

DIATOMS OF KALIMPONG, WEST BENGAL (INDIA)

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Abstract

This paper deals with 25 taxa of diatoms reported for the first time from Kalimpong, West Bengal, India. The following genera of diatoms have been represented (the number within brackets indicates the number of taxa of each genus) : *Diatoma* (1), *Ceratoneis* (1), *Fragilaria* (1) ; *Synedra* (1), *Eunotia* (1), *Achnanthes* (2), *Navicula* (1), *Pinnularia* (2), *Frustulia* (1), *Gyrosigma* (1), *Gomphonema* (4), *Cymbella* (4), *Nitzschia* (4), and *Hantzschia* (1).

Introduction

Notable contributions pertaining to taxonomy and ecology of diatoms of West Bengal are available (Biswas, 1949a, 1949b; Chatterjee *et al.*, 1980; Das & Santra, 1982; Ehrenberg, 1854; Kachroo, 1959a, 1959b; Prain, 1905; Skvortzow, 1935 & Srinivasa, 1965). Ehrenberg (1854) was among the first to record the geographical distribution of various species of diatoms. Since then, the study of this group has gained increasing impetus. In the present communication, the diatom-flora of Kalimpong which is situated at an altitude of 1,250 m has been studied with a view to elucidate the distribution pattern in varied environments.

The diatom samples were collected from fresh water ponds and a tank situated in the compound of Regional Sericulture Research Station and Dello respectively during May, 1984. Algal samples were preserved in 4% formalin solution for further detailed study and systematic identifications.

Taxonomic Description

1. *Diatoma hiemale* (Lyngbye) Heiberg var. *mesodon* (Ehr.) Grun.
Figs. 27, 28

Foged N., 1974, p. 46, pl. 3, figs. 20-24.

Valves small, solitary, free-floating, linear lanceolate with gradually attenuated acuminately rounded ends; furnished with irregular transverse costae; striae fine, lineate, present between costae and interrupted by median longitudinal pseudo-raphe. Length, 12-27 μm ; breadth, 6-6.5 μm ; transverse ribs 3-4 in 10 μm ; striae 15-16 in 10 μm .

Habitat—Pond, Collection no. 1330.

2. *Ceratoneis arcus* (Ehr.) Kuetz.
Fig. 8

Werff, A. V. & Huls, H., 1976. PAD XIb, 82.

Valves linear, solitary, slightly arcuate with somewhat convex dorsal margin and medianly inflated ventral margin; ends faintly constricted, rostrate-capitate; pseudo-raphe
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straight, narrow, linear; striae lineate, delicate, parallel throughout interrupted by an area of tumescence forming one sided central area. Length $54\ \mu\text{m}$; breadth $5.5\ \mu\text{m}$; striae 18-21 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1332.

3. *Fragilaria construens* (Ehr.) Grun.

Fig. 6

Tiffany, L. H. and Britton, M. E., 1952; p. 232, pl. 62, fig. 696; Foged, N., 1979; p. 53, pl. 7, figs. 19 and 20.

Valves small, free-floating, broadly oval having deep constriction below median portion and sharply attenuated, produced, rostrate-capitate apices; pseudo-raphé median, lanceolate; striae coarse, lineate, radiate throughout the valve. Length $17.8\ \mu\text{m}$; breadth $12\ \mu\text{m}$; striae 13-14 in $10\ \mu\text{m}$.

Habitat—Tank, Collection no. 1350.

4. *Synedra gaillonii* (Bory.) Ehr. var. *gaillonii* fig. 1. Patrick, R. and Reimer, C. W., 1966, p. 148, pl. 6, fig. 16.

Valves solitary, long, linear, slender, gradually narrowing towards rounded ends; pseudo-raphé distinct, narrow, linear; central area absent; striae coarse, lineate, parallel throughout the valve. Length $10\text{-}15\ \mu\text{m}$, breadth, $5.5\ \mu\text{m}$; striae, 12-13 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1332.

5. *Eunotia pectinalis* (Dillw.) Rabh. var. *minor* (Kuetz) Rabh.

Fig. 25

Patrick, R. and Reimer, C. W. 1966, p. 207, pl. 12, figs. 13, 14; Foged, N., 1976, p. 22, pl. 4, fig. 20.

Valves linear, slightly curved with dorsal margin convex, having two shallow undulations one on each side of the apex, ventral margin slightly concave; ends narrow, produced and rounded; terminal nodules and raphe small, distinct at the ends of the ventral side; striae lineate, irregularly arranged, slightly radiate and dense towards apices. Length $30\ \mu\text{m}$; breadth $5\ \mu\text{m}$; striae 18-19 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1330.

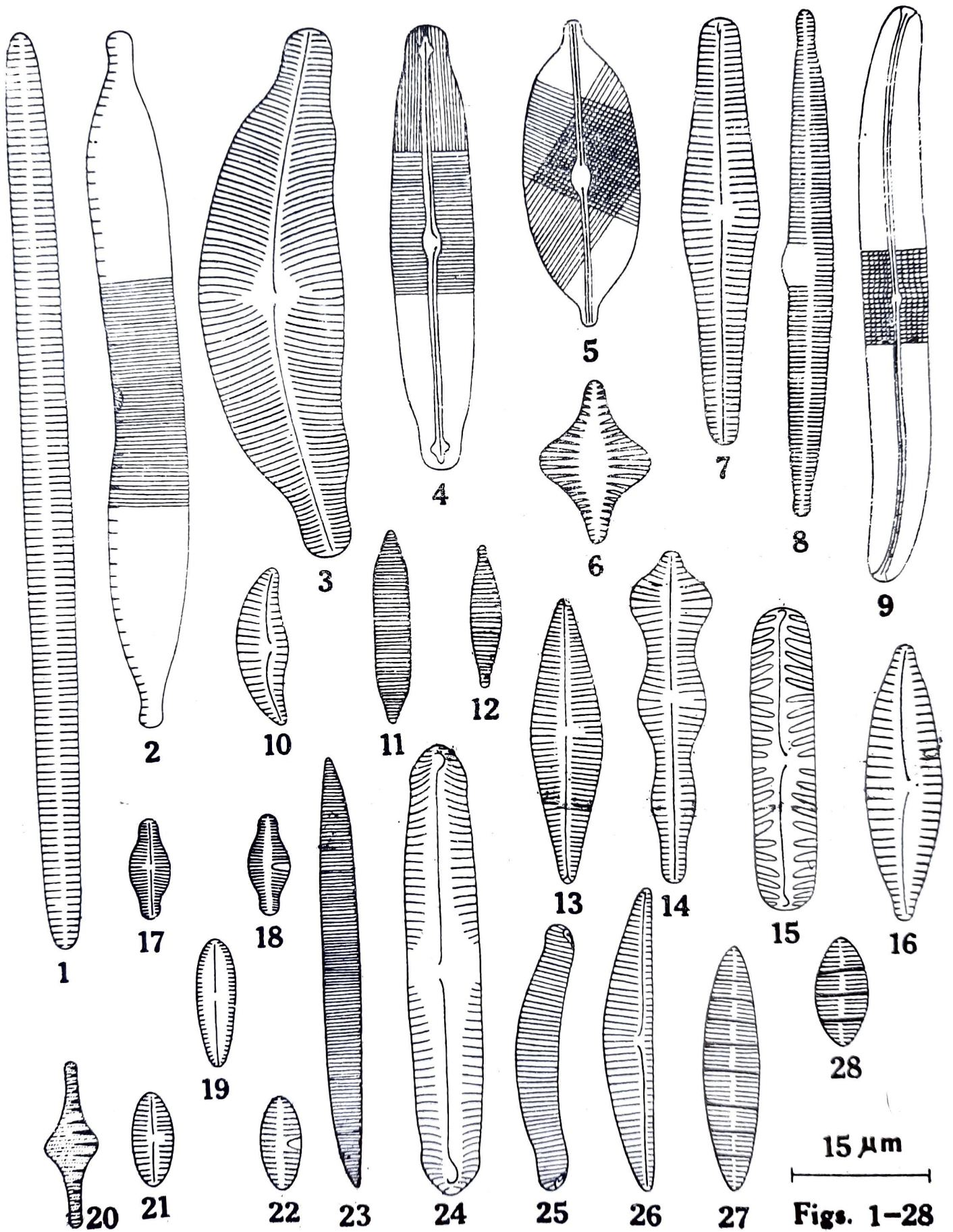
6. *Achnanthes biasoletiana* (Kuetz.) Grun. var. *minuta* Cleve

Figs. 17, 18

Gandhi, H. P., 1966, p. 92, figs. 1, 2.

Valves small, elliptical-lanceolate with constricted produced rounded ends; hypovalve with thin median straight raphe, terminal fissures straight; axial area linear, narrow; central area somewhat circular; striae fine lineate, slightly radiate throughout the valve; equivalve with narrowly lanceolate centrally placed pseudo-raphé formed by the union of axial and central area but interrupted by horse-shoe-shaped area on one side of the central region; striae fine, lineate, slightly radiate and comparatively denser than the striae of hypovalve. Length $11.2\ \mu\text{m}$; breadth $4\text{-}5\ \mu\text{m}$; striae 27-28 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1330.



Text-fig. 1-28

7. *Achnanthes lanceolata* (Bréb) Grun. var. *elliptica* Cleve

Figs. 21, 22

Gonzalves, E. A. and Gandhi, H. P., 1952 ; p. 144, figs. 52a, b.

Valves small, elliptical-lanceolate with gradually attenuated rounded ends; hypovalve with thin, median, straight raphe; axial area narrow linear expanding slightly rear area; central area somewhat elliptical, striae coarse, lineate, very slightly radiate throughout the valve; eqivalve with linear median pseudo-raphé interrupted centrally on one side by a horse-shoe-shaped area; striae coarse, lineate, radiate throughout the valve. Length 10.6 μm , breadth 4.8 μm , striae 17 in 10 μm .

Habitat—Tank, Collection no. 1350.8. *Navicula placentula* Ehr.

Fig. 5

Foged N., 1979, p. 78, pl. 30, fig. 2.

Valves solitary, linear lanceolate having convex margins and distinctly constricted highly produced rounded ends; raphe thin, straight, median with distinct central pores; axial area narrow, linear; central area broadly elliptical; striae fine, punctate, arranged in two oblique rows. Length 32.8 μm ; breadth 12.5 μm ; striae 21-23 in 10 μm .

Habitat—Tank, Collection no. 1350.9. *Pinnularia borealis* Ehr. var. *borealis*

Fig. 15

Patrick, R. and Reimer, C. W., 1966, p. 618, pl. 58, fig. 13.

Valves solitary, free-floating, linear oblong with parallel sides and truncately rounded ends; raphe thin, median with unilaterally bent central pores, terminal fissures curved, question mark-shaped; axial area narrow, linear widening towards centre; central area rectangular reaching the sides; coetae radiate in middle becoming convergent towards poles. Length 33 μm ; breadth 7 μm ; striae 7 in 10 μm .

Habitat—Tank, Collection no. 1350.10. *Pinnularia subsimilis* Gandhi

Fig. 24

Gandhi, H. P., 1970, p. 789, figs. 116-118.

Valves solitary, free-floating, somewhat linear-lanceolate, slightly attenuated towards apices; ends constricted, produced, cuneately rounded; raphe thin median with unila-

Text-figure 1—1, *Syndera gaillonii* (Borrey) Ehr. var. *gaillonii*; 2, *Hantzschia amphioxys* (Ehr.) Grun. var. *major* Grun.; 3, *Cymbella tumida* (Breb) Heurck; 4, *Frustulia vulgaris* (Thwaites) De Toni; 5, *Navicula placentula* Ehr.; 6, *Fragilaria construens* (Ehr.) Grun.; 7, *Gomphonema hebridense* (Greg.) Her.; 8, *Ceratoneis arcus* (Ehr.) Kuetz.; 9, *Cyrosigma spencerii* (W. Smith) Cleve; 10, *Cymbella ventricosa* Kuetz.; 11, *Nitzschia frustulum* (Kuetz.) Grun.; 12, *Nitzschia amphibia* Grun.; 13, *Gomphonema gracile* Ehr.; 14, *Gomphonema acuminatum* Ehr.; 15, *Pinnularia borealis* Ehr. var. *borealis*; 16, *Cymbella tumescens* A. Cl.; 17, 18, *Achnanthes bisoletiana* (Kuetz.) Grun. Nar. *minuta* Cleve; 19, *Gomphonema clevei* Ficke; 20, *Nitzschia sinuata* (W. Sm.) Grun. var. *tabellaria* Grun.; 21, 22, *Achnanthes lanceolata* (Breb.) Grun. var. *elliptica* Cleve; 23, *Nitzschia sigma* W. Sm. var. *rigidula* Grun.; 24, *Pinnularia subsimilis* Gandhi; 25, *Eunotia pectinalis* (Dillw.) Rabh. var. *minor* (Kuetz.) Rabh.; 26, *Cymbella pusilla* Grun.; 27, 28, *Diatoma hiemale* (Lyngbye) Heiberg var. *mesodon* (Ehr.) Grun.

terally bent central pores, terminal fissures curved question mark shaped; axial area narrow, linear gradually widening towards centre; central area broad, somewhat star-shaped; striae lineate, radiate in middle becoming slightly curved and convergent towards apices. Length 51 μm ; breadth, 8.5 μm ; striae 11-13, in 10 μm .

Habitat—Pond; Collection no. 1330.

11. *Frustulia vulgaris* (Thwaites) De Toni

Fig. 4

Foged, N., 1974, p. 58, pl. 8, fig. 5; Foged, N., 1979, p. 56, pl. 17, figs. 6, 13.

Valves free-floating, linear, rhombo-lanceolate with distinctly constricted much produced, truncately rounded ends; raphe thin, median with unilaterally bent central pores, enclosed between two silicious ribs that fuse at the terminal nodules appearing as a single rib, terminal nodules thickened giving the shape of a pencil point; axial area narrow, linear; central area somewhat elliptical; striae fine lineate, parallel throughout, interrupted by longitudinal striae forming a net-like structure. Length 48.5 μm ; breadth 9.5 μm ; transverse striae 24 in 10 μm ; longitudinal striae 25-26 in 10 μm .

Habitat—Tank, Collection no. 1350.

12. *Gyrosigma spencerii* (W. Smith) Cleve

Fig. 9

Gandhi, H. P., 1959a, p. 100, fig. 1.

Valves solitary, free-floating, linear sigmoid with broadly rounded ends; raphe thin, median sigmoid with distinct closely set central pores; axial area narrow, linear; central area slightly elliptical; transverse striae fine, lineate, parallel more conspicuous throughout the valve interrupted by faint longitudinal striae.

Length 61.5 μm ; breadth 7 μm ; transverse striae 20-21 in 10 μm , longitudinal striae 14-15 in 10 μm .

Habitat—Tank; Collection no. 1350.

13. *Gomphonema acuminatum* Ehr.

Fig. 14

Foged, N., 1974, p. 59, pl. 28, figs. 1, 2; Werff, A. V. and Huls, H., 1976. & DG XVIII, 130.

Valves small linear cuneate having tri-undulate margins, inflated in the middle, lower portion comparatively less inflated and elongated with broadly rounded base, upper region much broader somewhat triangular with capitate obtuse apiculate apex; raphe thin, straight median with distinct central pores; axial area narrow linear; central area somewhat rectangular having a unilateral dot opposite to very shortened striae; striae lineate radiate in middle, transversely parallel in the lower region and slightly curved and convergent towards apices. Length 37 μm ; breadth 2.8-7.5-9 μm ; striae 13-15 in 10 μm .

Habitat—Pond, Collection no. 1332.

14. *Gomphonema clevei* Fricke

Fig. 19

Gandhi, H. P., 1959b, p. 326, fig. 48.

Valves small, ovate-clavate with broadly rounded apex and gradually attenuated rounded base; raphe thin, median, straight with distinct central pores; axial and central area somewhat lanceolate; striae small, lineate, marginal, slightly radiate and parallel throughout the valve. Length $14\ \mu\text{m}$; breadth $4.5\ \mu\text{m}$; striae 19-20 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1330.

15. *Gomphonema gracile* Ehr.

Fig. 13

Prowse, G. W., 1962, p. 61, pl. 16, fig. a ; Gandhi, H. P., 1955, p. 328, fig. 32.

Valves linear, elongated, lanceolate-clavate with acutely rounded apex; base gradually attenuated and broadly rounded; raphe thin, median, straight; axial area narrow, linear, gradually widening towards centre; central area somewhat excentrically rectangular formed by the shortening of striae and have an isolated puncta on that side striae lineate, radiate distantly placed in the middle but much closer towards apices. Length $31.8\ \mu\text{m}$; breadth $8\ \mu\text{m}$; striae 15-18 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1330.

16. *Gomphonema hebridense* (Greg.) Her.

Fig. 7

Gandhi, H. P., 1970, p. 766, fig. 36.

Valves solitary, free-floating, elongated narrowly lanceolate clavate having a distinct inflation in the middle region, much produced and broadly rounded towards apex while slightly attenuated and rounded at base; raphe thin, median, straight with distinct central pores, terminal fissures slightly curved; axial area linear, narrow, gradually, widening towards centre; central area somewhat elliptical having an isolated puncta on one side; striae lineate, slightly radiate parallel, distantly placed in the middle becoming more close towards ends. Length $45\ \mu\text{m}$; breadth $8.8\ \mu\text{m}$; striae 12-15 in $10\ \mu\text{m}$.

Habitat—Tank, Collection no. 1350.

17. *Cymbella pusilla* Grun.

Fig. 26

Van-Heurck, H., 1896, p. 143, pl. 1, fig. 28.

Valves asymmetrical, lunate with dorsal margin convex and ventral margin straight; ends bluntly rounded; raphe thin, excentric, straight with dorsally bent central pores; axial area narrow, linear; central area broad, somewhat lanceolate; striae coarse, lineate, on dorsal side radiate parallel throughout, on ventral side marginal and comparatively dense. Length $34\ \mu\text{m}$; breadth $5.5\ \mu\text{m}$; striae 14-16 in $10\ \mu\text{m}$.

Habitat—Pond, Collection no. 1332.

18. *Cymbella tumescens* A. Cl.

Fig. 16

Gandhi, H. P., 1964, p. 370, figs. 64, 65.

Valves asymmetrical, boat-shaped, dorsal and ventral sides convex having constricted, produced, rounded ends ; raphe thick, curved and somewhat centric with distinct ventrally bent central pores ; axial area wide ; central area with a coarse stigma on ventral side ; striae coarse lineate, slightly radiate distantly placed in middle gradually set closer towards apices. Length 30.5 μm ; breadth 8.5 μm ; striae 9-12 in 10 μm .

Habitat—Tank, Collection no. 1350.

19. *Cymbella tumida* (Breb.) Heruck

Fig. 3

Gandhi, H. P., 1960, p. 104, figs. 65, 66.

Valves asymmetrical, dorsal side strongly convex, ventral side medianly gibbous, triundulate with strongly constricted, produced broadly rounded truncate ends ; raphe thick, curved, excentric with closely placed central pores ; axial area narrow, linear ; central area large, subquadrate ; strial coarse, lineate, curved, radiate throughout the valve. Length 57.8 μm ; breadth 16.5 μm ; striae 12-16 in 10 μm .

Habitat—Pond, Collection no. 1332.

20. *Cymbella ventricosa* Kuetz.

Fig. 10

Tiffany, L. H. and Britton, M. E., 1952, p. 279, pl. 74, fig. 871.

Valves small, asymmetrical, semi-elliptic with dorsal margin convex, ventral margin slightly concave with convex median inflation ; ends acuminate rounded ; raphe excentric, curved with distinct central pores ; axial area narrow, linear, gradually widening towards centre ; central area broad ; striae lineate, delicate, slightly radiate throughout the valve. Length 17.5 μm ; breadth 6 μm ; striae 12-15 in 10 μm .

Habitat—Pond, Collection no. 1330.

21. *Nitzschia amphibia* Grun.

Fig. 12

Gandhi, H. P., 1964, p. 379, figs. 101-103.

Valves small solitary, free-floating, linear lanceolate with convex margins and moderately constricted, produced rounded ends ; keel punctae coarse, marginal, irregularly placed ; striae lineate, delicate, parallel throughout the valve. Length 16 μm ; breadth 3.5 μm ; keel punctae 6-7 in 10 μm ; striae 19-20 in 10 μm .

Habitat—Tank, Collection no. 1350.

22. *Nitzschia frustulum* (Kuetz.) Grun.

Fig. 11

Gandhi, H. P., 1955, p. 331, fig. 41.

Valves small linear with parallel margins and abruptly narrowed faintly constricted, produced rounded ends ; keel punctae distinct, coarse ; striae very fine indistinct. Length 21.5 μm ; breadth 4 μm ; keel punctae, 11-12 in 10 μm ; striae 21-24 in 10 μm .

Habitat—Pond, Collection no. 1330.

23. *Nitzschia sigma* W. Sm. var. *rigidula* Grun.

Fig. 23

Van-Heurck, H., 1896, p. 396, pl. 16, fig. 354.

Valves solitary, free-floating linear, sigmoid, gradually attenuated towards acutely rounded ends; carinal dots distinct, marginal and irregularly placed; striae very fine, lineate, parallel throughout the valve. Length 48 μm ; breadth 4.2 μm ; carinal dots 14-15 in 10 μm ; striae 25-27 in 10 μm .

Habitat—Tank, Collection no. 1350.

24. *Nitzschia sinuata* (W. Sm.) Grun. var. *tabellaria* Grun.

Fig. 20

Van Heurck, H., 1896, p. 391, pl. 15, fig. 517.

Valves small, free-floating, lanceolate with inflated median portion and highly produced rostrate capitate ends; keel punctae coarse, marginal; striae fine, delicate, punctate, parallel throughout the valve. Length 18.2 μm ; breadth 6 μm ; keel punctae 8-9 in 10 μm ; striae 22-24 in 10 μm .

Habitat—Pond, Collection no. 1330.

25. *Hantzschia amphioxys* (Ehr.) Grun. var. *major* Grun.

Fig. 2

Foged, N., 1976, p. 27, pl. 20, figs. 1-3.

Valves solitary, free-floating, linear-lanceolate, dorsal side slightly convex, ventral slightly concave with distinct deep median depression, ends deeply constricted, produced, rounded; keel punctae distinct, thick, slightly elongated, median two set apart, rudiments of central nodules present below the depression of ventral valve; striae fine, lineate, parallel throughout the valve. Length 77 μm ; breadth 8 μm ; keel punctae 8 in 10 μm ; striae 24 in 10 μm .

Habitat—Tank, Collection no. 1350.

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