

PD2) The Distribution of Modern Dinoflagellate Cysts in the Yellow Sea

Sam Geun Lee*, Young Sik Lee, Wol Ae Lim, Seung Heo
Aquaculture Environment Research Center, South Sea Fisheries
Research Institute, NFRDI

1. Introduction

The Yellow Sea, lying between China mainland and Korea peninsula, is a typical semi-enclosed sea of which area is about 404 km² excluding Pohai Sea in the north. It has a shallow basin with the mean depth of 44 m and a maximum depth of 103 m. The dinoflagellates, the main species of harmful algal bloom(HAB), form cysts in a unfavorable condition during their life cycle. A few study about cysts from the East China Sea and around coastal areas of Korea and China(Cho and Matsuoka, 2001; Qi, 1996). But study on cysts in a wide range of Yellow Sea is few so far. The main purpose of this study was to have understanding of HAB's potential in the Yellow sea which is increasing a eutrophication.

2. Materials and Methods

The sampling was done at 33 points on the base on surface sediments in the Yellow Sea using Tamgu research vessel of NFRDI from 14 October to 2 November 2004 (Fig. 1). The supernatant water were removed using siphon, and then the sediment were extracted about 3 cm from the top of sediment. We done isolation of cyst following Cho and Matsuoka(2001) and counted and identified a cyst through microscope with a magnification of 200 and 400.

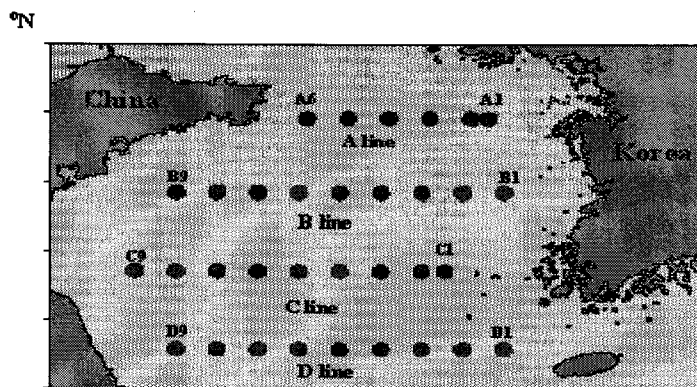


Fig. 1. Map showing the study lines and stations.

3. Results

Approximately 30 species of modern dinoflagellate cysts were identified in surface sediments in the Yellow Sea with a total abundance of 100~12,830 cysts/g (Fig. 2).

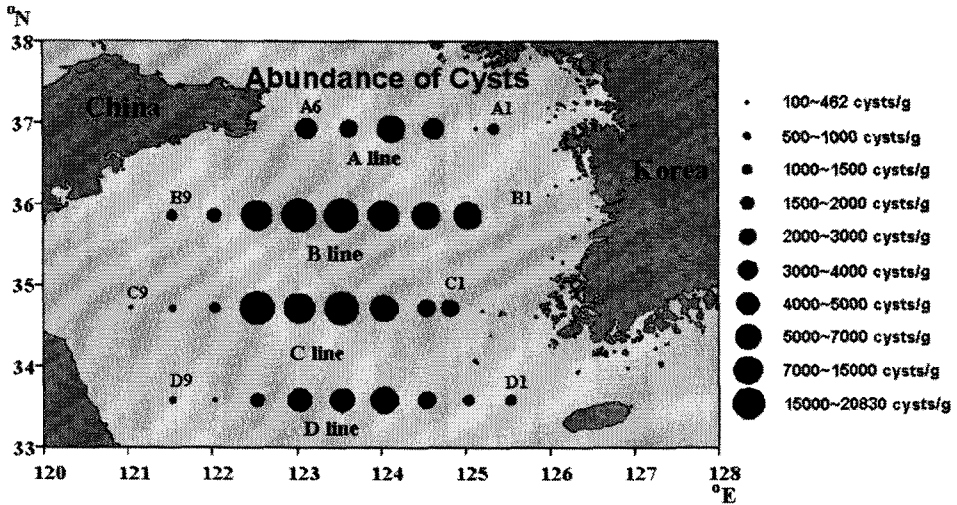


Fig. 2. Abundance of cysts in the Yellow Sea.

The predominant order was Gonyaulacales, accounted for 87% to total modern dinoflagellate cysts and followed by 9% to Peridinales and 4% to Gymnodinales (Fig. 3).

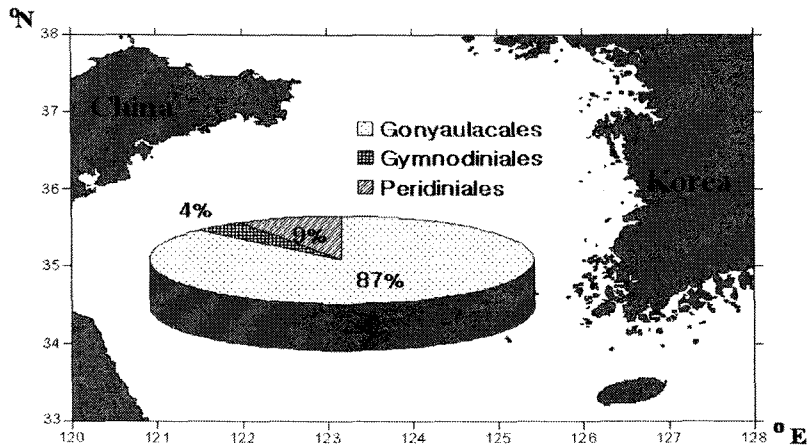


Fig. 3. Composition of cysts in the Yellow Sea.

The dominant species of Gonyaulacales were *Alexandrium tamarense*, *Gonyaulax scrippsae*, *G. spinifera*, and *G. verior* those of Peridinales were *Diplopsalis lenticula* and *Protoperidinium conicum* and those of Gymnodinales were *Pheopolykrikos hart-*

manii and *Gynodinium catenatum* (Table 1).

The overall distributional patterns of modern flagellate cysts showed high densities in the central part of the Yellow Sea where Gonyaulacales was 30~400 cysts/g (Fig. 4) and Peridinales with 10~1,500 cysts/g (Fig. 5) and showed decreasing densities in the coastal areas of Korea and China. In the coastal areas, it was relatively higher in Korea than in China except for Gymnodiniales which showed higher abundances of 20~850 cysts/g in waters near China side than near Korea (Fig. 6).

Table 1. The dominant species of cysts in the Yellow Sea

Order Line	Gonyaulacales	Gymnodiniales	Peridinales
A line	<i>Alexxandrium tamarensae</i> <i>Gonyaulax spinifera</i> <i>Gony. Verior</i>	<i>Pheopolykrikos hartmanii</i> <i>Gynodinium catenatum</i>	<i>Diplopsalis lenticula</i> <i>Protoperidinium conicum</i>
B line	<i>Alexxandrium tamarensae</i> <i>Gonyaulax scrippsea</i> <i>Gony. spinifera</i>	<i>Pheopolykrikos hartmanii</i> <i>Gynodinium catenatum</i> ,	<i>Diplopsalis lenticula</i> , <i>Scrippsiella trochoidea</i>
C line	<i>Alexxandrium tamarensae</i> <i>Gonyaulax scrippsea</i> <i>Gony. spinifera</i>	<i>Pheopolykrikos hartmanii</i> <i>Gynodinium catenatum</i>	<i>Diplopsalis lenticula</i> <i>Scrippsiella trochoidea</i>
D line	<i>Alexandrium tamarensae</i> <i>Gonyaulax spinifera</i> <i>Protoceratium reticulatum</i>	<i>Pheopolykrikos hartmanii</i> <i>Gynodinium impudicum</i>	<i>Diplopsalis lenticula</i> <i>Scrippsiella trochoidea</i>

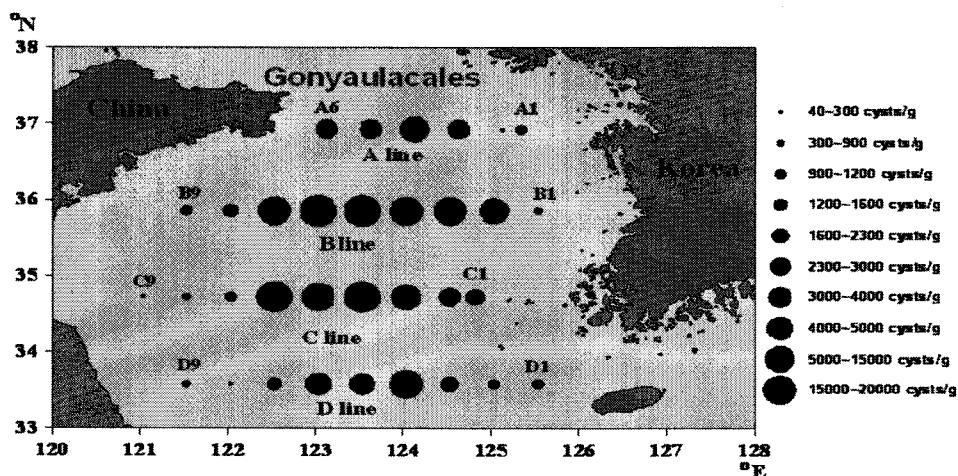


Fig. 4. Abundance of Gonyaulacales cysts in the Yellow Sea.

Alexandrium tamarensae and *Gynodinium catenatum*, well-known toxic dinoflagellate species, were dominant taxa collected with densities of 10~8,000 cysts/g and 5~170 cysts/g, respectively.

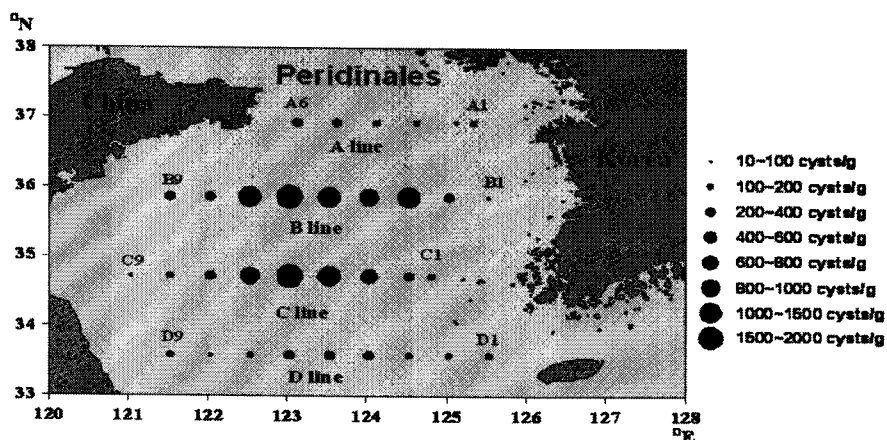


Fig. 5. Abundance of Peridinales cysts in the Yellow Sea.

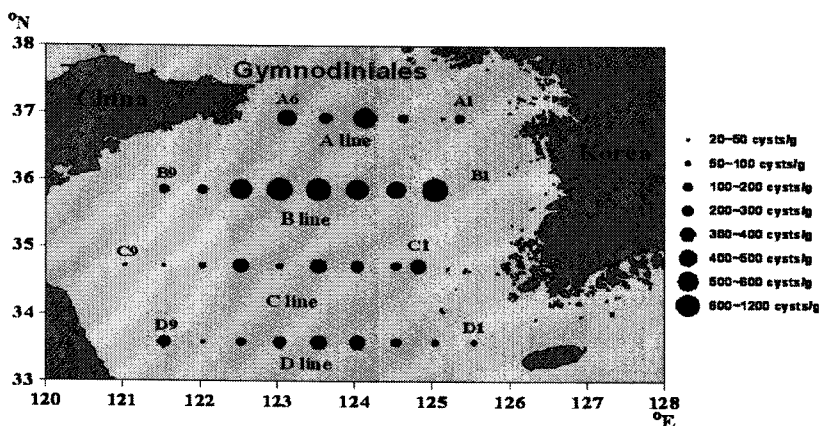


Fig. 6. Abundance of Gymnodiniales cysts in the Yellow Sea.

References

- Cho H. J. and Matsuoka K. 2001. Distribution of dinoflagellates cysts in the surface sediments from Yellow Sea and East China Sea. *Mar. Micropaleontology* 42: 103-123
- Lee J. B. and Matsuoka K. 1996. Distribution of cysts in surface sediments of the southern Korean waters. In: Yasumoto T., Oshima Y., Fukuyo Y (Eds), *Harmful and Toxic Algal Blooms*. IOC, UNESCO: 173-176
- Qi Y. Z., Hong Y., Zheng L., Kulis D.M. and Anderson D.M. 1996. Dinoflagellate cysts from recent marine sediments of the South and East China Seas. *Asian Mar. Biology*, 13: 87-103
- Matsuoka K. 1992. Coastal environmental change during the Holocene in Mine Bay of the Tsushima Island, based on the marine palynomorph assemblage. *The Quaternary Research*, 31: 147-154