TAXONOMIC STUDY OF THE GENUS NAVICULA FROM GIRNA RIVER NEAR JALGAON REGION MAHARASHTRA, INDIA

R. B. Borse
Research Centre, Dept. of Botany,
Nagnath Art’s, Commerce and Science College, Aundha (Nag.)
rajeshborse25@gmail.com

Abstract

Diatoms represent an important class of aquatic phototrophs, it is also important tool for monitoring environmental condition. In this study, we aimed to revolutionized our knowledge and understanding of conventional taxonomy of genus Navicula (Bacillariophyceae) from Girna river near Jalgaon regions of Maharashtra, India. Sample were taken from three locations at Girna river near Jalgaon region. Thirteen species of Navicula were observed under Light microscopic (LM), and identified till forms level. All Navicula species were taxonomically determined and are described for the first time from these areas. They were listed and presented with morphological descriptions, dimensional information and photographic information.

Key words: Morphographic, Girna, Navicula, taxonomically, Jalgaon, investigation.

Introduction

Diatoms not only the most important primary producers on the Earth, but also important tools for monitoring environmental conditions of the past and present. Especially the benthic diatoms are very useful tools in the interpretation of past environmental conditions as well as the understanding of the present ecosystem in river area.

Taxonomy is the science of classifying, naming, describing organisms and it also shows conservation of specific species. In advance biological researchers can’t find better result without classification, as the taxa of their organism are not specified for nomenclature. The oncoming student or researchers are confuse benefit of the research work. In this paper we given morphological description, scratches and photographs of total 13 taxa, in which there are 6 species, 4 variety and 3 forma of genus Navicula.

Navicula cells generally solitary and free floating. They are raphed, pinnate diatom with boat-shaped cells that may exist singly or in ribbons. The valves are symmetrical both apically and transapically, and may have rounded, acute, or capitate ends. The central area is often distinctly expanded. The lineate striae are composed of elongated areolae arranged parallel to the apical axis. However, the areolae may be difficult to see in many taxa, particularly in live, uncleaned samples. Navicula is the largest diatom genus, with over 10,000 species, varieties, and forms. Navicula, like many other raph-bearing diatoms, secretes mucilage from the raphe to enable the cells to glide along the substrate.

Materials and Methods

Algal materials were collected in specimen bottles at the beginning of the experiment. Filamentous form were collected with the forceps or by hand, while for phytoplankton forms surface water were collected between 8 to 9 am., epiphytic form were collected by scraping or squeezing the hydrophytes.

Algal sample were collected at monthly interval, during January 2007 to December 2008. The attached epiphytic and floating form of algae were collected in acid washed container bottles, and transferred to the laboratory for the immediate preservation in the 4% formalin for further taxonomic investigation.

The permanent slides of the diatoms were prepared by treatment method (Sarode and Kamat, 1984). Diatom frustules were prepared by boiling the sample in the mixture of concentrated sulphuric acid (20.25 ml preserved sample+20.25 ml conc. H₂SO₄). The diatomaceous remain were then washed in distilled water until acid free and centrifuged samples were preserved in 70% alcohol. Frustules were eventually mounted in Canada balsam for microscopic examination. Photographs taken by Nikon camera and sketches were made by using camera lucida. Identification of diatoms was mostly based on the key given by Hustedt (1930), Venkataraman (1939), Cleve-Euler (1955), Krishnamurthy (1954), Ganghi (1958, 1960, 1998) and Sarode and Kamat (1984).
Systematic account

**Genus- Navicula Bory, 1822**

### Navicula cocconeiformis Gregory

Valves 20-27 µ long, 8-9µ broad, rhombic elliptical with narrowed acutely rounded ends; raphe thin with central pores distinctly placed; axial area narrow; central area very small, elliptical; striae 24-26 in 10µ, parallel, slightly convergent at the ends, longitudinal striae about 25 in 10µ.


### Navicula cuspidata Kuetz.

Hustedt 1930, p. 268, f. 433.
Valves 65-107µ long, 14.6-20 µ, broad, rhombic lanceolate with acutely rounded ends; raphe thin and straight with hooked unilaterally bent central pores and large terminal fissures; axial area narrow, linear, slightly widened in the middle, central area very small; striae transverse, 14-16 in 10µ, parallel, slightly convergent at the ends, longitudinal striae about 25 in 10µ.


### Navicula cuspidata Kuetz. v. diminuta A. Cl.

Cleve-Euler 1952, p. 18, f. 1353 f.
Valves 60-85µ long, 16.1-20.5µ, broad, broadly lanceolate with constricted, rounded ends; raphe thin and straight with unilaterally bent central pores; axial area narrow; central area slightly widened; transverse striae 14-16 in 10µ, parallel, slightly convergent at the ends, longitudinal striae 20-22 in 10µ, fine.


### Navicula cuspidata Kuetz. v. ambigu (Ehr.) Cleve

Hustedt 1930, p. 268, f. 434.
Valves 56.7-126µ long, 15.5-28µ broad, narrowly rhombic lanceolate with constricted produced, capitulate ends; craticular plates sometimes present; raphe thin and straight with central pores hook like; axial area very narrow, linear; central area very small; transverse striae 18-20 in 10µ, longitudinal striae 20-22 in 10µ, fine.


### Navicula cuspidata Kuetz. v. ambita (Ehr.) Cleve f. diminuta A. Cl.

Pl. 1, fig. 5; Pl. 2, fig. 8

Cleve-Euler 1952, p. 18, f. 1353 f.
Valves 60-85µ long, 16.1-20.5µ, broad, broadly lanceolate with constricted, rounded ends; raphe thin and straight with unilaterally bent central pores; axial area narrow; central area slightly widened; transverse striae 14-16 in 10µ, parallel, slightly convergent at the ends, longitudinal striae 20-22 in 10µ, fine.


### Navicula cuspidata Kuetz. v. conspica Venkat.

Venkataraman 1939, p. 325, f. 83, 88.
Valves 138-141µ long, 35.5-35.8µ broad, rhombic to elliptical lanceolate with slightly constricted and rounded ends; raphe thin and straight, central pores bent unilaterally, axial area narrow; central area slightly widened; transverse striae 14 in 10µ, parallel, slightly convergent at the ends, longitudinal striae 8-10 in 10µ, coarse, clear and prominent, closer towards the margins and wider near the middle.


### Navicula cuspidata Kuetz. v. major Meister f. robusta Gonzalves et Gandhi

Valves 201-230µ long, 48-50µ broad, rhombic lanceolate with attenuated, constricted, capitulate ends; raphe thin and straight, with hooked, unilaterally bent central pores and broadly curved terminal fissures; axial area very narrow; central area slightly widened; transverse striae about 15 in 10µ, longitudinal striae about 18 in 10µ.

Bombay (Gonzalves and Gandhi 1954). Aliagb, Dhule.

### Navicula halophila (Grum.) Cleve f. subcapitata Ostrup

Venkataraman 1939, p. 327, f. 91.
Valves 33-40µ long, 6.7-7.5µ broad, lanceolate with slightly produced and capitulate ends; axial area narrow, linear; central area slightly widened in the middle; striae 15-16 in 10µ, perpendicular to the middle line.

Satnavari (Sarode and Kamat 1983a).

### Navicula minuta (Cleve) A. Cl.

Pl. 1, fig. 3; Pl. 2, fig. 2

Cleve-Euler 1953, p. 142, f. 791a (= Navicula minuta v. genuine A. Cl.).
Valves 18.5-21µ long, 6.2-7µ broad, broadly lanceolate with constricted, shortly capitulate ends; raphe thin and straight; axial area very narrow; central area very small, roundish; striae about 24 in 10µ, strongly radial and fine.

Kolhapu (Gandhi 1958b); Pali (Sarode and Kamat 1980b).

### Navicula pupula Kuetz. v. capitata Hustedt

Hustedt 1930, p. 281, f. 467c.
Valves 29-35µ long, 8.1-9µ broad, linear with slightly convex margins and constricted, broadly capitulate, rounded ends; raphe thin and straight; axial area narrow, linear; central area transversely rectangular and large; terminal nodules distinct; striae 16-18 in 10µ, radial and curved, long and short striae alternating in the middle.

**Navicula sahyadrensis** Sarode et Kamat

Valves 62.2-70 µ long, 1.2-14 µ broad, linear lanceolate with produced and acute rounded ends; raphe thin enclosed in siliceous ribs, central pores unilaterally bent, terminal fissures distinct; axial area narrow; central area small; striae 7-8 in 10 µ, in the middle and up to 10 in 10 µ, at the ends, thick, redial in the middle and convergent at the ends.

**Navicula viridula** Hust.

Pl. 1, fig. 2; Pl. 2, fig. 4.

Navicula viridula (Seeve 1954), Sattnavari (Sarode and Kamat 1983a). Kolhapur, Nagpur Dhule.

**Navicula viridula** Kuetz. v. rostellata (Cleve) Meister

Valves 49-54µ long, 11.5-13µ broad, broadly linear, somewhat lanceolate with suddenly narrowed and produced subrostrate ends; raphe thin, enclosed in siliceous ribs with central pore bent unilaterally; axial area narrow and indistinct; central area rounded; striae 8-10 in 10µ, thick, strongly radial in the middle and slightly convergent at the ends.


References


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Plate 2: *Navicula* Photographs under Light microscope

Plate 1: Navicula Scatches

1) Navicula cuspidata v. Major f. robusta 2) N. vitabunda 3) N. minuta 4) N. sahyadrensis
5) N. cuspidata v. ambigua f. diminuta 6) N. cuspidata v. conspicua 7) Navicula cocconeiformis
8) N. viridula 9) N. halophila f. subcapitata 10) N. viridula Kuetz. v. rostellata 11) N. cuspidata v. ambigua 12) N. pupula v. capitata 13) N. cuspidata