

AFFINITY OF DAYIACEAN BRACHIOPODS

by J. G. JOHNSON

ABSTRACT. A recent proposal to assign the dayiacean brachiopods to the Athyridoidea is rejected. A new suborder Dayioidea is proposed.

COPPER (1973) has recently suggested a radical revision of the systematic placement of the dayiacean brachiopods, i.e. genera of the families Dayiidae, Anoplothecidae, Kayseriidae, and Leptocoeliidae. His studies centred particularly around the genera *Bifida* Davidson and *Kayseria* Davidson. Copper maintained that the dayiaceans belong not with the atrypids, but instead should be reassigned to the suborder Athyridina (*sic*).

That the dayiaceans are distinct from atrypaceans there is no doubt; that is the basis for their separation at superfamily level. This being readily stipulated does not necessarily lead to the second conclusion—that dayiaceans are athyridids. To me there are as many, or more, reasons that show dayiaceans to be distinct from athyridids as from atrypaceans. Copper's reasons for suggesting a dayiacean-athyridid alliance invite the closest scrutiny.

Copper (1973, p. 118) noted that all dayiaceans are small brachiopods and this is true, but he also said, 'the small size factor seems to hold generally true also for most athyridids'. The quoted statement is misleading; *Cryptothyrella*, *Meristina*, *Meristella*, and many species of *Athyris* itself are relatively large. A valid generalization is that athyridids comprise genera and species representing a wide range in size.

Copper (1973, p. 118) noted that all dayiaceans lack a large pedicle opening and that they therefore were not primarily pedicle-supported brachiopods. This is true and it is surprising that Copper did not also point out that a large pedicle foramen is an athyridid hallmark. This attribute of the athyridid suborder is clearly noted in the Treatise diagnosis (Boucot *et al.*, in Moore 1965, p. H654). In page 119 Copper seems to say that athyridids lack or have a very small pedicle opening but his statement is ambiguous.

Copper (1973, p. 119) noted that athyridids are identified by, among other things, 'their relatively rounded shape', but many dayiaceans are costate or plicate, as are atrypids. Copper regards 'the radial rib structure' of some dayiaceans as 'superficial'. Why is this superficial? Because there are smooth and ribbed atrypids? Why then attempt to point to supposed exceptions by suggesting that *Atrythyris* Struve is ribbed? In fact *Atrythyris*, like *Pradoia* Comte, has radial lirae on an otherwise smooth surface.

In his discussion of the superfamily Dayiacea Copper (1973, p. 120) reported, 'Nearly all dayiaceans show a jugal saddle and accessory lamellae extending posteriorly from the jugal saddle. This feature is identical to that of the true athyridids (see Williams and Rowell 1965, p. H103).' The truth is that *no known dayiacean has a jugal saddle*. The very Treatise figure to which Copper pointed (Williams and

Rowell, *in* Moore 1965, p. H103, fig. 108) correctly shows that a jugal saddle is an anterior projection from a simple band-like jugum. Copper's own illustrations on pp. 121, 122 (text-figs. 1, 2) show *Bifida* and *Kayseria* each without a jugal saddle. A similar lack of jugal saddle is evident in photographs of *Coelospira* Hall (Boucot and Johnson 1967, pl. 166, figs. 20, 21). Copper's misunderstanding of jugal terminology is unfortunate, but no matter what names are applied to these structures it is impossible to agree with Copper's contention that they are 'identical' in dayiaceans and athyridids.

Leaving behind the question of jugal saddle, there remains Copper's contention (1973, p. 120) that, 'nearly all dayiaceans show . . . accessory lamellae'. One way to achieve this is by labelling; thus in Copper's text-fig. 1 what is commonly called a jugal stem (Williams and Rowell, *in* Moore 1965, pp. H103, H146) is labelled an 'abortive accessory lamella', which is like saying the fossil would have lamellae if it had lamellae. In fact only *Kayseria* of all dayiacean genera has accessory lamellae.

With these points in mind Copper's conclusions (pp. 136, 137) may be evaluated.

1. It is contended by Copper that *Bifida* and *Kayseria* have 'wedge-like crural bases instead of ball-like crural bases, as in atrypids'. It is impossible for atrypids to have 'ball-like' crural bases. Atrypid crural bases commonly appear subcircular in cross-section, but there is nothing in Copper's sections (text-figs. 3, 5) of *Bifida* or *Kayseria* that suggests to me any fundamental difference.

2, 3, and 6. These points made by Copper are part of the admitted differences between dayiaceans and atrypiceans and are why these taxa have been regarded as distinct and separate superfamilies. They fail as reasons to include dayiaceans in the Athyridoidea.

4 and 5. Copper here points to two unique structures, one of *Kayseria* and one of *Bifida*, and says they are 'absent in atrypids'. They also do not occur in any other dayiacean genus.

7 and 8. These points seem inconsequential to me.

My own conclusion is that because of much work on atrypid morphology, prominent among which is Copper's own, the group has grown while its recurring structures have become much better known. Copper has called, in essence, for a purification of the hierarchy to which the atrypid name shall be applied. To achieve this he has pointed to the contrasting features of dayiacean and atrypicean morphology. These are legion and are undeniable. However, Copper's solution as to where the ousted superfamily should reside is ill-considered.

As an alternative to inclusion of the dayiaceans in the Athyridoidea I propose a new suborder Dayioidea and suggest that its inherent morphologic structures are as characteristic and different as are the structures of the other spiriferid suborders, viz. Spiriferoidea, Retzioidea, Athyridoidea, and Atrypoidea, such that its recognition is fully justified.

I therefore append a diagnosis as follows:

Suborder DAYIOIDEA

Diagnosis. Spiriferida with costate or smooth, impunctate shells, lacking interareas

and having foramen within the delthyrium; spiralia directed ventrally, laterally, or planospiral parallel to the median plane, or not calcified; jugum present or absent, jugal saddle not developed.

REFERENCES

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