

Dictyonema – Rhabdinopora

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Erdtmann's recently proposed classification of the Tremadoc dendroid graptolites and, in particular, the splitting of the genus *Dictyonema* into benthic (*Dictyonema*) in planktic (*Rhabdinopora*) forms are discussed. In view of the lack of significant details concerning structure, especially in the type species, this distinction seems very premature.

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In a recent paper, Erdtmann (1982) proposed a reorganization of the classification of Tremadoc dendroid graptolites. According to him, the new classification better fits the assumed phylogeny of various taxa.

This interesting paper includes such a large number of taxonomic innovations that it is difficult here to analyse every one. Also, the proposed phylogeny brings up several points to be discussed; for example, the position of *Bryograptus pattens* Matthew, the ancestor of the *Dictyonema* of the *D. flabelliforme* group (*Rhabdinopora* of Erdtmann) is extremely hypothetical. In fact, at the type locality of St. John (New Brunswick), Matthew (1893, 1895) ascribes this species to the *Dictyonema* Zone. The author has sampled in detail the lower part of this zone in order to study the Cambrian – Ordovician boundary, and has never found this species. It is therefore very probable that it belongs to the upper part of the *Dictyonema* Zone. Also, it was described in association with *Dictyonema rusticum* (?) by Bulman (1950) from the material collected by Charles Lapworth in the Cape Rosier Section. Finally, a very similar fauna, perhaps even the same (a revision of the species is necessary), was quoted as being above the *D. flabelliforme* fauna in the Algerian Sahara (Legrand 1973). In fact, it seems that some reservation must be made as regards the occurrence of *Radiograptus* before that of *Dictyonema* of the *D. flabelliforme* group since at Cape Rosier (Gaspésie), its type locality, the species is associated with Anisograptidae (Bulman 1950).

Whatever the case may be, this note examines only the problem arising from the restriction by Erdtmann of the name *Dictyonema* for the typical benthic species and the resurrection of the genus

Rhabdinopora for every taxon of the planktic *D. flabelliforme* group.

The genus *Dictyonema*

The author (Legrand 1978, 1983) has recently pointed out that the type species of *Dictyonema* Hall, 1851 is *Gorgonia retiformis* Hall, 1843 designated by Miller in 1889. This choice is very unfortunate, as Ruedemann (1947, p. 184) has already pointed out. In fact, this species is rare and many morphological details are unknown. In particular, the proximal part is lacking in the lectotype (cf. Hall, 1852, pl. 40, fig. 1a, reproduced by Ruedemann 1908, pl. 3, fig. 1) and is badly preserved in the syntype figured by Hall 1865 (p. 12, fig. 10). It is therefore possible that *Gorgonia retiformis* might have been a benthic species attached to the substratum. In fact, this type species has never been revised and a careful study of the genus should begin with this species.

The genus *Rhabdinopora*

This genus was created by Von Eichwald in 1855 for the species *flabelliformis* that he first ascribed to the genus *Gorgonia* (thinking that it was an alcyonarian), then to the genus *Fenestella* (thinking it was a bryozoan). A long history ensued for this species (resumed by Erdtmann 1982), with the names *Phyllograptus* (Angelin 1854), *Graptopora* (Salter 1858), *Dictyograptus* (Hopkinson & Lapworth 1875), *Damesograptus* (Jahn 1892) and *Dictyodendron* (Westergard 1909) successively proposed. The assignment to the genus *Dictyonema* proposed for the first time by Schmidt (1858), was definitely accepted in 1927 through the work of Bulman.

In contrast to the species *retiformis*, the species *flabelliforme* and similar species, subspecies or forms are very well known through the studies of Bulman (1927a), even if certain problems have still not been resolved (Legrand 1974). Details of the proximal part, and of budding have been described, as have different aspects of the organs that probably enabled the colony to fix itself to a rigid or mobile support, or to float (Bulman 1927a; Stormer 1933, 1945; Bulman & Stormer 1971). The prevailing opinion at the present time is that the flabelliforme group is a collection of planktonic species.

Dictyonema – Rhabdinopora

The extensive vertical range of *Dictyonema* (Upper Cambrian to Carboniferous) has encouraged numerous workers to subdivide the genus. In view of the lack of clear and accurate morphological features to permit a subdivision, Bulman (1927b) distinguished between Cambrian (including Tremadoc species), Ordovician and Silurian *Dictyonema*. Now Erdtmann (1982), using a phylogenetic hypothesis that still requires confirmation, proposes to restrict the name *Dictyonema* for benthic forms and *Rhabdinopora* for planktic forms.

This subdivision appears improbable for the following reasons:

1. A good taxonomy must be based on facts, i.e. morphological characters and not on the interpretation of these facts which deprives it of all stability. The distinction between the benthic and pelagic *Dictyonema* is based, with very few exceptions, on the interpretation of morphological details of the proximal part. For example, is the difference between the “fibrous holdfast structures” that would have been utilised to fix the benthic species on a soft substrate, and the “bundled nemetic fibres” that the supposed pelagic species exhibit, sufficient to distinguish two genera from different families?

The author has been fortunate with samples from the Sahara, to be able to compare the appearance of specimens surrounded by matrix with those isolated from the matrix and has shown how much the reality was different from what was apparent. Thus, extremely precise and detailed observations are required before one can evaluate details of the proximal ends and possible holdfasts.

2. Also, it is questionable whether the ecological difference between living in the benthic or in the pelagic domain is sufficient to distinguish two genera. This criterion would be valid if the difference in habitat were reflected by important morphological differences. However, this is not the case, since the identity of the shape of thecae in the colonies living with their proximal part upward (pelagic) or downward (fixed colonies) is one of the great problems surrounding the interpretation of graptolitic paleobiology and evolution. The solution of this anomaly, which we can call the *Dictyonema* paradox, has been discussed by Kirk (1969, 1972) and concerns the mobility of graptolites and her interpretation of *Dictyonema flabelliforme* floating with its sicula downward and in the same position as the fixed species.

This plasticity of behaviour suggests a minor difference between the animals of the two environments. Also, to our knowledge, a proliferation of supposed fixed *Dictyonema* by the budding of new rhabdosomes has never been observed. This indicates a more or less pelagic phase during the larval or juvenile stage.

Therefore, should we consider the possibility of classifying juvenile stages and adult stages in a different genera and in different families?

Conclusion

Only the concept of species is natural. The genus is a more or less artificial human invention; every discussion about the genus is therefore relatively academic. It is not by creating a new taxonomy that we can further our knowledge of *Dictyonema*, but rather by patient collecting and the detailed study of well preserved specimens. Furthermore better material of the type species is needed as a first step.

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