

Taxonomic notes on two marine benthic diatoms in Korean tidal flats: *Climaconeis* sp. and *Petrodictyon voigtii* (Skvortsov) J. Park & C.H. Koh, comb. nov.

Jinsoon Park¹, Taisuke Ohtsuka² & Chul-Hwan Koh³

¹School of Earth and Environmental Science (Oceanography), Seoul National University, Seoul 151-742, Korea; (present address: University of Rostock, Institute of Biological Sciences, 18051 Rostock, Germany); jinsoonpark@snu.ac.kr

²Lake Biwa Museum, Oroshimo 1091, Kusatsu, Shiga 525-0001, Japan. ohtsuka@lhm.go.jp

³School of Earth and Environmental Science (Oceanography), Seoul National University, Seoul 151-742, Korea. kohch@snu.ac.kr

INTRODUCTION

Tidal flats are widely developed in East Asian countries along the east coast of China, the western coast of Kyusyu and the south-western coast of Honshu, Japan, as well as the western to southern coast of Korea. Benthic diatoms are important primary producers in these unique ecosystems, however their biodiversity is not well studied and taxonomic assignments are often inadequate but of major interest.

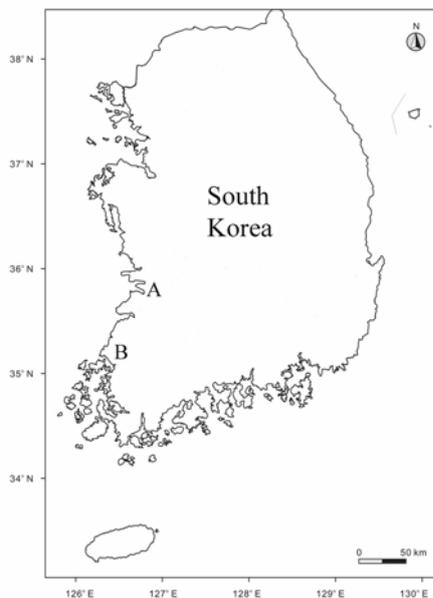


Fig. 1. Map showing the locations of sampling sites. A: Mangyeong-Dongjin River Estuary, B: Hampyeong Bay.

MATERIAL & METHODS

Surface sediments were taken from tidal flats in Hampyeong Bay (3 stations) and Mangyeong-Dongjin River Estuary (5 stations), on the west coast of Korea (Fig. 1). Photographs of live diatoms were taken under LM (Olympus BX50) for chloroplast information. Organic materials including diatom cells were separated from the sediment samples through consecutive sonication and decanting, then cleaned using HCl and H₂O₂. Permanent

preparations were prepared using Pleurax resin, and diatom frustules were photographed and observed under LM. SEM (JEOL 6301F) photos were also taken of some of the samples.

RESULTS

It was found that taxonomic revisions are required for two benthic diatoms from the Korean tidal flats, namely *Climaconeis* sp. and *Petrodictyon voigtii* (Skvortsov) J. Park & C.H Koh, comb. nov.

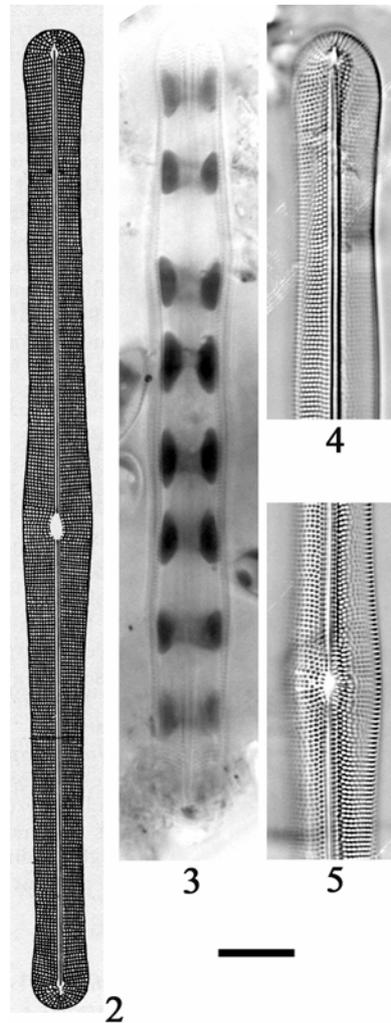


Fig. 2–5. Illustration of *Berkeleya scopulorum* and LM photographs of *Climaconeis* sp. – 2. *Berkeleya scopulorum* shown in Hustedt 1961-1966. – 3. Chloroplasts of *Climaconeis* sp. – 4. Apical area of *Climaconeis* sp. – 5. Central area of *Climaconeis* sp. – Scale bar = 10 μ m

***Climaconeis* sp.** (Fig. 3–5).

Dimension: Length: 110–185 μ m, width: 11–12 μ m, striae: 17–18 in 10 μ m.

Taxonomy: This taxon has long been identified and reported as *Navicula scopulorum* Bréb. ex Kütz. and/or *Berkeleya scopulorum* (Bréb. ex Kütz.) E.J.Cox in East Asia because of its superficial resemblance to *B. scopulorum* (Fig. 2). However, while *B. scopulorum* has comparably parallel striae pattern in and around the central area, specimens from Korean tidal flat showed strongly radiated striae pattern in the corresponding area. It also has distinctive outer undulations in the valve margin, which, together with the striae pattern, suggest that specimens from the Korean tidal flat are not conspecific with *B. scopulorum*. Furthermore, the chloroplasts (Fig. 3) show that this taxon is not a member of the genus *Berkeleya*; numerous (four to six pairs, personal observation) ribbon-shaped chloroplasts

indicate that this taxon should be a member of the genus *Climaconeis* (Round et al. 1990), presumably a new species from East Asia.

Distibution: Based on photographic information in the literatures from East Asia, this taxon was reported as *B. scopulorum* in Nakdong river estuary, Korea (Cho 1988), Gyeonggi Bay, Korea (Koh et al. 2007), Matsukawaura Lagoon, Japan (Nigorikawa & Hasegawa 1999) and Fujian Coast, China (Jin et al. 1985). It was also observed in Hampyeong Bay, Korea (this study). So far, no photographic report of *B. scopulorum* from East Asia which fits to its original description was found. Thus it is suspected that all the reports of *B. scopulorum* in East Asia are records for the occurrence of *Climaconeis* sp. which may be widespread throughout the coasts of Korea, Japan and China.

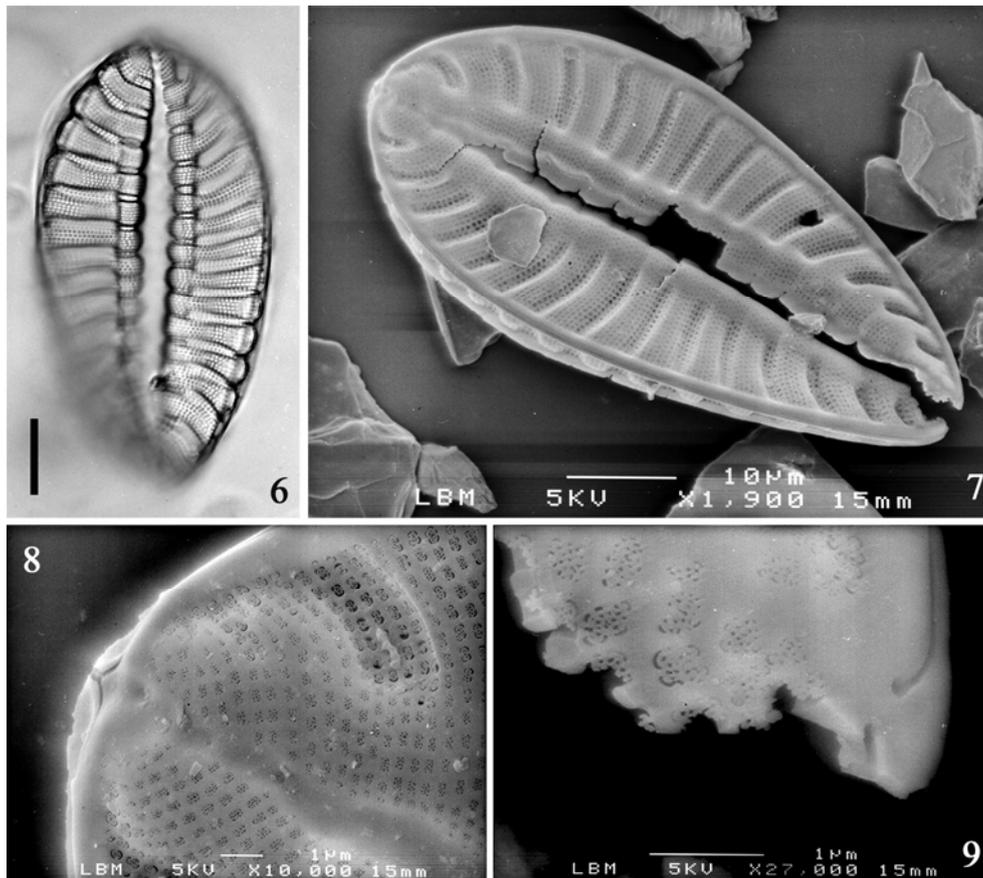


Fig. 6–9. LM and SEM photographs of *Petrodiclyon voigtii*. – 6. Valve face (LM) – 7. Valve face (SEM). – 8. ‘Nostril-like’ raphe endings at broader pole (SEM). – 9. Two polar raphe endings at narrower pole. – Scale bar (Fig. 6) = 10 μ m.

***Petrodiclyon voigtii* (Skvortsov) J. Park & C.H. Koh, comb. nov.** (Fig. 6 -9).

Basionym: *Surirella voigtii* Skvortsov in Philippine Journal of Science 47: 160, pl. 1: fig. 1-3, pl. 2, fig. 1. 1931, non *Surirella voigtii* Meister, nom. illeg.

Nomenclature: Although VanLandingham (1978) regarded *Surirella voigtii* Skvortsov as a later homonym and synonym of *Surirella voigtii* Meister (1932), *Surirella voigtii* Skvortsov has been published earlier than *Surirella voigtii* Meister (P. Silva, pers. comm.). In addition, the illustrations indicate that *Surirella voigtii* Skvortsov and *Surirella voigtii* Meister are two different species.

Dimension: Length: 58–60 μ m, width: 28–30 μ m, costae: 3 in 10 μ m, striae: 20 in 10 μ m.

Taxonomy: The morphology and size of the specimens from the Korean tidal flat (Fig. 6) fit well to the original photographs and description of *Surirella voigtii* Skvortsov, which was first observed and reported from China (Skvortzow 1931). Meanwhile SEM photographs (Fig. 7–9) showed that our ‘*Surirella voigtii*’ is a member of the genus *Petrodiclyon* judging from its ‘nostril-like’ raphe endings at the broader pole, two polar raphe endings at the narrower pole and a comparably smooth valve face (Round et al. 1990).

Distribution: Based on photographic information in literature from East Asia, *Petrodictyon voigtii* was reported in Gyeonggi Bay, Korea (Koh et al. 2007), Mangyeong-Dongjin River Estuary, Korea (this study), Matsukawaura Lagoon, Japan (Nigorikawa & Hasegawa 1999), Mikatagoko Lakes (brackish-water), Japan (Nigorikawa & Hasegawa 2000) and Formosa Strait, China (Skovortzow 1932). The species may be widespread throughout East Asian coasts of Korea, Japan and China.

DISCUSSION

Chloroplast and SEM information of the frustules seem to be of great importance for the differentiation of genera as can be seen from the above results. The *Climaconeis* sp. would be described as a new species in a later more detailed study (Park & Koh in prep.). But these first results suggest that many more detailed taxonomic studies of East Asian marine diatoms are required, first for correct identification, second for their taxonomic boundaries and third for a better understanding of their biodiversity.

ACKNOWLEDGEMENTS

We would like to thank Prof. Dr. Ulf Karsten (Universität Rostock) and Dr. Regine Jahn (BGBM Berlin-Dahlem) for academic discussions and grammatical advices.

REFERENCES

- Cho, K. J. 1988: The community structure of benthic diatoms along environmental gradient of sediment from the Nakdong River Estuary, Korea. Doctoral thesis, Seoul National University, Korea [in Korean].
- Hustedt, F. 1961-1966: Die Kieselalgen Deutschlands, Österreichs und der Schweiz unter Berücksichtigung der übrigen Länder Europas sowie der angrenzenden Meeresgebiete **3**. – In: Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und der Schweiz **7**. – Leipzig.
- Jin, D., Cheng, Z., Lin, J. & Liu, S. 1985: The Marine Benthic Diatoms in China. **1**. – Beijing.
- Koh, C. H., Park, J., Noh, J. H. & Choi, J. K. 2007: Benthic diatoms on the Songdo tidal flat. – Pp. 103-166 in: Koh, C. H. (ed.): The Korean tidal flat: Environment, Biology and Human, new ed. – Seoul [in Korean].
- Meister, F. 1932: Kieselalgen aus Asien. –, Berlin.
- Nigorikawa, A. & Hasegawa, Y. 1999: Changes in the environment and diatom thanatocoenoses from superficial oozes from the bottom of Matsukawaura Lagoon, Fukushima Prefecture, Northeast Japan. – *Diatom* **15**: 85-102 [in Japanese].
- Nigorikawa, A. & Hasegawa, Y. 2000: Diatoms and aquatic environments of the "Mikatagoko" Lakes in Fukui Prefecture, Central Japan. – *Diatom* **16**: 45-62 [in Japanese].
- Park, J. & Koh, C. H. in prep.: Taxonomic notes on *Climaconeis* sp. nov. from Korean tidal flats [title provisional].
- Round, F. E., Crawford R. M. & Mann, D. G. 1990: The Diatoms, biology and morphology of the genera. – Cambridge.
- Skovortzow, B. W. 1931: Marine diatoms from Formosa Strait. – *Philippine Journal of Science* **47(1)**: 151-161.
- VanLandingham, S. L. 1978: Catalogue of the Fossil and Recent Genera and Species of Diatoms and Their Synonyms. Part 7: *Rhoicosphenia* through *Zygoceros*. – Vaduz.