

Diatoms from Jayakwadi Bird Sanctuary, Paithan, (M. S.) India

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ABSTRACT

Jayakwadi project constructed on Godavari River at Paithan, is about 50 kms from Aurangabad. The water body called as "Nathsagar" is about 55 kms in length and 27 kms in width. It has good number of algae, plant, fishes and other aquatic animals. Millions of birds visit this water body every year and therefore the Gov. of Maharashtra has declared it as "Jayakwadi Bird Sanctuary". A preliminary survey of algae of the water body was undertaken at four locations during the years 2004-2008. It was noted that several planktonic algae were present in the water body. A large number of taxa of fresh water desmids have been recorded from different localities of Nathsagar. *Gomphonema*, *Fragilaria*, *Synedra*, *Achnanthes*, *Stauroneis*, *Neidium*, *Mastogloia*, *Lichmophora*, *Nitzschia* and *Surirella* are found to be dominant genus at certain locations of the water body during winter.

Keywords: Diatoms, Jayakwadi Bird Sanctuary

INTRODUCTION

Godavari is one of the prominent rivers in Maharashtra India. In Marathwada region of Maharashtra State, about 50 km away from Aurangabad, a dam is constructed on the river at Paithan, which is known as Jayakwadi project. The water body known as 'Nathsagar' has been declared by Govt. of Maharashtra as 'Bird Sanctuary' in 1986. Geographically it is located between 75° 00'00" and 75°15'00"E longitudes and 19°18'33" and 19°33'16"N latitudes. The water body is about 55km in length and 27 km in width. Of this area, about 25-28% area is shallow, where the water depth is less than one meter. This region of water body is biologically active, having large number of flora and fauna. Several angiospermic plants and large number of algae are observed in this area, which have not been explored so far. Therefore, the study of vegetation of the water body was undertaken during years 2005-2008.

During the study, a large number of phytoplanktons like *Gomphonema*, *Fragilaria*, *Synedra*, *Achnanthes*, *Stauroneis*, *Neidium*, *Mastogloia*, *Lichmophora*, *Nitzschia* and *Surirella* were observed. The present paper describes 09 species of *Gomphonema*, 02 species of *Fragilaria*, *Achnanthes*, *Anomooneis*, *Stauroneis*, 01 species of *Neidium*, *Mastogloia*, *Lichmophora*, 02 species of *Nitzschia*, 05 species of *Surirella* and its varieties, observed during present investigation. From Marathwada area studies on algae were carried out earlier by Kamat (1973, 1974), Sarode and Kamat (1984) and Ashtekar (1980). However, the algal flora of Jayakwadi Bird Sanctuary has not been studied so far, and this is the first report.

MATERIALS AND METHODS

For the present study, 4 locations of the Nathsagar water body viz. Kaigaon, Bramhgavan, Dhakephal and Nathsagar North were selected. The water samples from each locality were collected once in a month in the morning between 8.00 a.m. to 10.00 a.m. The collections were made for 3 consecutive years during 2005-2008, during the months of November to March. For phytoplankton analysis, water samples were collected by plankton net, as per the method adopted by Narkhede (2006). 20 liters of surface water was collected (by standing in the back water of dam at about 100-120 cm depth) by dipping a jug and filtered through the plankton net and was collected in 1 lit. Wide mouth bottle. 20 ml of water sample was preserved in 4% formalin. The morphological studies of specimens were done by using Olympus Research Microscope and Labomed Microscope (Model no. T250L250) and the photographs were taken using Kodak EasyShare cx 7330 camera.

RESULTS AND DISCUSSION

Thirty seven taxa, represented with 26 genera have been reported from this area. Genus *Gomphonema*, *Fragilaria*, *Lichmophora*, *Nitzschia* and *Surirella* occur dominantly in various locations. All these taxa are being reported for the first time from this area.

1) *Gomphonema balatonis* Pant. (Pl.1, Fig. 1)

Sarode and Kamat, 1984, p 183, pl 21, f 489
Valves 90-92 μ long, 11.5-12 μ broad, narrowly lanceolate clavate with rounded ends, without constrictions; raphe thick and straight, terminal fissures distinct; axial area narrow, linear, central area slightly unilaterally enlarged with an isolated,

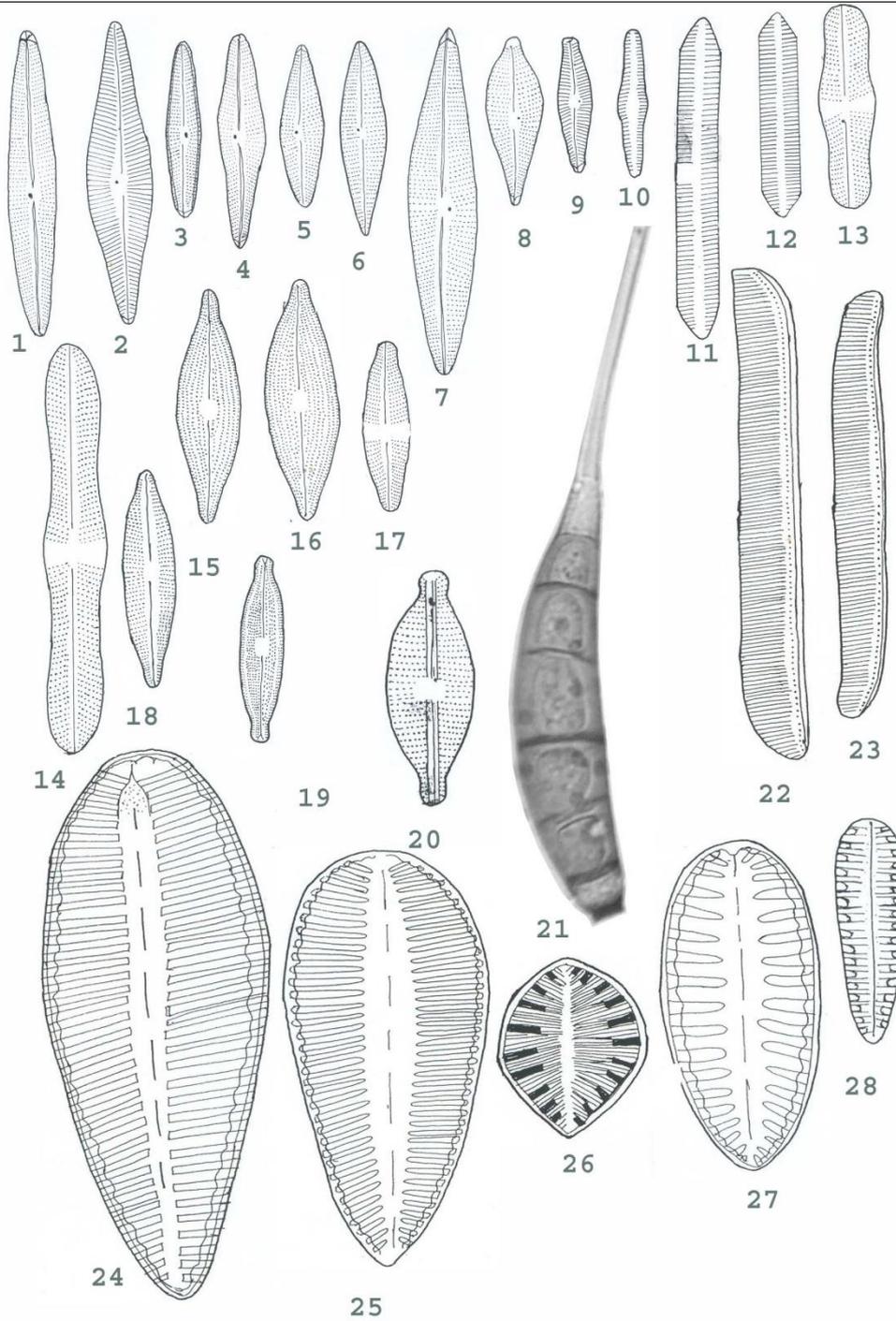


Plate 1: Fig. 1) *Gomphonema balatonis* 2) *G. gracile* v. *intricatiforme* 3) *G. intricatum* 4) *G. lanceolatum* 5) *G. lanceolatum* v. *insignis* 6) *G. longiceps* v. *subclavata* 7) *G. magnifica* 8) *G. moniliforme* 9) *G. subventricosum* 10) *Fragilaria brevistriata* v. *vidarbhensis* 11) *F. intermedia* f. *chandrapurensis* 12) *Synedra ulna* v. *notata* 13) *Achnanthes inflata* 14) *A. inflata* f. *vidarbhensis* 15) *Anomoeoneis lanceolata* 16) *A. sculpta* 17) *Stauroneis kirtikarii* 18) *S. phoenicenteron* f. *producta* 19) *Neidium affine* v. *amphirhynchus* f. *truncatula* 20) *Mastogloia baltica* 21) *Lichmophora abbreviata* 22) *Nitzschia obtusa* 23) *N. obtusa* v. *scalpelliformis* 24) *Surirella capronii* 25) *S. capronioides* 26) *S. ovata* 27) *S. robusta* 28) *S. tenuissima*

stigma on the opposite side; striae 6-8 in 10 μ , radial, fine and clearly punctate.

Locality : Bramhgavan
 Coll. No. and Date : JB- 51/4(03-02-07)

2) *G. gracile* Ehr. v. *intricatiforme* Mayer (Pl. 1, Fig. 2)

Sarode and Kamat 1984, p 186, pl 22, f 500 Valves 56.5-66.5 μ long, 10.5-11.3 μ broad, lanceolate, clavate inflated in the middle; ends obtuse, rounded; raphe somewhat thick and straight with distinct central nodules and curved terminal fissures; axial area narrow, linear; central area slightly expanded with an isolated stigma on the opposite side; striae 10-12 in 10 μ in the middle and up to 14 in 10 μ , towards the ends, slightly radial and coarse.

Locality : Dhakephal
Coll. No. and Date : JD- 216/5 (12-03-06)

3) *G. intricatum* Kuetz. (Pl. 1, Fig. 3)

Sarode and Kamat, 1984, p 188, pl 22, f 506. Valves 33-45 μ long, 7-7.9 μ broad, subclavate with constricted, slightly swollen broadly rounded apex and attenuated rounded base; raphe slightly thick; axial area narrow, linear; central area unilateral with an isolated stigma on the opposite side; striae 8 in 10 μ , in the middle and 10 in 10 μ , towards the ends, radial and coarse.

Locality : Nathasagar North
Coll. No. and Date : JNN- 376/2 (27-01-08)

4) *G. lanceolatum* Ehr. (Pl. 1, Fig. 4)

Sarode and Kamat, 1984, p 190, pl 22, f 514. Valves 40-110 μ long, 8-16 μ broad, lanceolate clavate with distinctly rounded apex and base, base somewhat narrower; raphe slightly thick and straight; axial area narrow, linear, central area slightly unilateral with an isolated stigma on the opposite side; striae 11-12 in 10 μ , radial and lineate.

Locality : Nathasagar North
Coll. No. and Date : JNN- 361 (24-11-07)

5) *G. lanceolatum* Ehr. v. *insignis* (Greg.) Cleve. (Pl. 1, Fig. 5)

Sarode and Kamat, 1984, p 191, pl 22, f 516. Valves 29-45 μ long, 7-9 μ broad, broadly lanceolate clavate with acute ends; raphe slightly thick with unilaterally bent, central pores and distinct terminal fissures; axial area moderate, linear; central area unilateral with an isolated stigma on the opposite side; striae 10-12 in 10 μ , radial, fine and distinctly punctate.

Locality : Nathasagar North
Coll. No. and Date : JNN- 305 (27-11-05)

6) *G. longiceps* Ehr. v. *subclavata* Grun. (Pl. 1, Fig. 6)

Sarode and Kamat, 1984, p 191, pl 22, f 518
Valves 28.4-44.6 μ long, 8.5-10.8 μ broad, lanceolate, slightly tumid in the middle with

somewhat broadly rounded apex and attenuated base; raphe thin and straight; axial area narrow, central area with an isolated stigma on the opposite side; striae 9-10 in 10 μ , almost parallel in the middle and slightly radial towards the ends, coarsely punctate.

Locality : Kaigaon
Coll. No. and Date : JK- 277/2 (16-03-08)

7) *G. magnifica* Gandhi (Pl. 1, Fig. 7)

Sarode and Kamat, 1984, p 192, pl 23, f 519. Valves 72-82.8 μ long, 17-19 μ broad, lanceolate, clavate, somewhat rhomboid, with acutely rounded apices; raphe thick and straight, axial area narrow, linear; central area small, slightly unilateral with an isolated stigma on the opposite side; striae 6-8 in 10 μ , radial, distinctly punctate, distantly placed in the middle.

Locality : Kaigaon
Coll. No. and Date : JK- 269/2 (20-01-08)

8) *G. moniliforme* Gandhi (Pl. 1, Fig. 8).

Sarode and Kamat, 1984, p 193, pl 23, f 522. Valves 52-62 μ long, 18.5-20.5 μ broad, broadly clavate, apex constricted; produced, sub-truncate; base with slightly concave margins and attenuated; raphe thick, central pores unilaterally bent and terminal fissures distinct; axial area narrow, linear; central area small, unilaterally dilated with an isolated stigma on the opposite side; striae 7-8 in 10 μ , radial, coarsely punctate.

Locality : Kaigaon
Coll. No. and Date : JK- 264/2 (15-12-07)

9) *G. subventricosum* Hustedt (Pl. 1, Fig. 9)

Sarode and Kamat, 1984, p 199, pl 23, f 542. Valves 45-70 μ long, 12.3-15.5 μ broad, lanceolate clavate with somewhat produced, slightly constricted; feebly capitate apex and attenuated base; raphe thin and straight; axial area narrow; central area unilateral with an isolated stigma on the opposite side; striae 10-12 in 10 μ , radial.

Locality : Bramhgavan
Coll. No. and Date : JB-51/4 (03-02-07)

10) *Fragilaria brevistriata* Grun. v. *vidarbhensis* Sarode and Kamat (Pl.1, Fig.10)

Sarode and Kamat, 1984, p 26, pl 1, f 18. Frustules linear, loosely attached together to form short chains in girdle view; valves 19.7-23 μ long, 3.5-4.8 μ broad, linear lanceolate, strongly tumid in the middle and slightly inflated towards the ends with somewhat acutely rounded ends;

pseudoraphe broad in the middle, linear lanceolate, striae 11-13 in 10 μ thick.

Locality : Bramhgavan, Dhakephal, Kaigaon, Nathsagar North.

Coll. No. and Date : JB-4 (06-11-05), JB-16/1 (04-12-05), JB-21/3 (01-01-06), JD-220/4 (12-11-06), JK-215/1 (20-11-05), JNN-311(22-01-06)

11) *F. intermedia* Grun. f. *chandrapurensis* Sarode and Kamat (Pl.1, Fig. 11)

Sarode and Kamat, 1984, p 27, pl 1, f 22. Frustules linear, rectangular, united together to form long band in girdle view; valves 40.2-69 μ long, 8.5-10 μ broad, linear with parallel margins, ends abruptly tapering and rounded; pseudoraphe narrow, linear; striae 10-12 in 10 μ coarse and distinct, absent in the middle on one side.

Locality : Bramhgavan, Dhakephal, Kaigaon, Nathsagar North.

Coll. No. and Date : JB-14/5 (04-12-05), JB-70 (01-12-07), JB-72/ (01-12-07), JD-210/2 (08-01-06), JK-253/7 (12-02-07), JNN-378/2(27-01-08)

12) *Synedra ulna* (Nitz.) Ehr. v. *notata* Kuetz. (Pl. 1, Fig.12)

Sarode and Kamat, 1984, p 32, pl 2, f 42. Cells solitary and free floating or in free floating colonies or epiphytic, frustules elongated and with truncate apices in girdle view. Valves 55.6-65 μ long, 8-9.5 μ broad, linear with slightly narrowed and obtuse or strongly narrowed and acutely rounded ends; pseudoraphe narrow; central area absent or sometimes unilaterally widened, striae 10-11 in 10 μ , coarse.

13) *Achnanthes inflata* (Kuetz.) Grun. (Pl.1, Fig.13)

Sarode and Kamat, 1984, p 55, pl 5, f 113. Frustules broadly linear, bent in the middle in girdle view; valves 42.8-55.8 μ long; 12.2 -16 μ broad, linear, dilated in the middle, ends broadly rounded; raphe valve with thin and straight raphe; axial area narrow; central area stauroid; striae 11-12 in 10 μ , radial and punctuate, rapheless valves with narrow, unilaterally disposed pseudoraphe, without central area; striae 9-10 in 10 μ , punctate.

Locality : Bramhgavan, Nathsagar North

Coll. No. and Date : JB-65/4 (03-11-07), JNN-324/3 (26-11-06).

14) *A. inflata* (Kuetz.) Grun. f. *vidarbhensis* Sarode et Kamat (Pl. 1, Fig.14)

Sarode and Kamat, 1984, p 55, pl 5, f 115. Valves 89-95.5 μ long; 16-16.6 μ broad, linear trigibbous with broadly cuneate rounded ends; raphe valve with thin and straight raphe, axial area fairly broad, linear, central area stauroid, reaching the margins; striae 9-10 in 10 μ , radial and punctuate; rapheless valve with unilateral, narrow pseudoraphe; central area absent; striae 9 in 10 μ , coarsely punctate, curved at the ends.

Locality : Bramhgavan, Nathsagar North

Coll. No. and Date : JB-72/4(01-12-07), JNN-300/3(27-11-05)

15) *Anomoeoneis lanceolata* Gandhi (Pl. 1, Fig. 15)

Sarode and Kamat, 1984, p 97, pl 11, f 235. Valves 48-64.8 μ long, 14-16.2 μ broad, somewhat broadly lanceolate, robust with rostrate ends; raphe thin and straight with prominent central pores and curved terminal fissures, axial area narrow, linear; central area large, unilateral; striae 18-20 in 10 μ , slightly radial, coarsely punctate, crossed by many hyaline longitudinal irregular spaces.

Locality : Bramhgavan

Coll. No. and Date : JB- 44/4 (03-12-06)

16) *A. sculpta* (Ehr.) Cleve (Pl. 1, Fig. 16).

Sarode and Kamat, 1984, p 98, pl 11, f 236. Valves 28.5-57.6 μ long, 11.5-14.4 μ broad, elliptic lanceolate, robust with constricted rostrate ends; raphe thin and straight with central pores unilaterally bent and terminal fissures slightly curved, axial area narrow, linear; central area large, unilaterally expanded with very fine indistinct punctae, irregularly disposed; striae 18-20 in 10 μ , radial, coarsely punctate, crossed by many hyaline longitudinal irregular spaces.

Locality : Bramhgavan

Coll. No. and Date : JB- 55/3 (03-02-07)

17) *Stauroneis kirtikarii* Sarode and Kamat (Pl. 1, Fig. 17)

Sarode and Kamat, 1984, p 91, pl 11, f 230. Valves 32.5-38.4 μ long, 8.1-10 μ broad, elliptic to linear elliptic with broadly rostrate, very slightly capitate ends; raphe thin and straight with distinct central pores; axial area narrow, central area large, stauroid, narrowed towards the margins; striae 22-24 in 10 μ , very fine and finely punctate.

Locality : Bramhgavan

Coll. No. and Date : JB-75/5 (06-01-08)

18) *S. phoenicenteron* Ehr. f. ***produta*** Gandhi (Pl. 1, Fig. 18)

Sarode and Kamat, 1984, p 94, pl 11, f 226. Valves 40.3-91.5 μ long, 8.6-18 broad, narrowly lanceolate, with slightly constricted, produced rounded ends; raphe thick with distinct central pores and curved terminal fissures; axial area narrow; central area a linear stauros; striae 18-24 in 10 μ , radial, fine and distinctly punctate.

Locality : Dhakephal
Coll. No. and Date : JD-200/2 (13-11-05)

19) *Neidium affine* (Ehr.) Cleve v. ***amphirhynchus*** (Ehr.) Cleve f. ***truncatula***. Gonzalves Gandhi, (Pl. 1, Fig.19)

Sarode and Kamat, 1984, p 78, pl 9, f 179. Cells usually solitary and free floating, rectangular in girdle view, without intercalary bands, valves 39-50 μ long, 10-12 μ broad, linear with almost parallel margins, suddenly contracted towards the ends and produced into broadly truncate poles, raphe thin and straight, central pores bent in opposite directions and terminal fissures narrowly bifurcated; axial area narrow; central area small and rhomboid; striae 20-22 in 10 μ , fine but clearly punctate, crossed by a hyaline furrow near the margins.

Locality : Bramhgavan
Coll. No. and Date : JB-58/3 (03-03-07)

20) *Mastogloia baltica* Grun. (Pl. 1, Fig. 20). Sarode and Kamat, 1984, p 60, pl 6, f 128. Valves 34-47.5 μ long; 12-13.5 μ broad, elliptic lanceolate with produced capitate ends; raphe nearly straight in between two longitudinal ribs; axial area narrow; central area small; roundish; striae 20-21 in 10 μ slightly radial and finely punctate.

Locality : Bramhgavan
Coll. No. and Date : JB-52/3 (03-02-07)

21) *Lichmophora abbreviate* Agardth (Pl.1, Fig.21)

Rath and Adhikari, 2005, p 78, pl 12, f 71. Frutules in girdle view cuneate with strongly rounded angles, lower end attached mucous stalk; cells forming colonies, septa projecting into the cells, valves ob lanceolate with margins subparallel towards the base, 28-75 μ long and 8-11 μ broad, pseudoraphe distinct.

Locality : Bramhgavan, Dhakephal
Coll. No. and Date : JB-4 (06-11-05), JB-16/1 (04-12-05), JB-21/3(01-01-06),

JD-220/4 (12-11-06).

22) *Nitzschia obtusa* W. Smith (Pl. 1, Fig. 22)

Sarode and Kamat 1984, p 221, pl 26, f 608. Valves 71-143 μ long, 7.5-10.5 μ broad, linear with obliquely cuneate rounded ends in opposite directions; keel strongly excentric, sometime with a slight notch in the middle; keel punctate 8-9 in 10 μ , rounded, two of the middle ones widely set; striae about 30 in 10 μ , fine and not clearly visible.

Locality : Bramhgavan
Coll. No. and Date : JB-50/3 (06-01-07)

23) *N. obtusa* W. Smith v. ***scalpelliformis*** Grun. (Pl. 1, Fig. 23)

Sarode and Kamat, 1984, p 222, pl 26, f 609. Valves 75-129 μ long, 5.5-7.5 μ broad, linear, very slightly sigmoid with obliquely wedge shaped acutely rounded ends; keel excentric, keel notched in the middle, keel punctate 7-8 in 10 μ , large rounded, striae 30-32 in 10 μ , very fine.

Locality : Kaigaon
Coll. No. and Date : JK- 264/2 (15-12-07)

24) *Surirella capronii* Breg (Pl. 1, Fig. 24)

Sarode and Kamat 1984, p 230, pl 27, f 641. Valves 137-183 μ long, 55.5-73 μ broad, heteropolar, ovate with broadly rounded, somewhat narrowed apex and cuneate acutely rounded base; middle line present, discontinuous, with strong spines developed on elevated cushions; axial area narrowly lanceolate; marginal folds strongly developed, with clear projections, flap windows quite evident; costae 9-13 in 100 μ , thick, radial at the ends; striae fairly visible.

Locality : Bramhgavan
Coll. No. and Date : JB-75/5 (1-6-08)

25) *S. capronioides* Gandhi (Pl. 1, Fig. 25)

Sarode and Kamat, 1984, p 231, pl 27, f 642. Valves 80-130.6 μ long, 42-50 μ broad, heteropolar, ovate with cuneate base; axial field narrowly lanceolate with a middle line interrupted throughout and with spines at both ends; flap marginal with clear flap projections; costae 24-26 in 100 μ , strong, radial at the ends; striae fine and indistinct.

Locality : Bramhgavan
Coll. No. and Date : JB-75/5 (1-6-08)

26) *S. ovata* Kuetz (Pl. 1, Fig.26)

Sarode and Kamat, 1984, p 232, pl 28, f 648. Valves 27-63.5 μ long, 19.5-33.4 μ broad, heteropolar, broadly ovate to ovate lanceolate with somewhat narrower base; pseudoraphe narrow, linear, marginal folds scarcely developed, costae 35-60 in 100 μ , thick, rib like, alternating with 2-5 striae; striae 16-20 in 10 μ , vary distinct and coarse.

Locality : Kaigaon
Coll. No. and Date : JK- 269/2 (20-01-08)

27) *S. robusta* Ehr. (Pl. 1, Fig. 27)

Sarode and Kamat, 1984, p 233, pl 28, f 652. Valves 113-164 μ long, 51-60 μ broad, heteropolar, broad to narrowly ovate with broadly rounded ends; axial field narrowly lanceolate with median line, marginal

folds very strongly developed with thick wavy projections; costae 8-11 in 100 μ , very strong, radial at the ends; striae indistinct.

Locality : Bramhgavan
Coll. No. and Date : JB-182/2 (2-3-08)

28) *S. tenuissima* Hustedt (Pl. 1 Fig. 28)

Sarode and Kamat, 1984, p 235, pl 28, f 657

Valves 23-44.5 μ long, 6-8.2 μ broad, small, heteropolar, narrowly lanceolate ovate with broadly rounded apex and gradually attenuated acutely cuneate base; axial area indistinct; flap margin with clear projections; costae about 35-50 in 100 μ , coarse, reaching the middle line.

Locality : Kaigaon
Coll. No. and Date : JK- 269/2 (20-01-08)

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