

# The systematic position of the Middle Cambrian fossil *Eldonia*

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## Abstract

The interpretation of *Eldonia*, WALCOTT, 1911, as a siphonophore is maintained, and a new suborder of Siphonophorida, the Eldoniina, erected.

The order of Siphonophorida (class Hydrozoa within the Cnidaria) comprises a number of types which have been grouped somewhat differently by different authors. HARRINGTON & MOORE (1956) recognize in the Treatise on Invertebrate Paleontology four suborders: the Calycophorina, Physophorina, Rhizophysalina, and Condrophorina, of which the latter three are sometimes united into one group by other authors, viz. the Physophora or Physophorida sensu late.

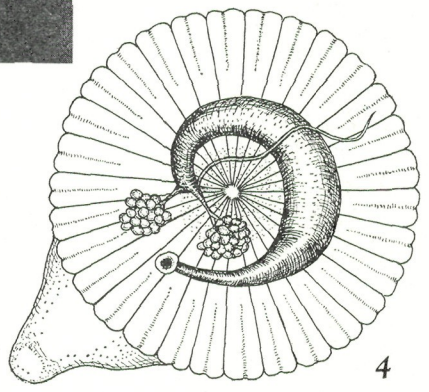
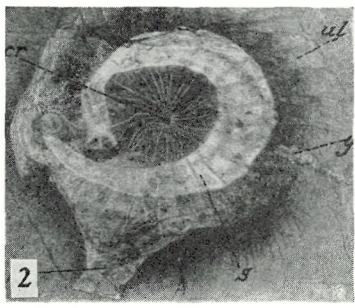
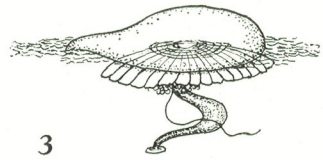
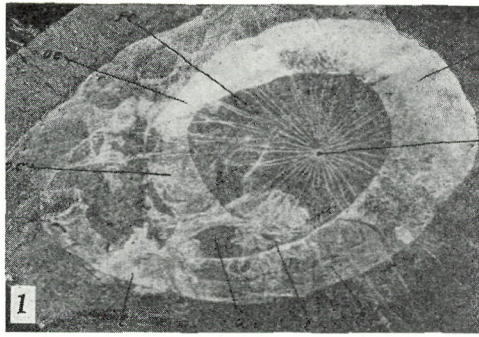
The Middle Cambrian fossil, *Eldonia ludwigi* WALCOTT, 1911, in the writers opinion is a solitary siphonophore which may be referred to the Physophora, but for which a new suborder, the Eldoniina (with the family Eldoniidae), will need to be erected. This suborder may be diagnosed as follows:

*Eldoniina*: Solitary siphonophorids with a large siphon, two gonodendra, (a single tentacle?), and probably a protective circle of bracts plus a large pneumatophore (or a large bilateral floating and swimming bell).

WALCOTT (1911) who originally described *Eldonia*, considered it to be a pelagic holothurian; an interpretation supported by A. H. CLARK (1912), but strongly criticized by H. L. CLARK (1912). However, no other definite suggestion as to the nature of the organism was given until 1956 when it was interpreted by the writer as being a siphonophore. A brief summary of this interpretation may be appropriate.

The type-specimen of *Eldonia* is shown in the photograph fig. 1. The photograph fig. 2 shows another of WALCOTT's specimens, while the drawings in figs. 3-4 suggest the possible appearance of the organism when alive; as seen from the side, floating at the surface, and from below, corresponding to the position usually represented by the imprints in the Burgess shale. (These drawings are slightly amended revisions of those published by the writer in 1956.)

The prominent curved organ (considered by WALCOTT to be the alimentary canal of a pelagic holothurian) is the siphon (or gastrozoid). It shows the three different sections (evidenced in the fossils by a different lustre) in the siphon of the recent siphonophores: the proboscis (intestine after WALCOTT) which ends in a suctorial disc, the stomach proper (stomach and



oesophagus after WALCOTT), and the basal part (oral chamber after WALCOTT).

The two organs shaped like clusters of grapes at the base of the siphon in the type-specimen (also seen in several other specimens) are the gonodendra (gonozooids), perhaps a male and a female respectively (WALCOTT considered them to be a pair of tentacles). A thread-like basal tentacle seems discernible in the type-specimen.

Further, the fossils show the imprint (especially distinct in the specimen fig. 2) which WALCOTT considered to be the medusa-like body of a pelagic holothurian; but interpreted by the writer as a circle of bracts and a large pneumatophore.

It was recently suggested by LEMCHE (1960 p. 95) that *Eldonia*, as is the case with *Camptostroma* and *Peytoia*, may also be a scyphozoan "as it shows similarities to the Coronata in the bell margin and to trachyline medusae in what appears to be the manubrium". During his current studies on the early phylogeny of the invertebrate phyla LEMCHE has reconsidered the organism and now assumes (verbal communication) that *Eldonia* was sessile, i.e. a scyphistoma-like coelenterate attached by the apical end of the bell. The square-cut end of the asymmetrical imprint (considered by the writer to be the compressed curved distal end of a pneumatophore) LEMCHE interprets as a disc of adhesion.

However, the writer is convinced that his interpretation of *Eldonia*

being a primitive siphonophore of the simplest possible organization is correct. *Eldonia* do not lack any of the characteristics essential for a siphonophore and at the same time do not show any features which are not perfectly in agreement with this interpretation.

Take e.g. the two organs which are interpreted as a pair of gonodendra in a siphonophore. What could they be interpreted as in a tetramerous medusa-like a scyphomedusa or in a trachyline medusa?

The eccentric position of the basal part of the curved dominant organ in *Eldonia* is well explained when we assume that it is a siphonophorean siphon, since this is often borne on a distinct peduncle. But there is strong disagreement to the interpretation of its being the manubrium of a scyphomedusa or trachyline medusa as this is always broadly connected with the bell centrally.

As regards the assumed floating (and swimming) organ(s) of *Eldonia*, the interpretation of this part of the fossil being composed by a circle of bracts and a large pneumatophore was suggested (more than distinctly evident from the imprints) through a comparison of *Eldonia* to such larval forms of siphonophores as those described by HÆCKEL (1888) under the names of *Athoria* and *Cystalia*. (These are a larval agalmid and the larva of *Epibulia ritteriana* respectively.) It may be that this part of *Eldonia* was not really separated into a pneumatophore and a circle of separate bracts, but was, as suggested by LEMCHE, a large bell showing some resemblance to the bell of a coronate medusa (e.g. *Periphylla*).

However, the reference of *Eldonia* to the Siphonophorida is well-founded on the basis of the siphon and the two gonodendra alone. It at least is not affected by the possibility that the organism may have had a saucer-shaped lobated swimming bell with a large bilateral apical float instead of the supposed circle of bracts and large pneumatophore.

The presence of an organism like *Eldonia* in the Middle Cambrian period supports the view held e.g. by FANNY MOSER (1924) that the siphonophores are the most primitive coelenterates in existence. The organization of *Eldonia* (which corresponds to that of a single cormidium in other full-grown siphonophores) further confirms the assumption (also held by MOSER) that the original siphonophorida were single individuals with polymorphic organs.

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