require a separate paper. Consequently, we have chosen not to follow this recommendation.

Figure 3

I like the overlay of the line drawing over the photograph of the specimen as that is helpful to translate the interpretation to the specimen itself but I would suggest the authors also consider adding a part C to this figure that has the line drawing alone to make it a little easier to view. I am not recommending the removal of the overlay of the drawing over the photograph but the addition of just the line drawing as an additional part of Figure 3.

We added a part C to Figure 3 as requested.

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Decision by [Hugo Martín Abad](#), posted 29 April 2024, validated 30 April 2024

New generic name for a small Triassic ray-finned fish from Perledo (Italy) - Minor revisions

Dear authors,

Thank you for submitting your manuscript to PCI Paleo, I find it an interesting contribution to the field of Palaeoichthyology. The work presented in the manuscript is carefully developed and well explained, supported on sound and verifiable data, and accompanied by useful figures. It is specially notable the way in which you have managed to easily explain the very complicated taxonomic history of the fossil fishes, with a complete account of previous works, as well as the expanded detailed anatomical description provided for one of the species.

The manuscript has now been reviewed by two specialists, who have provided valuable, constructive comments that I think you will find useful to improve the text and figures. You will see that, overall, they are minor revisions. I agree with the comments and suggestions provided by the two reviewers (I have also taken the liberty of adding a few more myself below), and I hope you will take them into account to create a revised version of your manuscript.

Thank you for your effort on expanding our knowledge on Mesozoic fish faunas, and for considering PCI Paleo as the adequate forum to submit it to.

Sincerely,

Hugo Martín-Abad

Additional suggestions:

- Line 100: Is the spelling "*ruppelli*" correct? Might it be missing an "e"?
- Line 153: There seems to be something repeated: upper Ladinian, Middle Triassic late Ladinian.
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Reviewed by [Guang-Hui Xu](#), 18 April 2024

The authors made a taxonomic revision of '*Allolepidotus*' *nothosomoides*, redescribed and compared it with other members of the halecomorph family Subortichthyidae. I recommend the publication of this manuscript with a few minor revisions. My comments are denoted directly in the attached PDF. **Responses to suggested review questions** *Title and abstract*

- Does the title clearly reflect the content of the article? **Yes**

Introduction

- Are the research questions/hypotheses/predictions clearly presented? **Yes**
- Does the introduction build on relevant research in the field? **Yes**

Materials and methods

- Are the methods and analyses sufficiently detailed to allow replication by other researchers? **Yes**
- Are the methods and statistical analyses appropriate and well described? **Yes**

Results

- In the case of negative results, is there a statistical power analysis (or an adequate Bayesian analysis or equivalence testing)? **Yes**
- Are the results described and interpreted correctly? **Yes**
- Have the authors appropriately emphasized the strengths and limitations of their study/theory/methods/argument? **Yes**
- Are the conclusions adequately supported by the results (without overstating the implications of the findings)? **Yes**

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Reviewed by anonymous reviewer 1, 18 April 2024

The manuscript *New generic name for a small Triassic ray-finned fish from Perledo (Italy)* is an important paper to publish because it tackles taxonomic revisions of halecomorph species from an important Triassic locality and provides a more detailed morphological description of a taxon transferred to a new genus. This manuscript also provides a detailed accounting for the taxonomic history of the actinopterygian taxa from this site. This type of taxonomic work and revising morphological descriptions is important for the field of paleoichthyology

and is worthy of publication. This work will help spur future work and understanding of the diversity of this locality. It is an important paper to publish but a few changes could be made or considered. These changes are detailed below and/or in a PDF copy of the manuscript with highlights and comment stickers.

General

- Small typos or suggested changes to wording have been highlighted in yellow and comment stickers in the attached PDF of the manuscript.
- Check the reference list versus the text, I could not find a few citations. I have left little comment stickers on the ones I could not find.

Responses to Suggested Review Questions

Title and abstract

- Does the title clearly reflect the content of the article? **Yes**
- Does the abstract present the main findings of the study? **Yes**

Introduction

- Are the research questions/hypotheses/predictions clearly presented? **Yes**
- Does the introduction build on relevant research in the field? **Yes**

Materials and methods

- Are the methods and analyses sufficiently detailed to allow replication by other researchers? **Yes**
- Are the methods and statistical analyses appropriate and well described? **Yes**

Results

- In the case of negative results, is there a statistical power analysis (or an adequate Bayesian analysis or equivalence testing)? **N/A**
- Are the results described and interpreted correctly? **Yes**

Discussion

- Have the authors appropriately emphasized the strengths and limitations of their study/theory/methods/argument? **Yes**
- Are the conclusions adequately supported by the results (without overstating the implications of the findings)? **Yes**

Specific Suggestions

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The authors should reconsider the use of a terminology based on tradition for the bones of the skull roof, specifically frontal and parietal. The terms parietal and postparietal should be used because it is terminology based on homology rather than tradition. If the authors do not want to change the terminology in the text because of previous publications using those terms for other halecomorph taxa, perhaps they can use parietal (frontal) and postparietal (parietal) so that both sets of terms are used. There seems to be examples of other authors describing these bones in other halecomorph fishes in this fashion (Arratia & Herzog, 2007). A description can be added to the materials and methods describing that the term in the parentheses is

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Arratia, G. & Herzog, A. 2007. A new halecomorph fish from the Middle Triassic of Switzerland and its systematic implications. *Journal of Vertebrate Paleontology* 27(4):838-849.

Schultze, H.-P. Nomenclature and homologization of cranial bones in actinopterygians, in: *Mesozoic Fishes 4—Homology and Phylogeny*, edited by: Arratia, G., Schultze, H.-P., and Wilson, M.V. H., Verlag Dr. Friedrich Pfeil, München, 23–48, 2008.

Wiley, E. O. 2008. Homology, identity and transformation; pp. 9–21 in G. Arratia, H.-P. Schultze, and M. V. H. Wilson (eds.), *Mesozoic Fishes 4—Homology and Phylogeny*. Verlag Dr. Friedrich Pfeil, München, Germany.

Figure 3

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