

THE FRESH-WATER DIATOM FLORA OF THE HIREBHASGAR-DAM AREA, MYSORE STATE

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INTRODUCTION

SINCE there are no records available of fresh-water Diatom flora from the Hirebhasgar-dam area, the author has an interest to present the same.

The Hirebhasgar-dam is situated on the Saravati River, approximately at 14° 18' N. and 75° 55' E., about 20 miles by macadam road from Sagar—on Birur-Talguppa line of the Southern Railway. The place is a small village mainly inhabited by a community of maintenance-staff of the Dam.

On a Botanical excursion to the Jog-falls in 1955, this place was visited and many samples of algæ were collected, from the river-sides, dam-pavement, streams and roadside puddles, by the author. All these were preserved on the spot in 5% of commercial formalin. On return to the headquarters, then at the Rajaram College, Kolhapur, the samples were examined carefully along with many others till March 1956. The following is the account of Diatoms that occurred in the collection from the said area.

In this account the Diatoms are mainly arranged and identified according to Hustedt's (1930) monograph with the additional help of Cleve-Euler's (1951-55). The dimensions given for each specimen are those actually recorded. The descriptions and illustrations given are mostly of such specimens which are little or less known in this country.

A SYSTEMATIC ENUMERATION OF DIATOMS

1. *Melosira granulata* (Ehr.) Ralfs

Van Heurck, *Treat Diat*, p. 444, pl 19, fig. 621; Hustedt, *Bacil.*, p. 87, fig. 44; Cleve-Euler, A., *Diat. Schwed. Finn.*—I, p. 25, fig 15 a-b (= *M. granulata* v. *typica* A. Cl.).

Frustules 5-5-8 μ in diameter and 12-18 μ high, cylindrical and united in chains, end cells with spines. Rows of areoles 9-10 in 10 μ .

Habitat: Dam-pavement, roadside puddles and ditches.

2. *Melosira granulata* v *angustissima* Müll.

Hustedt, *Bacil.*, p. 88, fig. 45; Cleve-Euler, A., *Diat. Schwed. Finn.*—I, p. 25, fig. 15 *d-e*.

Frustules 3.3–4.4 μ in diameter and 24–35 μ high, narrowly cylindrical, proportion 1:7–8, end cells with spines and furrows. Rows of areoles 11–12 in 10 μ .

Habitat: Dam-pavement and roadside puddles. A stray form

3. *Melosira granulata* v. *muzzanensis* Meister

Hustedt, *Bacil.*, p. 88, fig. 47; Cleve-Euler, A., *Diat. Schwed. Finn.*—I, p. 25, fig. 15 *f* [= *M. granulata* v. *muzzanensis* (Meister) Bethge]

Frustules 13–17 μ in diameter and 6–8 μ high, short cylindrical, end cells with spines and furrows. Rows of areoles 12 in 10 μ , areoles somewhat fine.

Habitat: Roadside pools, puddles and waste-water puddle from the pumping section of the dam. Found along with the species.

4. *Cyclotella stelligera* Cl. et Grun.

(Fig. 1)

Hustedt, *Bacil.*, p. 100, fig. 65; Cleve-Euler, A., *Diat. Schwed. Finn.*—I, p. 43, fig. 52 *a-b*

Frustules 10–15 μ in diameter, discoid with radial striæ in the central field around a punctum, striæ 10–11 in 10 μ . Marginal striæ coarse and 12–13 in 10 μ .

Habitat: Streams and roadside puddles. Appeared to be gregarious.

5. *Cyclotella glomerata* Bachmann

(Fig. 2)

Hustedt, *Bacil.*, p. 105, fig. 81; Cleve-Euler, A., *Diat. Schwed. Finn.*—I, p. 47, fig. 59; Tiffany and Britton, *Alg. Illinois*, p. 220, pl. 58, fig. 656.

Frustules 6–10 μ in diameter, small, discoid, united in loose colonies, central field with a ring of 6 short striæ or dots. Marginal striæ 13–14 in 10 μ , fine and radial.

Habitat: Streams and roadside puddles. Found associated with the above type, also gregarious.

6. *Synedra ulna* (Nitz.) Ehl

Hustedt, *Bacil.*, p. 151, fig. 158–9; Cleve-Euler, A., *Diat. Schwed. Finn.*—II, p. 61, fig. 382 *a* (= *S. ulna* v. *genuina* Grun.).

Valves 96–145 μ long and 6–8 μ broad, linear with constricted, produced ends. Striæ 9–10 in 10 μ .

Habitat: Widely distributed in the locality, but not abundant.

7. *Synedra ulna* v. *amphirhynchus* (Ehr.) Grun.

Hustedt, *Bacil.*, p. 154, fig. 167; Cleve-Euler, A., *Diat. Schwed. Finn.*—II, p. 62, fig. 382 g.

Valves 180–210 μ long and 5.6–6 μ broad, linear, bent with constricted capitate rounded ends. Striae 9–10 in 10 μ .

Habitat: Widely distributed in the locality and common

8. *Synedra ulna* v. *danica* (Kütz.) Grun.

Hustedt, *Bacil.*, p. 154, fig. 168; Cleve-Euler, A., *Diat. Schwed. Finn.*—II, p. 62, fig. 382 r.

Valves 168–205 μ long and 4.8–5 μ broad, linear-lanceolate with narrow capitate ends. Striae 10 in 10 μ .

Habitat: Widely distributed in the locality and common

9. *Achnanthes microcephala* Kütz.

(Figs. 3–4)

Hustedt, *Bacil.*, p. 198, fig. 273; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 40, fig. 568 a–d (= *A. microcephala* v. *typica* A. Cl.).

Frustules linear and bent in the middle in girdle view. Valves 13–16 μ long and 2.2 μ broad, linear-lanceolate with capitate ends. Striae very fine, about 30 in 10 μ .

Habitat: Dam-pavement and roadside ditches. Common.

10. *Frustulia vulgaris* Thwaites

(Fig. 5)

Hustedt, *Bacil.*, p. 221, fig. 327; Lund, J. W. G., *Soil Alg.*, p. 58, fig. 2 O–P; Cleve-Euler, A., *Diat. Schwed. Finn.*—V, p. 9, fig. 1329 a–b [= *F. vulgaris* (Thw.) Cl. v. *typica* A. Cl.]; Tiffany and Britton, *Alg. Illinois*, p. 245, p. 66, fig. 756 [= *F. vulgaris* (Thw.) De Toni]; Skvortzow, B. W., *Diat. from Khingan*, p. 42, pl. 2, fig. 12; *Diat. from Argun River*, p. 49, pl. 1, fig. 39 (= *F. vulgaris* v. *asiatica* Skv.).

Frustules found in brownish scum. Valves 44–48 μ long and 9–9.5 μ broad, linear-lanceolate with constricted, broad subrostrate ends. Raphe between thick siliceous ribs. Central area small, linear; polar areas long. Striae 24–28 in 10 μ , fine, radial in the middle and distantly set, very finely punctate.

Habitat: Dam-pavement, streams and waste-water puddle near the pumping section of the dam. Frequently occurred in the samples.

This form appears to be a variable one and it agrees well with the type described and illustrated by Hustedt, Cleve-Euler, Lund and others. Skvortzow, however, described similar forms from Khingan and Argun River as *F. vulgaris* Thw. v. *asiatica* Skv. In the original description

of his form from Khingan, he has stated "valves lanceolate with obtuse rounded ends", and in the case of form from Argun River "valves narrow, linear with parallel margins and subrostrate obtuse ends", whereas the illustrations in both the cases show linear-lanceolate outline with constricted subrostrate, obtuse ends, as noted in the present form. It is, therefore, here thought that they are probably the same as *F. vulgaris* Thw. It is a new record for India.

11. *Caloneis silicula* (Ehr.) Cl.

Hustedt, *Bacil*, p. 236, fig. 362; Cleve-Euler, A. *Diat. Schwed. Finn.*—IV, p. 98, fig. 1143 l [= *C. silicula* v. *undulata* (Grun.) Mayer].

Valves 28–32 μ long and 6 μ broad, linear with triundulate sides and cuneate rounded ends. Striæ 18–22 in 10 μ , fine and radial.

Habitat: Roadside ditches, pools and streams. Only a few specimens were observed.

12. *Neidium iridis* (Ehr.) Cl. v. *firmum* (Kütz.) Mayer
(Fig. 6)

Skvortzow, B. W., *Diat. from Khingan*, p. 42, pl. 2, fig. 9; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 120, fig. 1174 h.

Valves 53–70 μ long and 13.5 μ broad, elliptical-lanceolate with rounded cuneate ends. Raphe thick with central pores bent in opposite directions and terminal fissures bifurcated. Axial area narrow; central area somewhat obliquely elliptical and large. Striæ 18–20 in 10 μ , fine but clearly punctate, somewhat obliquely set in the middle, at length parallel and slightly convergent at the ends, crossed by a few longitudinal furrows near the sides.

Habitat: Pools in the river-bed, dam-pavement and roadside ditches. Mostly recorded as a stray specimen. It is a new record for India.

13. *Stauroneis phaniceron* Ehr.

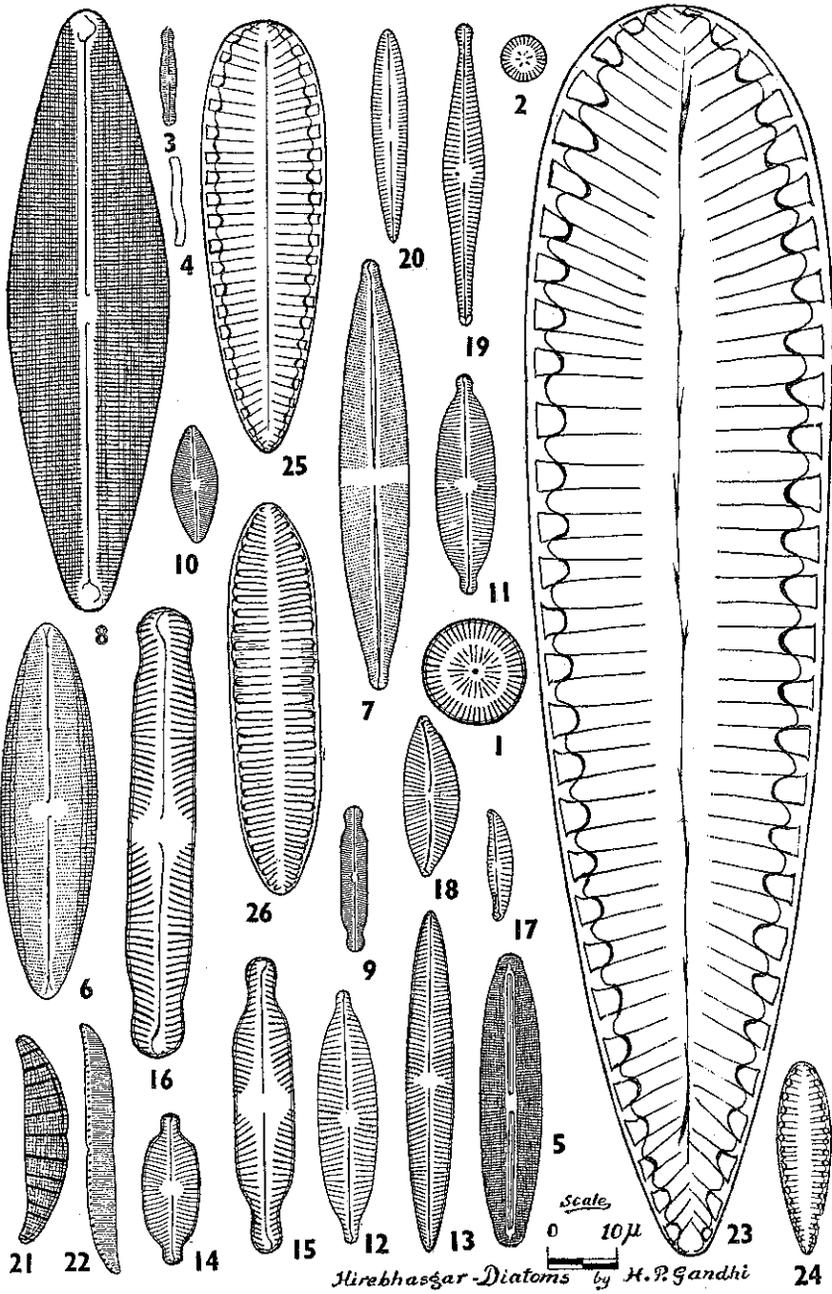
Hustedt, *Bacil*, p. 255, fig. 404; Tiffany and Britton, *Alg. Illinois*, p. 266, pl. 71, fig. 825 [= *S. phaniceron* (Nitz.) Ehr.]; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 209, fig. 944 a (= *S. phaniceron* v. *genuina* A. Cl.).

Valves 80–90 μ long and 17–18 μ broad, lanceolate with slightly produced, broadly rounded ends. Striæ 15–18 in 10 μ , clearly punctate and radial.

Habitat: Pools in the river-bed, roadside ditches and puddles. Not common.

14. *Stauroneis phaniceron* Ehr. f. *producta* f. nov.
(Fig. 7)

Valvæ 60–120 μ longæ atque 11–22 μ latæ, anguste-lanceolatæ, apicibus constrictis atque distincte productis et rotundatis. Raphe



FIGS. 1-26

FIGS. 1-26. Fig 1. *Cyclotella stelligera* Cl. et. Grun. Fig 2. *Cyclotella glomerata* Bachmann. Figs 3-4 *Achnanthes microcephala* Kütz. Fig. 5 *Frustulia vulgaris* Thwaites. Fig 6 *Neidium iridis* (Ehr.) Cl. v. *firmum* (Kütz.) Mayer. Fig. 7. *Stauroneis phaniceron* Ehr. f. *producta* f. nov. Fig. 8. *Navicula fulva* (Nitz.) Ehr. Fig. 9. *Navicula bryophila* Boye Pet. Fig. 10. *Navicula cocconeiformis* Greg. Fig. 11. *Navicula partabgarhensis* Gandhi. Fig. 12 *Navicula rostellata* Kütz. Fig. 13 *Navicula cari* Ehr. v. *angusta* Grun. Fig. 14. *Navicula dicephala* (Ehr.) W. Sm. v. *spherophora* A. Cl. Fig. 15. *Pinnularia interrupta* W. Sm. Fig. 16. *Pinnularia stauoptera* (Rabh.) Cl. v. *subparallela* A. Cl. Fig. 17. *Cymbella kerkevarensis* A. Cl. Fig. 18. *Cymbella ventricosa* Kütz. v. *minuta* (Hilse) Van Heurck. Fig. 19. *Gomphonema subtile* Ehr. Fig. 20. *Gomphonema vastum* Hust. v. *elongata* Skv. Fig. 21. *Rhopalodia musculus* (Kütz.) O. Müll. Fig. 22. *Nitzschia ignota* Krasske. Fig. 23. *Surirella tenera* Greg. v. *nervosa* A. S. Fig. 24 *Surirella subsalsa* W. Sm. Fig. 25. *Surirella subsalsa* W. Sm. f. *major* f. nov. Fig. 26 *Surirella asymmetrica* Østrup v. *serpentina* A. Cl.

crassa, poris centralibus distinctis; fissuris terminalibus curvatis. Area axialis angusta; area centralis linearis-staurodea. Striæ 22-23 in 10μ , radiales, tenues sed distincte punctatæ.

Valves 60-120 μ long and 11-22 μ broad, narrowly lanceolate with constricted, produced rounded ends. Raphe thick with central pores distinct, and curved terminal fissures. Axial area narrow; central area a linear stauros. Striæ 22-23 in 10μ , radial, fine but distinctly punctate

Habitat: Dam-pavement, roadside pools and ditches. Frequently appearing in the samples. It is also recorded from Rankala tank, Kolhapur, hilly streams at Radhanagari [in my paper on Radhanagari Diatoms (1957), I have treated this specimen as a type proper, which I now consider to be a new form]. Fairly common in the locality.

This form agrees with *S. phaniceron* Ehr., as described by Hustedt and others (Hust., p. 255, fig. 404). However, it differs from it in having constricted, distinctly produced rounded ends and comparatively finer striæ which are closely set than in the type. It is, therefore, regarded as a new form.

15. *Navicula cuspidata* Kütz.

Hustedt, *Bacil.*, p. 268, fig. 433; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 17, fig. 1353 a-c (= *N. cuspidata* v. *genuina* A. Cl.).

Valves 110-130 μ long and 27-30 μ broad, rhombic-lanceolate with slightly produced rounded ends. Longitudinal striæ 18-20 in 10μ and transverse striæ 16 in 10μ , somewhat coarse and perpendicular to the middle line.

Habitat: Widely distributed in the locality, but not abundant. Some forms with craticular plates were also recorded.

16. *Navicula fulva* (Nitz.) Ehr.

(Fig 8)

Donkin, A. S., *Brit. Fresh-water Diat.*, 41, pl. 6, fig. 9; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 17, fig. 1352

Valves 85–95 μ long and 22–23 μ broad, rhombic-lanceolate with broad or obtusely rounded ends, ends not at all produced. Raphe thin and straight with inconspicuously hook-like central pores and terminal fissures shortly curved. Axial area very narrow; central area scarcely formed. Transverse striae 14–15 in 10 μ , scarcely radial and indistinctly punctate or the longitudinal striae indistinct.

Habitat: Dam-pavement and roadside pools. It occurred only in a few samples.

Cleve-Euler regards Hustedt's form *N. cuspidata* Kütz. as *N. fulva*, but I do not consider it to be so with the material at my disposal, since Hustedt's form has rather produced and acutely rounded ends, whereas in *N. fulva*, they are not at all produced nor acutely rounded. Moreover, the longitudinal striae in the former are not so fine as to become indistinct as observed in *N. fulva*. I, therefore, prefer to keep these forms separate and as distinct species. It is a new record for India.

17. *Navicula pupula* Kütz.

Hustedt, *Bacil.*, p. 281, fig. 467 *a*; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 186, fig. 890 *a-c* (= *N. pupula* v. *genuina* Grun).

Valves 25–28 μ long and 7–5 μ broad, lanceolate with somewhat constricted, broadly rounded ends. Striae 22–24 in 10 μ , radial and curved.

Habitat: Roadside pools, puddles and ditches. Common in the samples collected.

18. *Navicula pupula* v. *rectangularis* (Greg.) Grun.

Hustedt, *Bacil.*, p. 281, fig. 467 *b*; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 187, fig. 890 *d-f*.

Valves 25–30 μ long and 7–7.5 μ broad, linear with broadly rounded ends. Striae 24–26 in 10 μ , radial and curved.

Habitat: Roadside pools, puddles and dam-pavement. Fairly common with the species.

19. *Navicula pupula* v. *capitata* Hust

Hustedt, *Bacil.*, p. 281, fig. 467 *c*; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 187, fig. 890 *h*.

Valves 22–28 μ long and 7.6 μ broad, linear-lanceolate with constricted broadly capitate rounded ends. Striae 22–26 in 10 μ , radial, curved and fine.

Habitat: Roadside pools, puddles and dam-pavement. Less frequent in the samples.

20. *Navicula bryophila* Boye Pet.

(Fig. 9)

Petersen, J. B., *Aërial Alg. Iceland*, p. 388, fig. 13; *Alg. Pamir Exped.* 1898-99, p. 38, fig. 6; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 175, fig. 865 e-f (= *N. bryophila* v. *lapponica* Hust.)

Valves 18-22 μ long and 4-4.5 μ broad, delicate, linear with constricted, broadly capitate or subcapitate rounded ends. Raphe thin and straight. Axial area very narrow; central area narrowly elliptical. Striæ 24-30 in 10 μ , radial throughout, end striæ rather finer than the middle ones, closely set and almost indistinct.

Habitat: Dam-pavement and waste-water puddle near the pumping section of the dam. Only a few specimens were observed in the collection.

This form agrees well with the type reillustrated by Peterson in "*Alg. Pamir Exped.—1898-99*" It also agrees with Cleve-Euler's *N. bryophila* v. *lapponica* Hust., in the outline, capitate ends and coarser striations in the middle region. However, Cleve-Euler has described and illustrated the striations at the ends to be convergent which are not so recorded in the present form. Boye Petersen also has not indicated them to be convergent at the poles both in the description and illustrations. This form makes a new record for India.

21. *Navicula cocconeiformis* Greg.

(Fig. 10)

Hustedt, *Bacil.*, p. 290, fig. 493; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 196, fig. 916.

Valves 14-21 μ long and 6.6-7.7 μ broad, broadly rhombic-lanceolate with inconspicuously constricted, obtusely rounded ends. Striæ 26-28 in 10 μ , radial, finely punctate, short and long alternating in the middle.

Habitat: Dam-pavement, roadside pools and waste-water puddle near the pumping section of the dam. Fairly common in the locality.

22. *Navicula cryptocephala* Kütz.

Hustedt, *Bacil.*, p. 295, fig. 496; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 154, fig. 813 a-e (= *N. cryptocephala* v. *genuina* A. Cl.)

Valves 27-30 μ long and 5-5.4 μ broad, lanceolate with constricted, produced, feebly capitate ends. Striæ 14-17 in 10 μ .

Habitat: Widely distributed in the locality and common.

23. *Navicula partabgarhensis* Gandhi

(Fig. 11)

Gandhi, H. P., *Fresh-water Diat. Partabgarh*, p. 320, fig. 20.

Valves 30–40 μ long and 7.8–8.5 μ broad, linear-elliptical with constricted capitate ends. Raphe thin and straight. Axial area narrow; central area fairly large, roundish. Striæ 18–20 in 10 μ , lineate, radial in the middle and convergent at the ends, 1–2 middle striæ short but not alternating with long ones.

Habitat: Roadside pools, puddles and ditches. Fairly common.

This form on comparison with the original type agrees well in all the details, except that it is only slightly broader.

24. *Navicula rostellata* Kütz.

(Fig. 12)

Hustedt, *Bacil.*, p. 297, fig. 502; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 158, fig. 818 *d-e* (= *N. rostellata* v. *minor* V. H.).

Valves 33–40 μ long and 8–9 μ broad, linear-lanceolate with somewhat abruptly constricted, produced ends. Striæ 10–14 in 10 μ , lineate, radial in the middle and convergent at the ends.

Habitat: Roadside pools, puddles and ditches. Fairly well distributed.

This form agrees well with the type described by Hustedt and others, except that comparatively smaller forms were also recorded with somewhat faint striations.

25. *Navicula cari* Ehr. v. *angusta* Grun.

(Fig. 13)

Hustedt, *Bacil.*, 299; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 153, fig. 810 *b*.

Valves 48–56 μ long and 6–8 μ broad, narrowly lanceolate with unconstricted rounded ends. Raphe thin and straight with curved terminal fissures. Axial area narrow, linear; central area large, quadrate. Striæ 12–14 in 10 μ , indistinctly lineate, radial in the middle and convergent at the ends, middle striæ very short.

Habitat: Widely spread in the locality, sometimes gregarious. Very common. Also recorded from Lonavala, Jog-falls, Sagar and Radhanagari. It appears that this diatom prefers hilly places. It is a new record for India.

26. *Navicula radiosa* Kütz v. *tenella* (Bréb.) Grun.

Van Heurck, *Treat. Diat.*, p. 180, pl. 3, fig. 114; Hustedt, *Bacil.*, p. 299; Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 156, fig. 816 *m-n* [= *N. radiosa* v. *tenella* (Bréb.) V. H.].

Valves 48–50 μ long and 7 μ broad, narrowly lanceolate with acute ends. Striæ 14–18 in 10 μ , radial in the middle and convergent at the ends.

Habitat: Roadside ditches and puddles. Noted as a stray form.

27 *Navicula dicephala* (Ehr.) W. Sm. v. *sphaerophora* A. Cl.
(Fig. 14)

Cleve-Euler, A., *Diat. Schwed. Finn.*—III, p. 143, fig. 792 g-h

Valves 22–30 μ long and 7–8 μ broad, linear or linear-elliptical with constricted, capitate rounded ends. Raphe thin and straight. Axial area narrow, linear; central area fairly large, roundish. Striae 13–16 in 10 μ , radial throughout and curved, indistinctly punctate and somewhat closely set at the ends.

Habitat: Widely spread in the locality and sometimes gregarious. Common. It is also recorded from the Jog-falls and Sagar. It makes a new record for India.

This form agrees well with the type described and illustrated by Cleve-Euler, except that some smaller and other larger forms were also recorded from this area.

*28. *Pinnularia acrosphaeria* Bréb.

Hustedt, *Bacil.*, p. 330, fig. 610; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 25, fig. 1022 a-b [= *P. acrosphaeria* (Bréb.) W. Sm. v. *genuina* Cl.]; Donkin, A. S., *Brit. Fresh-water Diat.*, p. 72, pl. 12, fig. 2 (= *Navicula acrosphaeria* Bréb.).

Valves 70–85 μ long and 10–11 μ broad, slightly swollen in the middle and at the broadly rounded ends. Striae 11–12 in 10 μ .

Habitat: Roadside pools, puddles and ditches. In one sample it was found to be gregarious. Frequent.

29 *Pinnularia acrosphaeria* f. *undulata* Cl.

Hustedt, *Bacil.*, p. 330; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 25, fig. 1022 c.

Valves 56–60 μ long and 10.5 μ broad, linear with undulate sides and broadly rounded ends. Striae 10–12 in 10 μ .

Habitat: road-side pools. It occurred as a stray form.

30. *Pinnularia acrosphaeria* v. *minor* Cl.

Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 25, fig. 1022 d.

Valves 37–40 μ long and 8.5 μ broad, linear, small with very slightly swollen middle and the end portions. Striae 12–13 in 10 μ .

Habitat: Fairly well distributed in the locality. Frequent.

* Genus *Pinnularia* is arranged according to Cleve-Euler's monograph, since a very large number of forms are described, rearranged and some sections modified and a few newly added in it.

31. *Pinnularia interrupta* W. Sm.

(Fig 15)

Hustedt, *Bacil.*, p. 317, fig. 573 *b*; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 63, fig. 1088 *k-n* [= *P. biceps* Greg. v. *minor* (Boye Pet.) A. Cl.].

Valves 42–50 μ long and 8.5–9 μ broad, linear with narrowed, constricted, produced subcapitate rounded ends. Raphe thin and straight. Axial area narrow, sublinear; central area very large, rhomboid and reaching the sides. Striæ 10–12 in 10 μ , coarse, radial in the middle and convergent at the ends, striæ in the middle part progressively becoming shorter till they disappear.

Habitat: Wide-spread in the region but not abundant.

In the collection from the Hirebhasgar area, all the specimens showed the central area very large, reaching the sides and the middle radial striæ progressively becoming shorter until disappearing in the centre. In this regard, therefore, it does not agree with *P. interrupta* W. Sm. (Hustedt, *op. cit.*, p. 317, fig. 573 *a*) which is treated as *P. biceps* Greg. v. *typica* A. Cl., by Cleve-Euler (Cleve-Euler, *loc. cit.*, p. 62, fig. 1088 *a, c-d*). On the other hand, it fairly resembles *P. interrupta* as illustrated by Hustedt (fig. 573 *b*) which according to Cleve-Euler is *P. biceps* v. *minor* (Boye Pet.) A. Cl. (Cleve-Euler's fig. 1088 *l*) as also Boye Petersen's form *P. interrupta* f. *minor* Boye Pet. (Boye Petersen, *Aërial Alg. Iceland*, p. 405, fig. 25). The present form shows the outline, central area and middle striæ like that in *P. interrupta* f. *minor* Boye Pet., but differs in having much larger dimensions and somewhat coarser striæ fewer in number. In the opinion of the present author, it is probable that *P. interrupta* (Hustedt's fig. 573 *b*) and *P. biceps* Greg. v. *minor* (Boye Pet.) A. Cl. (Cleve-Euler's fig. 1088 *k-n*) are the same as *P. interrupta* W. Sm., with some minor variations. Whereas, Boye Petersen's form may be treated as *P. interrupta* f. *minor* Boye Pet., as also Cleve-Euler's similar smaller forms *P. biceps* v. *minor*, with it.

32. *Pinnularia stauoptera* (Rabh.) Cl. v. *subparallela* A. Cl.

(Fig 16)

Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 68, fig. 1091 *n*.

Valves 60–70 μ long and 9–10 μ broad, linear, inconspicuously triundulate with ends constricted and broadly capitate-rounded. Raphe thin, slightly wavy with unilaterally bent central pores and curved terminal fissures. Axial area narrow, linear; central area large, rhomboid and reaching the sides. Striæ 9–11 in 10 μ , coarse, radial in the middle and convergent at the ends.

Habitat: Dam-pavement and a roadside ditch. Rather a stray form. This form is a new record for India.

33 *Cymbella kerkevarensis* A. Cl.

(Fig. 17)

Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 146, fig. 1215.

Valves 24–28 μ long and 8–8.5 μ broad, asymmetrical with dorsal side highly convex, ventral side moderately convex and the ends feebly constricted, rounded and produced. Raphe thin, almost central with ventrally bent central pores. Axial area very narrow; central area small. Striæ 13–14 in 10 μ , throughout radial and punctate.

Habitat: Dam-pavement, roadside pools and puddles. Very common in the locality. This diatom was also collected from the Jog-falls and Sagar. It is a new record for India.

34. *Cymbella turgida* (Greg.) Cl.

Hustedt, *Bacil.*, p. 358, fig. 660; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 123, fig. 1176 a–d.

Valves 50–55 μ long and 12–13 μ broad, dorsal side convex, ventral side almost straight with a median gibbosity, ends acute. Striæ 7–11 in 10 μ , coarsely lineate.

Habitat: road-side pools and ditches. A stray form.

35. *Cymbella ventricosa* Kütz.

Hustedt, *Bacil.*, p. 359, fig. 661; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 124, fig. 1177 a–c (= *C. ventricosa* v. *genuina* Mayer).

Valves 37–39 μ long and 11 μ broad, with slightly convex ventral side and highly convex dorsal side with acutely rounded ends. Striæ 10–11 in the middle and 13–16 in 10 μ at the ends, finely punctate.

Habitat: Roadside ditches and pools. A stray form.

36. *Cymbella ventricosa* Kütz. v. *minuta* (Hilse) V. H.

(Fig. 18)

Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 125, fig. 1177 g–i.

Valves 15–17 μ long and 4.4–5 μ broad, small, with dorsal side convex and ventral side straight with a broad median inflation, ends rounded and somewhat ventrally bent. Raphe thin and straight. Axial area narrow; central area small. Striæ 13–14 in the middle and upto 16 in 10 μ at the ends, radial in the middle.

Habitat: fairly well distributed in the locality. It was also collected from the Jog-falls and Sagar where, in some collections, it appeared to be gregarious. It makes a new record for India.

37. *Gomphonema sphaerophorum* Ehr.

Hustedt, *Bacil.*, p. 372, fig. 695; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 176, fig. 1267.

Valves 35–37 μ long and 7–8 μ broad, clavate with strongly constricted capitate apex and narrowed, produced capitate base. Striæ 12–16 in 10 μ , radial and punctate.

Habitat: Roadside pools, puddles and ditches. Mostly as a stray specimen.

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

Hustedt, *Bacil.*, p. 372, fig. 713 a; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 177, fig. 1269 a–c [= *G. parvulum* (Kütz.) V. H. v. *genuinum* Mayer]

Valves 20–25 μ long and 6.5 μ broad, lanceolate-clavate with shortly constricted produced ends. Striæ 13–16 in 10 μ , radial and faintly punctate.

Habitat: Fairly well distributed in the locality.

39. *Gomphonema parvulum* v. *subelliptica* Cl.

Hustedt, *Bacil.*, p. 373, fig. 713 b; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 178, fig. 1269 h–j (= *G. parvulum* v. *subellipticum* Cl.).

Valves 14–18 μ long and 6.6 μ broad, elliptical-clavate with scarcely constricted produced ends. Striæ 13–16 in 10 μ , radial.

Habitat: Dam-pavement, roadside pools and ditches. Sparingly seen in the collection.

40. *Gomphonema subtile* Ehr

(Fig. 19)

Hustedt, *Bacil.*, p. 376, fig. 709; Cleve-Euler, A., *Diat. Schwed. Finn.*—IV, p. 177, fig. 1268 c (= *G. subtile* v. *rotundatum* A. Cl.).

Valves 30–46 μ long and 5–6 μ broad, narrowly lanceolate-clavate, delicate, with slightly capitate broadly rounded apex and gradually attenuated produced rounded base. Raphe thin and straight. Axial area narrow; central area unilateral with an isolated stigma. Striæ 12–14 in 10 μ , indistinctly punctate.

Habitat: Dam-pavement, waste-water puddle near the pumpin section of the dam. A stray form. It is a new record for India.

41. *Gomphonema vastum* Hust. v. *elongata* Skv.

(Fig. 20)

Skvortzow, B. W., *Diat. from Kizaki Lake*, p. 51, pl. 13, figs. 33, 40

Valves 28–35 μ long and 4.5–5.5 μ broad, clavate-lanceolate with rounded apex and attenuated base. Raphe thin and straight. Axial area broadly lanceolate, almost $\frac{1}{2}$ the breadth of the valve; central area undefined, but with an isolated stigma on one side. Striæ 14–18 in 10 μ , slightly radial, marginal and fine.

Habitat: Well distributed in the locality and common. It is also recorded from the Jog-falls and Sagar, occasionally gregarious. It is a new record for India. So far known only from Nippon area.

42. *Rhopalodia musculus* (Kütz.) O. Müll.

(Fig. 21)

Hustedt, *Bacil.*, p. 392, fig. 745; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 43, fig. 1415 *k-l* [= *R. gibberula* (Ehr. ? Kütz) O. Müll. v. *constricta* (W. Sm.) A. Cl.].

Frustules solitary, elliptical with broadly rounded, sometimes constricted at the ends in girdle view. Valves 28–32 μ long and 6–6.6 μ broad with almost straight ventral side convex to semi-circular dorsal side with ventrally bent, acutely rounded ends, dorsal part in the middle somewhat notched. Costæ 3–5 in 10 μ , alternating with 5–8 rows of alveoli; rows of alveoli 14–15 in 10 μ , radially arranged and fine.

Habitat: Dam-pavement and a roadside pool. A stray form. It is a new record for India.

43. *Nitzschia ignorta* Krasske

(Fig. 22)

Hustedt, *Bacil.*, p. 422, fig. 819; Lund, J. W. G., *Soil Alg.*, p. 97, figs. 14 J–K, 15 A–G; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 78, fig. 1478 *c* [= *N. filiformis* (W. Sm.) Hust. v. *ignorta* (Krasske) A. Cl.].

Valves 33–45 μ long and 4–4.5 μ broad, linear sigmoid with obliquely rounded-wedge-shaped ends. Keel excentric, sigmoid with a median constriction and keel punctæ small, rounded, 10–11 in 10 μ . Striæ about 35 in 10 μ , very fine and almost indistinct.

Habitat: Well distributed in the locality and fairly common. This diatom is also recorded from Kolhapur, Jog-falls and Mugad, but as a stray specimen. It makes a new record for India.

44. *Surirella tenera* Greg.

Hustedt, *Bacil.*, p. 438, fig. 853; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 104, fig. 1525 *a-b* (= *S. tenera* v. *genuina* A. Cl.).

Valves 128–140 μ long and 35–38 μ broad, linear-ovate to long-ovate with broadly rounded apex and cuneate rounded base. Costæ 16–22 in 100 μ , radial at the ends.

Habitat: Widely spread in the locality, but not abundant. It is also collected from the Jog-falls (here in some places found to be gregarious), Sagar, Panhalgarh, Bombay and other places. Common.

45. *Surirella tenera* v. *nervosa* A. Schmidt.

(Fig. 23)

Hustedt, *Bacil.*, p. 439, fig. 854; Cleve-Euler, A., *Diat. Schwed. Finn.—V.*, p. 104, fig. 1525 *c-e*.

Valves 71–165 μ long and 16.5–44 μ broad, heteropolar, linear-ovate to long-ovate with broadly rounded apex and cuneate base. Middle line irregularly spinuous beset with strong terminal spines. Costæ 18–22 in 100 μ , radial at the ends.

Habitat: Widely distributed in the locality. Also collected from the Jog-falls and Sagar. Very common.

46. *Surirella subsalsa* W. Sm.

(Fig. 24)

Cleve-Euler, A., *Diat. Schwed. Finn.*—V, p. 105, fig. 1526 a–d, f (= *S. subsalsa* v. *smithii* A. Cl.).

Valves 27–35 μ long and 6.6–9.5 μ broad, heteropolar, ovate or ovate-lanceolate with acutely rounded base. Axial field narrow, linear to lanceolate, Costæ 35–40 in 100 μ .

Habitat: Dam-pavement, roadside ditches, pools and puddles. Fairly well seen in the collection.

47. *Surirella subsalsa* f. *major* f. nov.

(Fig. 25)

Frustula cuneata in aspectu zonali. Valvæ 60–65 μ longæ atque 16–17 μ latæ, heteropolares, ovatæ cuneatæ. Area axialis angustalanceolata cum linea media. Rugæ marginales distincte, undulatæ cum projectionibus indistinctis. Costæ 35–40 in 100 μ , striæ indistincte.

Frustules cuneate in girdle view. Valves 60–65 μ long and 16–17 μ broad, heteropolar and ovate-cuneate. Axial area narrowly lanceolate with a median line. Marginal folds distinct and undulated but with indistinct projections. Costæ 35–40 in 100 μ , striæ indistinct.

Habitat: Dam-pavement and roadside pools. A stray form.

This diatom differs from the above named type in being larger in dimensions and in having ovate-cuneate outline. It is, therefore, tentatively regarded as a new form.

48. *Surirella asymmetrica* Østrup v. *serpentina* A. Cl.

(Fig. 26)

Cleve-Euler, A., *Diat. Schwed. Finn.*—V, p. 114, fig. 1545 b–f.

Valves 55–58 μ long and 13.5–14 μ broad, scarcely heteropolar, linear or sublinear with cuneate or subcuneate rounded ends. Axial area very narrow, linear, median line not seen. Marginal folds feebly developed. Costæ 40–45 in 100 μ , striæ indistinct.

Habitat: Dam-pavement, roadside puddle and a pool in the river-bed. A stray form.

SUMMARY

For the first time the Diatoms from Hirebhasgar-dam area has been described in these pages and illustrations given only of those forms which are little or less known in this country.

In all forty-eight Diatoms are recorded from the said area of which two are considered to be new forms and fourteen new records for this country.

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