

Review of: "Cambrian Chordates and Early Fin Evolution"

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Potential competing interests: No potential competing interests to declare.

The article essentially consists of an Introduction and a Conclusion (which should be a Discussion). We do not receive any concrete information, except for data of the intermediate (?) results of preparation of the paleontological sample. The significance of these data is obscured by a very laconic presentation.

Abstract

In Abstract, Keywords and other parts of the paper, there are dots instead of the proposed family name. I think it is needed to suggest the name of the family.

In keywords, no need to repeat the phrase 'fin evolution' from the title. It is better to give some other word instead, which does not occur in the title, but can also be useful for searching.

Introduction

'The deuterostome body plan is in stark contrast to that of the protostomes, with its gut that runs backwards (with respect to the protostomous condition), and a body plan that is essentially upside down (with a dorsal as opposed to ventral nerve chord).'

It is not clear why the gut running backwards is a characteristic of the deuterostomes. There is such a gut in both protostomes (for example, Annelida, Ecdysozoa) and deuterostomes (Cephalochordata, Hemichordata). It is even more unclear why, according to the author, the upside-down inversion is characteristic of the deuterostomes. Inversion is peculiar only to Chordata, and by no means to all deuterostomes (Hemichordata and Echinodermata have no inversion). And it is necessary to refer to the work here:

Malakhov V.V. The problem of the basic structural plan in various groups of Deuterostomia // Zhurnal Obshchei Biologii (Journal of General Biology). 1977. Vol. 38. P. 485-499.

'Deuterostomes are presumably descended from the protostomes.' This is a fundamentally incorrect statement. The deuterostomes branched off from the common Triploblastica tree at the earliest stage (see, for example, **Dunn C.W., Giribet G., Edgecombe G.D., et al.** Animal phylogeny and its evolutionary implications, Ann. Rev. Ecol. Evol. Syst., 2014, vol. 45, pp. 371–395; **Telford M.J., Budd G.E., and Herve P.** Phylogenomic insights into animal evolution, Curr. Biol., 2015, no. 25, pp. R876–R887). It can be argued that the deuterostomes and the protostomes descended from a common ancestor, but in no case can it be argued that the deuterostomes descended from the protostomes. Either the author has

confused something in this point, or I have misunderstood the idea expressed here.

'The list of vertebrate features in *Mylokunmingia* is extensive: craniate condition, notochord, distinct head region, pericardial cavity with pharynx, cartilage internal skeleton, myomeres with chevrons, dorsal fin, and a paired ventral fin.'

I don't understand what does the 'pericardial cavity with pharynx' mean. The pharynx located in the pericardium? A pericardium equipped with a pharynx? The pharynx of the deuterostomes is an endodermal derivative. The pericardium is a mesodermal vesicle. What is meant by 'pericardial cavity with pharynx'?

'Myomeres have been described from another bilaterian deuterostome from the Chengjiang biota, *Shenzianyloma yunnanense* McMenamin, 2019 (Fig. 1).' If such a statement follows, accompanied by a Figure, then it will be nice to indicate these myomeres in the Figure or give a drawn copy of the Figure 1, where all the structures mentioned in the text are indicated.

'*Shenzianylomais* assigned' - missing a space.

'Figure 1. *Shenzianyloma yunnanense* McMenamin, 2019. View of the holotype, showing freshly prepared area in the ventral region of the tail (thick arrow); possible ~~possible~~ ventral fin ray box (thin arrow); and possible dorsal fin spine (star). Scale bar = 1 cm' - repeated word.

Materials & Methods

It is not specified where exactly the studied material was taken from, what tools were used for preparation, etc. It will be difficult for a reader who does not know the holotype to understand the characteristics of the material. In another work of the author, an excellent characteristic of the material is given. The following characteristic should also be given here:

'A specimen of *Shenzianyloma yunnanense* is from the early Cambrian Chengjiang Biota (Burgess Shale-Type (BST) deposit; Maotianshan Shale, 518 Ma). Although the exact locality of the holotype is unknown, a specimen of the brachiopod *Diandongia pista* occurs on the same slab, in accordance with matrix characteristics (yellow shale), indicating that the specimen is indeed derived from the Maotianshan Shale. The fossil was acquired in February 2019 from a crystal and fossil vendor located in Lianyungang, Jiangsu, China.'

Results

"A possible ~~possible~~ ventral fin ray box occurs on the ventral part of the *Shenzianyloma* tail (Figure 2)" - repeated word.

Discussion

In its current form, the Discussion should be combined with the Results.

Figure 4 should be flipped (mirrored) so that the animal is positioned there in the same way as in all other images in the work, and it should be combined with Figure 3, since they illustrate the same thing, just obtained in different ways.

Conclusion

This part is essentially a Discussion.

The statement '*Shenzianyuloma* lacks arthropod-like segmentation in the posterior part of its body' needs an explanatory diagram showing what is 'arthropod-like segmentation' and how the segmentation (myomeres) in the posterior part of the *Shenzianyuloma* differs from it.

By the way, clear explanatory diagrams are also needed for the declared 'fin evolution'.

Constant comparisons with the previous reconstruction on the same holotype are not very appropriate, since doubt immediately arises: what will be found at the next preparation, and during the next one? Does it make sense to publish data on each next stage of preparation of the holotype? Maybe it's better to conduct a full preparation and then publish the obtained results?

'The revised reconstruction of *Shenzianyuloma* is sufficiently unique to require the erection of the new family ... within Class Vetulicolida.' If it constantly comes up that it is necessary to erect a new family, then author should to name this family, describe its diagnostic signs, etc. Now it turns out that we see the small intermediate result of routine work and only the hints at what this result could lead to. Reading a comparative anatomical article with a claim to identify a new taxon, we would like to get more definite, accurate comparative and taxonomic data.