

## A PRELIMINARY ACCOUNT OF THE SOIL DIATOM FLORA OF KOLHAPUR

BY H. P. GANDHI

Rajaram College, Kolhapur

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### INTRODUCTION

VERY little is known of the Soil Diatom Flora of India and especially of Kolhapur, hence the author endeavours to present an account of the same.

The material for the study was collected from different parts of the city during the rainy seasons of 1952-55. It occurred in the form of brownish scum on the wet surface of the soil. On examination, the material showed a preponderance of species of *Hantzschia* or *Nitzschia*, associated with other forms included in this paper, which occurred in lesser numbers or as stray specimens.

The classification of forms is done according to Hustedt's (1930) monograph and the identification with the additional help of Cleve-Euler's (1951-55) monograph. The measurements given for each form are those actually recorded.

In all, thirteen forms have been described in this paper of which eight are new records for India.

### BACILLARIOPHYTA (DIATOMEÆ)

- A. Order CENTRALES
- I. Suborder DISCINEÆ
- 1. Family COSCINODISCACEÆ
- (a) Sub-family COSCINODISCOIDEÆ
- Genus *Cyclotella* Kützing 1834

1. *Cyclotella meneghiniana* Kütz. v. *genuina* A. Cl. f. *binotata* Grun. Cleve-Euler, A., *Diat. von Schwed. u. Finn*—I, p. 48, fig. 63 c; Gandhi, H. P., *Freshwater Diat. S-W India*, p. 196, fig. 1.

Frustules rectangular in girdle view with undulated sides. Valves discoid, 10-15  $\mu$  in diameter. Central field large, finely punctate in radial rows with two conspicuous dots on one side. Striæ coarse 9-10 in 10  $\mu$ .

*Distribution*.—India—Dharwar (Gandhi, 1956); Kolhapur—Saniwar-peth, Rajaram College (Science side) compound and Laxmipuri.

This form is a distinctive one on account of two conspicuous dots being present in the central field. Such dots have also been recorded by Van Heurck in some of his specimens, which he retained under

the species *C. meneghiniana* Kütz. (Van Heurck, *Treat Diat.*, p. 447, pl. 22, fig. 656). However, the present author considers it fit to separate such bistigmate specimens from the type and thus agrees with Cleve-Euler's view

- B. Order PENNALES
- I. Suborder BIRAPHIDINEÆ
- 1. Family NAVICULACEÆ
- (a) Sub-family NAVICULOIDEÆ
- Genus **Neidium** Pfitzer 1871
- 2. *Neidium affine* (Ehr.) Cl. v. *longiceps* (Greg.) Cl.  
(Fig. 1)

Hustedt, *Bacil.*, p. 244, fig. 378; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—IV, p. 112, fig. 1163 *a-d* [= *N. longiceps* (Greg.) A. Cl. v. *typicum* A. Cl. inclusive of f. *minuta* A. Cl.].

Valves small, linear or feebly concave in the middle with constricted broadly produced rounded ends, length 18–25  $\mu$  and breadth 4.5–5  $\mu$ . Raphe thin and straight with central pores bent in opposite directions. Axial area very narrow; central area small. Striæ finely punctate, 24–26 in 10  $\mu$ , slightly radial in the middle and somewhat perpendicular to the middle line at the ends, crossed by a faint longitudinal furrow near the margins.

*Distribution.*—India—Kolhapur—Sahu Road side, Science side compound and garden.

Genus **Anomæneis** Pfitzer 1871

- 3. *Anomæneis styriaca* (Grun.) Hust.  
(Fig. 2)

Hustedt, *Bacil.*, p. 265, fig. 432.

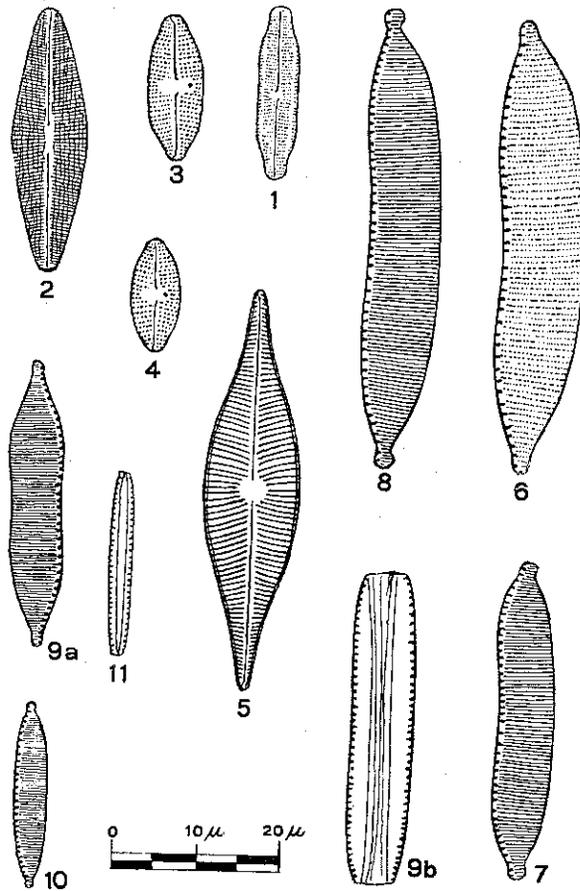
Valves rhombic-lanceolate with broadly rounded ends, length 15–30  $\mu$  and breadth 6–7.7  $\mu$ . Raphe thin and straight with central pores wide apart. Axial area very narrow; central area constricted in the middle, small. Striæ about 26–29 in 10  $\mu$ , punctate, radial and crossed by many longitudinal, wavy hyaline bands.

*Distribution.*—India—Kolhapur—widely distributed.

Cleve-Euler has described this form as *A. decipiens* A. Cl. v. *typica* A. Cl. (Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—III, p. 200, fig. 923 *a-b*), but the illustrations do not agree with either Hustedt's or the present form. On the other hand, Cleve-Euler's illustration "923 *e*", which agrees well in the outline, etc., with Hustedt's and present one, is being called as *A. decipiens* v. *hybrida* n. v., in the index to figures (p. 254) of which no description or name is available in the text.

Genus **Navicula** Bory 1822

Section *Naviculæ orthostichæ* Cleve



FIGS 1-11. Fig. 1. *Neidium affine* (Ehr.) Cl. v. *longiceps* (Gerg.) Cl. Fig. 2. *Anomaneis styriaca* (Grun.) Hust. Figs. 3-4. *Navicula mutica* Kütz. Fig. 5. *Navicula gothlandica* Grun. Fig. 6. *Hantzschia amphioxys* (Ehr.) Grun. v. *pusilla* Dippel. Fig. 7. *Hantzschia amphioxys* (Ehr.) Grun. v. *densestriata* (Font.) A. Cl. Fig. 8. *Hantzschia amphioxys* (Ehr.) Grun. v. *capitata* O. Müll. Fig. 9 (a) *Nitzschia thermalis* Kütz. v. *minor* Hilse. Fig. 9 (b) *Nitzschia thermalis* v. *minor* in girdle view. Fig. 10. *Nitzschia palea* (Kütz.) W. Sm. Fig. 11. *Nitzschia palea* in girdle view.

#### 4. *Navicula cuspidata* Kütz.

Donkin, A. S., *Brit. Diat.*, p. 39, pl. VI, fig. 6; Van Heurck, *Treat. Diat.*, p. 214, pl. 4, fig. 190; Hustedt, *Bacil.*, p. 268, fig. 433; Tiffany and Britton, *Alg. Illinois*, p. 254, pl. 68, fig. 789.

Valves broadly lanceolate with somewhat produced ends, length 50-77  $\mu$  and breadth 18-22  $\mu$ . Axial area narrow. Transverse striae

15–16 in  $10\mu$ , almost perpendicular to the middle line, longitudinal striæ 20–22 in  $10\mu$ .

*Distribution.*—India—Burma (West and West, 1907), Ceylon (West and West, 1902), Panjab (Majeed, 1935), Bombay and Salsette (Gonzalves and Gandhi, 1954), Kolhapur—widely distributed

#### 5. *Navicula mutica* Kütz.

Section *Naviculæ mesolciæ* Cleve

(Figs. 3–4)

Van Heurck, *Treat. Diat.*, p. 206, pl. 4, fig. 167; Hustedt, *Bacil.*, p. 274, fig. 453 a; Tiffany and Britton, *Alg. Illinois*, p. 254, pl. 67, fig. 773; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—III, p. 193, fig. 907 a [= *N. mutica* Kütz. v. *cohnii* (Hilse) Grun.].

Valves elliptic-lanceolate with constricted, produced, broadly rounded ends, length 12–16  $6\mu$  and breadth 5–6  $7\mu$ . Raphe thin and straight with somewhat unilaterally bent central pores. Axial area narrow; central area very large somewhat widened towards the margins with an isolated punctum on one side. Striæ 18–20 in  $10\mu$  radial, clearly punctate and somewhat closer at the ends.

*Distribution.*—India—Burma (West and West, 1907), Biswas's list no. 348; Kolhapur—widely distributed.

#### 6. *Navicula cryptocephala* Kütz.

Section *Naviculæ lineolatæ* Cleve

Donkin, A. S., *Brit. Diat.*, p. 37, pl. 5, fig. 14; Van Heurck, *Treat. Diat.*, pp. 180–81, pl. 3, fig. 122; Hustedt, *Bacil.*, p. 295, fig. 496; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—III, p. 154, fig. 813 a-e (= *N. cryptocephala* v. *genuina* A. Cl.).

Valves lanceolate with constricted, produced, somewhat capitate ends, length 25–28  $\mu$  and breadth 5–5  $\mu$ . Striæ 16–17 in  $10\mu$ , radial in the middle and convergent at the ends, indistinctly lineate.

*Distribution.*—India—Himalaya (Dickie, 1882), Burma (West and West, 1907), Calcutta (Skvortzow, 1935), Bombay and Salsette (Gonzalves and Gandhi, 1954), Partabgarh (Gandhi, 1955), Bengal (Grunow, 1865), Biswas's list no. 310; Kolhapur—widely distributed.

#### 7. *Navicula gotlandica* Grun.

(Fig. 5)

Hustedt, *Bacil.*, p. 296, fig. 499; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—III, p. 158, fig. 819 a-c (= *N. gotlandica* Grun. v. *genuina* A. Cl. and v. *minor* A. Cl.)

Valves broadly lanceolate with narrowed, produced, acutely rounded ends, length 40–47  $5\mu$  and breadth 9–5–10  $\mu$ . Raphe thin and straight. Axial area narrow, linear; central area small, rounded. Striæ 14–16

in  $10\ \mu$  in the middle and upto  $18$  in  $10\ \mu$  at the ends, radial in the middle and convergent at the ends, lineate.

*Distribution.*—India—Kolhapur—Rajaram College gardens and Science side compound.

This form also agrees well with the type given by Cleve-Euler in all respects except that its dimensions are intermediate between *N. gotlandica* Grun. v. *genuina* A. Cl and its other variety *minor* A. Cl. Here, therefore, Cleve-Euler's types have been regarded the same as Hustedt's.

(b) *Sub-family* GOMPHOCYMBELLOIDEÆ

Genus **Amphora** Ehrenberg 1840

8. *Amphora veneta* Kütz

Hustedt, *Bacil*, p. 345, fig. 631; Cleve-Euler, A., *Diat von Schwed. u. Finn.*—III, p. 96, fig. 682.

Frustules broadly elliptical with truncate ends,  $12-17\ \mu$  long and  $7-7.5\ \mu$  broad. Valves lunate with obtuse ventrally bent ends. Striæ finely punctate, radial, wider apart in the middle,  $20-25$  in  $10\ \mu$ .

*Distribution.*—India—Madras (Krishnamurthy, 1954), Kolhapur—Rankala-vesh, Saniwar-peth and Science side.

2. *Family* NITZSCHIACEÆ

(a) *Sub-family* NITZSCHIOIDEÆ

Genus **Hantzschia** Grunow 1880

9. *Hantzschia amphioxys* (Ehr.) Grun. v. *pusilla* Dippel

(Fig. 6)

Cleve-Euler, A., *Diat von Schwed. u. Finn.*—V, p. 48, fig. 1419 l.

Valves somewhat arcuate, linear, strongly narrowed, constricted and produced towards the ends, length  $40-52\ \mu$  and breadth  $6.5-8.2\ \mu$ . Keel excentric with small keel punctæ,  $7$  in  $10\ \mu$ . Striæ punctate,  $15-17$  in  $10\ \mu$ .

This form agrees well with the type given by Cleve-Euler, except that some slightly larger forms were also recorded.

*Distribution.*—India—Kolhapur—Saniwar-peth, Sukrawar-peth, Tarabai park, Rankala-vesh and Laxmipuri

10. *Hantzschia amphioxys* (Ehr.) Grun. v. *densestriata* (Font.) A. Cl.

(Fig. 7)

Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—V, p. 49, fig. 1419 n-p

Valves slightly arcuate, linear with narrowed, constricted somewhat broadly rostrate, backwardly bent ends, length  $25-37\ \mu$  long and  $5-5.5\ \mu$  broad. Keel excentric, keel punctæ small,  $9-11$  in  $10\ \mu$ . Striæ fine,  $23-25$  in  $10\ \mu$ .

*Distribution*—India—Kolhapur—Padma-Raje park, Rajaram College (Science side) garden and compound.

11. *Hantzschia amphioxys* (Ehr.) Grun. v. *capitata* O. Müll.  
(Fig. 8)

Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—V, p. 49, fig. 1419 t

Valves linear, arcuate with strongly narrowed, constricted capitate rounded ends, length 30–50  $\mu$  and breadth 7.5–8  $\mu$ . Keel excentric, keel punctæ small, 8–9 in 10  $\mu$ . Striæ 20–22 in 10  $\mu$ .

This form agrees well with the type given by Cleve-Euler, except that it is slightly a broader form.

*Distribution*—India—Kolhapur—Rajaram College (Science side) compound and garden.

Genus **Nitzschia** Hassall 1845

Section *Dubiæ* Grunow

12. *Nitzschia thermalis* Kütz v. *minor* Hilse  
(Fig. 9 a–b)

Hustedt, *Bacil.*, p. 403, fig. 772; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—V, p. 64, fig. 1445 g–h.

Frustules linear with truncate ends in girdle view. Valves linear with concave sides and wedge-shaped, constricted produced ends, length 30–33.5  $\mu$  and breadth 6.6  $\mu$ . Keel excentric, keel punctæ very small, 12–14 in 10  $\mu$ . Striæ very fine, almost indistinct, about 35 in 10  $\mu$ .

*Distribution*.—India—Kolhapur—Rankala-vesh, Rajaram College (Science side) compound and garden; Kolhapur filter-house area and Laxmipuri.

Section *Lanceolata* Grunow

13. *Nitzschia palea* (Kütz.) W. Sm  
(Figs. 10–11)

Van Heurck, *Treat. Diat.*, p. 401, pl. 17, fig. 554; Hustedt, *Bacil.*, p. 416, fig. 801; Cleve-Euler, A., *Diat. von Schwed. u. Finn.*—V, p. 90, fig. 1504 a–b (= *N. palea* v. *genuina* A. Cl. inclusive of f. *minuta* A. Cl.)

Frustules narrowly linear with slightly narrowed truncate ends in girdle view. Valves linear-sublanceolate with narrowed, constricted, feebly capitate ends, length 16.5–25  $\mu$  and breadth 3–4  $\mu$ . Keel excentric, keel punctæ small 12–14 in 10  $\mu$ . Striæ fine and almost indistinct, about 35 in 10  $\mu$ .

This form agrees well with the type described by Hustedt and other, except that some smaller forms were also recorded.

*Distribution*.—India—widely distributed.

## SUMMARY

For the first time soil Diatomaceæ has been investigated from Kolhapur of which an illustrated account is presented in these pages.

In all, thirteen forms have been recorded from this area of which eight are new records for India.

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