REASSESSMENT OF THE PHYLOGENETIC POSITION OF CONULARIIDS (EDIACARIAN-TRIASSIC) WITHIN THE SUBPHYLUM MEDUSOZOA (PHYLUM CNIDARIA)[1]

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[1] Supported by FAPESP and CNPq.
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Fossil taxa of uncertain phylogenetic affinities can play a crucial role in the analysis of character evolution within major extant groups. Conulariids comprise a distinctive group of marine metazoans with a fossil record that extends from perhaps the Ediacaran to the Upper Triassic. The phylogenetic affinities of conulariids have been debated for over 170 years, with arguments being marshaled in favor of their alliance with a number of widely divergent extant taxa. A steeply pyramidal, four-sided, finely lamellar apatitic skeleton characterizes most genera currently referred to the conulariids. Based on comparisons of the anatomy, morphogenesis, and paleoautecology of conulariids and extant taxa, many investigators have concluded that conulariids were scyphozoan cnidarians or close relatives of this group. Alternative interpretations of the phylogenetic relationships between conulariids and extant cnidarians had not been explicitly tested until the recent study of A.C. Marques and A.G. Collins, published in 2004, where a cladistic analysis of 87 morphological and life history characters of medusozoan cnidarians was conducted. These authors concluded that conulariids are an extinct group of medusozoan cnidarians most closely related to Stauromedusae. However, only six of the 87 characters used by these authors can be observed in conulariid fossils. Rescoring the character states of conulariids in a conservative manner yields a new hypothesis for the phylogenetic position of conulariids, namely that they are the sister group of the scyphozoan order Coronatae rather than Stauromedusae, which is revealed as the earliest diverging lineage of Medusozoa. This new hypothesis also implies several different sequences of character evolution within Cnidaria. Specifically, the presence of a periderm completely covering the polyp in conulariids and coronates appears to be derived within Scyphozoa. Strobilation appears to be a synapomorphy uniting conulariids, Coronatae, Rhizostomeae, and Semaeostomeae. This result supports the controversial interpretation of one exceptionally preserved conulariid that potentially shows that these animals produced ephyrae by strobilation. Finally, the pelagic adult medusa stage and the giant fiber nerve net appear to be features that are derived within Medusozoa.