

ON THE DIATOM FLORA OF SOME PONDS
AROUND VASNA VILLAGE NEAR
AHMEDABAD

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It is for the first time that the Diatom flora of temporary ponds of India and particularly of Ahmedabad is studied. These ponds owe their origin from large depressions or through unplanned excavations of land for road construction or otherwise. During the rains these get filled in to varying degrees and become the source of water-supply for various purposes of men and beasts alike. The accumulated water thus was found to be constantly disturbed and polluted. Depending upon the size of these low grounds, the area being anywhere between 75 - 400 sq. meters, the water was found to last in them for varying periods of time after the last showers of the wet period were over.

The ponds, 5 in number, which have been a subject for the present study were found to contain water from November to January. These being subject to constant biotic activity, were never found to support any higher kind of plants, not even such plants which would normally be free-floating or otherwise and tolerant to polluted waters. But, they often showed small or large flakes of matter originating from dead organic detritus mixed up with various Myxophyta, floating freely. The constant disturbance of water even perhaps seemed to retard the growth of non-flagellate planktonic life, since the water samples drawn during different times, usually at an interval of 15-20 days, mostly represented Flagellate-flora and fauna and several other small animal organisms.

The samples regularly collected for over a period of year (July 1956 to November 1957) from these ponds, particularly in the form of slimy matter loosely lying on the surface of the soil and water, on cursory observations showed a few diatoms-at a time 4-5 species. But when more careful examination was undertaken, some more forms were recorded. Curiously enough, all of the 5 ponds revealed a similar kind of flora both in quality and quantity. Moreover, many of the forms were constant but *Gomphonema parvulum* Kütz., *G.-v. micropus* (Kütz.) Cl., *G. montanum* Schum. v. *acuminatum* Mayer, *Nitzschia amphibia* Grun., *N.-v. acutiuscula* Grun. and *N. palea* (Kütz.) W. Sm., predominated the rest in one or the other pond. From further observations two striking facts were more or less apparent, viz, (1) the diatom species

inhabiting the slimy matter were abundant in samples collected from borders of these wet situations (from soil surface), possibly representing the benthos of the loose soil, in contrast to isolated forms occurring in free-floating flakes of dead organic matter, and (2) the floristic makeup was of such individuals which scarcely exceeded $50\ \mu$ length, leaving a few habitually larger species of which only three were recorded. These latter forms then were invariably found to be isolated or rather stray. Even other diatoms which elsewhere are known to be of larger size were here either quite small or represented their smaller limits corresponding to the typical biotic pattern.

Of the diatoms studied, *Eunotia tschirchiana* O. Müll., was found to be interesting. The species observed here for a continuous period of 16-months tended to point out that besides some form-change, with diminution of the length its breadth hardly suffered any significant reduction. Thus, this diatom seemed to reveal its life-history feature to a certain extent.

Again, in a larger pond besides free-floating flakes of dead organic matter with Myxophyta, were found some isolated masses of *Pithophora*, *Sphaeroplea* and stray filaments of some *Oedogonium*. On these larger algae, *Eunotia tschirchiana*, *Gomphonema parvulum*, *G.-v. micropus* and *G. lanceolatum* v. *affine* (Kütz.) Cl., were found to be also epiphytic particularly on the spots where encrustations of Calcium salts were present. The diatoms occurring thus, may be referred to Calciphilous group due to their this peculiar habit.

In this paper an illustrated taxonomical account is given particularly of the new taxa and new records for India and other illustrations are given to suggest any deviation occurring in the forms previously recorded. Further, under the individual diatoms besides their dimensions, field notes are also given and their distribution is suggested in the region of Ahmedabad leaving out the cases which have been dealt with elsewhere.

1. *Cyclotella meneghiniana* Kütz.

Diameter 11.5–14 μ , and striae 10 in 10 μ .

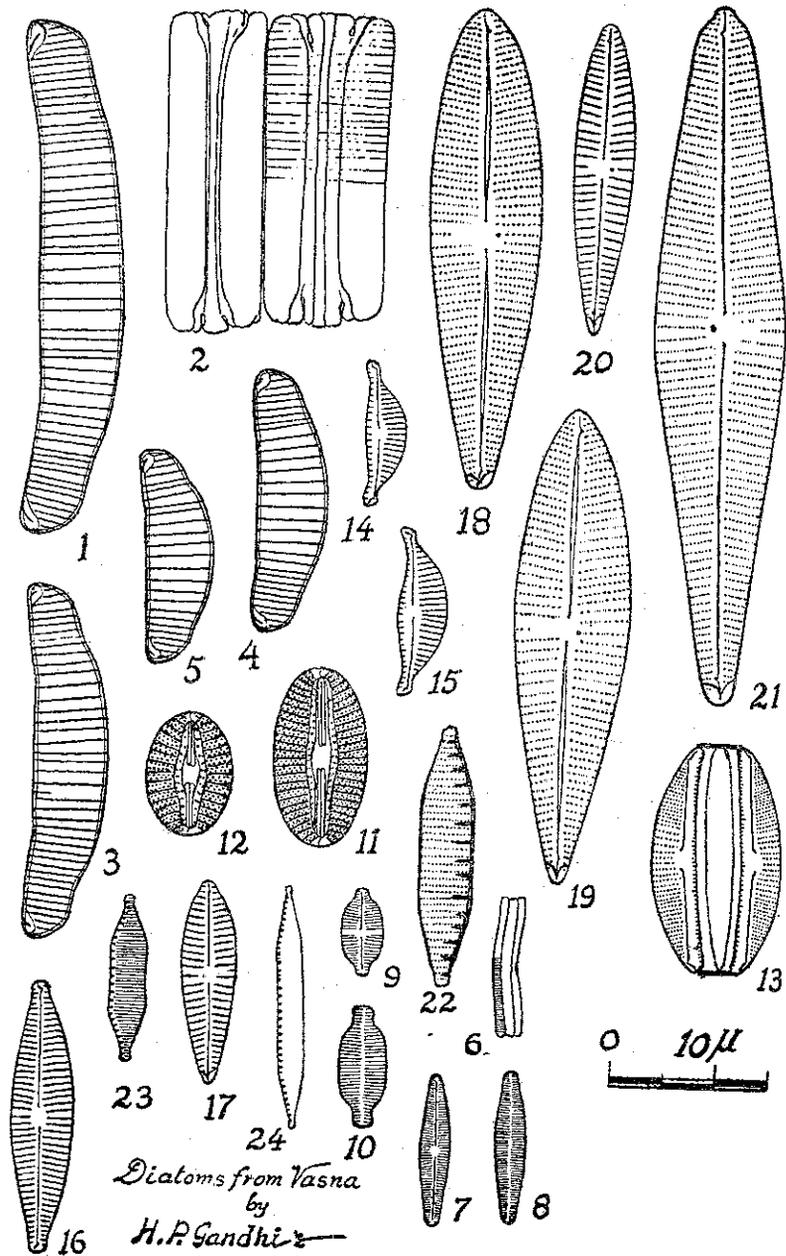
2. *Synedra ulna* (Kütz.) Ehr.

Length 110–165 μ , breadth 5–6.8 μ and striae 9–10 in 10 μ .

3. *Eunotia tschirchiana* O. Müll.

(Text-Figs. 1–5)

Schmidt, A., *Atlas Diat.*, 1874–1944, t. 382, f. 98–100; Hustedt, *Diat. Sunda-Exped.*, 1938, p. 173–74, t. 12, f. 23–29.—Frustules formed in short chains and rectangular in girdle view. Valves 20–50 μ long and 6–7.5 μ broad, slightly arcuate, dorsal side convex to strongly convex and ventral side more or less straight in the middle part with distinct bends towards the ends; ends gracefully constricted on the dorsal side with more or less produced obliquely truncate or subtruncate apices.



TEXT-FIGS. 1-24. Figs. 1-5 *Eunotia tschirchiana* O. Müll. Figs. 6-8. *Achnanthes minutissima* Kütz. Figs. 9-10. *Achnanthes exigua* Grun. Fig. 11. *Diploneis pseudovalis* Hust. Fig. 12. *Diploneis subovalis* Cl. v. *perminuta* (A. C).

Fig. 13. *Amphora veneta* Kütz. Figs. 14-15. *Cymbella thumensis* (A. Mayer, Hust.) Fig. 16. *Cymbella fonticola* Hust. Fig. 17. *Gomphonema parvulum* v. *micropus* (Kütz.) Cl. Figs. 18-19. *Gomphonema montanum* Schum. v. *acuminatum* Mayer. Fig. 20. *Gomphonema lanceolatum* v. *affine* (Kütz.) A. Cl. Fig. 21. *Gomphonema subapicatum* Frit. & Rich. Fig. 22. *Nitzschia denticula* Grun. v. *rostrata* v. nov. Fig. 23. *Nitzschia microcephala* Grun. v. *elegantula* Grun. Fig. 24. *Nitzschia vasnaii* sp. nov.

Polar nodules small but distinct. Striae 6-9 in the middle and 9-14 in $10\ \mu$ at the ends, coarse, striae in the middle part distant and irregularly formed and towards the ends gradually closely set and apparently regularly arranged.

TABLE I

Showing the typical dimensions as recorded

| Length in μ | Breadth in μ | No. of middle striae in $10\ \mu$ | No. of end striae in $10\ \mu$ |
|--------------------|---------------------|---|--------------------------------------|
| 20 | 7 | 7-8 | 9-13 |
| 25 | 7 | 8-9 | 9-14 |
| 28.5 | 6.6 | 7-9 | 9-12 |
| 28.0 | 6.6 | 7-9 | 9-14 |
| 34 | 7 | 7-8 | 9-13 |
| 50 | 7.5 | 6-8 | 10-14 |

This diatom closely agrees with the type as illustrated by Hustedt in the works cited hitherto, in the outline, somewhat in apices and the arrangement of striae. However, the local specimens differ from the same in having more clearly constricted and produced ends and also in having denser striae both in the middle and terminal zones. Looking at the species capable of showing high degree of structural variations as being suggested by Hustedt in the said references—it is felt here that presently recorded deviations could be admitted within the type, they being local and of small order.

This diatom was commonly collected from marginal scum of the ponds but it also occurred as epiphytic on *Pithophora* and other large algae. These frustules formed short ribbons in which no two specimens were found of equal width. This species was also collected from other parts of Ahmedabad but more commonly from Chandola and Kankaria lakes and fountain reservoirs of Seth Sarabhai's garden. Fairly distributed in the locality.

4. *Achnanthes minutissima* Kütz.

(Text-Figs. 6-8)

Length 13.3-15 μ , breadth 2.3-2.5 μ and striae about 35 in 10 μ .5. *Achnanthes exigua* Grun.

(Text-Figs. 9-10)

Length 9-12 μ , breadth 4.2-4.6 μ and striae 28-30 in 10 μ .6. *Diploneis pseudovalis* Hust.

(Text-Fig. 11)

Length 13-17 μ , breadth 8.6-10 μ , costae 12-14 in 10 μ alternating with two rows of fine punctae or alveoli.

This species was seen in good numbers in marginal slime of the ponds as tiny beautiful forms. It was frequently seen in several other pools and ditches on the roadside outside the city proper. However, in all 20% of collections from Ahmedabad were found to contain it.

7. *Diploneis subovalis* Cl. v. *perminuta* A. Cl.

(Text-Fig. 12)

Cleve-Euler, A., *Diat. Schwed. Finn.*—III, 1953, p. 83, f. 654 A.—Valves 12.5-16 μ long and 7.5-9 μ broad, broadly oval or deceptively rounded. Raphe between the ribs, ribs slightly widened at the central nodule. Furrows broadly lanceolate, somewhat more dilated in the middle. Costae 12-13 in 10 μ , strongly conspicuous, radial at the ends, alternating with two rows of clearly discernible punctae.

This diatom also occurred with the above-named species but was marked out by its possession of broad furrows and strongly marked costae. It was found in good number both in the marginal slime and tangles of *Pithophora* or some Myxophyta. From other parts of Ahmedabad, it was collected from pools, garden reservoirs and constantly wet situations under the garden taps. Fairly well distributed in the region.

8. *Amphora veneta* Kütz.

(Text-Fig. 13)

Length 12-22 μ , breadth in girdle view 8-13 μ , striae in the middle 17-19 but towards the ends about 26 in 10 μ .9. *Cymbella thumensis* (A. Mayer) Hustedt

(Text-Figs. 14-15)

Hustedt, *Diat. Balkan-Halbinsel*, 1945, p. 938, t. 42, f. 60-62; *Diat. norddeut. Seen*, 1950, p. 347, t. 37, f. 6-7.—Valves 12.5-15.2 μ long

and 3.8–4.7 μ broad, asymmetrical, semi-lanceolate, dorsal side strongly convex, ventral side more or less inflated in the middle, ends strongly constricted, capitate rounded or slightly obliquely rounded and somewhat ventrally bent. Raphe thin and straight or feebly curved and close to the ventral side; central pores dorsally bent and terminal fissures ventrally directed. Axial area very narrow; central area small and somewhat ventrally expanded. Striae 17–19 in 10 μ , distinct, radial on the dorsal side, very small marginal on the ventral side also sometimes obscure.

This species was found to be deceptive in its appearance since at the first sight it resembled some species of *Amphora*. However, the characteristic girdle view of *Amphora* was not seen. It was found to be a tiny beautiful species occurring in the marginal slime only. It was quite frequent in the samples collected at different times. Elsewhere in Ahmedabad, it occurred generally in larger pools soon after the rains. Not widely distributed.

Cleve-Euler regards this species as *C. parvula* Krasske (Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, 1955, p. 128, f. 1180 a-d).

10. *Cymbella fonticola* Hust.

(Text-Fig. 16)

Hustedt, *Diat. Sunda-Exped.*, 1938, p. 422, t. 24, f. 21–24.—Valves 20–26 μ long and 5–5.6 μ broad, asymmetrical, lanceolate with feebly constricted produced ends. Raphe thin and straight, close to the ventral side with central pores dorsally bent and terminal fissures ventrally directed. Axial area very narrow; central area small and not well defined. Striae 16–19 in 10 μ , radial, at the ends somewhat perpendicular to the middle line, indistinctly punctate.

This species was found in very good number associated with other diatoms in light brown slimy matter or in films formed on the wet soil. From other parts of Ahmedabad also it was well represented in various pools, ditches and roadside water courses during the rains. In Chandola and Kankaria lakes it was found associated with rotting masses of vegetable matter. A fairly common type in the area.

11. *Gomphonema parvulum* (Kütz.) Grun.

Length 14–22 μ , breadth 5.5–6 μ and striae 16–18 in 10 μ .

12. *Gomphonema parvulum* v. *micropus* (Kütz.) Cl.

(Text-Fig. 17)

Hustedt, *Bacil.*, 1930, p. 373, f. 713 c; Geitler, L., *Formwechsel Diat.*, 1932, p. 41–67, f. 11–28; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, 1955, p. 178, f. 1269 h-j.—Valves 14–20 μ long and 5.6–6 μ broad, clavate-lanceolate with feebly constricted produced apex. Raphe thin and straight. Axial area narrow; central area somewhat unilaterally

expanded with an isolated stigma on the opposite side. Striae 12-14 in $10\ \mu$ slightly radial

This diatom was found to be quite frequent in collections made during different times, both as epiphytic on larger algae and in the marginal slime. It occurred often with the species exhibiting several aspects as recorded by Geitler. From other parts of Ahmedabad, it was fairly well represented particularly in Chandola and Kankaria lakes and some fountain reservoirs. A fairly well distributed form in the region.

13. *Gomphonema parvulum* v. *subelliptica* Cl.

Length 12-14 μ , breadth 4.5-5 μ and striae 14-15 in $10\ \mu$.

14. *Gomphonema montanum* Schum. v. *acuminatum* Mayer

(Text-Figs. 18-19)

Length 42-48 μ , breadth 10.5-11.5 μ and striae 10-13 in $10\ \mu$. This diatom slightly differs from the previously recorded forms in having somewhat less acute to feebly cuneate apex.

This species was found to be abundant in ponds during the post-rainy period. It occurred both in free state as well as attached to filaments of *Pithophora*, *Sphaeroplea* and *Oedogonium*, particularly on spots having encrustations of Calcium salts. Elsewhere in Ahmedabad, it was found in both permanent and semi-permanent bodies of water. A common type in the region.

15. *Gomphonema lanceolatum* Ehr.

Length 27-39 μ , breadth 7-8 μ and striae 11-13 in $10\ \mu$.

16. *Gomphonema lanceolatum* v. *affine* (Kütz.) A. Cl.

(Text-Fig 20)

Length 30-40 μ , breadth 5.6-7 μ and striae 9-13 in $10\ \mu$. The present illustration corresponds to Cleve-Euler's (*op. cit.*) Fig no. 1280 k-m.

This diatom usually occurred in rather small number in these ponds in association of other species. It was found to form dense clusters around the Calcium encrusted parts of *Pithophora* filaments. Elsewhere in Ahmedabad also not well represented since in all 8-10% of samples showed its presence.

17. *Gomphonema subapicatum* Fritsch and Rich.

(Text-Fig 21)

Length 48-62 μ , breadth 10-12.5 μ and striae 9-11 in $10\ \mu$.

This species was collected as a very stray form in all these ponds, it was usually associated with dead and rotting vegetable matter. In Kankaria and Chandola lakes it was found to be rather abundantly

growing as also in certain garden reservoirs where the water remained undisturbed for a long time. Fairly distributed in the area

18. *Nitzschia denticula* Grun. v. *rostrata* v. nov.

(Text-Fig. 22)

Valvae 24·7–32 μ longae atque 5·6–6 μ latae, lineares, apicibus cuneatis et rostratis. Carina tenuis, valde ex-centro, carina punctis elongato, 5–6 in 10 μ . Striae 14–15 in 10 μ , distincte punctatae, punctis circiter 20 in 10 μ . Typus lectus a H. P. Gandhi ad Vasna die 1956–57, et positus in herbario proprio auctoris sub numero slide no. AHM—26.

Valves 24·7–32 μ long and 5·6–6 μ broad, linear with cuneate rostrate ends. Keel narrow and strongly excentric with keel punctae elongated 5–6 in 10 μ . Striae 14–15 in 10 μ , distinctly punctate, punctae about 20 in 10 μ .

This species agrees well with *N. denticula* Grun. (Hustedt, *Bacil.*, 1930, p. 407, f. 780), in the outline, keel punctae and the punctate striae. However, it differs from the type in having clearly cuneate-rostrate ends and somewhat less number of striae per 10 μ . It is, therefore, considered to be a new variety.

This diatom was usually found in a small number in the marginal slime of various ponds. It was a conspicuous form due to its prominent keel punctae and clearly punctate striae. It is not much known from other parts of the city.

19. *Nitzschia microcephala* Grun. v. *ellegantula* Grun.

(Text-Fig. 23)

Length 12–15·2 μ , breadth 3–3·3 μ , keel punctae 14–15 in 10 μ and striae about 28–30 in 10 μ , often very fine.

20. *Nitzschia amphibia* Grun.

Length 14–33·3 μ , breadth 4·2–4·7 μ , keel punctae 7–9 in 10 μ and striae 16–18 in 10 μ .

21. *Nitzschia amphibia* v. *acutiuscula* Grun.

Length 23–34 μ , breadth 4·5–4·7 μ , keel punctae 8–10 in 10 μ and striae about 18 in 10 μ .

22. *Nitzschia palea* (Kütz.) W. Sm.

Length 20–30 μ , breadth 2·5–3·6 μ , keel punctae 12–13 in 10 μ and striae not clearly marked but probably more than 30 in 10 μ .

23. *Nitzschia vasnii* sp. nov.

(Text-Fig 24)

Valvae 20–24·3 μ longae atque 2–2·3 μ latae, lineares, marginibus parallalis atque apicibus elongatis cuneatis et breviter capitatis. Carina angustissima, ex-centro, carina punctis 16–18 in 10 μ , minuta. Striae tenuissimae ac indistincte, probabiliter 40–45 in 10 μ . Typus lectus a H. P. Gandhi ad Vasna die 1956–57, et positus in herbario proprio auctoris sub numero slide no. AHM.—28.

Valves 20–24·3 μ long and 2–2·3 μ broad, linear with parallel sides and long cuneate shortly capitate ends. Keel very narrow, excentric with keel punctae 16–18 in 10 μ , minute. Striae very fine and indistinct, probably 40–45 in 10 μ .

This diatom does not agree with any of the known similar looking types, hence it is considered to be a new species.

This species was found in small numbers usually mixed up with slimy matter of the ponds or in pale brownish matter deposited on dead partially submerged leaves. Elsewhere in Ahmedabad it was seen in similar localities as well as in marginal slime of Chandola and Kan-karia lakes, but in a small number.

24. *Nitzschia obtusa* W. Sm. v. *scalpelliformis* Grun.

Length 105–142 μ , breadth 7·6–8·5 μ , keel punctae 7–8 in 10 μ and striae about 30 in 10 μ , sometimes more.

This species was sparingly represented in these ponds in the marginal slime formed by dead vegetable matter, etc. From other parts of Ahmedabad it was found in all wet situations but in brackish waters it was more abundant and occasionally gregarious. A common type in the region

SUMMARY

The paper deals with the Diatom-communities of some five temporary ponds around Vasna village near Ahmedabad. From the periodic collection and observation of the material for a period of nearly 16 months it was noted that all these ponds which happened to be subject of constant biotic activity represented similar kind of Diatom flora both in quality and quantity. The Diatom species occurring in them usually were of small size representing a typical biotic-group and also they seemed to form a benthic group of the loose soil.

From these ponds in all 24 diatoms were collected representing 9 genera. Of these, 4 are new records for India, one species and one variety is considered to be new to the Science.

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