

Deciphering the evolutionary history of early Mesozoic fossil corals

Bernard Lathuilière, Danwei Huang, and The CoralloSphere Group

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The morphology of stony corals (Scleractinia) remains the only means to reconstruct the most inclusive evolutionary history of the clade comprising both extant and extinct species. The definitions of morphological characters and their associated trait states are critical for assembling a dataset that could be analysed for phylogenetic reconstruction. Here, we present coral morphological data that consist of more than a hundred characters reviewed by the CoralloSphere working group. These characters would eventually form the basis of a data matrix used to reconstruct the phylogeny of all extinct and extant scleractinian families. The initial results obtained by the working group comprise poorly resolved trees, which are biased by the complexity of the multiple character states and the multiplicity of researchers involved in the coding process. When the analysis is restricted to matrices consisting of families from the Triassic and Jurassic periods and coded by a single person, resolution increased, allowing for further exploration of various ingroups and outgroups. The results presented here represent analyses of (i) a data matrix with all families represented by their type genus; (ii) a data matrix with selected families represented by their solitary or phaceloid genera; (iii) a data matrix with only Triassic corals; (iv) a data matrix with only Jurassic corals; (v) a data matrix with Triassic and Jurassic corals; and (vi) data matrices with several outgroups. Well-resolved trees have been obtained in several cases. Phylogenetic relationships among basal, robust and complex groups established using molecular data are discussed in the context of the morphological phylogeny obtained here.

Key words: Anthozoa, Scleractinia, evolution, phylogeny, cladistics, Triassic, Jurassic.

Bernard Lathuilière [bernard.lathuiliere@univ-lorraine.fr;


ORCID: <https://orcid.org/0000-0001-5088-30571>], Uni-versité de Lorraine,

CNRS, lab. GeoRessources UMR 7359, BP 70239, 54506,

Vandoeuvre-lès-Nancy Cedex, France. Danwei Huang [huangdanwei@nus.edu.sg

; ORCID: <https://orcid.org/0000-0003-3365-5583>], Lee Kong Chian Natu-ral History Museum, National University of Singapore, 2 Conservatory Drive, Singapore, 117377, Singapore.

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