PHYLOGENOMIC EVIDENCE DISENTANGLES AFFINITIES OF THE MESOZOA

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Orthonectida and Dicyemida are enigmatic animal groups that witnessed long years of hot disputes among evolutionists and comparative morphologists regarding their true affinities in the animal world. These minute parasitic forms possess aberrant metagenetic life cycles and intriguing body plans that always provoked contradictory hypotheses. Historically, they were coined together as the Mesozoa to represent the relict link between protists and multicellular animal life. This view was challenged recently by studies of morphology and molecular phylogenetic analyses. We report results of phylogenomic studies based on originally obtained genomic and proteomic data on the orthonectid *Intoshia linei* and a dicyemid *Dicyema* sp. We constructed and analyzed multigene datasets that largely encompass available genetic diversity of lophotrochozoan animals. The results evidently suggest that orthonectids are members of crown Spiralia, while dicyemids occupy a basal position to the Lophotrochozoa. We report that the Orthonectida and Dicyemida are lineages of bilaterian animals that evolved independently by dramatic morphological reduction most likely associated with unique parasitic lifestyles. Adaptations in I. linei are associated with considerable reduction of metazoan developmental genes to a limit that might be considered a “survival gene kit” for a bilaterian animal form.

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