

**Potential risk of
Mesodinium rubrum bloom
in the aquaculture area
of Dapeng'ao cove,
China: diurnal changes
in the ciliate community
structure in the surface
water***

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Abstract

Diurnal changes in the structure of the ciliate community in surface waters were studied in the aquaculture area of Dapeng'ao cove, China. Two periods of heavy rainfall occurred during the study period, intensifying water column stratification and influencing the water's properties. A total of 21 ciliate taxa from 15 genera were identified; the dominant species was *Mesodinium rubrum*. The maximum abundance of *M. rubrum* reached 3.92×10^4 indiv. dm^{-3} , contributing 95.1% (mean value) to the total ciliate abundance. Diurnal changes in *M. rubrum* abundance were highly variable, the driving force probably being irradiance and food availability. The results suggest that *M. rubrum* may form blooms in aquaculture areas when there is a suitable physical regime with enriched nutrients, which is potentially harmful to the fish-farming industry.

1. Introduction

Ciliates play an important role in transferring the production of pico- and nanoplankton to meso- and macrocarnivores (Stoecker & Michaels 1991, Pierce & Turner 1993). Ota & Taniguchi (2003) suggested that ciliate populations in the East China Sea may control primary producers through intensive grazing and also act as important nutrient regenerators. Because of their ubiquitous distribution, small size and rapid metabolic and growth rates, ciliates are considered a key part of the aquatic ecosystem (Dolan 1999). Some ciliates, such as the red-tide ciliate *Mesodinium rubrum*, belong to harmful algae bloom (HAB) species in the ocean. Blooms of *M. rubrum* are recurrent events in the world, sometimes extending over hundreds of square kilometres (Lindholm 1990). They have been found off Peru (Ryther 1967), in the Ria de Vigo (Villarino et al. 1995), and also in Southampton Water (Hayes et al. 1989), where such blooms occur every year from late May to August, peaking in abundance in July (Williams 1996).

Dapeng'ao cove has been subject to eutrophication due to elevated nutrient discharges from aquaculture and to the human population growth in this region since the 1990s (Wang et al. 2006). HABs have been recorded in Daya Bay since the 1980s, and have occurred in almost every one of the last ten years or so (Zhao et al. 2004, Liu & Wang 2004, Wang et al. 2006, Song et al. 2009), especially in spring and summer. Wang et al. (2008) stated that HAB species not previously recorded during 1991–2003 in the northern South China Sea included *Phaeocystis globosa*, *Scrippsiella trochoidea*, *Heterosigma akashiwo* and *M. rubrum*. Previous studies in Dapeng'ao cove focused on the phytoplankton community, so information on the ciliate community was rarely available. In the present study, we aimed to study the short-term dynamics of the ciliate community in the aquaculture area of Dapeng'ao cove, with special reference to the ecological dynamics of *M. rubrum*.

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