

Origin of core-dinoflagellates via neoteny of noctilucid-like zoospores

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SUMMARY

Dinoflagellates have some of the most unique protozoan characteristics (e.g., they lack histone proteins, have condensed chromosomes throughout the cell cycle, and have RNA editing). My previous study suggested that *N. scintillans* is the second-earliest branch after *Oxyrrhis marina* within the dinoflagellates. Here, I propose that noctilucids are a possible evolutionary link between ancestral diploid dinoflagellates and other haploid core dinoflagellates. If this hypothesis is correct, a common ancestor of the core dinoflagellates would have evolved from an ancestor with a haploid nucleus (such as the noctilucid gametes) via neoteny. This would have made it possible for the haploid trophonts (the core dinoflagellates) to evolve from the diploid trophonts (*Oxyrrhis* and *Noctiluca*). Thus, the haploidization of the ancestor (the core dinoflagellates) would have rapidly radiated; which is supported by the low resolution of their phylogenetic relationships. Some (or most) members of the core dinoflagellates subsequently would have acquired the ability to sexually reproduce. This would have led to a transient post-mating diploid state followed by meiosis; which is supported by the fact that some species show a very short diploidic period from gamete fusion to meiosis during sexual reproduction. This hypothesis could also help to elucidate the evolution of the alveolates.