

Life cycle and wall ultrastructure of Early Cambrian unicellular green algae (Chlorophyta)

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Several radiation and extinction events of phytoplankton (acritarchs), inferred to represent unicellular green algae, are recognized on a global scale during the Cambrian Period and at least the initial Cambrian event may be classified as one of the major biotic changes. The appearance of ornamented acritarchs, morphologically innovative, diverse and evolutionary complex in a way never recorded before is unique. Subsequently evolving morphotypes (known from Phanerozoic) represent mostly repetition and re-combination of morphological features invented during the initial Cambrian radiation, with the exception of some more advanced excystment structures (pylomes).

Development of various modes of life (a result of environmental adaptation) and reproduction cycles (sexual genetic recombination and alternation of generations in eukaryotes and mass blooms of vegetative populations in prokaryotes) have been the mechanisms that increased the ability to survive the extreme environmental stress at least in a few refuge sites. Formation of the cyst and alternation of the generations (sexual and vegetative) in the life cycle indicate the development of early strategies to survive ecological crisis and as a competitive advantage in the increasingly complex marine ecosystem. However, to maintain the alternation of generations and to produce a cyst, microbiota must have had an access to the bottom sediments to rest periodically before popping-up into the photic zone as Modern algae do.

Additionally to the morphology, the wall ultrastructure revealed by TEM studies suggests that some of the microfossil taxa are biologically affiliated with the recent chlorophycean and prasinophycean green algae.