# Dinoflagellate benthic cysts and red tides


## ABSTRACT

Dinoflagellates are recognised by planktonologists as one of the main groups in the phytoplankton. Their importance is due both to their contribution to primary production, and the fact that they are responsible for most of red tide events. Some of them can produce very potent toxins, which can make dinoflagellate consumers become toxic, as well; this affects mainly mollusc bivalves, an important halieutic resource in the Iberian Peninsula. Others produce icthyotoxins that can kill aquatic fauna, putting the aquaculture industry at risk.

Dinoflagellates are eukariotic organisms with affinities with plants and animals; there are benthic, parasitic and symbiotic forms, being best-known and best-studied their free-living planktonic forms.

Dinoflagellates are also considered by geologists as an important group of microfossils used in biostratigraphy, namely when looking for petroleum. Nevertheless, most fossil dinoflatellates are too different from the free-living forms studied by planktonologists. Their affinities were unknown until the 1960s, when paleontologists discovered equivalent live forms and demonstrated that they were benthic, resting forms of dinoflagellates. Since then, it has been recognised that most of the dinoflagellate species include in their life cycle at least one resting form, called a cyst; these are emerging as an important research field.

For paleontologists, the currently living cysts offer the opportunity to interpret fossil data, since they cast light on the original organisms and their ecology. To planktonologists, they are a challenge, a new benthic perspective on the ecology of dinoflagellates.

Cysts can also be the seed for red tides, as they are for the renewal of the motile phase whenever ecological conditions are favourable.


**Key words:** Cysts, dinoflagellates, red tides.


## *RESUMEN*

### *Quistes bentónicos de dinoflagelados y mareas rojas*

*Los dinoflagelados son uno de los principales grupos del fitoplancton, cuya importancia radica tanto en su contribución a la productividad primaria como en su implicación en la mayoría de los fenómenos de mareas rojas. Algunos pueden producir toxinas muy potentes que cuando son acumuladas por sus consumidores los hacen tóxicos, principalmente moluscos bivalvos que constituyen una importante fuente de recursos en la península Ibérica, o ictiotoxinas que pueden aniquilar la fauna acuática, con el consiguiente peligro para la acuicultura.*

*Los dinoflagelados son organismos eucariontes con afinidades con las plantas y los animales; hay formas bentónicas, parásitas y simbiontes, aunque las mejor conocidas y estudiadas son las formas planctónicas de vida libre. Los dinoflagelados son también conocidos por los geólogos como un importante grupo de microfósiles utilizado en la bioestratigrafía, principalmente en la búsqueda de petróleo. En todo caso, la mayoría de los dinoflagelados fósiles son muy diferentes de las formas de vida libre estudiadas por los fitoplanctólogos. Sus afinidades eran desconocidas hasta que, en los años sesenta, los paleontólogos descubrieron formas equivalentes vivas y demostraron que eran formas bentónicas de reposo de dinoflagelados.*


***Palabras clave:*** *Quistes, dinoflagelados, mareas rojas.*