A SYSTEMATIC ACCOUNT OF THE DIATOMS OF BOMBAY AND SALSETTE

PART II

Pennales : Sub-orders—Biraphidineæ *(Contd.)*

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THIS paper is in continuation of the one which was published in this journal (Vol. XXXI, No. 3, 1952, pp. 117–151), and is the second of the series. The translation into Latin of the new diagnoses has been done by Rev. Fr. H. Santapau, Bombay. The authors record their grateful thanks to him.

IV. Suborder	BIRAPHIDINEÆ *(Contd.)*
(2) *Family*	NAVICULACEÆ *(Contd.)*
(*a*) *Subfamily*	Naviculoideæ *(Contd.)*

Genus *Gyrosigma* Hassal, 1845

62. *Gyrosigma acuminatum* (Kütz.) Rabh.

(Fig. 62)

Smith, W., *Syn. Brit. Diat.*, Vol. I, 1853, p. 66, pl. 22, fig. 209; Van Heurck, *Traité des Diatomées*, 1899, p. 256, pl. 7, fig. 274; Schönfeldt, H., Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 117, fig. 255; Gustav, L., *Die Algen*, 1914, p. 165, pl. 12, fig. 320; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 222, fig. 329; Skvortzow, B. W., Diatoms from Poyang Lake, Hunan, China, *Phil. Jour. Sci.*, Vol. 57, 1935, p. 468, pl. 2, fig. 1; Diatoms from Kizaki Lake, Honshu Island, Nippon, Vol. 61, 1936, p. 28, pl. 9, fig. 14; Diatoms from Argun River, Hsing-An Pei Province, Manchauko, Vol. 66, 1938, p. 49, pl. 1, fig. 7; Abdul-Majeed, M., Fresh-water Algæ of the Panjab, Pt. I, Bacillariophyta (Diatomeæ), *Panjab University Publications*, Lahore, 1935, p. 20, pl. 3, fig. 7.

Frustules solitary. Valves sigmoid, lanceolate in outline, gradually tapering from the middle towards the ends which are broadly rounded. Raphe sigmoid, lying in the centre. Transverse and longitudinal striæ at equal distances from one another. Axial area very narrow, central area small and elliptical.

Dimensions	..	Length 117–120 μ
		Breadth 15–16 μ
		Striæ 18 in 10 μ
Habitat	..	Fresh-water. Streams at Borivli; Powai Lake. Common.

63. *Gyrosigma attenuatum* (Kütz.) Rabh.

(Fig. 63)

Smith, W., *Syn. Brit. Diat.*, Vol. I, 1853, p. 68, pl. 22, fig. 216; Van Heurck, *Traité des Diatomées*, 1899, p. 255, pl. 7, fig. 271; Migula, W., *Kryptogamen-Flora*, Bd. II, Teil 1 *a*, 1907–09, p. 239, Taf. 9, fig. 2; Schönfeldt, H., Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 116, fig. 256; Hustedt, Fr. Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 224, fig. 330.

Valves narrowly sigmoid, lanceolate, gradually narrowed from the middle towards the poles which are obtusely rounded. Raphe central and sigmoid. Axial area narrow, central area small and elliptical. Transverse striæ more numerous and finer than the longitudinal ones, perpendicular to the middle line.

Dimensions .. Length 185–195 μ
Breadth 23–25 μ
Trans. striæ 16 in 10 μ
Longit. striæ 12 in 10 μ
Habitat .. Fresh-water. Pools at Wadala. Rare.

64. *Gyrosigma balticum* (Ehr.) Rabh.

(Fig. 64)

Van Heurck, *Traité des Diatomées*, 1899, p. 255, pl. 7, fig. 272; Migula, W., *Kryptogamen-Flora*, Bd. II, Teil 1 *a*, 1907–09, p. 240, pl. 9, fig. 1; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 224, fig. 331; Carter, N., A comparative study of two salt marshes, Part II, *Jour. Ecol.*, Vol. 21, 1933, p. 193, fig. 21, 1–2; Venkataraman, G., A Systematic Account of Some South Indian Diatoms, *Proc. Ind. Acad. Sci.*, Vol. X, No. 6, Sect. B, 1939, p. 318, figs. 71, 72; Subrahmanyan, R., A Systematic Account of the Marine Plankton Diatoms of the Madras Coast, *Proc. Ind. Acad. Sci.*, Vol. 24, No. 4, Sect. B, 1946, p. 173, figs. 373–375.

Valves slightly sigmoid, linear, with more or less parallel sides. Poles broad, oblique and bluntly rounded. Raphe eccentric and sigmoid. Central area small. Transverse and longitudinal striæ equidistant.

Dimensions .. Length 207–225 μ
Breadth 21–23·4 μ
Striæ 16 in 10 μ
Habitat .. Brackish-water. Chembur creek. Very common.

65. *Gryosigma kützingii* (Grun.) Cleve

(Fig. 65)

Schönfeldt, Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 117, fig. 257; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 224, fig. 333; Skvortzow, B. W., Diatoms from Kizaki Lake, Honshu

Island, Nippon, *Phil. Jour. Sci.*, Vol. 61, 1936, p. 28, pl. 3, fig. 7; Diatoms from Ikeda Lake, Satsuma Province, Kiewsien Island, Nippon, Vol. 62, 1937, p. 197, pl. 1, fig. 4.

Valves slightly sigmoid, lanceolate with rounded ends. Raphe central and slightly sigmoid. Axial area narrow and linear, central area small. Transverse striæ coarse, longitudinal striæ fine and more in number than the transverse ones. Transverse striæ perpendicular to the middle line except in the centre where they are radial.

Dimensions .. Length 103–113 μ
Breadth 14–16·3 μ
Transverse striæ 20 in 10 μ
Longitudinal striæ 24–26 in 10 μ

Habitat .. Fresh-water. Streams at Borivli; Powai Lake. Not common.

66. *Gyrosigma scalproides* (Rabh.) Cleve

(Fig. 66)

Van Heurck, *Traité des Diatomées*, 1899, p. 259, pl. 7, fig. 284; Migula, W., *Kryptogamen-Flora*, Bd. II, Teil 1 *a*, 1907–09, p. 240, Taf. 9, fig. 5; Schönfeldt, Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 117, fig. 259; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 226, fig. 338; Gustav, L., *Die Algen*, 1914, p. 165, pl. 12, fig. 322; Abdul-Majeed, M., Fresh-water Algæ of the Panjab, Pt. I, Bacillariophyta (Diatomeæ), *Panjab University Publications*, Lahore, 1935, p. 20, pl. 3, fig. 7; Skvortzow, B. W., Diatoms from Kizaki Lake, Honshu Island, Nippon, *Phil. Jour. Sci.*, Vol. 61, 1936, p. 28, pl. 12, fig. 5; Hustedt, Fr., Systematisch und Okologisch untersuchung uber die Diatomeen-Flora von Java, Bali und Sumatra nach dem Material Deutschen Limnologischen Expedition, Systematischer Teil, *Archiv fur Hydrobiol.*, Suppl. Bd. XV, 1938, p. 188, pl. 14, fig. 3.

Valves slightly sigmoid, linear and slightly attenuated towards the ends which are obliquely rounded. Raphe central and sigmoid. Central area very small and narrow. Striæ fine, but distinct. Transverse striæ very slightly radial in the middle and perpendicular to the middle line throughout.

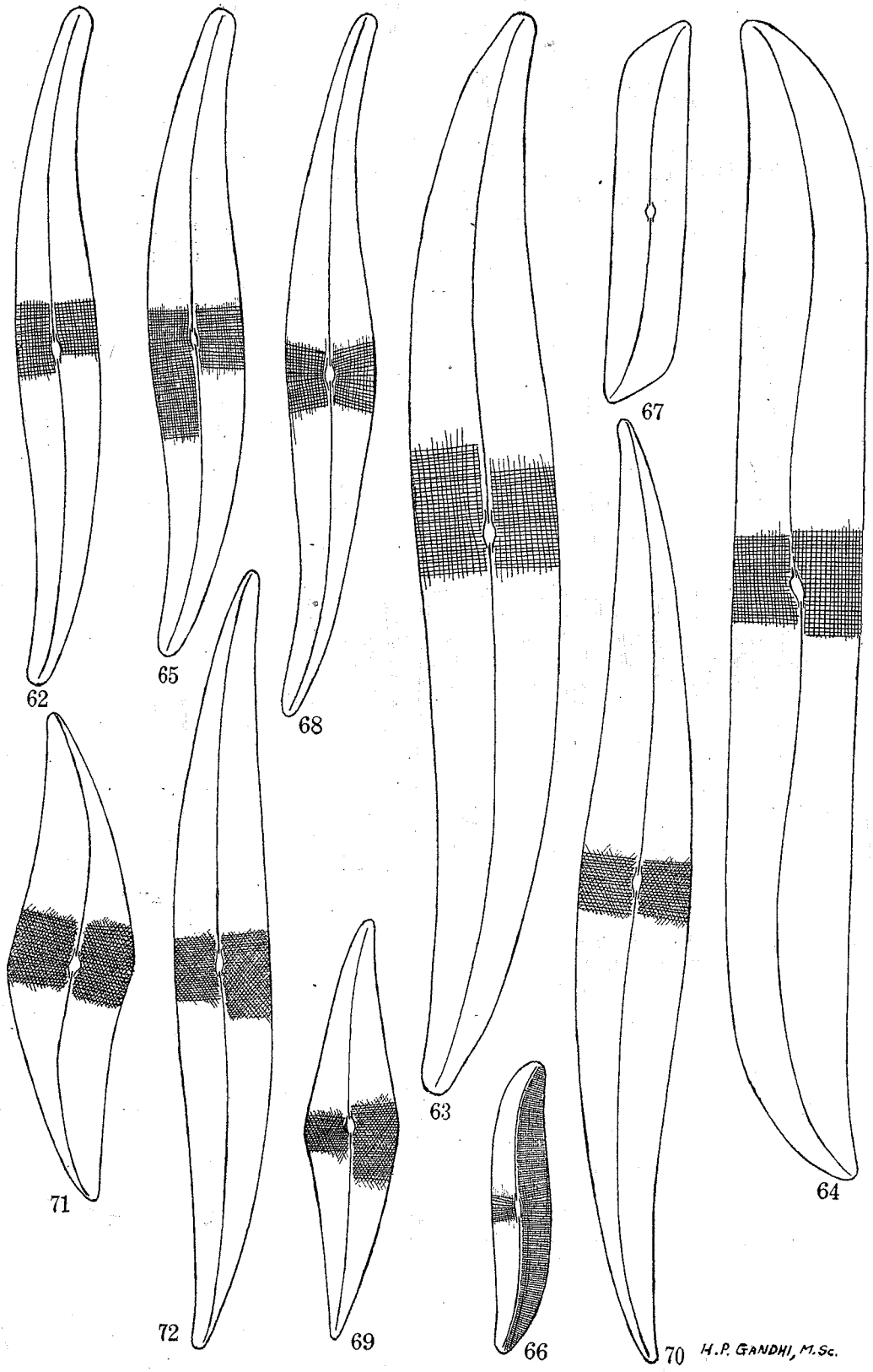
Dimensions .. Length 53–57 μ
Breadth 10 μ
Transverse striæ 24 in 10 μ
Longitudinal striæ 26–28 in 10 μ

Habitat .. Fresh-water. Pools at Wadala. Not common.

67. *Gyrosigma scalproides* (Rabh.) Cleve var. *eximia* (Thw.) Cleve

(Fig. 67)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 226, fig. 339; Carter, N., A comparative study of two salt, marshes, Pt. II,



FIGS. 62–72

FIGS. 62–72. Fig. 62. *Gyrosigma acuminatum* (Kütz.) Rabh., × 840. Fig. 63. *Gyrosigma attenuatum* (Kütz.) Rabh., × 840. Fig. 64. *Gyrosigma balticum* (Ehr.) Rabh., × 840. Fig. 65. *Gyrosigma kützingii* (Grun.) Cleve, × 840. Fig. 66. *Gyrosigma scalproides* (Rabh.) Cleve, × 840. Fig. 67. *Gyrosigma scalproides* (Rabh.) Cleve var. *eximia* (Thw.) Cleve, × 840. Fig. 68. *Gyrosigma baikalensis* Skv., × 840. Fig. 69. *Pleurosigma angulatum* (Quekett) W. Smith, f. *chemburiana* forma nova., × 840. Fig. 70. *Pleurosigma elongatum* W. Smith, × 840. Fig. 71. *Pleurosigma æstuari* Brebisson, × 840. Fig. 72. *Pleurosigma delicatulum* W. Smith, × 840.

Jour. Ecol., Vol. 21, 1933, p. 193, fig. 18; Venkataraman, G., A Systematic Account of Some South Indian Diatoms, *Proc. Indian Acad. Sci.*, Vol. 10, Sect. B, 1939, p. 319, fig. 76.

Valves linear with parallel sides and obliquely rounded ends. Raphe straight, nearly central and slightly sigmoid at the poles. Striæ finely punctate; longitudinal striæ faint.

Dimensions .. Length 59·4–72 μ
Breadth 12·6–14 μ
Transverse striæ 25 in 10 μ
Longitudinal striæ 30–32 in 10 μ

Habitat .. Brackish-water. Mahim and Chembur creeks. Common.

68. *Gyrosigma baikalensis* Skv.

(Fig. 68)

Skvortzow, B. W., Bottom Diatoms from Olhon Gate of Baikal Lake, Siberia, *Phil. Jour. Sci.*, Vol. 62, 1937, p. 315, pl. 5, figs. 64–65.

Valves lanceolate-sigmoid. Ends produced and acutely rounded. Raphe sigmoid and central. Central area flexuose, small. Transverse striæ slightly radial in the middle and equal in number to the longitudinal striæ.

Dimensions .. Length 126–132 μ
Breadth 15 μ
Striæ 17–18 in 10 μ

Habitat .. Fresh-water. Streams at Borivli. Rare.

Genus *Pleurosigma* W. Smith, 1852

69. *Pleurosigma angulatum* (Quekett) W. Smith f. *chemburiana* forma nova

(Fig. 69)

Frustula libere natantia, solitaria, pallide brunneis pigmentis colorata. Valvæ tenuiter sigmoideæ, rhombico-lanceolatæ atque in medio distincte angulatæ. Apices acute rotundati. Raphe tenuiter sigmoidea atque tenuis. Area axialis angusta, area vero centralis parva atque rhombica. Striæ transverse atque oblique positæ, equidistantes ab alterutra.

Frustula 72–96 μ longa, 15–16·6 lata; striæ 20–24 in 10 μ.

Frustules free-floating, solitary with pale brown pigment. Valves slightly sigmoid, rhombic-lanceolate, distinctly angular in the middle. Ends acutely rounded. Raphe sigmoid and thin. Axial area narrow, central area small and rhombic. Transverse and obliquely placed striæ equidistant from one another.

Dimensions .. Length 72–96 μ
Breadth 15–16·6 μ
Striæ 20–24 in 10 μ
Habitat .. Fresh-water. Pools at Wadala. Very common in brackish-waters of Mahim and Chembur creeks.

This fresh-water form is proportionately smaller than the type. The striæ are also finer and more closely placed. Hence it is regarded as a new form.

70. *Pleurosigma elongatum* W. Smith

(Fig. 70)

Smith, W., *Syn. Brit. Diat.*, Vol. I, 1853, p. 64, pl. 20, fig. 199; Van Heurck, *Traité des Diatomées*, 1899, p. 253, pl. 6, fig. 262; Migula, W., *Kryptogamen Flora*, Bd. II, Teil 1 *a*, 1907–09, p. 237, Taf. 9 B, fig. 2; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 228, fig. 343; Subrahmanyan, R., A Systematic Account of the Marine Plankton Diatoms of the Madras Coast, *Proc. Indian Acad. Sci.*, Vol. 24, Sect. B, 1946, p. 175, figs. 380–382.

Valves slightly sigmoid, elongated, somewhat lanceolate, gradually attenuated from the middle towards the poles which are acutely rounded. Raphe central, slightly sigmoid. Transverse striæ finer than the oblique ones.

Dimensions .. Length 168–180 μ
Breadth 18–20·4 μ
Transverse striæ 18–20 in 10 μ
Oblique striæ 16–18 in 10 μ
Habitat .. Brackish-water. Chembur creek. Fairly common.

71. *Pleurosigma salinarum* Grun.

(Fig. 74)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 228, fig. 344; Venkataraman, G., A Systematic Account of Some South Indian Diatoms, *Proc. Indian Acad. Sci.*, Vol. 10, Sect. B, 1939, p. 321, figs. 78, 79.

Valves linear-lanceolate, sharply rounded at the poles, sigmoid. Raphe central, sigmoid. Axial area very narrow, central area small, elliptical. Oblique striæ more than the transverse ones and very conspicuous.

Dimensions .. Length 110–125 μ
Breadth 15–18 μ
Transverse striæ 25 in 10 μ
Oblique striæ 28–34 in 10 μ

Habitat .. Brackish-water. Chembur and Mahim creeks. Common.

72. *Pleurosigma Normanii* Ralfs.

(Fig. 73)

Subrahmanyan, R., A Systematic Account of the Marine Plankton Diatoms of the Madras Coast, *Proc. Indian Acad. Sci.*, Vol. 24, No. 4, Sect. B, 1946, p. 175, figs. 378, 379, 385 and 387; Allen and Cupp, Plank. Diat. Java Sea, *Ext. Ann. Jard. Bot. Buitenzorg*, Vol. XLIX, 1935, p. 157, fig. 106.

Valves broadly lanceolate, sigmoid, with slightly acute, rounded ends. Raphe sigmoid and central. Axial area narrow; central area small and elongated. Transverse striæ distinct and more numerous than the oblique striæ.

Dimensions .. Length 162–168 μ
Breadth 28 μ
Transverse striæ 19–21 in 10 μ
Oblique striæ 17–18 in 10 μ

Habitat .. Brackish-water. Mahim creek. Common.

73. *Pleurosigma æstuari* Bréb.

(Fig. 71)

Migula, W., *Kryptogamen-Flora*, Bd. II, Teil 1 *a*, 1907–09, p. 235, Taf. IX, fig. 10.

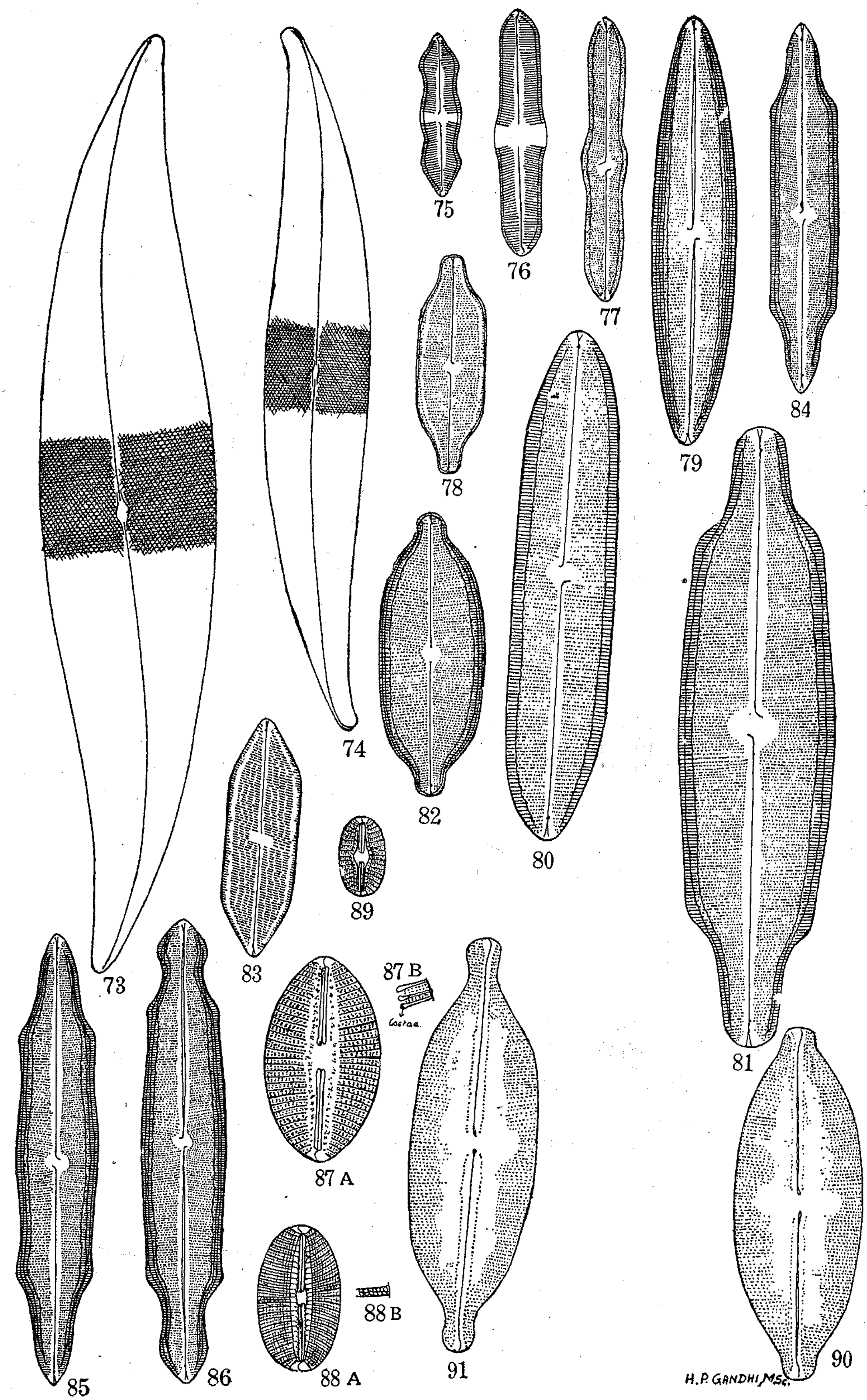
Pleurosigma angulata, var. *æstuari* Smith, W., *Syn. Brit. Diat.*, Vol. I; Van Heurck, *Traité des Diatomées*, 1899, p. 251, pl. 6, fig. 256.

Valves broadly lanceolate, sigmoid. Raphe more strongly sigmoid than the valves, eccentric, somewhat angular. Transverse and oblique striæ almost equidistant.

Dimensions .. Length 90–95 μ
Breadth 21 μ
Transverse striæ 18–20 in 10 μ
Oblique striæ 20–22 in 10 μ

Habitat .. Brackish-water. Mahim creek. Very rare.

The sigmoid and eccentric raphe distinguishes the form from *P. angulatum* (Quekett) W. Smith var. *quadratum* W. Sm. This form is slightly broader than the type.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H.P. GANDHI, MSc.

FIGS. 73–91

FIGS. 73–91. Fig. 73. *Pleurosigma normanii* Ralfs, × 840. Fig. 74. *Pleurosigma salinarum* Grun., × 840. Fig. 75. *Caloneis silicula* (Ehr.) Cleve var. *gibberula* (Kütz.) Grun., × 840. Fig. 76. *Caloneis silicula* (Ehr.) Cleve var. *truncatula* Grun. f. *borivliana* forma nova., × 840. Fig. 77. *Neidium bisulcatum* (Lagerst.) Cleve f. *undulata* O. Mull., × 840. Fig. 78. *Neidium affine* (Ehr.) Cleve var. *amphirhynchus* (Ehr.) Cleve f. *truncatula* forma nova., × 840. Fig. 79. *Neidium iridis* (Ehr.) Cleve, × 840. Fig. 80. *Neidium iridis* (Ehr.) Cleve f. *ambigua* forma nova. × 840. Fig. 81. *Neidium productum* (W. Smith) Cleve var. *bombayensis* var. nova., × 840. Fig. 82. *Neidium dubium* (Ehr.) Cleve, × 840. Fig. 83. *Neidium oblique-striatum* A.S. var. *parallella* var. nova., × 840. Fig. 84. *Neidium indicum* spec. nova., × 840. Fig. 85. *Neidium indicum* f. *undulata* forma nova., × 840. Fig. 86. *Neidium indicum* var. *capitata* var. nova., × 840. Fig. 87. *Diploneis subovalis* Cleve, × 840. Fig. 88. *Diploneis Smithii* (Bréb.) Cleve, × 840. Fig. 89. *Diploneis pseudovalis* Hust., × 840. Fig. 90. *Anomœoneis sphœrophora* (Kütz.) Pfitzer var. *Guntheri* O. Mull. f. *rostrata* forma nova., × 840. Fig. 91. *Anomœoneis sphrœophora* (Kütz.) Pfitzer, × 840.

74. *Pleurosigma delicatulum* W. Smith

(Fig. 72)

Smith, W., *Syn. Brit. Diat.*, Vol. I, 1853, p. 65, pl. 20, fig. 205; Gustav, L., *Die Algen*, 1914, p. 165, pl. 22, fig. 324.

Valves elongated and lanceolate, narrow, slightly sigmoid, with acutely rounded ends. Raphe very slightly eccentric. Central area small, elliptical. Transverse striæ equal in number to the oblique ones and equidistant from one another.

Dimensions .. Length 230–253 μ
Breadth 28–33 μ
Striæ 21–23 in 10 μ

Habitat .. Brackish-water. Mahim creek. Rare.

Genus *Caloneis* Cleve, 1894

75. *Caloneis silicula* (Ehr.) Cleve var. *gibberula* (Kütz.) Grun.

(Fig. 75)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 238, fig. 365.

Valves linear with triundulate margins, slightly gibbous in the middle and towards the poles. Ends wedge-shaped, slightly contracted and produced, rounded. Raphe straight, ends of the raphe in the central area bent unilaterally. Axial area broad, lanceolate; central area wide, reaching the walls, in rare cases not reaching the walls. Striæ radial, crossed by a thin line near the margins.

Dimensions .. Length 31–40 μ
Breadth 7·2–8 μ
Striæ 18–20 in 10 μ

Habitat .. Fresh-water. Streams at Borivli; pools at Jogeswari. Common.

76. *Caloneis silicula* (Ehr.) Cleve var. *truncatula* Grun. *borivliana* forma nova.

(Fig. 76)

Frustula libere natantia, pallide brunneis pigmentis colorata. Valvæ lineares atque gibbosæ in medio. Apices late cuneati. Raphe tenuis atque recta. Area axialis late lanceolata, area vero centralis late stauroidea. Striæ tenuiter radiales in medio, perpendiculares in lineam mediam ad apices. Striæ decussatæ linea distincta ad margines.

Frustula 45–47 μ longa, 9 μ lata; striæ 18–20 in 10 μ.

Frustules free-floating with light brown pigment. Valves linear and gibbous in the middle. Ends broadly wedge-shaped. Raphe thin and straight. Axial area broadly lanceolate, central area broadly stauroid. Striæ slightly radial in the middle and perpendicular to the middle line towards the ends. Striæ crossed by a distinct line near the margins.

Dimensions .. Length 45–47 μ
Breadth 9 μ
Striæ 18–20 in 10 μ

Habitat .. Fresh-water. Streams at Borivli. Rare.

This form differs from the type (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 238, figs. 363, 364) as the ends are distinctly wedge-shaped and not rounded. The dilation in the central region is also more pronounced. Hence it is regarded as a new form.

Genus *Neidium* **Pfitzer**

77. *Neidium bisulcatum* (Lagerst.) Cleve f. *undulata* O. Müll.

(Fig. 77)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 242, fig. 375; Skvortzow, B. W., Diatoms from a peaty bog in Lianchiho River Valley, Eastern Siberia, *Phil. Jour. Sci.*, Vol. 66, 1938, p. 167, pl. 1, fig. 1.

Valves linear, slightly gibbous in the middle, with broadly rounded, wedge-shaped ends. Raphe thin and straight; ends of the raphe in the central area bent in opposite directions, terminal fissures distinctly bifurcated. Axial area narrow, central area elliptical. Striæ fine, distinctly punctate, mostly perpendicular to the middle line and convergent at the poles. Longitudinal furrows present near the margins, crossing the striæ.

Dimensions .. Length 53–58 μ
Breadth 7·2–8 μ
Striæ 26 in 10 μ

Habitat .. Fresh-water. Powai Lake. Not common.

78. *Neidium affine* (Ehr.) Cleve var. *amphirhynchus* (Ehr.) Cleve f. *truncatula* forma nova.

(Fig. 78)

Valvæ lineares, marginibus fere parallelis, ad apices subito contractæ atque productæ in late truncatos polos. Raphe tenuis, recta, apicibus vero in aream centralem versis, incurvatisque in directiones oppositas, fissuris vero terminalibus anguste bifurcatis. Area axialis angusta, nonnihil dilatata polos inter et centrum. Area centralis parva atque rhomboidea. Striæ tenuiter sed clare punctatæ atque decussatæ sulco hyalino prope margines.

Frustula 41–50 μ longa, 10–10·8 μ lata; striæ 20–22 in 10 μ.

Valves linear with almost parallel margins, suddenly contracted towards the ends and produced into broadly truncate poles. Raphe thin, straight; ends of the raphe in the central area bent in opposite directions, terminal fissures narrowly bifurcated. Axial area narrow, somewhat expanded between the poles and the centre. Central area small and rhomboid. Striæ fine, but clearly punctate, crossed by a hyaline furrow near the margins.

Dimensions .. Length 41–50 μ
Breadth 10–10·8 μ
Striæ 20–22 in 10 μ

Habitat .. Fresh-water. Powai Lake. Not common.

This form seems to approach *N. affine* var. *amphirhynchus* (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 243, fig. 377) in general appearance. The walls however, are parallel and the ends are shortly produced and pronouncedly truncate. The hyaline furrow interrupting the striæ near the margin is also very distinct. Hence it is regarded as a new form.

79. *Neidium iridis* (Ehr.) Cleve

(Fig. 79)

Van Heurck, *Traité des Diatomées*, 1899, p. 220, pl. 5, fig. 212; Hustedt, Fr., Pascher's *Susswasser Flora*, Heft 10, 1930, p. 245, fig. 379; Skvortzow, B. W., Diatoms from Khingan, North Manchuria, China, *Phil. Jour. Sci.*, Vol. 35, 1928, p. 41, pl. 2, fig. 7.

Valves linear-lanceolate with distinctly convex margins and broadly rounded ends. Raphe flaccid in the middle; ends of the raphe in the central area bent in opposite directions, terminal fissures bifurcated. Axial area widened between the centre and the poles, central area obliquely elliptical. Striæ distinctly punctate, slightly radial in the middle and more or less perpendicular to the middle line towards the ends. Striæ crossed by several longitudinal furrows near the margins.

Dimensions .. Length 75–80 μ
Breadth 14–15·2 μ
Striæ 18 in 10 μ
Habitat .. Fresh-water. Streams at Borivli; Powai Lake. Common.

These forms are slightly narrower than the type.

80. *Neidium iridis* (Ehr.) Cleve f. *ambigua* forma nova.

(Fig. 80)

Valvæ lineares, lateribus fere parallelis, apicibus vero late rotundatis atque distincte cuneatis. Raphe tenuis atque recta, apicibus vero in aream centralem versis, incurvatisque in contrarias directiones, fissuris vero terminalibus distincte furcatis. Striæ distincte punctatæ, tenuiter radiales in medio, sed perpendiculares in mediam lineam ad apices. Striæ decussatæ sulco marginali.

Frustula 86–92 μ longa, 18–19 μ lata; striæ 16–17 in 10 μ.

Valves linear with almost parallel sides and broadly rounded and distinctly wedge-shaped ends. Raphe thin and straight; ends of the raphe in the central area bent in opposite directions, terminal fissures distinctly forked. Striæ distinctly punctate, slightly radial in the middle and perpendicular to the middle line towards the ends. Striæ crossed by a marginal furrow.

Dimensions .. Length 86–92 μ
Breadth 18–19 μ
Striæ 16–17 in 10 μ
Habitat .. Fresh-water. Streams at Borivli; Powai Lake. Not common.

This form comes nearest to *N. iridis* (Ehr.) Cleve f. *vernalis* Reichelt (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 245, fig. 380). The ends however, of this form are distinctly wedge-shaped and not rounded. The central area too, is larger, while the striæ are lineate near the margin. Hence it is regarded as a new form of *N. iridis* (Ehr.) Cleve.

81. *Neidium productum* (W. Smith) Cleve var. *bombayensis* var. nova.

(Fig. 81)

Valvæ lineari-ellipticæ, lateribus tenuiter undulatis. Apices subito contracti, producti atque late rotundati. Raphe tenuis atque recta, apicibus vero in aream centralem versis, incurvatisque in directiones contrarias, fissuris vero terminalibus distincte bifurcatis. Area axialis lata, atque dilatata polos inter et centrum. Area centralis magna, transverse elliptica. Striæ tenuiter radiales, distinctæ punctatæ, decussatæque ad margines sulcis longitudinalibus.

Frustula 104–107 μ longa, 27 μ lata; striæ 19–21 in 10 μ.

Valves linear-elliptical with slightly undulate sides. Ends abruptly contracted, produced and broadly rounded. Raphe thin and straight; ends of the raphe in the central area strongly bent in opposite directions, terminal fissures distinctly bifurcated. Axial area wide, dilated between the centre and the poles. Central area large and transversely elliptical. Striæ slightly radial and distinctly punctate, crossed at the margins by longitudinal furrows.

Dimensions .. Length 104–107 μ
Breadth 27 μ
Striæ 19–21 in 10 μ

Habitat .. Fresh-water. Streams at Borivli; Powai Lake and pools at Wadala. Not common.

This form in general characters resembles *N. productum* (W. Smith) Ch. (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 245, fig. 383). It is however a narrower form. Moreover the walls are abruptly contracted near the ends which are produced and broadly rounded. The striæ too are more closely placed than in the type. Hence it is regarded as a new variety of *Neidium productum* (W. Smith) Cleve.

82. *Neidium dubium* (Ehr.) Cleve

(Fig. 82)

Schönfeldt, H., Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 75, fig. 140; Gustav, L., *Die Algen*, 1914, p. 160, pl. 11, fig. 314; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft, 10, 1930, p. 246, fig. 384 *a*; Skvortzow, B. W., Bottom Diatoms from Olhon Gate of Baikal Lake, Siberia, *Phil. Jour. Sci.*, Vol. 62, 1937, p. 319, pl. 9, fig. 41.

Valves broadly linear with slightly convex margins which taper somewhat suddenly to form narrowly produced, rostrate or slightly capitate ends. Raphe thin and straight. Axial area, linear. Central area small, circular or broadly elliptical. Striæ very fine, but distinctly punctate and radial, crossed by two to three longitudinal furrows near the margins. Marginal part of the striæ lineate.

Dimensions .. Length 50·4–55 μ
Breadth 19 μ
Striæ 20–22 in 10 μ

Habitat .. Fresh-water. Streams at Borivli; Pools at Jogeshwari. Common.

The dimensions of the forms recorded here are slightly more than those of the type.

83. *Neidium oblique-striatum* A.S. var. *parallella* var. nova.

(Fig. 83)

Frustula spumæ infixa, pallide brunneis pigmentis colorata. Valvæ late lineares, lateribus parallelis, apicibus vero acutis cuneatis rotundatis. Raphe tenuis et recta, apicibus vero in aream centralem tenuiter

incurvatis, fissuris vero terminalibus bifurcatis. Area axialis linearis, area vero centralis oblique rectangularis. Striæ fortiter obliquæ atque lineatæ, ad margines interruptæ sulco hyalino.

Frustula 38–44 μ longa, 11–12·6 μ lata; striæ 18–20 in 10 μ.

Frustules embedded in scum, with pale brown pigment. Valves broadly linear, with parallel sides and wedge-shaped, rounded ends. Raphe thin and straight; ends of the raphe in the central area slightly bent, terminal fissures bifurcated. Axial area linear, central area obliquely rectangular. Striæ strongly oblique and lineate, interrupted near the margins by a hyaline furrow

Dimensions	..	Length 38–44 μ
		Breadth 11–12·6 μ
		Striæ 18–20 in 10 μ
Habitat	..	Fresh-water. Pond at Dahisar, and rain-water puddles at Mira Road. Common.

This form resembles *N. iridis* var. *amphigomphus* (Ehr.) van Heurck (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 245, fig. 382), in outline, but differs in dimensions and the nature of the striæ. It resembles *N. oblique-striatum* A.S. var. *rostrata* Skw. (Skvortzwo, B. W., *Phil. Jour. Sci.*, Vol. 61, 1936, p. 30, pl. 4, fig. 16) in the nature of the striæ, but differs in shape. This form moreover, is proportionately much longer than the last-mentioned type. The perfectly parallel side walls and the acutely rounded wedge-shaped ends are certainly distinctive. Hence it is regarded as a new variety of *N. oblique-striatum* A.S.

84. *Neidium indicum* spec. nova.

(Fig. 84)

Frustula in limo lutoso, pallide luteis pigmentis colorata. Valvæ lineares, lateribus parallelis vel tenuiter convexis, quæ subito contrahuntur atque fastigantur in apices anguste productos, acute cuneatos. Raphe tenuis, filiformis, apicibus vero in aream centralem versis, incurvatisque in directiones contrarias, fissuris vero terminalibus bifurcatis. Area axialis angusta, nonnhil distenta centrum inter et polos. Area centralis magna atque rhomboidea. Striæ radiales, subtiles sed distincte punctatæ, lineatæ ad margines, ubi sulci longitudinales illas decussant.

Frustula 63–75·6 μ longa, 11–15 μ lata; striæ 24–26 in 10 μ.

Frustules in muddy slime, with pale yellow pigment. Valves linear, with parallel or slightly convex sides, which suddenly contract and taper into narrowly produced acutely wedge-shaped ends. Raphe thin, thread-like; ends of the raphe in the central area bent in opposite directions, terminal fissures bifurcated. Axial area narrow, somewhat distended between the middle and the poles. Central area large, rhomboid. Striæ radial, fine but distinctly punctate, lineate near the margins where longitudinal furrows cross them.

Dimensions .. Length 63–75·6 μ
Breadth 11–15 μ
Striæ 24–26 in 10 μ

Habitat .. Fresh-water. Powai Lake. Common.

The outline of this form remotely resembles that of *N. productum* (W. Smith) Cl. (Hustedt, Fr., in Pacher's *Süsswasser-Flora*, Heft 10, 1930, p. 245, fig. 383) from which however, it differs in being narrower, in the side walls being almost straight and in the ends being definitely wedge-shaped and pointed. Its appearance is certainly quite distinctive and it is therefore regarded as a new species.

85. *Neidium indicum* f. *undulata* forma nova.

(Fig. 85)

Forma hæc nova multis in partibus ad speciem typicam accedit; differt vero in eo quod margines sunt distincte triundulati, atque area centralis est rotundata, haud vero angularis.

This form is identical with *Neidium indicum* except that the margins are distinctly triundulate and the central area is rounded and not angular.

Dimensions .. Length 84–86 μ
Breadth 15 μ
Striæ 24–26 in 10 μ

Habitat .. Fresh-water. Powai Lake. Common.

86. *Neidium indicum* var. *capitata* var. nova.

(Fig. 86)

Valvæ lineari-ellipticæ atque subito contractæ ad polos ad efformandos apices capitatos cuneatosque. Area centralis parva, rotundata. Raphe crassa; cætera ut in typo.

Frustula 86–88 μ longa, 23 μ lata; striæ 25 in 10 μ.

Valves linear-elliptical, suddenly contracted towards the poles to form capitate and wedge-shaped ends. Central area small, rounded. Raphe thick. Other details as in the type.

Dimensions .. Length 86–88 μ
Breadth 23 μ
Striæ 25 in 10 μ

Habitat .. Fresh-water. Powai Lake. Not common.

This form is distinguished from the type by its ends which are distinctly capitate and wedge-shaped. The raphe too is flaccid in the middle and not thin. The margins are very slightly triundulate. Hence it is regarded as a new variety of *N. indicum*.

Genus *Diploneis* Ehrenberg, 1840

87. *Diploneis subovalis* Cleve

(Fig. 87 A and B)

Ostrup, E., Fresh-water Diatoms from Iceland, *Bot. Iceland*, Vol. 2, 1932, Pt. II, p. 918, pl. 1, fig. 10; Rich, F., Contributions to our knowledge of the fresh-water algæ of Africa. 12. Some diatoms from the Victoria Falls, *Trans. Roy. Soc. S. Africa*, Vol. 24, 1936, Pt. III, p. 211, Pl. 10, fig. 1; Skvortzow, B. W., Notes on the algal flora of New-Zealand. I. Fresh-water Diatoms from New Zealand, *Phil. Jour. Sci.*, Vol. 67, 1938, p. 171, fig. 1 *d*; Venkataraman, G., A Systematic Account of Some South Indian Diatoms, *Proc. Indian Acad. Sci.*, Vol. 10, 1939, p. 322, pl. XVII, figs. 3–4; fig. 74.

Valves broadly elliptical with rounded ends. Central nodule large and rounded. Furrows narrow, very closely following the central nodule and its horns. Costæ strong, alternating with double rows of alveoli. With low magnification, the costæ appear strong with pin-headed ends towards the raphe.

Dimensions .. Length 27–38 μ
Breadth 18–21·6 μ
Costæ 8–10 in 10 μ
Rows of alveoli 16–18 in 10 μ

Habitat .. Fresh-water. Pools at Borivli. Rare.

88. *Diploneis Smithii* (Bréb.) Cleve

(Fig. 88 A and B)

Van Heurck, *Traité des Diatomées*, 1899, p. 197, pl. 4, fig. 151; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 253, fig. 402; Carter, N., A comparative study of two salt marshes, *Jour. Ecol.*, Vol. 21, Pt. II, 1933, p. 179, fig. 16; Skvortzow, B. W., Marine littoral diatoms from the environs of Vladivostok, *Phil. Jour. Sci.*, Vol. 47, 1932, p. 141, pl. 5, fig. 14; Diatoms from the bottom of the sea of Japan, *Phil. Jour. Sci.*, Vol. 47, 1932, p. 273, pl. 2, fig. 8; Subrahmanyan, R., A Systematic Account of Marine Plankton Diatoms of Madras Coast, *Proc. Indian Acad. Sci.*, Vol. 24, Sect. B, 1946, p. 180, fig. 399.

Valves elliptical with broad, rounded ends and strongly convex sides. Central nodule fairly strongly developed, rounded-quadrate. Furrows lanceolate, narrowing towards the poles. Horns strongly formed. Costæ robust, radial, alternating with double rows of alveoli.

Dimensions .. Length 27–30 μ
Breadth 16·2 μ
Costæ 9 in 10 μ
Rows of alveoli 18–20 in 10 μ

Habitat .. Brackish-water. Chembur creek. Common.

89. *Diploneis pseudovalis* Hust.

(Fig. 89)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 253, fig. 403.

Valves linear-elliptical with broadly rounded ends. Central nodule very large, slightly rounded or quadrate. Furrows very narrow, equally broad throughout. Horns, linear. Costæ strong, slightly radial alternating with double rows of fine alveoli.

Dimensions .. Length 16–18 μ
Breadth 9–9·5 μ
Costæ 12 in 10 μ
Rows of alveoli 26–28 in 10 μ

Habitat .. Fresh-water. Garden tank of the Institute of Science, Bombay. Common.

Genus *Stauroneis* **Ehrenberg, 1843**

90. *Stauroneis phœnicenteron* Ehr.

(Fig. 104)

Smith, W., *Syn., Brit. Diat.*, Vol. I, 1853, p. 59, pl. 19, fig. 185; Van Heurck, *Traité des Diatomées*, 1899, p. 159, pl. 1, fig. 50; Migula, W., *Kryptogamen-Flora*, 1907–09, Bd. II, Teil 1 *a*, p. 270, pl. 6, fig. 10; Gustav, L., *Die Algen*, 1914, p. 173, pl. 13, fig. 389; Schönfeldt, Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 113, fig. 247; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 255, fig. 404; Skvortzow, B. W., Diatoms of Kizaki Lake, Honshu Island, Nippon, *Phil. Jour. Sci.*, Vol. 61, 1936, p. 32, pl. 5, fig. 19; Iyengar, M. O. P. and Subrahmanyan, R., Fossil Diatoms from the Karewa Beds of Kashmir, *Proc. Nat. Acad. Sci. India*, Vol. 13, Pt. 4, 1943, p. 230, figs. 11, 14, 15.

Valves lanceolate with broadly rounded and slightly constricted ends. Raphe straight, somewhat broad. Axial area fairly wide, central area stauroid, widening slightly near the margins. Striæ fine, but distinctly punctate and radial.

Dimensions .. Length 104–150 μ
Breadth 19–25 μ
Striæ 15–18 in 10 μ

Habitat .. Fresh-water. Streams and pools at Borivli; Powai Lake. Very common.

91. *Stauroneis phœnicenteron* Ehr. var. *vulgaris* Dippel f. *intermedia* Dippel.

(Fig. 103)

Skvortzow, B. W., Diatoms from Khingan, North Manchuria, China, *Phil. Jour. Sci.*, Vol. 35, 1928, p. 44, pl. 2, fig. 28.

Valves lanceolate with obtusely rostrate, slightly produced, capitate ends. Raphe thick, with curved terminal fissures. Axial area broadly linear, central area stauroid, widening near the margins. Striæ distinctly punctate and fewer than in *Stauroneis phœnicenteron*.

Dimensions .. Length 135–150·4 μ
Breadth 25·5–27 μ
Striæ 12–13 in 10 μ

Habitat .. Fresh-water. Pools at Borivli; Powai Lake. Rather rare.

92. *Stauroneis phœnicenteron* Ehr. f. *capitata* forma nova.

(Fig. 92)

Valvæ anguste lanceolatæ atque tenues, magnis apicibus rotundatis capitatis. Raphe crassa, poris centralibus magnis atque fissuris terminalibus ornata. Area axialis sat lata; area vero centralis stauroideo, tenuiter dilatata ad latera. Striæ subtiles sed distincte punctatæ atque fortiter radiales.

Frustula 113·4–120 μ longa, 21·6 μ lata; striæ 18–20 in 10 μ.

Valves narrowly lanceolate and delicate, with large, rounded, capitate ends. Raphe thick, with bifurcated terminal fissures. Axial area fairly wide, central area stauroid, slightly dilated towards the sides. Striæ fine, but distinctly punctate and strongly radial.

Dimensions .. Length 113·4–120 μ
Breadth 21·6 μ
Striæ 18–20 in 10 μ

Habitat .. Fresh-water. Powai Lake. Not common.

This form in appearance resembles *S. anceps* Ehr. f. *gracilis* (Ehr.) Cl. (Hustedt, Fr., Pascher's *Süsswasser-Flora*, 1930, p. 256, fig. 406), but differs with regard to the nature of the raphe, which is here fairly thick as in *S. phœnicenteron* Ehr. and not thin. The striæ too are distinctly punctate. It resembles *S. phœnicenteron* Ehr. in all respects except for the capitate ends. It is therefore regarded as a new form of *S. phœnicenteron* Ehr.

93. *Stauroneis anceps* Ehr.

(Fig. 93)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 256, fig. 405.

Valves elliptic-lanceolate with constricted subcapitate and broadly rounded ends. Raphe thin, thread-like, straight, with slightly curved, terminal fissures. Axial area very narrow, central area wide and stauroid, widening towards the sides. Striæ indistinctly punctate and strongly radial.

Dimensions .. Length 54–60 μ
Breadth 14·4–15 μ
Striæ 18 in 10 μ

Habitat .. Fresh-water. Pond at Goregaon; pools near Dahisar and Mira Road.

This form differs slightly from the type as the ends of the valves are neither produced nor distinctly capitate, but are subcapitate. Another slight difference is that the striæ are more distantly placed.

94. *Stauroneis anceps* Ehr. f. *gracilis* (Ehr.) Cleve

(Fig. 94)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 256, fig. 406; Skvortzow, B. W., Diatoms from Poyang Lake, Hunan, China, *Phil. Jour. Sci.*, Vol. 57, 1935, p. 469, pl. 2, fig. 2; Diatoms from Kizaki Lake, Honshu Island, Nippon, Vol. 61, 1936, p. 32, pl. 5, fig. 20.

Valves lanceolate, gradually tapering from the middle towards the poles, which are capitate. Raphe thin and straight. Axial area narrow, central area linear, stauroid. Striæ very indistinctly punctate, strongly radial.

Dimensions .. Length 110–120 μ
Breadth 18–19·8 μ
Striæ 20–22 in 10 μ

Habitat .. Fresh-water. Powai Lake. Common.

95. *Stauroneis anceps* Ehr. f. *linearis* (Ehr.) Cleve

(Fig. 95)

Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 256, fig. 407; Skvortzow, B. W., Diatoms from Kizaki Lake, Honshu Island, Nippon, *Phil. Jour. Sci.*, Vol. 61, 1936, p. 32, pl. 5, fig. 14.

Valves linear with somewhat parallel sides, suddenly constricted towards the ends which are capitate. Raphe thin, thread-like. Axial area narrow, central area stauroid, slightly broader near the sides. Striæ fine but distinct, strongly radial.

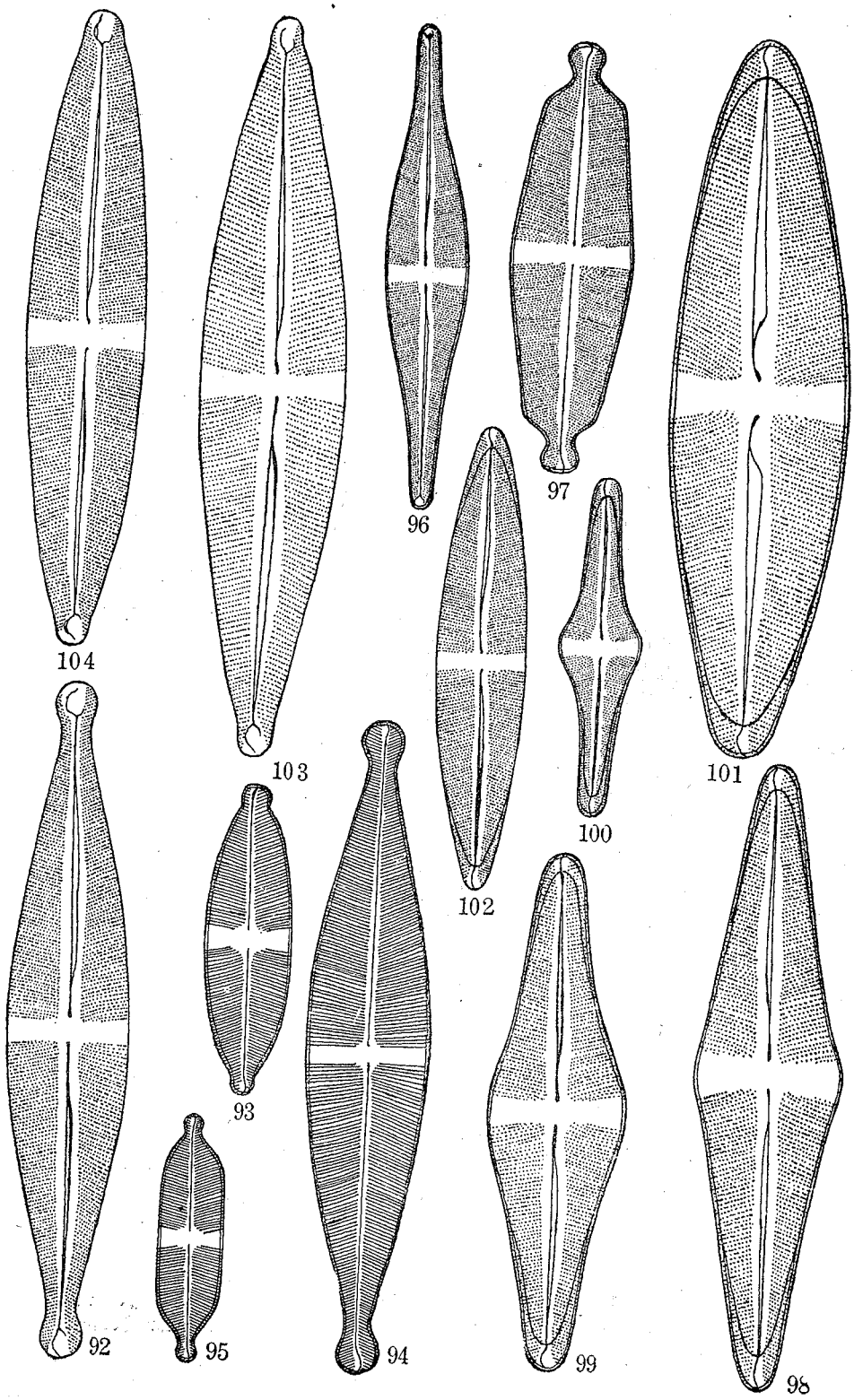
Dimensions .. Length 43–50 μ
Breadth 12·6–13 μ
Striæ 22 in 10 μ

Habitat .. Fresh-water. Pools on Chembur Hills. Common.

96. *Stauroneis anceps* Ehr. var. *hyalina* Brun and Peragallo f. *producta* forma nova.

(Fig. 96)

Valvæ lanceolatæ, ornatæ longis, anguste productis apicibus, qui sunt rotundati. Raphe nonnihil lata atque tenuiter curvatis fissuris



FIGS. 92–104

FIGS. 92–104. Fig. 92. *Stauroneis phœnicenteron* Ehr. f. *gracilis* forma nova., × 840. Fig. 93. *Stauroneis anceps* Ehr., × 840. Fig. 94. *Stauroneis anceps* Ehr. f. *gracilis* (Ehr.) Cleve, × 840. Fig. 95. *Stauroneis anceps* Ehr. f. *linearis* Cleve, × 840. Fig. 96. *Stauroneis anceps* Ehr. var. *hyalina* Brun & Peragallo f. *producta* forma nova., × 840. Fig. 97. *Stauroneis angulare* spec. nova., × 840. Fig. 98. *Stauroneis acuta* W. Smith, × 506. Fig. 99. *Stauroneis acuta* W. Smith (small form), × 840. Fig. 100. *Stauroneis acuta* W. Smith var. *tenuis* var. nova., × 840. Fig. 101. *Stauroneis obtusa* var. *chemburiana* var. nova., × 840. Fig. 102. *Stauroneis obtusa* Lagerst. f. *indica* forma nova., × 840. Fig. 103. *Stauroneis phœnicenteron* Ehr. var. *vulgaris* Dippel f. *intermedia* Dippel. × 840. Fig. 104. *Stauroneis phœnicenteron* Ehr., × 840.

terminalibus prædita. Area axialis angusta, centralis vero linearis stauroidea, Striæ minute punctatæ atque radiales.

Frustula 82·3–85 μ longa, 14·4 μ lata; striæ 28 in 10 μ.

Valves lanceolate with long, narrow, drawn-out ends which are rounded. Raphe somewhat broad with slightly curved terminal fissures. Axial area narrow, central area linear, stauroid. Striæ finely punctate, radial.

Dimensions .. Length 82·3–85 μ
Breadth 14·4 μ
Striæ 28 in 10 μ

Habitat .. Fresh-water. Pond at Goregaon, Powai Lake. Not common.

This form is exactly like *S. anceps* Ehr. var. *hyalina* Brun and Peragallo (Hustedt, Fr., in Pascher's *Süsswasser-Flora*, 1930, p. 256, fig. 408) except that the ends are greatly produced and the raphe is broader. Hence it is regarded as a new form.

97. *Stauroneis angulare* spec. nov.

(Fig. 97)

Frustula in spuma marginali stagnorum atque lacunarum, pallide brunneis pigmentis ornata. Valvæ elliptico-rhomboideæ, angulares in medio, abrupte angustatæ ad efformandos apices distinctos capitatos. Raphe tenuis et recta. Area axialis moderate lata; centralis vero stauroidea, tenuiter dilatata ad latera. Striæ minute punctatæ et radiales.

Frustula 77–85 μ longa, 21·6–23 μ lata; striæ 25 in 10 μ.

Frustules occurring in the marginal scum of ponds and pools, with pale brown pigment. Valves elliptic-rhomboid, angular in the middle, abruptly narrowing to form distinctly capitate ends. Raphe thin and straight. Axial area moderately broad, central area stauroid, widening slightly near the sides. Striæ finely punctate, radial.

Dimensions .. Length 77–85 μ
Breadth 21·6–23 μ
Striæ 25 in 10 μ

Habitat .. Fresh-water. Pond and pools at Dahisar, Mira Road, Powai Lake. Not common.

The shape of this form is distinctve. The valves are angular in the middle and also towards the ends of the marginal walls from where they contract abruptly to form distinctly capitate poles. The striæ too are finely punctate. It somewhat resembles *S. anceps* Ehr. but is a much broader form. Hence it is regarded as a new species.

Section *Pleurostauron* **W. Smith**

98. *Stauroneis acuta* W. Smith

(Figs. 98, 99)

Smith, W., *Syn. Brit. Diat.*, Vol. I, 1853, p. 59, pl. 19, fig. 187; Van Heurck, *Traité des Diatomées*, 1899, p. 159, pl. 1, fig. 51; Migula, W., *Kryptogamen-Flora*, 1907–09, Bd. II, Teil 1 *a*, p. 271, pl. 6, fig. 11; Schönfeldt, H., Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 115, fig. 251; Gustav, L., *Die Algen*, 1914, p. 173, pl. 13, fig. 390; Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 259, fig. 415 *a*.

Frustules in girdle view united together to form ribbons. Valves rhombic-lanceolate, tumid in the middle and broadly rounded at the ends. Longitudinal septa well developed. Raphe straight and expanded with ends in the central area slightly bent unilaterally and terminal fissures slightly curved. Axial area broad in the centre, narrowing towards the poles. Central area stauroid, widening near the sides. Striæ strongly radial, fine but distinctly punctate.

Dimensions .. Length 167–180 μ
Breadth 37–38 μ
Striæ 13–15 in 10 μ

Habitat .. Fresh-water. Pond at Goregaon, pools in Hills near Chembur. Very common.

Much smaller forms (Fig. 99) were sometimes found (Length 50–60 μ, Breadth 11–13 μ).

99. *Stauroneis acuta* W. Smith var. *tenuis* var. nova.

(Fig. 100)

Frustula ut plurimum parva, in limo marginali lacunarum, unita per valvarum facies in catenas breves. Valvæ rhombicæ, plurimum dilatatæ in medio et subito contractæ medium inter et polos, ad efformandos apices late rotundatos. Raphe crassa et recta, et fissuris terminalibus haud profundis ornata. Area axialis angusta; centralis vero magna, stauroidea, dilatata ad latera. Striæ radiales, indistincte punctatæ et proxime positæ.

Frustula 50–60 μ longa, 11–13 μ lata; striæ 20–22 in 10 μ.

Frustules usually small, occurring in the marginal slime of pools, united by their valve faces in short ribbons. Valves rhombic, very much dilated in the middle and suddenly contracted between the middle and poles to form produced, broadly rounded ends. Raphe

straight and thick, with shallow, terminal fissures. Axial area narrow, central area large, stauroid, widening near the sides. Striæ radial, slightly curved, indistinctly punctate, and very closely placed.

Dimensions .. Length 50–60 μ
Breadth 11–13 μ
Striæ 20–22 in 10 μ

Habitat .. Fresh-water. Streams and pools on Chembur Hills. Not common.

This form resembles *S. acuta* W. Smith in general outline, being expanded in the middle and having broadly rounded ends. It is, however, small and slender and almost from the middle contracts sharply. It is also greatly produced towards the poles. The striæ too are slightly curved and more closely placed. Hence it is regarded as a new variety of *S. acuta* W. Smith.

100. *Stauroneis obtusa* Lagerst var. *chemburiana* var. nova.

(Fig. 101)

Frustula solitaria, libere natantia, occurrentia ut spuma marginalis brunnea in aquis stagnosis. Valvæ ellipticæ vel elliptico-lanceolatæ; apices late rotundati. Septa longitudinalia bene evoluta atque elliptica. Raphe latissima, angustata ad apices, fissuris terminalibus haud profundis ornata. Area axialis lata, lanceolata; centralis vero lata, stauroidea. Striæ fortiter radiales atque distinctissime punctatæ.

Frustula 125–130 μ longa, 31–31·5 μ lata; striæ 12–13 in 10 μ.

Frustules solitary, free-floating, occurring in the brownish, marginal scum of streams. Valves elliptical or elliptical-lanceolate. Ends broadly rounded. Longitudinal septa strongly developed and elliptical. Raphe very broad, narrowing towards the ends, with shallow terminal fissures. Axial area wide, lanceolate. Central area wide, stauroid. Striæ strongly radial and very distinctly punctate.

Dimensions .. Length 125–130 μ
Breadth 31–31·5 μ
Striæ 12–13 in 10 μ

Habitat .. Fresh-water. Streams at Chembur. Rare.

This form belongs to the section Pleurostauron, because of the longitudinal septa. It differs from *Stauroneis obtusa* Lagerst (Hustedt, Fr., Pascher's *Süsswasser-Flora*, 1930, p. 259, fig. 416), as it is more robust and possesses broadly rounded poles. It also has a very broad raphe and no polar septa. Hence it is regarded as a new variety of *S. obtusa* Lagerst.

101. *Stauroneis obtusa* Lagerst. f. *indica* forma nova.

(Fig. 102)

Valvæ lanceolatæ, apicibus angustis rotundatis. Septa longitudinalia bene evoluta, sepits polaribus nullis. Raphe recta, tenuiter

incrassata et fissuris terminalibus haud profundis ornata. Area axialis angusta, aliquantum linearis; centralis vero area linearis, stauroidea. Striæ radiales et distincte punctatæ.

Frustula 75–80 μ longa, 14–15 μ lata; striæ 18–20 in 10 μ.

Valves lanceolate with narrow, rounded ends. Longitudinal septa well-developed, polar septa absent. Raphe straight, slightly thickened, with shallow terminal fissures. Axial area narrow, Central area linear and stauroid. Striæ radial and distinctly punctate.

Dimensions .. Length 75–80 μ
Breadth 14–15 μ
Striæ 18–20 in 10 μ

Habitat .. Fresh-water. Streams and pools in hills near Chembur. Fairly common.

This form resembles *S. obtusa* Lag. (Hustedt, Fr., Pascher's *Süsswasser-Flora*, 1930, p. 259, fig. 416) except that the poles are narrowly rounded and the polar septa are absent.

Genus *Anomœoneis* **Pfitzer, 1871**

102. *Anomœoneis sphœrophora* (Kütz.) Pfitzer

(Fig. 91)

Schönfeldt, H., Pascher's *Süsswasser-Flora*, Heft 10, 1913, p. 87, fig. 174, Hustedt, Fr., Pascher's *Süsswasser-Flora*, Heft 10, 1930, p. 262, fig. 422; Fritsch, F. E., and Rich, F., Contribution to our knowledge of the fresh-water algæ of Africa. Bacillariales (Diatoms) from Griqualand, West, *Trans. Roy. Soc. S. Africa*, Vol. 18, 1930, p. 103, fig. 4 *a*; Abdul-Majeed, M., Fresh-water algæ of the Panjab, Pt. I. Bacillariophyta (Diatomeæ), *Panjab University Publications*, Lahore, 1935, p. 122, pl. III, fig. 9; Venkataraman, G., A Systematic Account of Some South Indian Diatoms, *Proc. Indian Acad. Sci.*, Vol. 10, Sect. B, 1939, p. 324, fig. 75.

Valves elliptical-lanceolate with rostrate, capitate ends. Raphe straight, with semi-circular terminal fissures. Axial area broad, linear. Central area large, asymmetrical. Striæ radial, clearly punctate and interrupted by blank spaces.

Dimensions .. Length 73–80 μ
Breadth 21·6–22 μ
Striæ 15–17 in 10 μ
Punctæ 16–18 in 10 μ

Habitat .. Fresh-water. Powai Lake; streams at Borivli and pond at Dahisar. Common.

The ends of this form are more constricted and more distinctly capitate than in the type.

103. *Anomœoneis sphærophora* (Kütz.) Pfitzer var. *Guntheri* (Ehr.) Mull. f. *rostrata* forma nova.

(Fig. 90)

Valvæ elliptico-lanceolatæ, apicibus tenuiter productis, late rotundatis, haud capitatis ornatæ. Area axialis lata, linearis; centralis vero aliquantum asymmetrica, sed haud producta usque ad latera. Striæ radiales atque distincte punctatæ, punctis vero interruptis per plurima vacua spatia longitudinalia.

Frustula 63–68 μ longa, 21–22 μ lata; striæ 15–17 in 10 μ; punctæ 18–20 in 10 μ.

Valves elliptical-lanceolate with slightly produced, broadly-rostrate ends which are not capitate. Axial area wide. Central area somewhat asymmetrical, but not reaching the sides. Striæ radial and distinctly punctate, punctæ interrupted by blank spaces.

Dimensions .. Length 63–68 μ
Breadth 21–22 μ
Striæ 15–17 in 10 μ
Punctæ 18–20 in 10 μ

Habitat .. Brackish-water at Mahim and pond at Dharavi. Abundant.

This form in outline seems to be between *A. sphærophora* var. *sculpta* (Ehr.) Mull (Hustedt, Fr., Pascher's *Süsswasser-Flora*, 1930, p. 262, fig. 423) and *A. sphærophora* var. *Guntheri* (Hustedt, *op. cit.*, p. 262, fig. 424). Its ends are not as produced as in var. *sculpta*, nor are they as broad as in var. *Guntheri*. As it resembles the latter variety more, it is regarded as a new form of this type.