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The Diatom-flora of the Bombay and Salsette Islands–II

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With plates 123 (1) – 127 (5)

INTRODUCTION

In continuation of the author's (GANDHI, 1960) earlier account of the Diatom-flora of the Bombay and Salsette Islands, this one forms the last part. It deals with the Diatom genera: *Epithemia*, *Rhopalodia*, *Hantzschia*, *Nitzschia*, *Surirella* and *Campylodiscus*. Among these, the genus *Nitzschia*, is rather important on account of several species it has belonging to different groups. It may, however, be said that the brackish-waters have not been thoroughly investigated with the result that this element forms only a small fraction of the whole.

As stated by the author in his earlier account, the material for present study was collected from a variety of fresh-water and a few brackish-water situations (especially from Mahim-Bandra, Chembur, Wadala and Ghod-Bunder side creeks), during the years 1944 to 1956.

In the present account the Diatoms are arranged according to CLEVE-EULER'S (1951–1955) monograph with the additional help of HUSTEDT'S (1930) and other more important works. Of these, the species which have already been recorded in the Indian Literature are merely listed here with some necessary notes or remarks and the rest of them are fully described.

Genus – *EPITHEMIA* BRÉBISSON, 1838

1. *Epithemia zebra* (EHR.) KÜTZ. (Fig 1)

Habitat: Fresh-water. Collected as a stray diatom from ponds at Goregaon, Bandra, Andheri, streams at Borivli and Kanheri-caves, but more frequently collected from Powai and Vihar lakes.

2. *Epithemia zebra* v. *saxonica* (KÜTZ.) GRUN. (Fig 2)

Habitat: Fresh-water. Collected from streams at Borivli, ponds at Goregaon, Andheri and Vile-Parle in good numbers mostly occurring among the masses of *Chara*, *Nitella* or *Ceratophyllum*.

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3. *Epithemia zebra* v. *porcellus* (Küz.) Grun.

Habitat: Fresh-water. Collected as a very stray diatom from ponds at Goregaon and Andheri, Vihar and Powai lakes

4. *Epithemia zebra* v. *denticuloides* Husi (Figs. 3–4)

Husiedi, 1936, Arch Hydrobiol. Suppl., 14:173, t. 3, f 19;—1938, *ibid*, 15:453, t 39, f. 21–23.

Valves 60–65 μ long and 8.5–10 μ broad, weakly arcuate, lanceolate with dorsal side uniformly convex, ventral side weakly concave and ends slightly constricted on the dorsal side, acutely produced and rounded. Raphe in the raphe canal fine, raphe canal narrow reaching about $^1/_5$ the width of the valve on ventral side making a very wide angle. Costae 3–4 in 10 μ, quite coarse, slightly radial and alternating with 4–6 rows of fine alveoli, rows of alveoli about 16–18 in 10 μ.

Habitat: Fresh-water Collected as a stray specimen from ponds at Goregaon, Wadala and Andheri A few specimens also were recorded from Vihar lake.

5 *Epithemia zebra* v *subcapitata* Mayer (Fig. 5)

Mayer, A., 1936, Denkschr. Bay. Bot. Ges Regens., 20 (N.F. 14):92–96, t. 5, f. 2.

Valves 80–95 μ long and 10–11.2 μ broad, weakly arcuate, linear-lanceolate with dorsal side convex and ventral side slightly concave, ends slightly constricted on the dorsal side, subcapitate and rounded. Raphe in the raphe canal distinct with clear central pores, raphe canal fairly wide reaching about $^1/_3$ the width of the valve making a wide angle. Costae 2–4 in 10 μ, fairly coarse, slightly radial and curved, alternating with 3–6 rows of small alveoli, rows of alveoli about 12–14 in 10 μ.

Habitat: Fresh-water. Collected in a very small number from a pond at Goregaon, fairly good number of specimens were obtained from Powai and Vihar lakes. It was also recorded from Rankala tank at Kolhapur.

6 *Epithemia sorex* Küz. (Fig. 6)

Habitat: Fresh-water. Collected mostly as a stray diatom from Powai and Vihar lakes as also from ponds at Goregaon and Andheri.

Genus – *RHOPALODIA* O. MÜLLER, 1895

7 *Rhopalodia gibba* (EHR.) O MÜLL. (Figs. 7–8)

Habitat: Fresh-water. A widely distributed diatom in the region but never found to be gregarious except in some hill-streams at Borivli.

8. *Rhopalodia gibba* v. *ventricosa* (EHR.) GRUN (Figs. 9–13)

Habitat: Fresh-water rarely slightly brackish-water. A very well distributed diatom in the region. It was more abundantly recorded from ponds at Goregaon, Andheri, Vile-Parle and Bandra, garden reservoirs at the Institute of Science.

9. *Rhopalodia gibberula* (EHR.) O MÜLL. (Figs. 14, 16)

Habitat: Fresh-water. Collected as a stray diatom from streams at Borivli. It was also recorded from brackish-waters at Mahim-Bandra and Ghod-Bunder creek areas.

10 *Rhopalodia gibberula* v. *van heurckii* O. MÜLL. (Fig. 15)

HUSTEDT, 1930, Bacill., p. 391, f. 744.

Valves 25–34 μ long and 7–7.5 μ broad, arcuate, highly convex on the dorsal side, slightly concave on the ventral side, dorsal side slightly notched in the middle, ends ventrally bent, weakly capitate and rounded. Costae 2–4 in 10 μ, coarse, radial and curved, alternating with 3–6 rows of small alveoli, rows of alveoli 14–16 in 10 μ, alveoli about 16 in 10 μ.

Habitat: Fresh-water. Collected from ponds at Andheri and Goregaon, streams at Borivli, Powai and Tansa lakes. Fairly common.

11. *Rhopalodia gibberula* v. *minuens* O. MÜLL. (Fig. 17)

CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, 43, f. 1415 m, n.

Valves 20–30 μ long and 10–12.5 μ broad, weakly arcuate, semi-elliptical, dorsal side strongly convex with a slight median notch, ventral side almost straight or slightly dilated in the middle, ends constricted on the dorsal side, produced, rounded and very slightly bent towards the ventral side. Costae 2–4 in 10 μ, radial and strongly curved, alternating with 4–7 rows of fine alveoli, rows of alveoli about 15–17 in 10 μ, alveoli about 16 in 10 μ.

Habitat: Fresh-water. Collected as a very stray diatom from streams at Borivli and a few specimens from Powai lake.

The present diatom slightly differs from that of CLEVE-EULER's on account of clearly rostrate ends However, it is referred to the type provisionally for the want of material.

12 *Rhopalodia musculus* (KÜTZ) O. MÜLL

Habitat: Fresh-water. Collected from streams at Borivli, Powai lake. Some stray specimens also were recorded from ponds at Goregaon and Vile-Parle.

Genus – *HANTZSCHIA* GRUNOW, 1877

13. *Hantzschia amphioxys* (EHR.) GRUN. (Figs 18, 22)

SCHMIDT, A , 1874–1959, Atlas Diat., t. 329, f. 15–20; VAN HEURCK, H., 1896, Treat. Diat , p. 381, f. 123, pl. 15, f 483; BRISIOL, B M., 1920, Ann. Bot., 34:70, f. 10:1–2; HUSTEDT, 1930, Bacill , p 394, f. 747; LUND, J. W. G., 1946, New Phytol., 45 (1):96, f. 13A–D, F; CLEVE-EULER, A , 1952, Diat Schwed. Finn—V, p 47, f. 1419a–c (= v. *genuina* GRUN)

Valves 20–60 μ long and 5–9 5 μ broad, slightly arcuate, linear, dorsal side convex, ventral side concave somewhat depressed in the middle, ends constricted bluntly rostrate to weakly capitate and produced. Keel very excentric, keel punctae coarse, about 5–7 in 10 μ (variable in number). Striae 14–18, rarely more in 10 μ, quite distinct. Two of the middle keel punctae always widely set.

Habitat: Fresh-water. A widely distributed diatom. Also recorded from many wet soils from the region. The soil forms invariably showed higher count for keel punctae and striae than those obtained from wet places

14. *Hantzschia amphioxys* v *densestriata* (FONT.) A. CL.

Habitat: Fresh-water Collected from several wet situations in the area, sometimes along with the type.

15. *Hantzschia amphioxys* v. *stricta* HUST. (Figs 23–24)

SCHMIDT, A , 1874–1959, Atlas Diat t. 345, f 18

Valves 189–240 μ long and 12–13 μ broad, elongated, slightly arcuate, linear, ends narrowly wedge-shaped, constricted, subcapitate and produced Keel excentric, notched in the middle, keel punctae 6–8 in 10 μ, coarse, uniformly set but two of them wide apart in the middle Striae about 14 in 10 μ, well marked and finely punctate.

Habitat: Fresh-water. Collected as an occasional diatom from streams at Borivli, Powai and Vihar lakes.

16. *Hantzschia linearis* (O. Müll.) A. Cl. (Fig. 21)

Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 51, f. 1421a–d

Valves 130–190 μ long and 10–13 μ broad, arcuate, linear, dorsal side uniformly convex, ventral side concave but more so in the middle, ends long cuneate, constricted, clearly produced and subcapitate. Raphe slit seen at the ends. Keel quite excentric, keel punctae 6 to 8 in 10 μ, fairly large, two of the median ones widely set. Striae about 14–15 in 10 μ, coarse and clearly lineate punctate.

Habitat: Fresh-water. Collected as a frequent form from streams at Borivli, Powai and Vihar lakes. Elsewhere in the region seen rather rarely.

17. *Hantzschia distincte-punctata* Husi. v. *valida* v. nov. (Fig. 19)

Valvae 49–54 μ longae atque 9–9.5 μ latae, aliquantum arcuatae, lineares, margine dorsali convexa ac plus minus recta in medio, ventrali concava, apicibus aliquantum abrupte constrictis et capitatis. Carina excentrica, carina punctis 5–6 in 10 μ, crassis, mediis duobus remotioribus. Striae 12–13 in 10 μ, crasse punctatae atque distinctae, punctis circiter 12–13 in 10 μ. Typus lectus a H. P. Gandhi ad lacus Powai die 18–7–1945, et positus in herbario proprio auctoris sub numero slide BOM-POW. no. 12

Valves 49–54 μ long and 9–9.5 μ broad, slightly arcuate, linear, dorsal side convex and more or less straight in the middle, ventral side concave, ends somewhat abruptly constricted and capitate. Keel excentric, keel punctae 5–6 in 10 μ, coarse two of the middle punctae distantly set. Striae 12–13 in 10 μ, coarse and clearly punctate, punctae about 12–13 in 10 μ.

Habitat: Fresh-water. Collected in a small number from Powai lake but also recorded from a pond at Goregaon and Vile-Parle as a rare diatom.

This diatom agrees with *Hantzschia distincte-punctata* Husi. (Husiedi, 1922, Hedwigia, 63:167 (= *H. amphioxys* v. *distincte-punctata* Husi.);—Schmidi's Atlas Diat., t. 329, f. 21–22;—1938, Arch. Hydrobiol. Suppl., 15:462, t. 40, f. 4; Cholnoky, B. J., 1955, Ber. dtsch. bot. Ges. 68:18, f. 19;—1957, Portugal. Acta Biol., B 6 [1]:66, t. 3, f. 63), in having very distinctly punctate striae and their organisation, also in number of keel punctae. However, the present specimen differs from the type in being smaller, much broader in proportion therefore robust. Moreover, the apices are somewhat abruptly constricted, less produced and capitate. With these observed differences, therefore, it is considered to be a new variety.

18. *Hantzschia borivliana* sp. nov. (Fig. 20)

Valvae 63.5–70 μ longae atque 12.5 μ latae, arcuatae, lanceolatae, margine dorsali valde convexa, ventrali aliquantum concava, apicibus constrictis, leniter elongatis capitatis rotundatis Carina valde excentrica, carina punctis 6–7 in 10 μ, crassis et plus minus elongatis irregulariter positis. Striae 16–17 in 10 μ, indistincte punctatae. Typus lectus a H. P. Gandhi ad rivulis Borivli die 10–8–46, et positus in herbario proprio auctoris sub numero, slide BOM-BOR. no 26

Valves 63.5–70 μ long and 12.5 μ broad, arcuate, lanceolate, dorsal side strongly convex, ventral side slightly concave, ends constricted, slightly produced, capitate and rounded. Keel strongly excentric, keel punctae 6–7 in 10 μ, coarse and more or less elongated and irregularly disposed. Striae 16–17 in 10 μ, indistinctly punctate.

Habitat: Fresh-water Collected in a small number from streams at Borivli and Kanheri-caves. Stray specimens also were gathered from Powai lake

This diaton does not agree with any other type, hence it is regarded as a new species.

Genus – *NITZSCHIA* (Hassall, 1845 et others) Grunow, 1880
Section – *Tryblionellae* (W Sm.) Grunow

19. *Nitzschia granulata* Grun (Fig. 25)

Schmidt, A., 1874–1959, Atlas Diat., t. 330, f. 4–9; Boyer, C. S., 1916, Diat. Philadelphia, p. 116, pl. 32, f. 3; Cleve-Euler, A., 1952, Diat Schwed Finn.—V, 56, f. 1428; Pantocsek, J. 1902, Res. Wiss Erf Balat., 2 (2):84, t. 9, f. 250 (= *Zotheca csaszkaae* Pant ?).

Valves 36–42 μ long and 13.6–14.4 μ broad, elliptical-lanceolate with cuneate rounded ends sometimes indistinctly constricted. Keel very excentric, keel punctae very coarse about 7 in 10 μ, biseriately punctate Striae 7–8 in 10 μ, moniliform punctate, punctae about 8–10 in 10 μ, arranged in single rows in the middle zone but on the margin side in double rows and much smaller.

Habitat: Brackish-water. Collected in small numbers from creeks at Ghod-Bunder, Chembur and Mahim-Bandra. Fresh-water–from streams at Borivli?

20. *Nitzschia tryblionella* Haniz v. *victoriae* Grun.

Habitat: Fresh-water. Collected mostly as a stray diatom from streams at Borivli, Kanheri-caves and Dhahisar hills. It was also collected from several hill streams all along the Western Ghats.

21. *Nitzschia tryblionella* v. *levidensis* (W Sm.) Grun. (Figs. 26–27)

Habitat: Fresh-water. It is a widely distributed diatom in the region of Bombay and Salsette but was never found to be gregarious.

The larger specimens which were collected from Powai lake showed more robust structure and indistinctly constricted beak-like ends. Of such specimens fig. 26 given corresponds well with that of Husiedi's specimens collected from the region of Malaya Archipelago (Husiedi, 1942, Int. Rev. Ges. Hydrobiol. u. Hydrogr., 41 [1/3]:128, f. 276–278).

22. *Nitzschia debilis* (Arnoti) Grun. (Fig. 28)

Van Heurck, 1896, Treat. Diat., 385, pl. 15, f. 497; Husiedi, 1938, Arch. Hydrobiol. Suppl. 15:466;—1957, Abh. naturw. Ver. Bremen, 34 (3): 339; Schmidt, A., 1874–1959, Atlas Diat., t. 332, f. 17 (= *N. tryblionella* v. *debilis* [Arnoti] Grun.); Husiedi, 1930, Bacill., p. 400, f. 759 (= *N. tryblionella* v. *debilis* [Arnoti] A. Mayer); Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 59, f. 1430 m–o (= *N. tryblionella* v. *debilis* [Arnoti] Grun.).

Valves 16–22 μ long and 7.5–9 μ broad, linear-lanceolate to elliptical-lanceolate, ends very weakly constricted beak-like. Keel very excentric, slightly notched in the middle, keel punctae large cuboidal, 6–7.5 in 10 μ, more or less uniformly disposed. Striae 12–13 in 10 μ, quite coarse rib-like, undulate due to longitudinal folds on the valves.

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri caves and Dhahisar hills, mostly as a stray diatom.

Krishnamurthy (1954) has described this diatom as *N. tryblionella* v. *debilis* (Arnoti) A. Mayer (Krishnamurthy, 1954, J. Indian bot. Soc., 33:378, f. 68–69) but his illustration and diagnosis do not conform in any way with any standard reference. It is surprising that for this diatom he records much denser keel punctae and clearly—coarsely punctate striae as also pronouncedly rostrate apices of the valves. From the closer study it evidently appears that the author has studied some other type than *N. tryblionella* v. *debilis*, as he has done in several other cases of his paper.

23. *Nitzschia balatonis* Grun. (Fig. 29)

Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 59, f. 1431; Pantocsek, J., 1902, Res. Wiss. Erf. Balat., 2 (2):84, t. 9, f. 254 (= *Tryblionella balatonis* [Grun.] Pant.).

Valves 18–23.5 μ long and 7.5–8 μ broad, linear-lanceolate with constricted clearly apiculate rounded ends. Keel quite excentric, keel punctae about 13–14 in 10 μ, small not evidently marked out due to clearly punctate striae. Striae about 16–18 in 10 μ, clearly punctate

but in the mid-longitudinal zone much finer hence showing a fairly wide lanceolate longitudinal furrow.

Habitat: Brackish-water? Collected in a small number from Chembur area. It was also recorded from Rankala tank at Kolhapur but as a rare diatom.

This diatom agrees well with the type described by CLEVE-EULER and PANTOCSEK. However, according to PANTOCSEK the striae are much finer, i. e. about 22 in 10 μ. With these two differing views before the author, he is a bit hesitant while referring the present specimen to *N. balatonis*. HUSTEDT described a similar looking type as *N. punctata* (W SM.) GRUN. formae *minores* (HUSTEDT, 1938, Arch Hydrobiol., suppl., 15:466, t. 40, f. 31–32), but they appear to be different in being broadly lanceolate. Moreover, the striae are more clearly punctate and less in number than noted here. Yet here again the uncertainty prevails since HUSTEDT gives no other details except that of the length, 10–20 μ. In any way, the present diatom is considered to be *N. balatonis*, till more details are known in the future regarding this type.

24. *Nitzschia hungarica* GRUN (Fig 30)

SCHMIDT, A., 1874–1959, Atlas Diat., t. 331, f. 6–13; VAN HEURCK, 1896, Treat. Diat., p. 387, pl. 15, f. 504; PANTOCSEK, J., 1902, Res. Wiss. Erf. Balat., 2 (2):86, t. 11, f. 273; HUSTEDT, 1930, Bacill., p. 401, f. 766; CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, p. 61, f. 1435a (= v *genuina* GRUN.)

Valves 50–74.7 μ long and 7–8.7 μ broad, 9.5 μ at the broadest, linear, with slightly concave sides and cuneate, constricted beak-like rounded ends. Keel narrow and very excentric, keel punctae 8–9 in 10 μ, small rounded, two of the middle punctae somewhat distantly placed. Striae about 16–18 in 10 μ, fine but distinct, interrupted by a moderately wide longitudinal hyaline space.

Habitat: Brackish-water. Collected from Mahim-Bandra, Ghod-Bunder, Wadala and Chembur side creeks usually in good number.

25. *Nitzschia acuminata* (W. SM.) GRUN. (Fig 31)

SCHMIDT, A., 1874–1959, Atlas Diat., t. 331, f. 4–5; VAN HEURCK, 1896, Treat. Diat., p. 388, pl. 15, f. 506; HUSTEDT, 1930, Bacill., 401, f. 764; CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, 61, f. 1436a.

Valves 39.6–70 μ long and 12.6–15 μ broad, linear, very slightly concave in the middle with broadly cuneate, sometimes slightly constricted and indistinctly produced ends. Keel broad and slightly depressed in the middle, excentric, keel punctae about 13–16 in 10 μ, but not evidently marked out due to the same number of striae being

present Striae 13–16 in 10 μ, interrupted by a fairly broad hyaline longitudinal space in the middle zone

Habitat: Brackish-water Frequently collected from Mahim-Bandra, Ghod-Bunder, Chembur and Wadala side creeks. Not recorded from fresh-waters

26. *Nitzschia apiculata* (Greg.) Grun.

Habitat: Brackish-water. Commonly collected along with the above type.

27. *Nitzschia calida* Grun. (Fig. 32)

Habitat: Fresh-water. Collected as a common diatom from a garden reservoir at the Institute of Science, streams at Borivli, ponds at Goregaon, Vile-Parle and many other places.

28. *Nitzschia umbilicata* Husi (Figs. 41, 59)

Husiedi, 1949, Expl. Parc National Albert Miss H. Damas, 8:129, t. 11, f. 65

Valves 34–40 μ long and 9–9 5 μ broad, but in the middle only 8 5 μ, linear, slightly or not at all concave in the middle, ends somewhat abruptly narrowed, constricted and distinctly apiculate Keel strongly excentric, keel punctae 7–9 mostly 8 in 10 μ, small rounded, middle two punctae somewhat widely set. Striae about 18–19 in 10 μ, coarse and clearly marked, slightly undulate

Habitat: Fresh-water. Collected from hill streams at Borivli, Kanheri caves, Dhahisar, Lonavla, Khandala and other places on the Ghats as a frequent diatom It mostly occurred in brownish masses of dead vegetable matter.

Section – *Dubiae* Grunow

29. *Nitzschia stagnorum* Rabh (Fig. 33)

Schmidt, A , 1874–1959, Atlas Diat., t 346, f. 14–16; Husiedt, 1930, Bacill , p. 405, f. 773;—1950, Arch. Hydrobiol , 43:403, t. 41, f 49–50; Cleve-Euler, A , 1952, Diat Schwed. Finn.—V, p. 64, f. 1444a–b

Valves 45–61 μ long and 7–7.5 μ broad, 8–8 5 μ at the broadest, linear with distinctly concave sides, ends narrowly cuneate, constricted with acutely produced rounded and indistinctly bent. Keel very excentric and narrow, keel punctae about 8–9 in 10 μ, quite small, roundish, two of the middle punctae, somewhat widely set and others irregularly disposed. Striae about 26 in 10 μ, fine but distinct.

Habitat: Fresh-water Collected as a common diatom from pools at Wadala, streams at Borivli, marginal slime of Powai and Vihar

lakes, ponds at Andheri and Goregaon Elsewhere, it is seen as a very stray diatom Wadala side pools were slightly brackish.

30. *Nitzschia thermalis* Kütz v. *minor* Hilse (Fig 34)

Habitat: Fresh-water. Collected from ponds at Andheri, Vile-Parle, Goregaon and other wet situations usually in smaller numbers.

Section – *Bilobatae* Grunow

31. *Nitzschia bremensis* Husi (Fig. 35)

Schmidt, A., 1874–1959, Atlas Diat., t 334, f. 4–6; Husiedi, 1930, Bacill., p. 406, f. 769; Cleve-Euler, A., 1952, Diat. Schwed. Finn —V, p. 82, f 1488a.

Valves 60–79 μ long and 7.5 μ broad in the middle to 9.5 μ towards the ends, linear with distinctly concave sides, ends long cuneate, constricted, acutely produced, somewhat capitate and backwardly inclined. Keel very excentric, keel punctae 5–7 in 10 μ, stretched, crooked, irregularly disposed throughout Striae 20–23 in 10 μ, fine but distinct.

Habitat: Fresh-water to brackish-water. Collected from a pond at Dhahisar, Wadala and Dharavi side.

Cleve-Euler has placed this diatom under the Section—*Linearis* Grun., but the author feels that it should be treated under Section—*Bilobatae* Grun., because of its much closer affinity with other members of the group, as done by Husiedi.

32. *Nitzschia jugata* Gandhi

Habitat: Fresh-water. Collected from a large pool in a nallah somewhere between Goregaon and Andheri in the form of brownish encrustation on a partially submerged rock. Water of the pool was polluted

33. *Nitzschia jugata* v. *gracilis* v. nov. (Fig 51)

Valvae 125–162 μ longae atque 14–17 5 μ latae, robustae, semi-linearis-lanceolatae, margine ventrali recta, dorsali concava in medio, apicibus cuneatis rotundatis Carina valde excentrica, carina punctis circiter 7 in 10 μ, crassissimis et pariter positis, mediis duobus remotioribus. Striae 18–20 in 10 μ, tenues sed distinctae. Typus lectus a H. P. Gandhi ad stagnum Goregaon die 4–7–1945, et positus in herbario proprio auctoris sub numero, slide BOM-GOR no. 5

Valves 125–162 μ long and 14–17.5 μ broad, robust, semi-linear-lanceolate, ventral side straight and dorsal side concave in the middle,

ends cuneate and rounded. Keel strongly excentric, keel punctae about 7 in 10 μ, very coarse and more or less uniformly disposed, middle two punctae distantly set. Striae 18–20 in 10 μ, fine but distinct.

Habitat: Fresh-water. Collected from a pond at Goregaon in a small number.

This diatom agrees well with *N. jugata* Gandhi (Gandhi, 1955, J. Indian bot. Soc., 34:330, f. 38;—1959, Ceylon J. Sci. [Biol. Sect.], 2 [1]:111, pl. 9, f. 10), in size, keel margin, punctae and its arrangement. However, the present diatom differs in having unconstricted ends and somewhat fine, closely set striae. It is, therefore, considered to be a new variety. This diatom also differs from *N. compacta* Husi. (Husedi, 1956, Deutsche Antarctic Exped., 1938–1939, II, p. 169, t. 13, f. 160), in the keel margin, keel punctae and less number of striae, although the general outline is the same.

Section – *Vivaces* Grunow

34. *Nitzschia vivax* W. Sm. (Fig. 52)

Husedi, 1930, Bacill., p. 411, f. 788; Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 69, f. 1459a (= v. *genuina* A. Cl.).

Valves 59–80 μ long and 10–11.2 μ broad, semi-linear-lanceolate, dorsal side convex but straight in the middle, ventral side straight or weakly convex, ends constricted, somewhat produced, subcapitate or capitate rounded. Keel strongly excentric, set on the ventral side, keel punctae about 6 in 10 μ, very coarse, somewhat elongated, irregularly set. Striae about 12–14 in 10 μ, quite coarse and distinct.

Habitat: Fresh-water. Collected as a stray specimen from ponds at Goregaon and Andheri. More commonly seen in brackish-waters at Mahim-Bandra and Wadala side creeks.

Section – *Sigmatae* Grunow

35. *Nitzschia sigma* W. Sm.

Habitat: Polluted or brackish-water. Collected from creeks at Bandra-Mahim, Wadala, Chembur and other places usually in good numbers. Stray specimens also were recorded from polluted water of pools along railway lines off Dhahisar and ponds at Vile-Parle and Andheri.

36. *Nitzschia sigma* v. *rigida* Grun. (Fig. 53)

Schmidt, A., 1874–1959, Atlas Diat., t. 336, f. 6; Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 75, f. 1470c–d.

Valves 106–130 μ long and 6 4–6 5 μ broad, sigmoid, lanceolate with gradulally narrowed acutely rounded produced ends. Keel sigmoid and excentric, keel punctae about 8–9–10 in 10 μ, small. Striae about 20 in 10 μ, finely punctate but distinct.

Habitat: Slightly brackish-waters Collected from some large pools at Wadala. The present diatom agrees well in all respects with that of CLEVE-EULER's but here the striae were noted to be fewer in number thus correponding the type. However, the separation is effected on the basis of more slender attenuated ends.

Section – *Obtusae* GRUNOW

37. *Nitzschia obtusa* W. SM. (Figs 36–37)

Habitat: Fresh- and brackish-water. Widely distributed in the region.

KRISHNAMURIHY's *N. scalaris* (EHR.) W. SM. (KRISHNAMURIHY, 1954, J. Indian bot. Soc., 33:378, f. 71), is probably this form but with more exaggerated apices. Looking at the keel punctae illustrated by the author for *N. scalaris*, they do not compare at all and much less the notched keel Moreover, the author does not give the record of number of striae especially when he calls them to be coarse KRISHNAMURIHY's specimen could be *N obtusa* forma (SCHMIDT's Atlas Diat., t. 352, f 6).

38 *Nitzschia obtusa* v. *scalpelliformis* GRUN (Fig. 38)

Habitat: Fresh and brackish-water. A widely distributed diatom in the region, perhaps more frequently noted than the type. In certain brackish water situations it was found to be gregarious.

39 *Nitzschia obtusa* v. *scalpelliformis* f. *parva* HUST. (Fig. 39)

SCHMIDT, A., 1874–1959, Atlas Diat., t 336, f. 25–26

Valves 30–40 μ long and 5–5.2 μ broad, linear with obliquely cuneate rounded ends in contrary directions. Keel very excentric with a slight notch in the middle, keel punctae about 10–12 in 10 μ, small and rounded, two of the middle ones widely set. Striae 30 in 10 μ, rather fine and seen with much difficulty

Habitat: Fresh-water Collected from streams at Borivli, Kanheri-caves, Dhahisar hills, Powai and Vihar lakes – especially from the marginal slime with dead rotting vegetable matter. Usually recorded in small numbers.

KRISHNAMURTHY'S *N. sigma* (KÜTZ.) W. SM. (KRISHNAMURTHY, 1954, J. Indian bot. Soc., 33:379, f. 72), is probably the present form of *N. filiformis* (W. SM.) HUST., but not the type he advocated *N. sigma*, has neither the notched keel nor the clearly beaded carinal dots. The author's diagnosis is rather misleading and the illustration is wholly incorrect if it is *N. sigma*.

40. *Nitzschia obtusa* v. *constricta* v. nov. (Figs 54–56)

Valvae 178–270 µ longae atque 12–12.6 µ latae sed in medio 8–9 µ, elongatae, lineari-lanceolatae, in medio distincte constrictae et aliquantum gibbosae, apicibus oblique cuneatis rotundatis in directiones contrarias. Carina valde excentrica, punctis carinalibus circiter 8 raro 7–9 in 10 µ, crassa et distincte rotundata, mediis duobus remotioribus. Striae probabiliter 35 in 10 µ, fere indistinctae. Typus lectus a H. P. GANDHI ad sinus Chembur die 26–7–1946, et positus in herbario proprio auctoris sub numero, slide BOM-CHE. no. 6.

Valves 178–270 µ long and 12–12.6 µ broad but 8–9 µ in the middle, elongated, linear-lanceolate, in the middle distinctly constricted and slightly gibbous, ends obliquely cuneate-rounded in the contrary directions. Keel strongly excentric, keel punctae about 8 rarely 7–9 in 10 µ, coarse and distinctly rounded, two of the middle ones distantly placed. Striae probably 35 in 10 µ, almost indistinct.

Habitat: Brackish-water. Collected in abundance from creeks at Chembur and Ghod-Bunder.

This diatom corresponds well with *N. obtusa* in all respects, except that it has distinct constrictions in the middle on either side of which small tumidities appear. Moreover, the keel punctae are more prominent and the striae much finer. It is, therefore, considered to be a new variety.

41. *Nitzschia filiformis* (W. SM.) HUST.

Habitat: Fresh- and brackish-water. Collected from several places in the region of Bombay and Salsette but usually in small numbers. Fresh-water habitats were mostly polluted by much organic matter.

42. *Nitzschia ignorata* KRASSKE

Habitat: Fresh- and brackish-water. Collected from several pools with polluted water and also from marshy lands around creeks.

43. *Nitzschia clausiiformis* sp. nov. (Fig. 57)

Valvae 70–86 µ longae atque 9–9.5 µ latae, lineares, apicibus aliquantum constrictis et oblique cuneatis in directiones contrarias, subcapitatis. Carina

valde excentrica, aliquantum incisa in parte media, punctis carinalibus circiter 7–8 in 10 μ, crassa et distincta Striae circiter 28–30 in 10 μ, tenues. Typus lectus a H P. Gandhi ad sinus Chembur die 26–7–1946, et positus in herbario proprio auctoris sub numero, slide BOM-CHE no 8.

Valves 70–86 μ long and 9–9.5 μ broad, linear, ends slightly constricted subcapitate and obliquely cuneate in opposite directions Keel strongly excentric, slightly notched in the middle part, keel punctae about 7–8 in 10 μ, coarse and distinct Striae about 28–30 in 10 μ, fine.

Habitat: Brackish-water. Collected from Chembur, Wadala and Mahim-Bandra side creeks, but usually in small numbers.

This diatom somewhat resembles *N. obtusa* v *scalpelliformis* Grun., in the outline and keel punctae However, it differs in having more clearer striae and the apices being constricted and subcapitate. It has a close appearance to *N. clausii* Haniz (Husiedt, 1930, Bacill., 421, f. 814) but differs in several respects from the type It is therefore considered to be a new species and the present epithet is chosen since its shape is very suggestive of *N. clausii*

Section – *Lineares* Grunow (and others)

44. *Nitzschia linearis* W Sm.

Habitat: Fresh-water. Collected from several wet situations in the region but usually in small numbers

45. *Nitzschia ingenua* Husi. (Fig. 40)

Husiedt, 1936, Arch Hydrobiol. Suppl. 14:175, t. 3, f 22;—1938, *ibid*., 15:470, t. 40, f 9–10; Basrow, R F., 1960, J Quek Micros. Club, Sr 4, 5 (9):240, pl 2, f. 9

Valves 90–160 μ long and 4 6–5.5 μ broad, linear with almost parallel sides and cuneate, constricted, distinctly capitate rounded ends. Keel quite excentric and narrow, keel punctae 7–11 in 10 μ, variable and irregularly disposed. Striae about 35 in 10 μ, rather fine.

Habitat: Fresh-water Collected from a garden reservoir of the Institute of Science, ponds at Goregaon, Vile-Parle and some other places in varying numbers.

46. *Nitzschia sublinearis* Husi.

Habitat: Fresh-water. A fairly well distributed diatom in the region.

47. *Nitzschia recta* HANTZ. (Fig 58)

HUSTEDT, 1930, Bacill., p. 411, f. 785; CLEVE-EULER, A., 1952, Diat Schwed. Finn —V, p 81, f. 1484a–d (= v. *typica* A. CL.)

Valves 63.5–90 μ long and 6–7 μ broad, linear with parallel sides and long acutely cuneate rounded ends Keel very excentric, narrow without a notch, keel punctae 6–9 in 10 μ, coarse and rather very irregularly disposed. Striae over 35 in 10 μ, rather very fine and indistinct.

Habitat: Fresh-water. Occasionally collected from streams at Borivli, Kanheri caves and Dhahisar hills, but more frequently observed from Powai and Vihar lakes and some other large ponds, mixed with dead masses of vegetable matter

The type illustrated by KRISHNAMURTHY (1954, J Indian bot. Soc., 33:378, f. 70) does not represent the characteristic arrangement of keel punctae, etc

Section – *Lanceolatae* GRUNOW

48. *Nitzschia diducta* HUST. (Fig. 50)

HUSTEDT, 1938, Arch. Hydrobiol., Suppl 15:473, t. 40, f. 20; BASTOW, R. F., 1960, J Quek. Microsc. Club, Sr. 4, 5 (9):240, pl. 2, f. 12

Valves 40–52 μ long and 8.5–10 μ broad, linear with broadly subcuneate constricted rostrate rounded ends. Keel very excentric and narrow, keel punctae 8–10 in 10 μ, small, irregularly set, two of the middle ones somewhat distantly placed Keel side sometimes noted to be slightly depressed. Striae about 32 in 10 μ, rather fine.

Habitat: Fresh-water. Collected from Dhahisar hill streams, Borivli and Kanheri caves and other places, usually in small numbers

This diatom agrees well with HUSTEDT's type, but from this locality mostly larger specimens were recorded.

49. *Nitzschia capitellata* HUST. v *maxima* v. nov. (Fig. 42)

Valvae 80–88.7 μ longae atque 9–10 μ latae, lineares, marginibus parallelis, apicibus longe cuneatis, capitatis et rotundatis. Carina valde excentrica, punctis carinalibus circiter 11–12 in 10 μ, minuta. Striae circiter 28 in 10 μ, tenues sed distinctae. Typus lectus a H. P. GANDHI ad stagnum Wadala die 31–7–1946, et positus in herbario proprio auctoris sub numero slide BOM-WAD.—8

Valves 80–88.7 μ long and 9–10 μ broad, linear with parallel sides, ends long cuneate, rounded and capitate. Keel strongly excentric, keel punctae about 11–12 in 10 μ, small Striae about 28 in 10 μ, fine but distinct.

Habitat: Fresh-water. Collected from ponds at Wadala in a small number. It was also recorded from Rankala tank at Kolhapur

This diatom agrees well with *N capitellata* Husi (Husiedi, 1930, Bacill., p 414, f 792; Cleve-Euler, A., 1952, Diat Schwed. Finn.—V, p 84, f. 1490 a[= v. *genuina* A. Cl.]), in the shape, keel, keel punctae and striae. Moreover, the length to breadth proportions also agree quite closely However, the present specimens are comparatively much larger and broader with only 28 striae in 10 μ, thus they differ. Again, they differ from *N frequens* Husi. (Husiedi, 1957, Abh. naturw Ver. Bremen, 34:348, f. 52–54), in having much closer striae and larger dimensions The keel punctae are also not distantly set in the middle, hence it much differs The present specimens, as they compare closely with *N capitellata*, except for the differences pointed out, they are therefore regarded as a new variety.

50. *Nitzschia gracilis* Haniz. (Fig. 60)

Habitat: Fresh-water. Collected from several wet situations in the region, but often in small numbers.

51. *Nitzschia heufleriana* Grun

Habitat: Fresh-water. Collected from ponds at Andheri, Goregaon and Vile-Parle where it occurred in association of *Chara* and *Ceratophyllum*. Elsewhere in the region it was observed as a stray diatom.

52 *Nitzschia heufleriana* v. *elongata* Pani (Fig 61)

Paniocsek, J., 1902, Res. Wiss Erf. Balat, 2 (2):89, t. 11, f. 271; Cleve-Euler, A., 1952, Diat. Schwed. Finn —V, p. 86, f. 1494 d

Valves 94–126 μ long and 6.4–8.5 μ broad, slightly bent, linear, ends long cuneate, constricted, produced capitate rounded Keel excentric, keel punctae 9–10 in 10 μ, small but distinct. Striae about 18–20 in 10 μ, quite distinct

Habitat: Fresh-water. Collected from Powai and Vihar lakes in good numbers but it was recorded as a stray specimen from Goregaon and Andheri ponds

53. *Nitzschia intermedia* Haniz. (Fig 43)

Husiedi, 1938, Arch. Hydrobiol Suppl, 15:477, t. 41, f 4–7; Cleve-Euler, A, 1952, Diat Schwed Finn —V, p 86, f. 1495 a

Valves 90–138 μ long and 6–6.5 μ broad, linear-lanceolate, elongated, ends cuneate, constricted, produced and subcapitate Keel excentric,

keel punctae variable 8–11 in 10 μ, small. Striae 24 in 10 μ, sometimes denser up to 27 in 10 μ, rather fine

Habitat: Fresh-water. Collected from Powai, Vihar and Tansa lakes as a frequent diatom. It was also collected from larger ponds at Goregaon, Andheri, Vile-Parle and Bandra in smaller numbers or as a stray diatom.

54. *Nitzschia woltereckii* Husi. (Fig 62)

Husiedt, 1942, Int. Rev Ges. Hydrobiol. u. Hydrogr., 42 (1/3):135, f. 309–312; Bastow, R. F., 1960, J. Quek. Microsc. Club, Sr 4, 5 (9):240, pl 2, f 8

Valves 118–140 μ long and 5.5–6 μ broad, narrowly lanceolate with attenuated ends which are somewhat produced and acutely rounded. Keel excentric, keel punctae 9–12 in 10 μ, small. Striae about 22 in 10 μ, quite fine

Habitat: Fresh-water. Collected from ponds at Andheri, Goregaon, Bandra, Vile-Parle as a common diatom. Elsewhere, in the region recorded only casually

55. *Nitzschia subrostrata* Husi (Fig 63)

Husiedt, 1942, Int. Rev Ges. Hydrobiol u. Hydrogr., 42 (1/3):137, f 313–319

Valves 37–57 μ long and 2.8–3 μ broad, narrowly lanceolate with somewhat narrowed, produced acutely rounded ends. Keel excentric, keel punctae 13–15 in 10 μ, small. Striae about 28–30 in 10 μ, rather fine and seen with difficulty.

Habitat: Fresh-water. Collected as a frequent diatom from streams at Borivli, Powai and Vihar lakes, ponds at Goregaon, Andheri and Bandra. Stray specimens also were recorded from several other large bodies of water in the region.

56. *Nitzschia gandersheimiensis* Krasske

Habitat: Brackish to almost fresh-water. Collected from pond at Dharavi, Bandra-Mahim creek side and badly polluted water at Vile-Parle, ponds at Jogeswari and Goregaon

57. *Nitzschia amphibia* Grun

Habitat: Fresh- to very slightly brackish-water. A very widely distributed diatom in the region and also common

58. *Nitzschia amphibia* v. *acutiuscula* GRUN. (Fig. 64)

Habitat: Fresh- to very slightly brackish-water. A widely distributed diatom in the region but less frequently noted than the type.

59. *Nitzschia robusta* HUST. (Fig. 44)

HUSTEDT, 1949, Expl. Parc National Albert Miss. H. Damas, 8:141, t. 13, f. 35–38.

Valves 13–21.6 μ long and 4.7–6 μ broad, broadly lanceolate with or without indistinctly constricted rounded ends. Keel strongly excentric, keel punctae 5–7 in 10 μ, large roundish or quadrate. Striae 12–13 in 10 μ, rarely upto 14, very coarsely punctate, punctae being beaded about 11–13 in 10 μ.

Habitat: Fresh-water. Collected from Powai and Vihar lakes as a common diatom occurring among the dead and decaying masses of vegetable matter. Stray specimens also were recorded from ponds at Vile-Parle, Andheri and other places.

60. *Nitzschia frustulum* (KÜTZ.) GRUN. (Figs 45, 65)

SCHMIDT, A., 1874–1959, Atlas Diat., t. 349, f. 17–26; HUSTEDT, 1930, Bacill., p. 414, f. 795; REIMER, 1954, Butler Univ. Bot. Studies, 9:178–191, f. 1–4; CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, p. 87, f. 1497a–b [= v. *genuina* MAYER]

Valves 25–40 μ long and 4–5.2 μ broad, linear, sometimes slightly bent, ends narrowed, constricted and produced. Keel excentric, keel punctae 9–11 in 10 μ, quite coarse. Striae 20–24 in 10 μ, finely punctate but distinct.

Habitat: Fresh-water to slightly brackish-water. A widely distributed species in the region, occasionally gregarious.

61. *Nitzschia microcephala* GRUN. (Fig. 46)

Habitat: Fresh-water. Collected from several wet situations in the region. It was also recorded from slightly brackish-water from Chembur, Dharavi side pools.

The specimen illustrated here has the dimensions: length 19–25 μ, breadth 4–4.5 μ, keel punctae about 13 in 10 μ and striae nearly 35 in 10 μ. Such specimens have also been recorded by FRITSCH et RICH (1929, Trans. roy. Soc. S. Afr., 18:120, f. 10 K), which are fairly broader and longer than those described by HUSTEDT, CLEVE-EULER and others. KRISHNAMURTHY also has described this species (KRISHNAMURTHY, 1954, J. Indian bot. Soc. 33:378, f. 67), but the illustration does not indicate the reliable record.

62 *Nitzschia palea* (Kütz.) W. Sm (Fig. 47)

Habitat: Fresh- to slightly brackish-water. A very variable common type found throughout the region of Bombay and Salsette Islands. Also, it is known from wet soils.

Section – *Nitzschiellae* (Rabh.) Grun.

63. *Nitzschia reversa* W. Sm. (Fig 48)

Boyer, C. S., 1916, Diat. Philadelphia, p. 123, pl. 33, f. 11

Valves 67.5–75 μ long and 4.5 μ broad, narrowly lanceolate, ends very much attenuated, slender, produced and bent in contrary directions. Keel very excentric, keel punctae about 15 in 10 μ, very small. Striae about 32 in 10 μ, rather fine and indistinct.

Habitat: Fresh-water. Collected in a small number from Powai and Vihar lakes. Very stray specimens also were recorded from Someswar tank at Dharwar.

Van Heurck described such specimens as *N. longissima* (Bréb.) Ralfs v. *reversa* (W. Sm.) V. H. (Van Heurck, 1896, Treat. Diat., p. 405) and Cleve-Euler regarded them as *N. longissima* v. *reversa* Grun. (Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 92, f. 1508d). However, the author retains them as a distinct species and treats them according to Boyer.

64. *Nitzschia longirostris* Husi. (Fig. 49)

Husiedi, 1938, Arch. Hydrobiol. Suppl., 15:490, t. 40, f. 8

Valves 105–117 μ long and 4.5 μ broad, linear with almost parallel sides, somewhat abruptly narrowed into long produced, slender slightly capitate ends. Keel excentric and narrow, keel punctae variable 10–14 in 10 μ, the average being 11–12 in 10 μ, quite small. Striae about 35 in 10 μ, fine and seen with a bit difficulty.

Habitat: Fresh-water. Collected from streams at Borivli and Kanheri caves, marginal slime of Powai and Vihar lakes, usually in small numbers. Elsewhere in the area seen as a very rare diatom.

65. *Nitzschia spiculoides* Husi. (Fig. 66)

Husiedi, 1949, Expl. Parc National Albert Miss. H. Damas, 8:151, t. 13, f. 5–6.

Valves 70–80 μ long and 3–4.5 μ broad, spindle-shaped or narrowly lanceolate with narrowed much produced rounded ends but not capitate. Keel narrow and excentric, keel punctae about 12–15 in 10 μ,

very small, middle two punctae widely set Striae rather fine and indistinct.

Habitat: Fresh-water. Collected from garden reservoirs of the Institute of Science, Powai, Vihar and Tansa lakes and several other ponds in the region, from among the dead vegetable matter.

66. *Nitzschia lorenziana* GRUN. v *subtilis* GRUN.

Habitat: Fresh- to weakly brackish-water. Collected from streams at Borivli, Kanheri caves, ponds at Andheri, Goregaon, Vile-Parle, Bandra and some polluted pools in a nallah situated between Andheri and Goregaon. It occurred usually in small numbers.

Genus – *SURIRELLA* TURPIN, 1828

67. *Surirella robusta* EHR. (Fig. 70)

Habitat: Fresh-water. Collected from Powai, Vihar and Tansa lakes as a frequent diatom but stray specimens also were obtained from streams at Borivli and Kanheri-caves.

68. *Surirella splendida* (EHR., W. SM.) V. H.

Habitat: Fresh-water. Collected from Powai and Vihar lakes in small numbers.

69. *Surirella tenera* GREG. (Figs. 71, 74)

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri caves, Dhahisar hills, Powai and Vihar lakes, usually in small numbers but in a certain pool of Borivli stream it was found to be gregarious. This diatom was also collected from Lonavla, Khandala and other places on the Western Ghats.

70. *Surirella tenera* v. *nervosa* A. SCHMIDT

Habitat: Fresh-water. Collected along with the above type but in smaller numbers.

71. *Surirella subsalsa* W. SM.

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri-caves, Dhahisar hills, Lonavla, Khandala and other hill streams on the Western Ghats. A common diatom.

72. *Surirella tenuissima* Husi (Fig. 72)

Husiedi, 1938, Arch. Hydrobiol. Suppl., 15:504, t. 43, f. 8–10.

Valves 25–45 μ long and 6–8 μ broad, small, heteropolar, narrowly lanceolate-ovate, apex broadly rounded and base gradually attenuated, acutely cuneate. Axial area indistinct. Flap margin clear with clear projections, flap windows also distinct. Costae about 35–50 in 100 μ, well marked and reaching the middle line.

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri caves, Lonavla and Khandala hilly region as a frequent diatom.

73. *Surirella biseriata* Bréb. (Figs. 67, 78)

Schmidt, A., 1874–1959, Atlas Diat., t. 22, f. 13–14 (also f. 6–8 = *S. oblonga* Ehr.); Woole, F., 1890, Diat. N. America, pl. 52, f. 1–2 (also f. 12–13 = *S. oblonga?* Ehr.); Van Heurck, 1896, Treat. Diat., p. 369, f. 120, pl. 12, f. 575; Boyer, C. S., 1916, Diat. Philadelphia, p. 124, pl. 35, f. 2, pl. 39, f. 12; Husiedi, 1930, Bacill., p. 432, f. 831; Okuno, H., 1950, Atlas fossil. Diat., pl. 18, f. 9; Meisier, F., 1912, Kieselalg. Schweiz, 4 (1):225, t. 42, f. 1 (= *S. biseriata* v. *vulgaris* Meisi.); Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 105, f. 1528a–b (= v. *genuina* Mayer and also f. *minor* Grun.).

Valves 89–114 μ long and 21–28 μ broad, isopolar, linear to narrowly lanceolate or elliptic-lanceolate with cuneate, acutely rounded ends. Axial area narrowly linear or linear-lanceolate, generally variable in width. Middle line present. Flap margin distinct with clear projections, flap windows distinct. Costae 15–20 in 100 μ, quite evident and radial towards the ends.

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri caves, Lonavla, Khandala and other places on the Western Ghats. It was often collected in good numbers.

This species appeared to be variable in shape and robustness of valves, but non of the specimens showed their ends produced or beak-like as indicated by Van Heurck, Woole and in the "Atlas Diat.". However, the present specimens closely agree with those illustrated by Husiedi, Boyer, Cleve-Euler, Okuno and Meisier. The fig. no. 78 given here corresponds with those given by Husiedi and Okuno and the fig. no. 67 corresponds with those given by Van Heurck, Woole, Boyer, Meisier, Cleve-Euler and others. Further, the fig. no. 67 corresponds with *S. oblonga* Ehr., practically in all the details and it is felt here that *S. oblonga*, could be one of the manifestations of the said type.

Again, the number of specimens examined here indicate that they are comparatively less broad than those recorded by other workers,

i. e. length to breadth proportions being 5:1 as against 3–4:1 (recorded by other workers). However, by measuring the illustration given by HUSTEDT it is found that 5:1 proportion also holds good. Hence, the present diatoms are considered to be *S. biseriata*.

74. *Surirella biseriata* v. *subparallela* MEIST. f *indica* f. nov. (Fig. 68)

Valvae 108–120 μ longae atque 23.5–26 μ latae, isopolares, lineares, marginibus parallelis, apicibus late cuneatis. Area axialis lineari-lanceolata. Linea media nulla. Rugae marginales evolutae et projectionibus distinctis. Costae circiter 20–22 in 100 μ, radiales in utroque apice. Typus lectus a H. P. GANDHI ad rivulis Borivli die 18–8–1946, et positus in herbario proprio auctoris sub numero slide BOM-BOR no. 37.

Valves 108–120 μ long and 23.5–26 μ broad, isopolar, linear with parallel sides and broadly cuneate ends. Axial area linear-lanceolate. Median line absent. Marginal fold well developed with distinct projections. Costae about 20–22 in 100 μ, radial towards the ends.

Habitat: Fresh-water. Collected from streams at Borivli as a frequent form but stray specimens also were observed in collections made from Powai and Vihar lakes.

This diatom agrees well with *S. biseriata* v. *subparallela* MEIST. (MEISTER, F., 1912, Kieselalg. Schweiz, 4 [1]:225, pl. 42, f. 3 [= f. *major* MEIST.]; CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, p. 107, f. 1528 m.), in the outline, apices and the arrangement of costae. However, the present diatoms differ in being smaller in dimensions, somewhat slender with slightly contorted axial area. Moreover, the costae are more in number, hence these specimens are considered to be a new form.

75. *Surirella linearis* W. SM.

Habitat: Fresh-water. Collected from streams at Borivli, Lonavla, Khandala, Powai and Vihar lakes, mixed up with vegetable detritus.

KRISHNAMURTHY (1954, J. Indian bot. Soc., 33:379, f. 75) and VENKATARAMAN (1956, Fr.-water Diat. S. I., p. 14, f. 38), have made extremely unreliable records of this diatom. The former author makes the elliptical outline of this diatom and does not show the characteristic marginal folds, flap windows and appropriate costae, moreover, the number of costae indicated is more than normal. Whereas the latter author gives an illustration of a very small specimen having a very high density of costae numbering 80 in 100 μ (8 costae in 10 μ) which is not at all true for this species. It appears that the author has observed some different type altogether, perhaps with the omission of striae. Elsewhere in his paper there are several drawbacks which need a careful revision to the benefit of future workers.

76. *Surirella capronii* BRÈB (Fig 73)

SCHMIDT, A., 1874–1959, Atlas Diat., t. 23, f. 10; HUSTEDT, 1909, Abh. naturw. Ver. Bremen, 19 (3):450, f. 11;—1930, Bacill., 440, f. 857; CLEVE-EULER, A., 1952, Diat. Schwed. Finn.—V, p. 110, f. 1537.

Valves 141–190 μ long and 57.5–75 μ broad, heteropolar, ovate with broadly rounded somewhat narrowed apex and acutely cuneate rounded base. Middle line present but discontinuous beset with strong spines on well developed cushions (elevated) at either ends. Axial area narrowly lanceolate and hyaline. Marginal folds strongly formed with clear projections, flap windows quite evident. Costae about 9–13 in 100 μ, thick with parallel margins, radial at the ends. Striae fairly visible.

Habitat: Fresh-water. Collected from streams at Borivli and Kanheri caves usually in small numbers. Stray specimens also were seen in a brackish water sample from Wadala side.

77. *Surirella capronioides* GANDHI (Fig. 80)

Habitat: Fresh- to somewhat polluted water. Collected from streams at Borivli, Kanheri caves and Dhahisar hills usually in good numbers. Stray specimens also were obtained from a nallah lying between Goregaon and Jogeswari railway stations.

78. *Surirella spinifera* HUST (Figs. 75, 79)

HUSTEDT, 1936, Arch. Hydrobiol. Suppl., 14:178, t. 5, f. 36.

Valves 100–160 μ long and 35–54 μ broad, heteropolar, long-ovate with broadly rounded apex and acutely cuneate rounded base. Middle line faint. Axial area fairly wide, lanceolate with a solitary stout spine towards the apex. Flap margin poorly developed with indistinct flap projections and flap windows. Costae about 22 in 100 μ. Striae rather fine about 30 or so in 10 μ.

Habitat: Fresh-water. Collected from streams at Borivli and Powai lake as a frequent diatom.

This diatom agrees well with the type described by HUSTEDT, but the local specimens showed more ovate-cuneate shape, somewhat less number of costae and slightly visible marginal fold. However, the present specimens are treated as *S. spinifera* with some hesitation. This diatom further corresponds with *S. conoidea* MEIST (MEISTER, F., 1934, Ber. Schw. Bot. Ges., 44:103, pl. 9, f. 88) in the shape, axial area, and a single strong spine towards the apex but *S. conoidea*, is much smaller form with larger number of striae, hence it differs.

79. *Surirella angustata* Küiz. (Fig. 69)

Husiedi, 1930, Bacill., p. 435, f 844–45

Valves 25–29 μ long and 9.5–10.5 μ broad, isopolar, linear with broadly cuneate ends Pseudoraphe very narrow and linear. Flap margin indistinct, flap projections not developed Costae 60–65 in 100 μ, rib-like and irregularly reaching the middle line, alternating with distinct striae about 18–20 in 10 μ.

Habitat: Fresh-water Collected from ponds at Dhahisar, Wadala, Goregaon, Vile-Parle and Andheri. Stray specimens also were recorded from Powai and Vihar lakes from among the rotting masses of vegetable matter.

80. *Surirella ovata* Küiz.

Habitat: Fresh-water? Collected from a nallah flowing between Goregaon and Jogeswari railway stations It occurred is encrustations formed on partially submerged rocks with much polluted water.

81. *Surirella ovata* v. *pinnata* (W. Sm.) Husi (Fig. 77)

Husiedi, 1930, Bacill., p. 442, f 865; Cleve-Euler, A., 1952, Diat Schwed Dinn.—V, p 122, f. 1566g–h; Van Heurck, 1896, Treat. Diat., p. 373, pl. 13, f. 591 (= *S. ovalis* Bréb v. *pinnata* [W Sm.] V H); Boyer, C S., 1916, Diat. Philadelphia, p. 126, pl. 36, f. 7–9 (= *S pinnata* W Sm.)

Valves 40–56 μ long and 16.2–18 μ broad, heteropolar, long-ovate with broadly rounded apex and gradually narrowed and well marked cuneate base Pseudoraphe very narrow, linear Flap margin scarcely developed therefore the flap projections absent or inapparent Costae about 40–60 in 100 μ, rib-like, alternating with striae, striae about 18–20 in 10 μ, quite distinct.

Habitat: Fresh-water. Collected from streams at Borivli, Kanheri caves, Lonavla and Khandala hills It occurred mostly as a stray diatom.

82. *Surirella ovata* v *salina* (W. Sm) Husi. (Fig. 76)

Husiedi, 1930, Bacill, p. 442, f 866; Van Heurck, 1896, Treat. Diat., p. 373, pl. 13, f. 589 (= *S. ovalis* Bréb v. *salina* [W. Sm.] V H); Cleve-Euler, A., 1952, Diat. Schwed Finn.—V, p 120, f 1565c–d (= *S. ovalis* v. *salina* [W Sm] A. Cl.).

Valves 45–53 μ long and 16–18 μ broad, heteropolar, ovate-cuneate with broadly rounded apex and uniformly narrowed cuneate, acutely rounded base. Pseudoraphe very narrow, linear. Flap margin scarcely developed, flap projections therefore absent. Costae 60–65 in 100 μ,

rib-like, variously reaching the middle line, alternating with distinct striae about 18–20 in 10 μ, radial towards the ends.

Habitat: Fresh- to slightly brackish-water. Collected from pools at Wadala from among the rotting detritus. Stray specimens also were recorded from a nallah near Goregaon.

Genus – *CAMPYLODISCUS* Ehrenberg, 1841

83. *Campylodiscus bicostatus* W Sm. (Figs. 81–82)

Schmidt, A., 1874–1959, Atlas Diat., t. 55, f. 4–6; Van Heurck, 1896, Treat. Diat., p 379, pl. 14, f 599; Cleve-Euler, A., 1952, Diat. Schwed. Finn.—V, p. 127, f. 1578; Husiedt, 1930, Bacill., p 448, f. 874 (= *C clypeus* Ehr. v *bicostata* [W. Sm.] Husi.)

Valves 60–80 μ in diameter, rounded or subquadrate, saddle-shaped in girdle view. Axial area narrow, linear. Flap margin, projections and flap windows indistinct. Costae 15–20, rarely 25 in 100 μ, roughly marked with coarse, lineate striae about 15–17 in 10 μ. In the middle zone two semi-circular groups of striae present surrounded by a hyaline ring or space. Striae in the middle zone lineate and about 16 in 10 μ, rather irregularly formed.

Habitat: Brackish-water. Chiefly collected from creeks at Chembur. Some stray specimens also were recorded from Wadala and Mahim-Bandra creeks and marshy-lands.

In the specimens collected from this region, the striae groups in the middle zone were well marked.

SUMMARY

In this part of the paper eighty-three more Diatoms from Bombay and Salsette Islands are recorded which represent six genera. Of these, 37 are new records for India and two species, four varieties and a form are considered to be new for the Science. Furthermore, the genus *Nitzschia* is rather important since it is being well represented both in quality and quantity. The quality here refers to the typical tropical elements that it harbours and the quantity relates to the number of species belonging to different groups that are found here.

At the end of this paper an appendix is given, listing up all the fresh- and brackish-water Diatoms that are discovered from the Islands of Bombay and Salsette, to the facility of future workers.

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Appendix

An alphabetic list of all the fresh- and brackish-water Diatoms dicovered from the Bombay and Salsette Islands

Name of the Diatom	Habitat	Remarks
Achnanthes affinis Grun.	Fresh-water	A later discovery
A andicola (Cl.) Husi.	Fresh-water	
A. — v. *elongata* Gonzalves et Gandhi	Fresh-water	
A. brevipes Agardh v *intermedia* (Küiz.) Cl.	Fresh-water	
A. coarctata Bréb v. *elliptica* Krasske	Fresh-water and Brackish-water	
A. — v *parallela* Venkai.	Fresh-water	
A exigua Grun.	Fresh-water	
A — v. *heterovalvata* Krasske	Fresh-water	
A. hungarica Grun	Fresh-water	
A inflata Küiz.	Fresh-water	
A lanceolata Bréb	Fresh-water	
A. — v. *elliptica* Cleve	Fresh-water	
A —v. *tenuis* Gonzalves et Gandhi	Fresh-water	
A. longipes Agardh	Brackish-water	
A microcephala Küiz	Fresh-water	A later discovery
A. minutissima Küiz.	Fresh-water	A later discovery
Amphiprora alata Küiz	Brackish-water	
A. lata Grev v. *angustior* McCaii	Brackish-water	
Amphora acutiuscula Küiz.	Brackish-water	
A ovalis Küiz. v. *gracilis* (Ehr.) Cl.	Fresh-water	
A. — v. *pediculus* Küiz	Fresh-water	
A. veneta Küiz.	Freshwater and Brackish-water	A later discovery
Anomoeoneis sphaerophora (Küiz.) Pfiizer	Fresh-water and Brackish-water	
A — v. *guntheri* (Ehr.) Müli. f. *rostrata* Gonzalves et Gandhi	Brackish-water	
Caloneis silicula (Ehr.) Cl.	Fresh-water	A later discovery
C — v. *gibberula* (Küiz.) Grun.	Fresh-water	
C —v *truncatula* Grun f. *borioliana* Gonzal et Gandhi	Fresh-water	
Campylodiscus bicostatus W. Sm.	Brackish-water	
Ceratoneis iyengarii Gonzales et Gandhi	Brackish-water	
Cocconeis placentula Ehr.	Fresh-water	
C — v *euglypta* (Ehr.) Cl.	Fresh-water	
C — v. *lineata* (Ehr.) Cl	Fresh-water	
C scutellum Ehr.	Brackish-water	
Coscinodiscus radiatus Ehr.	Brackish-water	
Cyclotella catenata Brun	Fresh-water	

Name of the Diatom	Habitat	Remarks
C kützingiana THWAITES	Fresh-water	A later discovery
C meneghiniana KÜTZ.	Fresh-water to Brackish-water	
C stelligera CL. et GRUN.	Fresh-water	
C striata (KÜTZ.) GRUN.	Brackish-water	
C — v. *bipunctata* FRICKE	Brackish-water	
Cymbella amphicephala NAEG	Fresh-water	
C aspera (EHR.) CL.	Fresh-water	
C austriaca GRUN v. *subrhomboidea* (ØST.) A. CL.	Fresh-water	
C bengalensis GRUN.	Fresh-water	
C gracilis (RABH.) CL.	Fresh-water	
C leptoceros (EHR.?) GRUN. v *rostrata* HUST. f. *indica* GANDHI	Fresh-water	
C powaiana GANDHI	Fresh-water	
C tumida (BRÉB.) V. H.	Fresh-water	
C turgida (GREG.) CL.	Fresh-water	
C ventricosa KÜTZ.	Fresh-water	
C yarrensis (A. S.) CL.	Fresh-water	
Diploneis pseudovalis HUST.	Fresh-water	
D puella (SCHUM.) CL.	Fresh-water to Brackish-water	A later discovery
D smithii (BRÉB.) CL.	Brackish-water	
D subovalis CL.	Fresh-water	
D — v. *perminuta* A. CL.	Fresh-water	A later discovery
Epithemia sorex KÜTZ.	Fresh-water	
E zebra (EHR.) KÜTZ.	Fresh-water	
E — v *denticuloides* HUST.	Fresh-water	
E — v. *porcellus* (KÜTZ.) GRUN.	Fresh-water	
E — v *saxonica* (KÜTZ.) GRUN.	Fresh-water	
E — v. *subcapitata* MAYER	Fresh-water	
Eucocconeis lapponica HUST. f *rostrata* GONZAL. et GANDHI	Fresh-water	
Eunotia alpina (NAEG.) HUST.	Fresh-water	
E arcus EHR.	Fresh-water	
E — v. *uncinata* GRUN.	Fresh-water	
E fallax A. CL. v. *gracillima* KRASSKE	Fresh-water	
E — v. — f *densestriata* GONZALVES et GANDHI	Fresh-water	
E indica GRUN.	Fresh-water	A later discovery
E lunaris (EHR.) GRUN.	Fresh-water	
E — v *subarcuata* (NAEG.) GRUN.	Fresh-water	
E monodon EHR.	Fresh-water	
E pectinalis (KÜTZ.) RABH.	Fresh-water	A later discovery
E — v. *gibbulosus* VENKAT.	Fresh-water	
E — v *neglecta* GANDHI	Fresh-water	A later discovery
E — v. *undulata* (RALFS) RABH.	Fresh-water	

Name of the Diatom	Habitat	Remarks
E. praerupta Ehr	Fresh-water	
E. — v. *inflata* Grun.	Fresh-water	
E — v. *muscicola* B. Pei. f. *major* Gonzal et Gandhi	Fresh-water	
E pseudopectinalis Husi. f. *robusta* Gonzal. et Gandhi	Fresh-water	
E. valida Husi. v. *ambigua* Gonzal. et Gandhi	Fresh-water	
E — v — f *borivliana* Gonzal. et Gandhi	Fresh-water	
E veneris (Kütz) O. Müll	Fresh-water	
Fragilaria intermedia Grun (= v. *robusta* Venkat.)	Fresh-water	
Gomphonema acuminatum Ehr v. *turris* (Ehr.) Cl	Fresh-water	
G aequatoriale Husi.	Fresh-water	
G. angustatum (Kütz) Rabh. v. *producta* Grun. f. *indica* Gandhi	Fresh-water	
G augur Ehr.	Fresh-water	
G balatonis Pant.	Fresh-water	
G. — v *lanceolata* Gandhi	Fresh-water	
G. clavatoides Gandhi	Fresh-water	
G — v. *valida* Gandhi		
G constrictum Ehr. v. *capitata* (Ehr.) Cl	Fresh-water	
G — v. *indica* Gandhi	Fresh-water	
G. gracile Ehr.	Fresh-water	
G — v. *aurita* A. Br.	Fresh-water	
G — v. *frickei* Gandhi	Fresh-water	
G — v. *lanceolata* (Kütz.) Cl.	Fresh-water	
G. — v *naviculoides* (W. Sm.) Grun	Fresh-water	
G. — v *subcapitata* Gandhi	Fresh-water	
G intricatum Küiz	Fresh-water	
G — v. *vibrio* (Ehr.) Cl	Fresh-water	
G lanceolatum Ehr.	Fresh-water	
G — v. *insignis* (Greg.) Cl.	Fresh-water	
G lingulatum Husi	Fresh-water	
G magnifica Gandhi	Fresh-water	
G — v *rhomboidea* Gandhi	Fresh-water	
G martini Fricke	Fresh-water	
G. moniliforme Gandhi	Fresh-water	
G. montanum Schum.	Fresh-water	
G — v *acuminatum* Mayer	Fresh-water	
G olivaceum (Lyngbye) Küiz.	Fresh-water	
G. parvulum Küiz.	Fresh-water	
G. — v. *lagenula* (Grun.) Husi.	Fresh-water	
G — v *micropus* (Küiz.) Cl.	Fresh-water	

Name of the Diatom	Habitat	Remarks
G — v *subellipticum* Cl.	Fresh-water	
G sphaerophorum Ehr.	Fresh-water	
G spiculoides Gandhi	Fresh-water	
G — v. *major* Gandhi	Fresh-water	
G subapicatum Friisch et Rich	Fresh-water	
G — v. *okamurae* (Skv) Gandhi	Fresh-water	
G subtile Ehr. v *malayensis* Husi	Fresh-water	
G sumatrense Fricke	Fresh-water	
G tenuis Gandhi	Fresh-water	
G undulatum Husi.	Fresh-water	
Gyrosigma acuminatum (Küiz.) Rabh	Fresh-water	
G attenuatum (Küiz.) Rabh	Fresh-water? to Brackish-water	
G. baikalensis Skv	Fresh-water	
G. balticum (Ehr) Rabh.	Brackish-water	
G kützingii (Grun.) Cl.	Fresh-water	
G. scalproides (Rabh) Cl.	Fresh-water and Brackish-water	
G — v. *eximia* (Thw) Cl	Brackish-water	
Hantzschia amphioxys (Ehr.) Grun	Fresh-water	
H — v. *densestriata* (Foni) A Cl	Fresh-water	
H — v. *stricta* Husi		
H borieliana Gandhi	Fresh-water	
H. distincte-punctata Husi. v *valida* Gandhi	Fresh-water	
Mastogloia amoyensis Voigi v. *robusta* Gonzal. et Gandhi	Fresh-water	
M. dolosa Venkai. v. *ambigua* Gonzal. et Gandhi	Fresh-water	
M. exigua Lewis f *brevirostris* Venkai.	Fresh-water	
Melosira granulata (Ehr.) Ralfs	Fresh-water	
M — v *angustissima* Müll	Fresh-water	A later discovery
M — v. *muzzanensis* Meisi.	Fresh-water	
M islandica Grun. sub-sp *helvetica* O. Müll.	Fresh-water	
Navicula cincta (Ehr) Küiz.	Fresh-water	
N cocconeiformis Greg	Fresh-water	
N. cryptocephala Küiz.	Fresh-water to Brackish-water	
N. — v. *veneta* (Küiz.) Grun	Brackish-water	
N. cuspidata Küiz.	Fresh-water	
N. — v. *ambigua* (Ehr.) Cl	Fresh-water	
N. — v *conspicua* Venkat	Fresh-water	
N. — v. *heribaudii* Perag	Fresh-water	
N. — v. *major* Meisi	Fresh-water	

Name of the Diatom	Habitat	Remarks
N. — v. — f *robusta* Gonzal. et Gandhi	Fresh-water	
N densestriata Husi	Fresh-water	
N mutica Küiz	Fresh-water and soil	A later discovery
N — v. *linearis* Gonzal. et Gandhi	Fresh-water	
N. pupula Küiz	Fresh-water	
N. — v *capitata* Husi.	Fresh-water	
N. — v. *elliptica* Husi.	Fresh-water	A later discovery
N — v. *rectangularis* (Greg.) Grun.	Fresh-water	
N. pygmaea Küiz.	Fresh-water and Brackish-water	
N rostellata Küiz	Fresh-water	
N. salinarum Grun	Fresh-water and Brackish-water	
N. schönfeldtii Husi.	Fresh-water	
N simplex Krasske	Brackish-water	
N tuscula (Ehr.) Grun.	Fresh-water	
N. viridula Küiz	Fresh-water	
N — v *rostellata* (Cl.) Meisi.	Fresh-water	
N — v *rostrata* Skv	Fresh-water	
Neidium affine (Ehr.) Cl.	Fresh-water	
v *amphirhynchus* (Ehr.) Cl	and soil	A later discovery
N — v. — f *truncatula* Gonzal. et Gandhi	Fresh-water	
N. bisulcatum (Lagst.) Cl.	Fresh-water	A later discovery
N. — f. *undulata* O. Müll.	Fresh-water	
N dubium (Ehr.) Cl.	Fresh-water	
N friedrichii Gandhi (nomen. nov.)[2])	Fresh-water	A later discovery
N. indicum Gonzal. et Gandhi	Fresh-water	
N. — f. *undulata* Gonzal. et Gandhi	Fresh-water	
N — v. *capitata* Gonzal. et Gandhi	Fresh-water	
N iridis (Ehr.) Cl.	Fresh-water	
N. — f *ambigua* Gonzal. et Gandhi	Fresh-water	
N oblique-striatum A. S. v. *parallela* Gonzal. et Gandhi	Fresh-water	
N productum (W. Sm.) v *bombayensis* Gonzal. et Gandhi	Fresh-water	
Nitzschia acuminata (W. Sm.) Grun.	Brackish-water	
N amphibia Grun.	Fresh-water to Brackish-water	

[2]) This is a new nomenclature for *Neidium hustedtii* Gandhi (Gandhi, 1959, Ceylon J. Sci. [Biol. Sci.], 2 [1]:103, pl. 9, f. 4) which had to be renamed since it appeared to be a later homonym for *Neidium hustedtii* Basiow (Basiow, R. F. 1954, Trans. Devon. Assoc. Adv. Sci., 86 [46]: 288–89, pl. 30, f. 1, 1a–b). The author wishes to convey his grateful thanks to Dr. J. W. G. Lund, Rev. R. F. Basiow and Dr. C. W. Reimer for being very helpful in supplying the information, literature and suggestion for the need of a new name, respectively

Name of the Diatom	Habitat	Remarks
N. — v. *acutiuscula* Grun.	Fresh-water	
N. apiculata (Greg.) Grun.	Brackish-water	
N. balatonis Grun.	Brackish-water?	
N. bremensis Husi.	Fresh-water to Brackish-water	
N. calida Grun	Fresh-water	
N. capitellata Hantz v. *maxima* Gandhi	Fresh-water	
N. clausiiformis Gandhi	Brackish-water	
N. debilis (Arnott) Grun.	Fresh-water	
N. diducta Hust.	Fresh-water	
N. filiformis (W Sm.) Husi.	Fresh-water and Brackish-water	
N. frustulum (Küiz.) Grun.	Fresh-water	
N. gandersheimiensis Krasske	Fresh-water to Brackish-water	
N. gracilis Haniz.	Fresh-water	
N. granulata Grun.	Brackish-water	
N. heufleriana Grun	Fresh-water	
N. — v. *elongata* Pant	Fresh-water	
N. hungarica Grun.	Brackish-water	
N. ignorata Krasske	Fresh-water to Brackish-water	
N. ingenua Husi	Fresh-water	
N. intermedia Haniz.	Fresh-water	
N. jugata Gandhi	Fresh-water polluted	
N. — v. *gracilis* Gandhi	Fresh-water	
N. linearis W. Sm	Fresh-water	
N. longirostris Husi.	Fresh-water	
N. lorenziana Grun v *subtilis* Grun.	Fresh-water	
N. microcephala Grun	Fresh-water to Brackish-water	
N. obtusa W. Sm.	Brackish-water	
N. — v *constricta* Gandhi	Brackish-water	
N. — v. *scalpelliformis* Grun.	Fresh-water and Brackish-water	
N. — v — f. *parva* Husi	Fresh-water	
N. palea (Küiz.) W Sm.	Fresh-water	
N. recta Haniz	Fresh-water	
N. reversa W. Sm.	Fresh-water	
N. robusta Husi.	Fresh-water	
N. *sigma* (Küiz.) W. Sm.	Brackish-water	
N. — v *rigida* Grun.	Brackish-water	
N. spiculoides Husi.	Fresh-water	
N. stagnorum Rabh	Fresh-water	
N. sublinearis Husi	Fresh-water	
N. subrostrata Husi.	Fresh-water	
N. thermalis Küiz. v *minor* Hilse	Fresh-water	

Name of the Diatom	Habitat	Remarks
N. tryblionella HANTZ. v. *levidensis* (W. SM.) GRUN.	Fresh-water	
N — v. *victoriae* GRUN.	Fresh-water	
N umbilicata HUSI	Fresh-water	
N vivax W. SM.	Brackish-water	
N woltereckii HUSI	Fresh-water	
Pinnularia acrosphaeria (BRÉB.) W SM	Fresh-water	
P. — f. *undulata* CL	Fresh-water	
P. — v. *minor* CL.	Fresh-water	
P. — v. *sandvicensis* A. S.	Fresh-water	
P appendiculata (AG.) CL.	Fresh-water	
P. balatonis (PANI) GANDHI	Fresh-water	
P. braunii (GRUN.) CL	Fresh-water	
P brébissonii (KÜTZ) CL.	Fresh-water	
P. — v. *producta* A. CL	Fresh-water	
P — v. — f *biundulata* (O. MÜLL) A CL.	Fresh-water	
	Fresh-water	
P brevicostata CL v. *indica* GANDHI	Fresh-water	
P. conica GANDHI	Fresh-water	
P divergens W. SM.	Fresh-water	
P. — v *capitata* MILLS	Fresh-water	
P. — v. *elliptica* GRUN.	Fresh-water	
P. — v. *undulata* HÉR et PERAG.	Fresh-water	
P. divergentissima (GRUN.) CL.	Fresh-water	
P. dolosa GANDHI	Fresh-water	
P. — v. *chariessa* GANDHI	Fresh-water	
P episcopalis CL.	Fresh-water	
P. finlandica A. CL	Fresh-water	
P. gibba EHR.	Fresh-water	
P. graciloides HUSI.	Fresh-water	
P. hartleyana GREV v. *pulchella* MILLS	Fresh-water	
P interrupta W. SM.	Fresh-water	
P. kiusiuensis SKV	Fresh-water	
P. lacus-biwa SKV f. *minor* GANDHI	Fresh-water	
P legumen EHR. v. *florentina* (GRUN.) CL.	Fresh-water	
P lundii HUSI.	Fresh-water	
P. major (KÜTZ) CL. v. *sendaiensis* HUSI.	Fresh-water	
P. meisteri A. CL. v *scandica* A. CL.	Fresh-water	
P mesolepta EHR. v. *indica* GANDHI	Fresh-water	
P. — v. *stauroneiformis* GRUN	Fresh-water	
P. microstauron (EHR) CL.	Fresh-water	
P. — v. *ambigua* MEISTER	Fresh-water	A later discovery
P molaris GRUN.	Fresh-water	
P nakaii SKV. v. *indica* GANDHI	Fresh-water	
P. neglecta (MAYER) Å. BERG	Fresh-water	

Name of the Diatom	Habitat	Remarks
P — v. *undulata* Gandhi	Fresh-water	
P nipponica Skv.	Fresh-water	
P. platycephala (Ehr.) Cl.	Fresh-water	
P polyonca (Bréb.) O Müll.	Fresh-water	
P pseudoluculenta Gandhi	Fresh-water	
P. scythica (Pant.) Gandhi	Fresh-water	
P simplex Gandhi	Fresh-water	
P stauroptera (Rabh.) Cl ? Grun.	Fresh-water	
P — v. *clevei* Meist. f *hyalina* (Perag et Hèr.) A. Cl.	Fresh-water	
P stomatophora Grun v *triundulata* Foni	Fresh-water	
P streptoraphe Cleve	Fresh-water	
P subcapitata Greg v. *hilseana* (Jan.) O. Müll.	Fresh-water	
P. termes Ehr. v *termitina* (Ehr.) A. Cl.	Fresh-water	
P. ueno Skv. v. *wadalensis* Gandhi	Fresh-water	
Pleurosigma aestuarii Bréb.	Brackish-water	
P. angulatum (Quek.) W. Sm f. *chemburiana* Gonzal. et Gandhi	Brackish-water	
P. delicatulum W. Sm.	Brackish-water	
P. elongatum W. Sm.	Brackish-water	
P. normanii Ralfs	Brackish-water	
P. salinarum Grun.	Brackish-water	
Raphoneis amphiceros Ehr.	Brackish-water	
R — v. *linearis* Gonzalves et Gandhi	Brackish-water	
Rhopalodia gibba (Ehr.) O. Müll.	Fresh-water	
R — v. *ventricosa* (Ehr.) Grun	Fresh-water	
R gibberula (Ehr.) O. Müll.	Fresh-water and Brackish-water	
R — v *minuens* O Müll.	Fresh-water	
R — v *van heurckii* O. Müll	Fresh-water	
R musculus (Küiz.) O. Müll	Fresh-water	
Stauroneis acuta W Sm.	Fresh-water	
S. — v. *tenuis* Gonzal. et Gandhi	Fresh-water	
S anceps Ehr.	Fresh-water	
S — f. *gracilis* (Ehr.) Cl.	Fresh-water	
S. — f. *linearis* (Ehr.) Cl.	Fresh-water	
S. — v. *hyalina* Brun et Perag. f *producta* Gonzal. et Gandhi	Fresh-water	
S angulare Gonzal. et Gandhi	Fresh-water	
S. obtusa Lagst. v. *chemburiana* Gonzal. et Gandhi	Fresh-water	
S. — f *indica* Gonzal. et Gandhi	Fresh-water	
S phoenicenteron Ehr.	Fresh-water	
S. — f *capitata* Gonzal. et Gandhi	Fresh-water	

Name of the Diatom	Habitat	Remarks
S. — v. *vulgaris* Dip. f. intermedia Dip.	Fresh-water	
Surirella angustata Küiz	Fresh-water	
S. biseriata Bréb	Fresh-water	
S. — v *subparallela* Meist. f. *indica* Gandhi	Fresh-water	
S. capronii Bréb.	Fresh-water and Brackish-water	
S. capronioides Gandhi	Fresh-water	
S. linearis W. Sm	Fresh-water	
S. ovata Küiz.	Fresh-water polluted	
S. — v. *pinnata* (W. Sm.) Husi.	Fresh-water	
S. — v. *salina* (W. Sm.) Husi	Fresh-water to Brackish-water	
S. robusta Ehr.	Fresh-water	
S. spinifera Husi.	Fresh-water	
S. splendida (Ehr.) V. H.	Fresh-water	
S. subsalsa W. Sm	Fresh-water	
S. tenera Greg	Fresh-water	
S. — v. *nervosa* A. S	Fresh-water	
S. tenuissima Husi	Fresh-water	
Synedra rumpens Küiz	Fresh-water	
S. — v. *familiaris* (Küiz.) Grun	Fresh-water	
S. — v. *fragilarioides* Grun	Fresh-water	
S. — v. *meneghiniana* Grun.	Fresh-water	
S. ulna (Niiz.) Ehr.	Fresh-water	
S. — v. *amphirhynchus* (Ehr.) Grun.	Fresh-water	
S. — v *biceps* Küiz	Fresh-water	
S. — v. *danica* (Küiz.) Grun.	Fresh-water	
S. — v. *subaequalis* Grun.	Fresh-water	

From the above list of diatoms, the following table could be of ready reference:

A table suggesting the distribution of genera of Diatoms in the region of Bombay and Salsette Islands

Name of the Diatom genus	No of diatoms	Distribution		
		Fresh-water	Fresh- and Brackish-water	Brackish-water
Achnanthes	16	14	1	1
Amphiprora	2	—	–	2
Amphora	4	2	1	1
Anomoeoneis	2	–	1	1
Caloneis	3	3	–	–
Campylodiscus	1	–	–	1

Continuation page 505

Continuation of table

Name of the Diatom genus	No. of diatoms	Distribution		
		Fresh-water	Fresh- and Brackish-water	Brackish-water
Ceratoneis	1	–	–	1
Cocconeis	4	3	–	1
Coscinodiscus	1	–	–	1
Cyclotella	6	3	1	2
Cymbella	11	11	–	–
Diploneis	5	3	1	1
Epithemia	6	6	–	–
Eucocconeis	1	1	–	–
Eunotia	20	20	–	–
Fragilaria	1	1	–	–
Gomphonema	41	41	–	–
Gyrosigma	7	4	1	2
Hantzschia	5	5	–	–
Mastogloia	3	3	–	–
Melosira	4	4	–	–
Navicula	26	21	3	2
Neidium	13	13	–	–
Nitzschia	48	28	9	11
Pinnularia	52	52	–	–
Pleurosigma	6	–	–	6
Raphoneis	2	–	–	2
Rhopalodia	6	5	1	–
Stauroneis	12	12	–	–
Surirella	16	14	2	–
Synedra	9	9	–	–
	334	278	21	35

CONCLUDING REMARKS

From the above given list and table, it is indicated that in all 334 diatoms are recorded from the Bombay and Salsette Islands, representing 31 genera Of these, 278 belong to fresh-water, 35 to purely brackish-water and 21 having the dual character. In the numerical order of 10-dominant genera mention may be made of, *Pinnularia* (52), *Nitzschia* (48), *Gomphonema* (41), *Navicula* (26), *Eunotia* (20), *Achnanthes* (16), *Surirella* (16), *Neidium* (13), *Stauroneis* (12) and *Cymbella* (11), and the rest of them are represented either by small number or by stray specimens

Further, it is noted that genera *Caloneis*, *Cymbella*, *Epithemia*, *Eucocconeis*, *Eunotia*, *Fragilaria*, *Gomphonema*, *Hantzschia*, *Mastogloia*, *Melosira*, *Neidium*, *Pinnularia*, *Stauroneis* and *Synedra* are confined to practically fresh-water; *Amphiprora*, *Campylodiscus*, *Ceratoneis*, *Coscinodiscus*, *Pleurosigma*, and *Raphoneis* to brackish-water and the remaining find distribution both in fresh- and brackish-water. However, these figures are more or less tentative, since the brackish-waters have not been thoroughly investigated.

EXPLANATION OF THE PLATES 123 (1) – 127 (5)

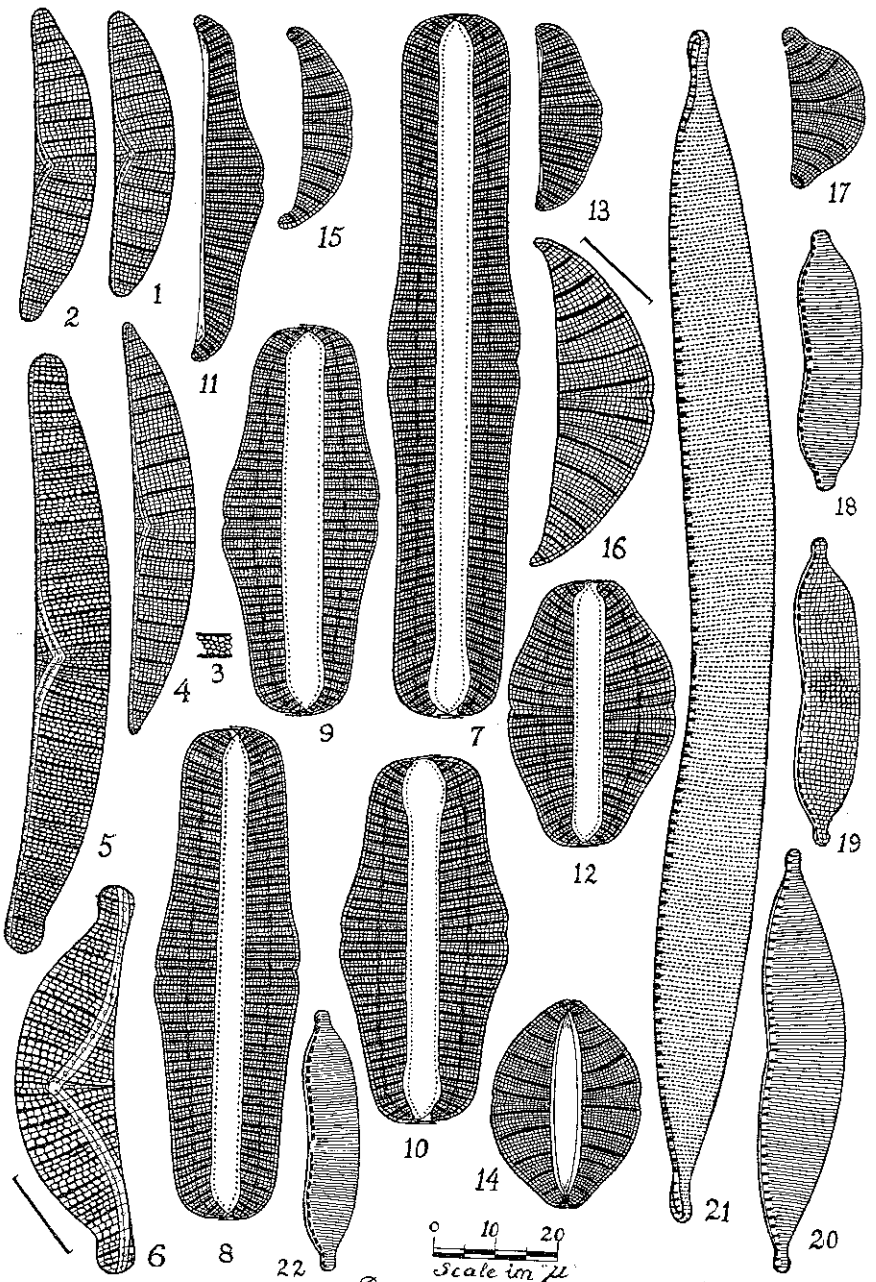
Figs. 1. *Epithemia zebra* (EHR.) KÜTZ. 2 *E. zebra* v. *saxonica* (KÜTZ.) GRUN. 3. E. *zebra* v *denticuloides* HUSI. showing the arrangement of alveoli. 4. *E. zebra* v *denticuloides* HUSI. 5. *E. zebra* v. *subcapitata* MAYER 6. *E. sorex* KÜTZ. 7–8. *Rhopalodia gibba* (EHR.) O. MÜLL. 9–13. *R gibba* v. *ventricosa* (EHR.) GRUN. 14, 16 *R gibberula* (EHR.) O. MÜLL 15. *R. gibberula* v *van heurckii* O. Müll. 17. *R gibberula* v. *minuens* O. MÜLL. 18. *Hantzschia amphioxys* (EHR.) GRUN. 19. *H. distincte-punctata* HUSI. v. *valida* v. nov. 20 *H. borivliana* sp nov. 21. *H linearis* (O. MÜLL.) A CL. 22. *H amphioxys* (EHR.) GRUN

Figs. 23–24. *Hantzschia amphioxys* v. *stricta* HUSI. 25. *Nitzschia granulata* GRUN. 26. *N. tryblionella* HANIZ v. *levidensis* (W. SM.) GRUN 27 *N tryblionella* HANIZ v. *levidensis* (W SM.) GRUN. smaller form with somewhat produced ends 28 *N. debilis* (ARNOTI) GRUN. 29. *N. balatonis* GRUN 30. *N. hungarica* GRUN. 31 *N. acuminata* (W. SM.) GRUN 32. *N calida* GRUN. 33 *N. stagnorum* RABH 34. *N thermalis* KÜTZ. v. *minor* HILSE. 35. *N. bremensis* HUSI 36. 37 *N obtusa* W. SM. 38. *N obtusa* v *scalpelliformis* GRUN 39. *N obtusa* v. *scalpelliformis* f. *parva* HUSI. 40. *N. ingenua* HUSI. 41. *N umbilicata* HUSI 42. *N. capitellata* HUSI. v *maxima* v. nov 43 *N. intermedia* HANIZ. 44 *N robusta* HUSI. 45. *N frustulum* (KÜTZ.) GRUN. 46 *N microcephala* GRUN. 47. *N. palea* (KÜTZ.) W SM 48. *N reversa* W. SM. 49. *N. longirostris* HUSI 50. *N diducta* HUSI

Figs. 51. *Nitzschia jugata* GANDHI v. *gracilis* v. nov 52 *N vivax* W. SM. 53 *N sigma* W. SM v *rigida* GRUN. 54–56. *N obtusa* W SM. v. *constricta* v. nov. 57 *N. clausiiformis* sp nov. 58. *N recta* HANIZ 59. *N. umbilicata* HUSI. 60 *N gracilis* HANIZ. 61. *N. heufleriana* GRUN. v *elongata* PANI. 62. *N woltereckii* HUSI. 63. *N subrostrata* HUSI 64. *N. amphibia* GRUN. v. *acutiuscula* GRUN 65. *N. frustulum* (KÜTZ.) GRUN. 66 *N spiculoides* HUSI. 67. *Surirella biseriata* BRÉB. 68. *S biseriata* v *subparallela* MEIST. f *indica* f nov 69 *S. angustata* KÜTZ

Figs 70 *Surirella robusta* EHR 71. *S. tenera* GREG. 72. *S. tenuissima* HUSI. 73. *S. capronii* BRÉB 74. *S tenera*—a larger type. 75 *S spinifera* HUSI. 76 *S ovata* KÜTZ. v. *salina* (W. SM.) HUSI. 77. *S. ovata* v *pinnata* (W SM.) HUSI.

Figs 78 *Surirella biseriata* BRÉB. 79. *S. spinifera* HUSI. 80 *S capronioides* GANDHI 81–82. *Campylodiscus bicostatus* W SM.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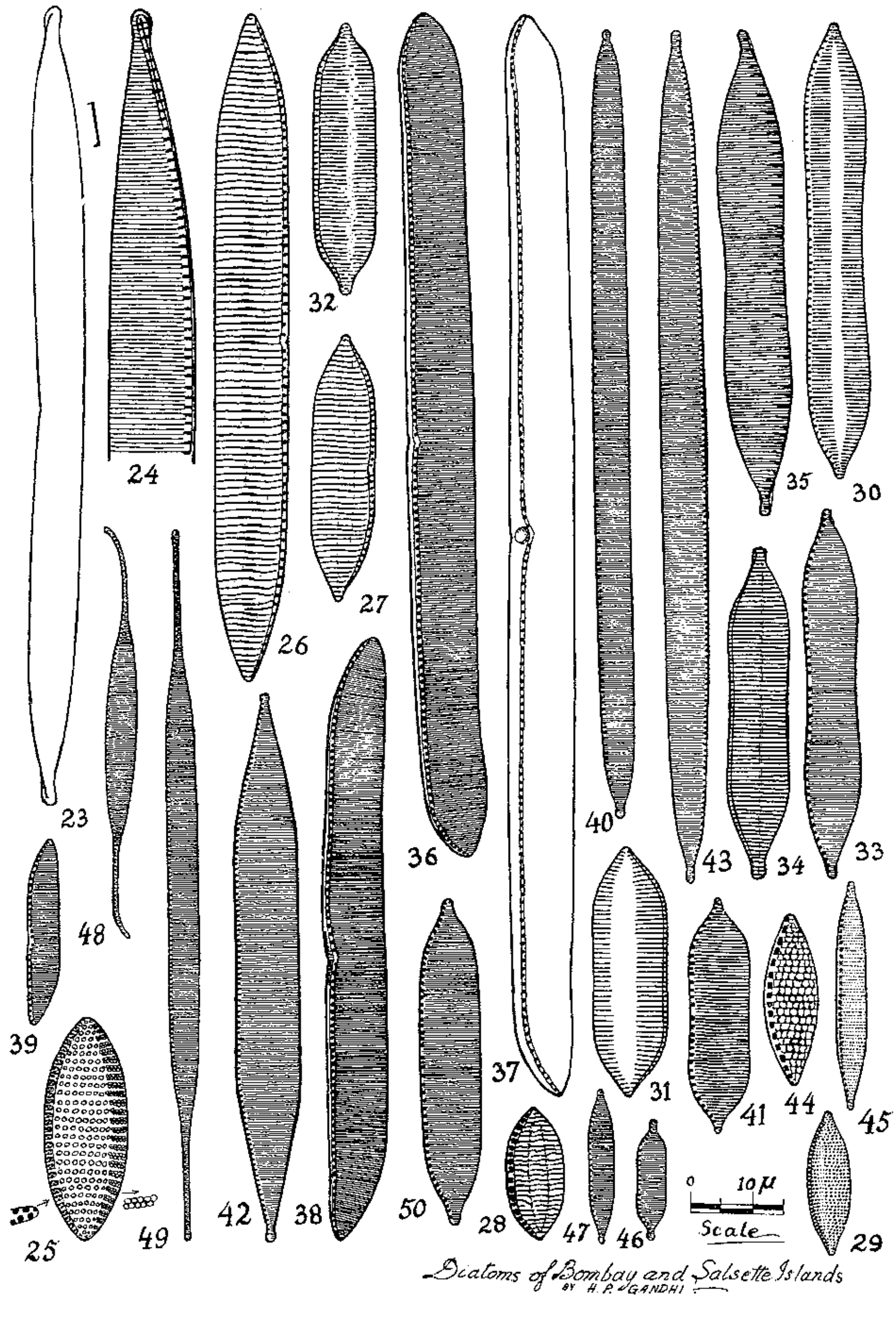
Diatoms of Bombay and Salsette Islands
by H. P. GANDHI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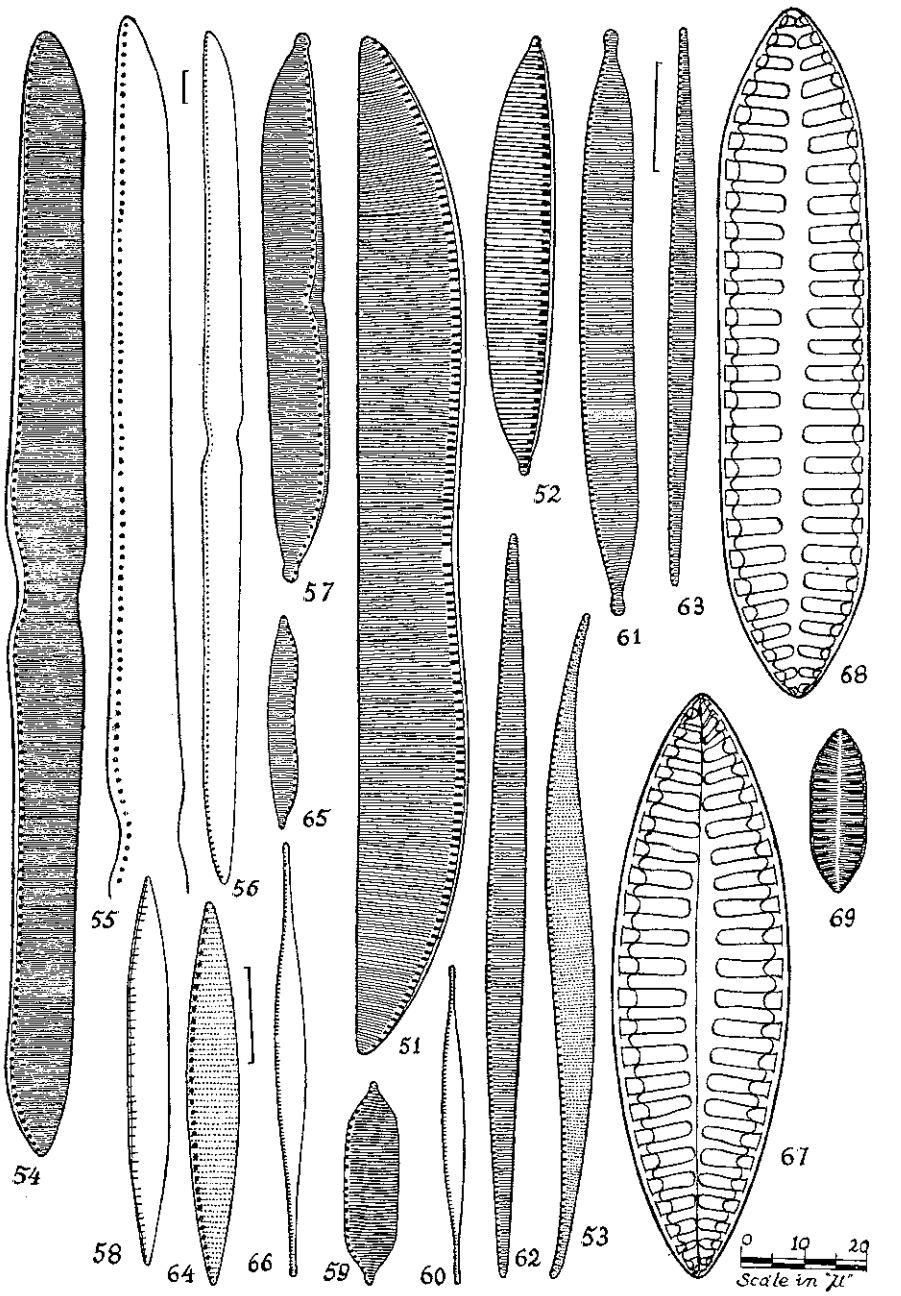
Diatoms of Bombay and Salsette Islands
BY H. P. GANDHI



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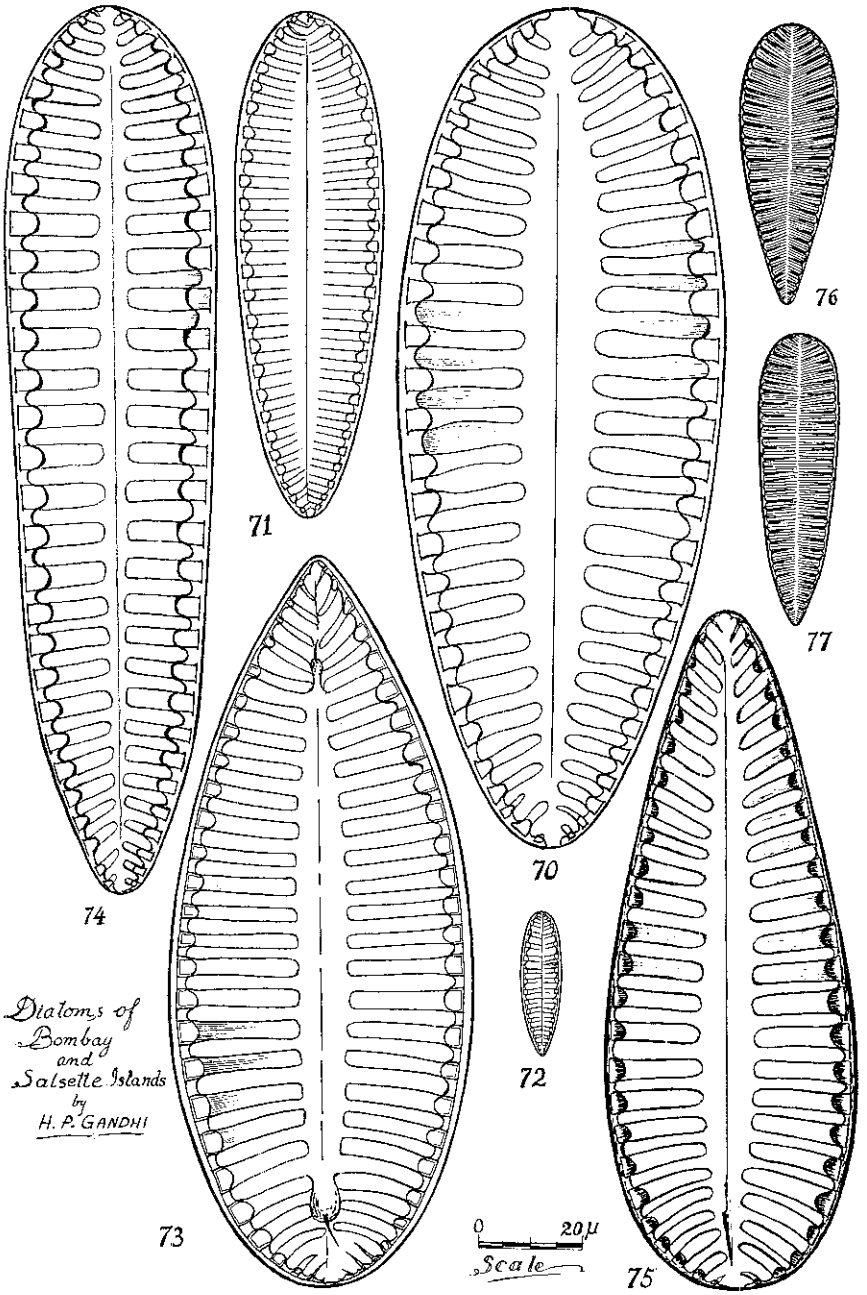
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Diatoms of
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H. P. GANDHI
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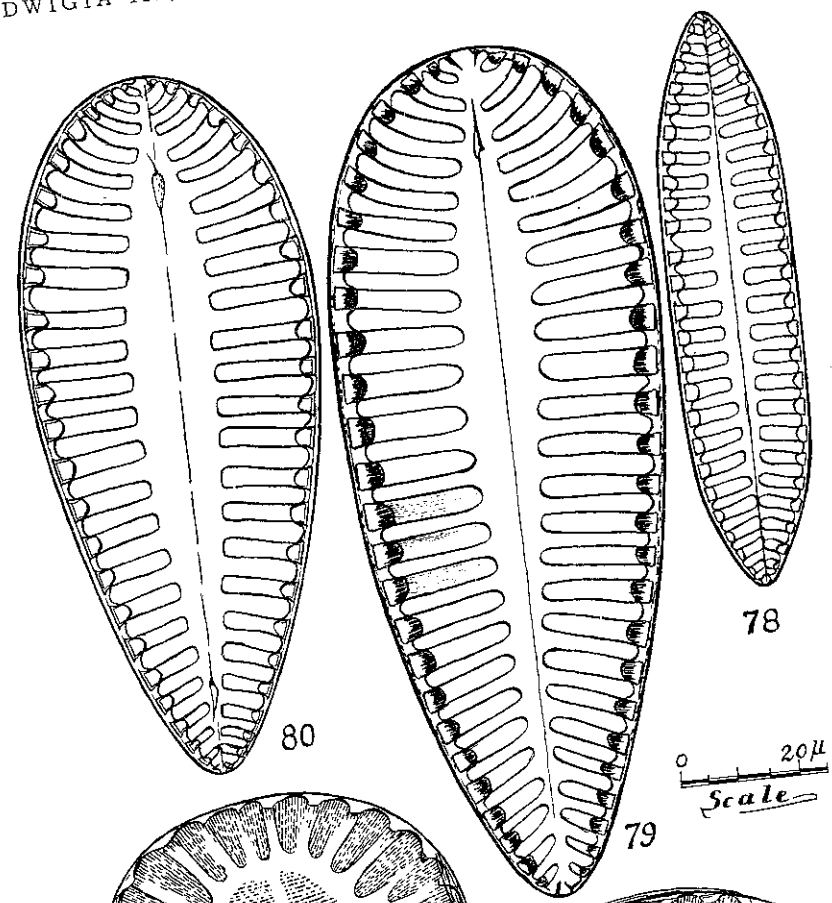

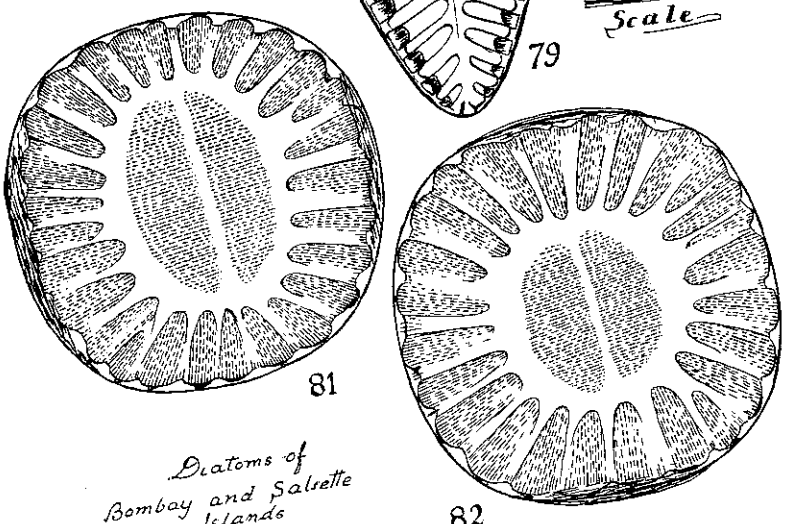

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