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Allogromiid test construction

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Allogromiid Foraminifera include a diverse array of predominantly monothalamous taxa that occur from freshwater settings to the deep sea. Their simple morphological appearance belies their underlying diversity reflected in test construction, molecular genetics, and modes of life. Recent molecular studies (Pawlowski *et al.*, 2002. *JFR, 32*(4):334-343) have shown that the traditional morphological approach to current allogromiid classification is not valid and that allogromiid classification is in need of major revision. In addition, allogromiid molecular phylotypes far outnumber described species (Habura *et al.*, 2004. *J. Eukaryotic Microbiol., 51*(2):173-179), illustrating just how little we know about the allogromiids.

The application of a variety of fine structural methods delineates a series of fundamental allogromiid test constructions (*e.g*., Goldstein & Richardson, 2002. *JFR, 32*(4):375-383): herringbone structure in an organic test (*e.g*., *Allogromia laticollaris)*, a herringbone organic inner test or "theca" with an organic (*e.g*., *Iridia lucida*) or agglutinated outer covering (*e.g.*, *Astrammina* spp.), a granulofibrillar inner theca with an agglutinated outer covering (e.g., *Notodendrodes* spp.), a flexible agglutinated construction with a featureless to fibrous inner organic lining (*e.g.*, *Cribrothalammina alba*, *Ovammina opaca)*, an agglutinated covering without a bioadhesive (*e.g*., *Crithionina*), and a "hyperamminid" construction with an agglutinated layer and inner organic lining comprised of crescent-shaped fibers. Ideally, we would like to compare the fine structure of test construction with membership in the various molecular clades. However, the current dataset is far too incomplete: we do not yet have both sequences and a fine-structural characterization for a sufficient number of species. Nonetheless, our growing information on test construction tends to support the validity of certain molecular clades. Allogromiid Clade E, for example, includes the sand-ingesting allogromiids (*Psammophaga* spp.) and new representatives from coastal Georgia. These representatives share a common test construction characterized by an agglutinated layer rich in clay platelets underlain by a finely fibrous inner organic lining that is in direct contact

with the plasma membrane. At least a portion of the Clade I allogromiids (*Astrammina rara*, *A. triangularis*, *Pelosina* sp.) also share a common test construction characterized by a herringbone organic inner theca with an agglutinated outer covering. Clade J likewise includes a suite of morphologically well-constrained species, although the characteristic *Crithionina*-like gross morphology may occur in some Clade M representatives. Clade L allogromiids (*Ovammina opaca, Cribrothalammina alba)* have a narrowly defined constructional theme: the agglutinated layer, rich in fine quartz grains and diatom fragments, is underlain by a prominent inner organic lining, portions of which may extend into the cytoplasm forming partial partitions, and secondary pores form in the test during gametogenesis. Some clades, however, are represented by a remarkable range of morphologies (*e.g.*, Clade C), and we need to know more about the morphological constructions involved. Clearly more work is needed before a new allogromiid classification can be established. Such a new classification will need to integrate structure over multiple scales.
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