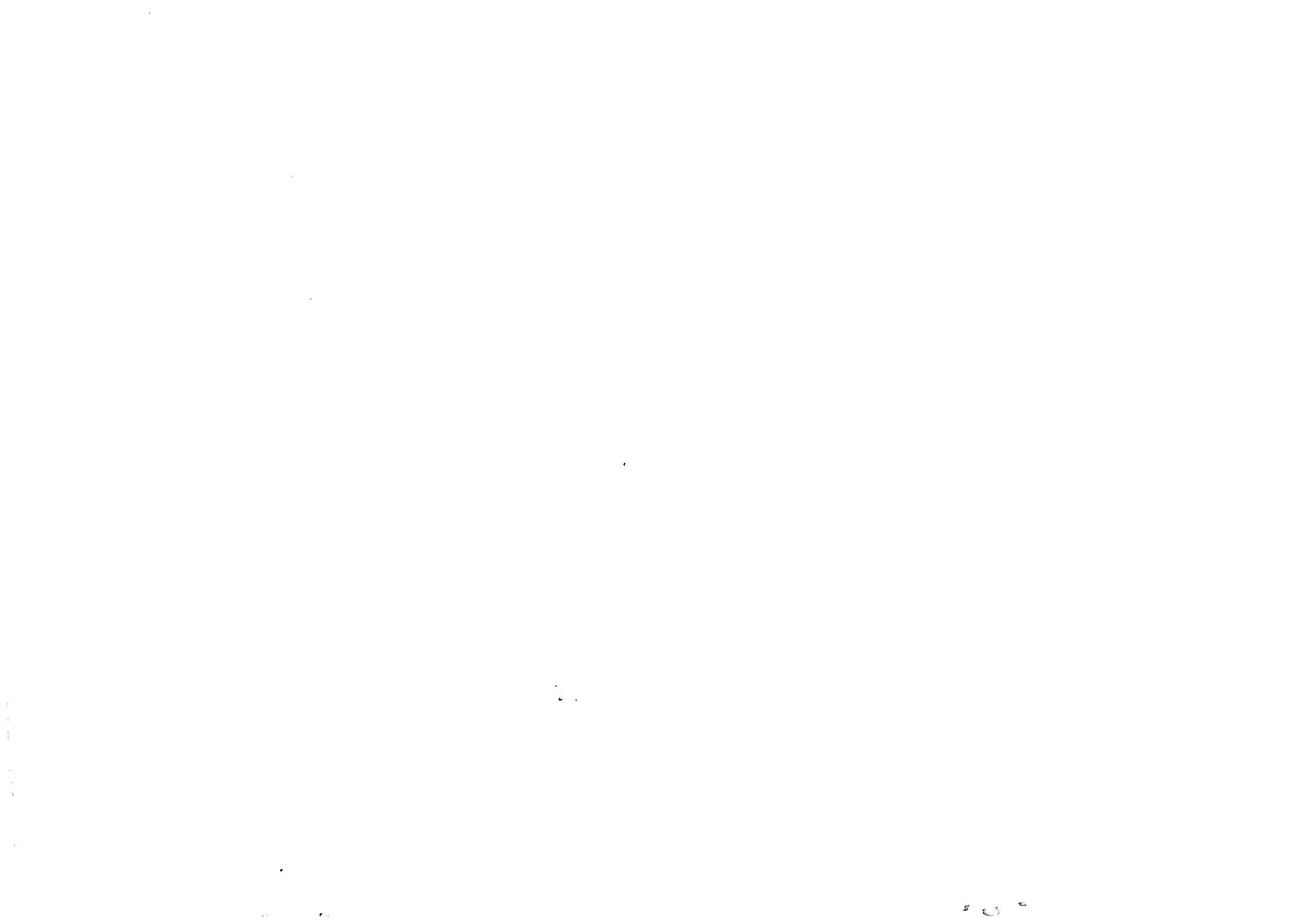


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A Further Account of the Marine Littoral Diatoms of the Saldanha Bay Lagoon, Cape Province, South Africa

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1. The diatom flora of several samples from four stations on the shores of Saldanha Bay (South Africa) has been studied.
2. A number of species new to science are described. These are:
Achnanthes navalis n. sp.
Amphora ridicula n. sp.
Navicula osterosa n. sp.
Striatella aberrans n. sp.
3. Reference is made in the text to systematic details and comments.

This paper deals with the continuation of an investigation of the marine littoral diatom flora of the Saldanha Bay Lagoon, situated on the west (Atlantic) coast of South Africa, about 110 km north of Cape Town. The author (Giffen 1975) recently published a description of the littoral diatoms from a single station viz. "Sand Baai" near the village of Langebaan on the eastern shore of the Saldanha Bay Lagoon. The six samples which were investigated proved to be very rich in taxa, 214 species including two new combinations and sixteen new species being recorded.

In view of proposed industrial development of the Lagoon entailing the building of a bulk loading harbour for iron ore, it was deemed expedient to complete the diatom survey before possible pollution of the site takes place. During 1970 and 1971 further samples were collected from four stations widely spaced around the shore of the lagoon. These stations were as follows:

- I. Noord Baai (1970) situated near the town of Saldanha.
617. Scrapings from drift algae chiefly *Ecklonia buccinalis*.
- II. Oesterwal to Flemming Point, an area south of Langebaan 4.4 km:
634–635. From the stems and leaves of *Zostera capensis* Setch. growing on mud in shallow water.
636. From masses of *Gracilaria confervoides* in shallow water.

III. Southern end of the lagoon near Schrywer's Hoek, a swampy area uncovered at low tide.
638 to 640. From algal masses on the mud or in cattle hoof marks, chiefly *Cladophora* sp. or *Enteromorpha* sp.

IV. Riet Vlei to Donker Gat. A shallow tidal flat forming a deep inlet into the north end of the peninsula which constitutes the west wall of the lagoon (1971).
664–666. From shallow swampy pools along the shore amongst *Enteromorpha* and *Cladophora*. These samples show a somewhat brackish or estuarine content rather than purely marine littoral species.

Systematic Part

Reference to original descriptions have only been given where species are of recent origin or not reported in wellknown modern literature or not previously reported by the author. Certain wellknown cosmopolitan species are dealt without citation. These species are described and figured effectively by Hustedt, 1930 (Bacillariophyta) and 1927–1966 (Kieselalgen). For convenience of reference genera and species are recorded in alphabetical order.

Achnanthes Bory 1822.

A. brevipes Agardh var. *typica* Cleve. – 638, 639, 640, 655, 666.
This species was dominant in sample 666.

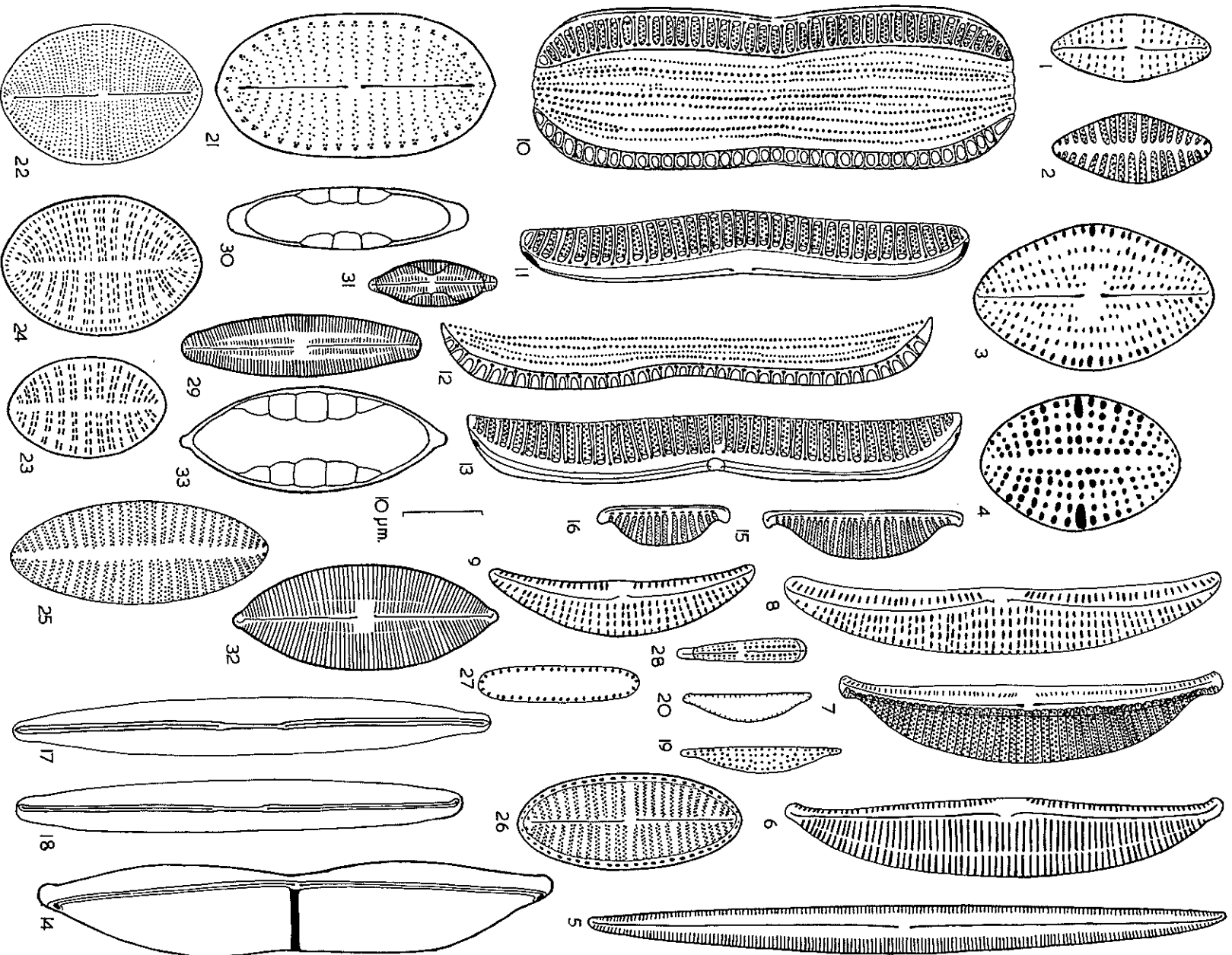


Plate 1.

- 1, 2. *Achnanthes navalis* n. sp. 3, 4. *A. prominenterii* Giffen 5. *Ampifora cymbelloides* Grunow. 6. *A. graeffii* (Grun.) Cleve 7.
A. granulata Greg. sensu Hustedt. 8, 9. *A. langebaaniae* Giffen. 10-13. *A. ritchiae* n. sp. 14. *A. staurophora* (Castrac.) Cleve 15, 16.
A. turgida Greg. 17, 18. *Berkeleya fragilis* (Greville 19, 20. *Campylostira cymbelliformis* (A. Schmidt) Grun. 21. *Cocconeis britannica*
 Naegeli 22-24. *C. claudastina* var. *capensis* Cholnoky 25, 26. *C. costata* var. *pacifica* Grun. 27. *Fragilaria lapponica* Grun. 28. *Gomphonema pseudoseptatum* Giffen 29-31. *Mastogloia Gieskesii* Cholnoky 32, 33. *M. pseudoexigua* Cholnoky.

A. brevipes var. *intermedia* (Kützing) Cleve. — 636, 638, 639, 640, 664, 665, 666. The variety was not frequent in sample 666.

A. brevipes var. *parvula* (Kützing) Cleve. This variety, although wide-spread, is never frequent in South African samples. — 617, 638, 639, 640.

A. fimbriata (Grunow) Ross, 1963, 72, fig. 17–22 (= *A. manifera* Brun, cf. Hustedt, 1955, 18, Pl. 6, fig. 1–8; Giffen, 1963, 212, Pl. 1, fig. 1–4.)

Achnanthes fimbriata (Grun.) Ross, recorded under the name *A. manifera* Brun, has proved to be fairly wide spread in South African littoral waters. — 636, 638.

A. groenlandica f. *meridiana* Giffen (1973, 33, fig. 1–4). This form comprises rather small individuals, 14–28 μm long and 4.5–6 μm broad with 6–8 transapical striae in 10 μm on the areoalve and 8–10 in 10 μm on the raphoalve i. e. considerably closer than on the type. — 636.

A. hauckiana Grunow. (cf. Cleve, 1895, 190; Hustedt, 1927–1966, part 2: 388, fig. 834).

The forms observed are mostly small to 17 μm long with 9 transapical striae in 10 μm . Frequent in the material. — 636, 639, 640, 664.

A. hauckiana var. *elliptica* Schultz. (cf. Hustedt, l. c. 388 without figure). — 634, 638.

A. hauckiana var. *rostrata* Schultz. (cf. Hustedt, l. c. 388). Cholnoky, (1968, 13, fig. 1–4) discussed the status of the two varieties of *A. hauckiana* namely var. *elliptica* (above) and var. *rostrata* Schultz and considers that both varieties should be moved to the type. Incidentally as some of his individuals were only about 7 μm long and 4.5 μm broad Cholnoky suggests that if the type is to include the varieties, the diagnosis must be emended. The so-called varieties were frequent in the material. — 634, 638.

A. lanceolata (Brébisson) Grunow. A fresh water species displaced. — 665.

A. lanceolata var. *rostrata* (Östrup) Hustedt. (cf. Hustedt, 1927–1966, part 2: 410, fig. 863i–m). A fresh water species also displaced. — 665.

A. longipes Agardh. (cf. Hustedt, l. c. 427, fig. 878). Not frequent. — 640, 664.

Achnanthes navalis n. sp.

Valves elliptic to elliptic-lanceolate with obtuse rounded ends, 19–20 μm long, 8 μm broad. Areoalve with narrow linear or linear-lanceolate pseudoraphe, without central area. Transapical costae 7–8 in 10 μm slightly radiate with double rows of alternating puncta. Raphoalve with narrow linear-lanceolate axial area, central area a wide fascia reaching the margins, transapical striae parallel in the middle to slightly radiate at the ends, 8–9 in 10 μm clearly punctate with elongate puncta forming 2 to 3 more or less parallel longitudinal striae about 12 in 10 μm .

Type slide 617/5. Iconotype figures No. 1, 2.

Valvae elliptici-lanceolatae apicibus obtuse rotundatis 20 μm longae 8–9 μm latae. Areovalva cum area axialis angustae lanceolata, area centrali nulla, costis transapicalibus leniter radiantibus 7–8 in 10 μm , inter costis punctibus alternans in seribus duobus. Raphoalva: raphe filiformis, recta, area axialis lanceolata modice angusta area centralis fascias usque ad marginem attingens, striae leniter radiantes in media parte valvae circiter 8 in 10 μm ad apices 9 in 10 μm valde punctatae, punctis in lineis duobus tribusve.

Habitat in aquis marinis Oceani Atlantici in lacunae Saldanha loci North Bay dicti, Provincia Capensis.

Typus: praeparatum No. 617/5 in collectione Giffen, Fort Hare, Provincia Capensis. Iconotypus: figurae nostrae No. 1, 2.

This species though small can be readily recognized by the fascia with parallel sides on the raphoalve and the slightly radiate costae with double rows of alternating puncta on the areoalve. Fig. 1, 2. — 617.

A. promunturii Giffen, (1970b, 88, fig. 1–4).

The species is distinguished by its coarse structure and the presence of large median puncta. It was not uncommon in one sample. Fig. 3, 4. — 617.

Amphiprora Ehrenberg 1839.

A. sulcata O'Meara (cf. Cleve 1894: 18; Hustedt, 1955, 37; Peragallo, 1897–1908, Pl. 38, fig. 1–3). — 636.

Amphora Ehrenberg 1840.

A. acutiuscula Kützing. (cf. Cleve, 1895, 121; A. Schmidt, Atlas, T. 26, fig. 59; Giffen, 1967, 250. — 634, 636.

A. angusta (Gregory) Cleve var. *Eulensteini* Grunow. (cf. Cleve, 1895, 135; A. Schmidt, Atlas T. 25, fig. 1–3, T. 40, fig. 35–37; Giffen 1973, 33, fig. 5).

Wide-spread and frequently abundant along the littoral of both the Atlantic and Indian Ocean coasts. — 634, 636.

A. angusta var. *ventricosa* (Gregory) Cleve (cf. Cleve, 1895, 135; A. Schmidt, Atlas, T. 26, fig. 6; Hustedt, 1955, 42, Pl. 16 fig. 26; Giffen, 1975, 73).

The author in the above paper (1975) discusses an apparent confusion which has arisen in the nomenclature of this variety. In all cases where this form has been observed I have followed Cleve (l. c.) and Hustedt (l. c.) in my determinations. Hendey 1951, 70, Pl. 9, fig. 6 and 1964, 269, Pl. 38, fig. 12) describes and figures *A. ventricosa* Gregory which is apparently similar to that of Hustedt but states that "the striae are very fine and often indistinct, 18–20 in 10 μm ". This description is, however, very much closer to that of *A. angusta* var. *typica* Cleve (striae 17–18) than that of *A. ventricosa* (dorsal striae 7–9 in 10 μm). — 636, 638.

A. arcus Gregory. (cf. Cleve, 1895, 127, Pl. IV, fig. 6 and as *A. arcus* var. *sulcata* A. Schmidt; A. Schmidt, Atlas T. 26, fig. 46, 47; Giffen, 1975, p. 73 fig. 7).

In a recent paper (Giffen l. c.) the author finds that the characters for the separation of *A. arcus*, and *A. sulcata* either as separate species or as varieties of each other are not significant and that *A. arcus* var. *sulcata* should be included in the type. — 634, 636.

A. arenicola Grunow. (cf. Cleve, 1895, 104, Pl. IV, fig. 19, 20; Peragallo, 1897–1908, Pl. 44, fig. 11–13; Giffen, 1967, 251).

Typical examples of this species were not uncommon in one sample. Dimensions: 38 μm long, frustule 16 μm broad, valve 6 μm broad, Striae on the dorsal side 10 in 10 μm , on the ventral side 9–10 in 10 μm . — 634.

A. coffeaeformis (Agardh) Kützing. (cf. Cleve, 1895, 120; Hustedt, 1930, 345, fig. 634). The species was fairly common in two samples, both in salt marsh with a tendency to brackishness. — 640, 665.

A. crassa Gregory. (cf. Cleve, l. c. 109; A. Schmidt, Atlas, T. 28, fig. 30–33, T. 39, fig. 30; Peragallo, 1897–1908, Pl. 46, fig. 5; Giffen, 1970a, 266, fig. 14, 15).

The transapical striae on the observed specimens were closer than described being 9–10 in 10 μm . — 636.

A. crassa var. *punctata* Cleve (cf. A. Schmidt Atlas T. 28, fig. 13).

This variety is included in the type by Cleve but is upheld by Peragallo (1897–1908, Pl. 46, fig. 8). The very strong and coarse puncta of the striae certainly make the variety quite distinct. — 634.

A. cymbelloides Grunow (cf. Cleve, 1895, 136; A. Schmidt, Atlas T. 26, fig. 61, 62 as *A. angusta* var. *glaberrima*, and fig. 65, 66 as *A. angusta* var. *minuta* non A. Schmidt, Atlas T. 25, fig. 8, 14 which is *A. angusta* var. *typica*).

Cleve (l. c.) gives the transapical striae for this species as "striae very fine 29 in 10 μm or more". The South African examples, which I have no doubt belong to this species, are very variable and have somewhat coarser striation viz. 24–27 in 10 μm . The length varies from 60 to 80 μm and the breadth 11–12 μm . Fig. 5. — 634, 635, 636.

A. eunotia Cleve, 1895, 122, Pl. IV, fig. 2, 3. (cf. Cholnoky, 1960, 28, fig. 55; Giffen 1963, fig. 16).

Wide-spread but never abundant in the South African littoral. — 634, 636.

A. exigua Gregory. (cf. Cleve, l. c. 123; Cholnoky, 1960, 22, fig. 56; Giffen, 1963, 217, fig. 17, 18).

This species is one of the most frequent and wide-spread species of *Amphora* and occurs in nearly all the samples. — 634, 636, 638–640, 664, 665.

- A. Graeffii* (Grunow) Cleve. (cf. Cleve, 1895, 113; A. Schmidt, Atlas, T. 26, fig. 40; Peragallo, 1897–1908, Pl. 46, fig. 20, Pl. 47, fig. 4, 11).
Typical examples of this species were observed. Dimensions 56 to 60 μm long, 10 μm broad, dorsal transapical striae 12 in 10 μm , ventral striae 10 in 10 μm . It is my opinion that this species has not previously been recorded from South African waters. Fig. 6. – 634, 636, 639.
- A. granulata* Gregory. (cf. Cleve, 1895, 123; Cholnoky, 1968, 18, 19; Giffen, 1967, 251, fig. 11 and 1971, 3, fig. 8, 9). Considerable confusion seems to exist over the nomenclature of this species. There seem to be two very different forms of *A. granulata* described under this epithet, namely that of Hustedt (cf. 1955, 40, Pl. 14, fig. 8–10, 26, 27) and the older diagnosis of Cleve (l. c.). The author (1971, 3, fig. 8, 9) dealt with this problem, comparing the South African material with that of a sample from the Clyde, Scotland and finding that the two forms were identical. The question can only be finally settled by reference to the type specimens of Gregory. Hustedt's form which possesses double rows of puncta between fine costae (1955, l. c.) was recorded in one sample of the material under review and is figured as *A. granulata* sensu Hustedt pending further investigation. The dimensions were 48 μm long, 10–11 μm broad, with 9 transapical costae in 10 μm on the dorsal side, and 17 in 10 μm on the ventral side. Double rows of rather obscure puncta lie between the costae. This agrees fully with Hustedt's taxon. Fig. 7. – 617, 634.
- A. helenensis* Giffen, 1973, 33, fig. 7–9. Apparently wide-spread and often frequent along the west coast of South Africa. – 617, 634, 636, 664, 665.
- A. javanica* A. Schmidt, Atlas, T. 27, fig. 27, 30–33. (cf. Giffen, 1970a, 267, fig. 19 incorrectly given on p. 267 as fig. 18 but correct on the plate as fig. 19).
This South African form is closest to that figured in A. Schmidt, Atlas, T. 27, fig. 33, which shows similar blank lines on the ventral side of the valve. The striae are somewhat wider viz. 10 in 10 μm . Similar forms were recorded and figured from the Kowie River on the Indian Ocean coast (Giffen, l. c.). – 638.
- A. laevis* (Gregory) Cleve var. *laevis* (Gregory) Cleve. (cf. Cleve, 1895, 130; A. Schmidt, Atlas T. 26, fig. 3, 13, 14; Giffen, 1967, 253, fig. 14). – 634.
- A. langebaanae* Giffen, 1975, p. 74 fig. 13–15.
This recently described species has proved to be wide-spread along the Atlantic coast of the Cape Province and has been recently observed in the littoral of the Island of Mauritius (unpublished). It is somewhat similar to some varieties of *A. crassa* Gregory but differs in the simple intercalary bands which are heavily punctate in *A. crassa*. The transapical striae consist of 3–4 rows of elongated puncta separated by longitudinal blank spaces. Fig. 8, 9. – 617, 636, 639.
- A. obtusa* Gregory var. *radula* Cleve, 1895, 132. (cf. Peragallo, 1897–1908, pl. 48, fig. 5, 6).
Typical specimens showing clearly the sudden change in direction of the ventral striae from radial to convergent at the ends of the valve (cf. Giffen, 1974, fig. 49, in press) – 636.
- A. ocellata* Donkin (cf. Cleve, 1895, 133; A. Schmidt, Atlas, T. 26, fig. 17; Peragallo, Pl. 49, fig. 4).
The species is apparently rare on the South African coasts, having been recorded only once previously (Giffen, 1974) and then only a single individual was seen. The occurrence in the present material was similarly very scarce. – 634.
- A. ostrearia* Brébisson var. *typica* Cleve, 1895, 129. (A. Schmidt, Atlas, T. 26, fig. 25; Peragallo, Pl. 49, fig. 14).
Wide-spread and not uncommon in South African littoral. – 636.
- A. ostrearia* var. *belgica* Grunow (cf. Cleve, 1895, 130; Peragallo, Pl. 49, fig. 16).
Dimensions: frustule 48 μm long, 20 μm broad, valve 48 μm in length, 8 μm in breadth, intercalary bands 9 in 10 μm , transapical striae 17 in 10 μm on the dorsal side, 20 on the ventral. These forms agreed very closely with the description and figures except that the ventral striae were somewhat closer i. e. 20 in 10 μm . – 636.
- A. ostrearia* var. *lineata* Cleve, 1895, 130; Peragallo, Pl. 49, fig. 17, 18).
Dimensions 40–42 μm long, frustule 18–20 μm broad, valve 7–8 μm wide, transapical striae 11–12 in 10 μm . Frequent in one sample. – 636.
- A. ostrearia* var. *vitrea* Cleve (cf. Cleve, 1895, 129; A. Schmidt, Atlas, T. 39, fig. 15–17 as *A. porcellus* Kitton; Giffen, 1963, 220, fig. 24, 25). This variety is wide-spread and often frequent in the South African littoral and has been recorded from both the Atlantic and Indian Ocean coasts. – 634.
- A. proteoides* Hustedt, 1955, 37, Pl. 13, fig. 9–11; (cf. Giffen, 1963, 220, fig. 26; Cholnoky 1968, 20, fig. 20).
The species was first recorded from South Africa by the author in the Gulu Lagoon, Eastern Cape Province and later by Cholnoky (l. c.) in the St Lucia Lagoon, Natal. The present discovery in the Saldanha Lagoon gives some indication of its distribution in South Africa as an estuarine species, tolerant of rapidly changing salinity. It was never abundant in the samples. – 634, 636, 638, 639, 640.
- A. proteus* Gregory. – 634 to 639, 664, 665.
- A. proteus* var. *oculata* Peragallo 1897–1908, pl. 44, fig. 21, 22; Giffen, 1973, 34. Wide-spread. – 634, 635.
- Amphora ridicula* n. sp.
In two samples numerous forms of a naviculoid diatom occurred which I have, with some doubt, referred to the genus *Amphora* and assigned to it a specific epithet.
Frustule rectangular to elliptical with truncate ends, sometimes slightly constricted in the middle, 50–62 μm long to 20 μm broad. Connecting zone broader on one side than on the other with numerous longitudinal divisions (intercalary bands) 9–10 in 10 μm transversely striate, striae ca. 18 in 10 μm . Valve linear with broad obliquely rounded or incurved ends 50–62 μm long 7–8 μm broad. Raphe more or less straight or somewhat biarcuate, central pores not approximate, terminal fissures obscure. Axial area fairly wide on both sides of the raphe, asymmetric. Surface of the valve on both sides costate, costae 6 in 10 μm , between the costae double rows of obscure alternating puncta.
Type slide 636 in the Giffen Collection. Iconotype figures No. 10–13.
- Frustulae in visu connectivale rectangulatae sive ellipticae apicibus truncatis rotundatis interdum in parte mediana laevisime constrictis 50–62 μm longae 20 μm latae. Septa connectivalia numerosa 9–10 in 10 μm , striis distinctis circiter 18 in 10 μm ornata. Valvae lineares apicibus oblique rotundatis sive incurvatis 50–62 μm longae, 7–8 μm latae. Area axialis lata asymmetrica utrinque raphae. Raphe plus minusve directa sive leniter biarcuata, poris centralibus non approximatis fissuris terminalibus obscuris. Superficies valvae utrinque raphe costatis validis 6 in 10 μm ex punctis obscuris in seribus duobus et in quincuncem ordinatis compositae.*
Habitat: in aquis marinis Oceani Atlantici in lacunae Saldanha loci Oesterwal dicti Provincia Capensis.
Typus: praeparatum No. 636 in collectione Giffen, Fort Hare Provincia Capensis. Iconotypus: figurae nostrae No. 10–13.
I have placed this naviculoid diatom in the genus *Amphora* with some doubt. The valve is extremely asymmetric having a very excentric raphe with broad axial areas on both sides, dorsal as well as ventral. The dorsal transapical costae are more or less twice the width of the ventral costae. Between the costae are rather obscure (seen only in phase contrast) double rows of alternating puncta. A single valve is very convex often somewhat resembling the genuflexed valve of *Achnanthes* (cf. *Achnanthes longipes* Agardh v. s.) but both valves are similar and raphebearing. Fig. 10–13. – 635, 636.
- A. spectabilis* Gregory (cf. Cleve, 1895, 132; A. Schmidt, Atlas, T. 40, fig. 18–23; Peragallo, 1897–1908, Pl. 48, fig. 8).
Recorded from Simons Bay by Heiden and Kolbe (1928) and from Sand Bay Saldanha (Giffen, 1974).
- A. staurophora* (Castracane) Cleve (cf. Cleve, 1895, 129, Pl. IV, fig. 33, 34. Castracane, 1886, 20. Pl. 27, fig. 6?; A. Schmidt, Atlas, T. 25, fig. 85, 86 as *A. sp.*).
Dimensions of the South African material which was scarce were length 60–64 μm , breadth 10 μm . The transapical striae (given by Cleve as "delicate punctate about 20 in 10 μm ") were scarcely visible but gave the impression of being much closer. Fig. 14. – 636.
- A. turgida* Gregory (cf. Cleve, 1895, 123; A. Schmidt, Atlas, T. 25, fig. 22 (22–25); Hendey, 1964, 264).
The individuals seen vary considerably in size from 12 to 25 μm long and 4.5–6 μm in width with 9–12 transapical striae in 10 μm

in the middle to 15 in 10 μm at the ends. Although most of those observed were considerably shorter than the described limits 20–40 μm long (cf. Cleve, l. c.) I assign them here without much doubt. Under critical illumination some of the individuals which are almost indistinguishable from the above mentioned forms showed rather obscure double rows of puncta with a blank band or longitudinal line, very narrow and just above the raphe (fig. 15). A satisfactory answer to this and other questions is scarcely possible until a modern revision of the genus is made. Fig. 15, 16. – 617, 638.

Anorthoneis Grunow 1867.

A. eurystoma Cleve, 1895, 166, Pl. III, fig. 12. (cf. Hustedt, 1955, 15, Pl. 12, fig. 7, Pl. 5, fig. 16, 17; Giffen, 1970a, 268, fig. 22, 23).

The individuals noted in the single sample, agreed with the small forms reported earlier (Giffen, l. c.) from the Kowie River eastern Cape Province which were rarely more than 12–15 μm in length. – 617.

Arachnoidiscus Bailey 1849.

A. ornatus Ehrenberg. (cf. N. E. Brown, 1933, 49, Pl. 3, fig. 2–5) Wide-spread and not infrequent as an epiphyte on the larger algae. – 617, 634.

Auliscus Ehrenberg 1844.

A. ovalis Arnott (cf. Rattray, 1888, 891 no fig.; A. Schmidt, Atlas, T. 30, fig. 16, 17, T. 125, fig. 3; Giffen, 1975, fig. 24). Not frequent in any sample. – 636.

A. reticulatus Greville (cf. Hustedt, 1927–1966, part 1, 513, fig. 288; A. Schmidt, Atlas, T. 30, fig. 1–4; Peragallo, 1897–1908, Pl. 109, fig. 6, 7).

Wide-spread and often frequent. – 634, 638, 644–666.

A. sculptus (W. Smith) Ralfs in Pritch. (cf. Hustedt, 1927–1966, part 1, 516, fig. 290; *A. caelatus* Bailey idem p. 518, fig. 291; Giffen, 1975, p. 75).

The author, following the suggestion of Hustedt l. c. and Hendey, 1964, 99, has included *A. caelatus* Bailey in *A. sculptus* (W. Sm.) Ralfs for the reason that they are indistinguishable from each other. The species is widely distributed in the South African marine littoral. – 638, 639, 664, 665.

A. sculptus var. *rhypis* (A. Schmidt) Giffen, 1975, 75. (cf. A. Schmidt, Atlas T. 32, fig. 10, 11; Hustedt, 1927–1966, part 1, 520, fig. 295 as *A. caelatus* var. *rhypis*).

The author (1975 p. 75) suggests that, although the variety seems to be strongly characterised, it may be necessary to include it in the type on account of his observations on the life history of *A. reticulatus* Greville in which early stages of the new valve in a dividing cell differs very much from the older mature valve. This same conditions may later be seen in *A. sculptus*. – 638.

A. sculptus var. *strigillatus* (A. Schmidt) Giffen, 1975, 75, fig. 23. (cf. A. Schmidt, Atlas, T. 32, fig. 24–26 “*strigillata*”; Hustedt, 1927–1966, part 1, 520, fig. 294 as *A. caelatus* var. *strigillatus*). For the reasons given above the strongly characteristic var. *strigillatus* has been continued as a variety of *A. sculptus*. Wide-spread and not infrequent in the samples. – 638, 664, 665, 666.

Berkeleya Greville 1927 emend Cox 1975.

B. fragilis Greville (cf. Cleve 1894, 126 as *Amphipleura micans* var. *fragilis*; Hustedt, Kieselalg. part 2, 723, fig. 1094b; Cox, 1975, 1–10, 205–217). In one sample a few individuals were observed which I have assigned to the above species. They measured 56–60 μm long, 6–7 μm broad with transapical striae invisible. These forms seem to be about midway between *B. fragilis* and *B. hyalina* (Round et Brooks) Cox. Fig. 17, 18. – 665.

B. rutilans (Trentepohl) Grunow (cf. Hustedt, 1927–1966, part 2, 720, fig. 1093; Giffen, 1970b, 89). Frequent and wide-spread. – 638, 664, 665.

Biddulphia Gray 1821.

B. obtusa (Kützing) Ralfs (cf. Hustedt, 1927–1966, part 1, 848, fig. 502 as *B. aurita* var. *obtusa*). – 636, 638, 664, 665.

B. Tuomeyi (Bailey) Roper (cf. Hustedt, ibidem, 834, fig. 491; Giffen, 1967, 255).

Rarely observed in South African material. – 638.

Caloneis Cleve 1891.

C. fusoides (Grunow) Heiden & Kolbe, 1928, 627; Cleve, 1894, 133 as *Nav. fusoides*; Hendey, 1951, 57, Pl. 12, fig. 14; Giffen, 1973, 34, fig. 10).

Previously recorded from the Atlantic coast of South Africa and never frequent. – 617.

C. liber (W. Smith) Cleve. Wide-spread. – 664.

C. Westii (W. Smith) Hendey 1964, 230, Pl. 44, fig. 5–10, Pl. 45, fig. 1–13. (cf. W. Smith, 1853, 49, Pl. 16, fig. 135, syn.

Nav. formosa Gregory; A. Schmidt, Atlas, T. 50, fig. 8–15 as *Nav. formosa*; *Cal. formosa* (Greg.) Cleve, 1894, 57.

Very rare in one sample. The dimensions of the South African specimens: 50–72 μm long, 15–18 μm broad, transapical striae 15 in 10 μm . – 617.

Campyloneis Grunow 1862.

C. Grevillei (W. Smith) Grunow – 617, 636.

Campylosira Grunow 1882.

C. cymbelliformis (A. Schmidt) Grunow (cf. Hustedt, 1927–1964, part 1, 128, fig. 650; *C. inane* Giffen, 1975 p. 76 fig. 33–35).

In a previous paper (Giffen 1975) the author described an odd form which he could only fit into the genus *Campylosira*.

These forms have later proved to be the numerous intercalary bands of *C. cymbelliformis*, the valves of which were overlooked owing to the scarcity of individuals. In the present material a cell was observed which left no doubt as to the true identity of *C. inane* Giffen (fig. 19) and it is now given its correct name *C. cymbelloides* (A. S.) Grunow. Fig. 19, 20. – 634, 636, 640.

Cerataulus Ehrenberg 1844.

C. turgidus Ehrenberg (cf. Hustedt, Kieselalg. part 1, 860, fig. 512; A. Schmidt, Atlas, T. 115, fig. 12–15, T. 116, fig. 1–3; Peragallo, 1897–1908, Pl. 107, Fig. 7).

This species was very rare in one sample. It has been recorded from Madagascar but apparently not previously from the South African littoral. – 636.

Chaetoceros Ehrenberg 1844.

C. compressus Lauder (cf. Hustedt, 1927–1966, part 1, 685, fig. 388. Taylor, 1966, 456).

This was very rare in the material being a pelagic species. – 617.

Climacosphenia Ehrenberg 1843.

C. moniligera Ehrenberg (cf. Hustedt, ibidem part 2, 89, fig. 625, Giffen, 1970a, 270). Rare in the material. – 636.

Cocconeis Ehrenberg 1838.

C. britannica Naegeli in Kützing Sp. Alg 1849 (cf. Hustedt, ibid. part 2, 233, fig. 786; Cleve, 1895, 151).

Typical specimens were seen in two samples but were never very abundant. Cholnoky (1968, 25) comments that the species has rarely been recorded from South African waters. In the examples in the region under review, many individuals show double rows of areolae ending in single rows towards the raphe as in *C. scutellum* Ehr. and can be readily confused with that species. Fig. 21. – 617, 634.

C. californica Grunow var. *kerquelenensis* Heiden & Kolbe, 1928, 585, T. 5, fig. 109 (cf. Giffen, 1970b, 90, fig. 11; 1973, 35, fig. 11, 12).

This variety of *C. californica* Grun. which the author reported earlier (1973 l. c.) is separated from the type by a series of intermediate stages and can only be upheld for purposes of con-

venience as the clones usually remain separate and extreme forms are not as a rule found together in a sample. — 617.

C. clandestina A. Schmidt var. *capensis* Cholnoky, 1963, 42, fig. 6, 7; Heiden & Kolbe, 1928, 584, Pl. 5, fig. 7, without name. Large numbers of this form were seen in one sample both as separate valves and as cells. From the latter it was possible to measure the striation of the rapho valve which shows, in the local material 18 transapical striae in 10 μ m as described by Cholnoky. I do not consider the difference as significant as the areovalves are indistinguishable and such variations are not uncommon. Fig. 22–24. — 617.

C. convexa Giffen, 1967, 257, fig. 26–28.

Not uncommon in several samples. It occurs chiefly in brackish waters. — 664, 665.

C. costata Gregory (cf. Cleve, 1895, 182; Hustedt, 1927–1966, part 2, 232, fig. 785. Wide-spread and abundant in most samples. 617, 634, 635, 638, 639, 640.

C. costata var. *pacifica* Grunow. (cf. Cleve, 1895, 182; A. Schmidt, Atlas, T. 189, fig. 12 (11–15) as *C. imperatrix* A. S.).

This variety differs from the type in its longer elliptical shape and a rather distinct blank band around the rim. Dimensions: 28–32 μ m long, 12–13 μ m broad, costae 7–8 on both valves with somewhat obscure double rows of puncta. Fig. 25, 26. — 636.

C. deperdita Giffen. 1975, p. 78, fig. 26–28.

This is a very small species of *Cocconeis*, characterised by an areo valve with a lanceolate axial area and central area which is small or absent on one side of the valve but unilaterally dilated into a fascia reaching to the margin on the other side. Transapical striae 15–17 in 10 μ m, slightly radiate or parallel in the middle and radiate at the ends. Rapho valve very faint, with raphe lying in a slightly silicified rib, transapical striae very fine, invisible. — 617, 634, 636, 639, 664.

C. diminuta Pantocsek, (cf. *Cocconeis disculus* var. *diminuta* (Pant.) A. Cleve, nec. Hustedt: Mölder and Tynni 1972 (Über Finnlands rezente und subfossile Diatomaceen VI, Bull. Geol. Soc. Finland 44, 141–149, p. 141, fig. 1).

I have no doubt as to the identity of this species which occurred in one sample in fair numbers. There seems to be some confusion between *C. disculus* Pant. as defined by Hustedt, 1927–1966, part 2, 346, fig. 800 and that of Mölder and Tynni l. c. Hustedt's species is described as a fresh water organism and that from Finland and my South African form originate from brackish water. I have correlated the local form with that of Mölder & Tynni on account of its ecological habitat. — 638.

C. dirupta Gregory (cf. Cleve, 1895, 175; Hustedt, 1927–1966, part 2, 354, fig. 809a–c; Cholnoky, 1968, 26; Giffen, 1971, 5). — 634.

C. molesta var. *crucifera* Grunow (cf. Cleve, 1895, 174; Hustedt, *ibid.* 352, fig. 805, c, d.) — 636.

C. nitens Edsbacke 1966, 65, Pl. 1, fig. 6, Pl. 2, fig. 6. (cf. Giffen, 1973, 35, fig. 13–15). Wide-spread and often frequent in the South African littoral. — 617, 636, 638, 664.

C. pellucida Grunow (cf. Hustedt, 1927–1966, part 2, 357, Fig. 812) Wide-spread and often abundant in the South African littoral but rare in the present material. — 634.

C. pelta A. Schmidt, Atlas, T. 191, fig. 6. (cf. Hustedt, *ibid.* part 2, 361, fig. 815a–c; Giffen, 1970a, 271, fig. 27 but not fig. 28, which is *C. peltoides* Hust.). — 639.

C. peltoides Hustedt, 1939, 606, fig. 23–27; Brockmann, 1950, 13, T. 6, fig. 3; Edsbacke 1966, 66, T. 5, fig. 3).

Previously recorded from South Africa (Giffen 1970a, fig. 28, under *C. pelta*, 1975, p. 78, fig. 30) and occurring sporadically and never abundant, it was fairly frequent in the material under review. — 617, 638, 664.

C. pinnata Gregory. (cf. Cleve, 1895, 181; A. Schmidt, Atlas, T. 189, fig. 1–5; Hustedt, 1927–1966, part 2, 330, fig. 783. Giffen, 1973, 35).

As previously recorded from South African sources the material showed frequently aberrant costae with only a few of the marginal costae with double rows of puncta (v. *supra*: *C. britannica*). — 636.

C. placentula var. *euglypta* (Ehrenberg) Cleve. A brackish water form. — 634, 635, 638, 664.

C. placentula var. *lineata* (Ehr.) Cleve. Also a common brackish water form. — 639, 665.

C. pseudomarginata Gregory var. *intermedia* Grunow (cf. Hustedt, 1927–1966, part 2, 360 without fig.; A. Schmidt, Atlas, T. 194, fig. 1, as *C. duplex*; Giffen, 1973, 35, fig. 16–18).

The rapheless valve can be readily confused with *C. nidulus* Edsbacke, 1966, 64, Pl. 1, fig. 6 (cf. Giffen 1970a, 211 where this same mistake was made!) — 617.

C. scutellum Ehrenberg. — 617, 634, 635, 636, 639.

C. scutellum var. *minutissimum* Grunow (cf. Hustedt, 1927–1966, part 2, 339 without fig.; Mölder & Tynni, 1972, IV, 143, Pl. 2, fig. 16a, b). — 635, 639.

C. scutellum var. *parva* Grunow (cf. Hustedt, *ibid.* 338, fig. 791. Giffen, 1963, 224, fig. 41; Cholnoky, 1968, 27). — 635.

C. stauroneiformis (Van Heurck) Okono, 1957, 217, fig. 2. (cf. Hendey, 1964, 180 *C. scutellum* var. *stauroneiformis* Van Heurck 1880–1885, pl. 29, fig. 10–11).

Hustedt 1927–1964, part 2, 339, fig. 792 incorrectly gives the authority for the epithet to W. Smith and not to Van Heurck. Smith merely stated “b nodule dilated into a stauros” (1853, 22) without varietal name. — 634, 636.

Coccinodiscus Ehrenberg 1838.

C. excentricus Ehrenberg (cf. Hustedt, 1927–1966, part 1, 388, fig. 201).

Small examples 20–30 μ m in diameter with 7–8 rows of areolae in 10 μ m were observed as previously recorded from South Africa. — 636.

C. granulosis Grunow (cf. Hustedt, l. c. 386, fig. 189).

Dimensions 25–32 μ m in diameter, striae 18 in 10 μ m, marginal spicules 3 in 10 μ m and quite typical. The species does not seem to have been recorded previously from South Africa. Hustedt states that it is probably littoral. — 636, 664, 665.

C. marginatus Ehrenberg. — 634.

C. nitidus Gregory. — 617, 664, 665.

Cyclotella Kützing 1834.

C. stelligera Cleve (cf. Hustedt, l. c. part 1, 339, fig. 172. Giffen, 1963, 226).

The species occurred frequently in several samples and is widespread in the South African littoral. — 617, 634, 640, 665.

Cymatoneis Cleve 1894.

C. circumvallata Cleve, 1894, 76, Pl. 1, fig. 10, 11. (cf. Peragallo, 1887–1908, Pl. 13, fig. 28; H. van Heurck, 1896 (Tret.), 238, fig. 37).

A few specimens of this species were recorded in one sample and agreed almost completely with the original description. Of his figures, however, only fig. 10 is really typical of the South African material. Cleve's fig. 11 seems to be a somewhat teratological form and unfortunately was apparently copied by van Heurck (l. c. fig. 37).

Dimensions of the local examples: 40–52 μ m long, 10 μ m broad, transapical striae 9 in 10 μ m, puncta 10–12 in 10 μ m, somewhat more widely spaced than in the original diagnosis (14 in 10 μ m). Fig. 44, 45. — 636.

Cymatopleura W. Smith 1851.

C. solea (Brébisson) W. Smith (cf. Hustedt 1930, 425, fig. 823a; Hustedt in A. Schmidt, Atlas, T. 275, fig. 4–7; Peragallo, 1897–1908, pl. 68, fig. 5–8).

Hustedt gives the distribution of this diatom as fresh water and it is generally regarded as belonging to this habitat. However, Peragallo (l. c.) shows his first two figures viz. fig. 5, 6, as marine forms and fig. 7, 8 as fresh water forms. It was rare in the material but could possibly be regarded as autochthonous for the locality is of brackish water. Because there are no streams or fresh water pools in the vicinity it does not seem to be displaced from fresh water. — 635.

Cymbella Agardh 1830.

C. pusilla Grunow (cf. Hustedt 1930, 354, fig. 646; Giffen, 1963, 227).

This is a brackish water species typical of estuarine conditions and has been recorded from most of the river estuaries of the eastern and western coasts of South Africa. — 639, 665.

Denticula Kützing 1844.

D. subtilis Grunow (cf. Hustedt, 1955, 43, pl. 9, fig. 26–28; Giffen, 1963, 227, fig. 46).

Wide-spread and often abundant. — 617, 638, 639, 640, 664.

Dimerogramma Ralfs in Pritch. 1861.

D. inane Giffen 1970b, 91, fig. 20–22.

The species as yet has only been collected from small rhodophyte epiphytes on *Laminaria buccinalis* along the cold water Atlantic coast. — 636.

D. marinum (Gregory) Ralfs (cf. Hustedt, 1927–1966, part 2, 119, fig. 642). Very rare in one sample. — 636.

D. marinum var. *lanceolatum* (Peragallo) Hustedt (cf. Hustedt, l. c. 120 without figure. Peragallo, 1897–1908, Pl. 82, fig. 12; Giffen, 1975 p. 79, fig. 42–44).

Previously recorded from other stations in Saldanha Bay. — 636, 639, 665.

D. minor (Gregory) Ralfs. Widely distributed and often frequent. — 638, 640, 664, 665, 666.

D. minor var. *nana* (Gregory) Van Heurck (cf. Hustedt, l. c. 119, fig. 641; Giffen, 1970a, 273. — 639.

Diploneis Ehrenberg 1844.

D. bomboides (A. Schmidt) Cleve 1894, 88. (cf. Hustedt, 1927–1966, part 2, 695, fig. 1080). Not frequent. — 636.

D. bombus Ehrenberg (cf. Hustedt, l. c. 704, fig. 1086a–c; Giffen, 1963, 227).

A brackish water estuarine species, widely distributed in South Africa. — 634–636, 638, 664, 665.

D. crabro Ehrenberg (cf. Cleve, 1894, 100–102; Hustedt, l. c. 616, fig. 1028).

A very variable species not wide-spread in the South African littoral. — 639, 664.

D. didyma Ehrenberg (cf. Cleve, 1894, 90; Hustedt, l. c. 685, fig. 1075a, b; Giffen, 1967, 260; 1970a, 273).

This species has been recorded from South African littoral but is always scarce in the samples. — 636.

D. incurvata (Gregory) Cleve, 1894, 84. (cf. Hustedt, l. c. 593, fig. 1012b–d).

Previously recorded from the “Cape of Good Hope”, Cleve l. c. — 635, 636.

D. interrupta (Kützing) Cleve, 1894 84; Hustedt, l. c. 602, fig. 1019; Giffen, 1967, 260).

Wide-spread, common and often abundant, particularly in brackish estuarine habitats. — 636, 638, 639.

D. notabilis (Greville) Cleve, 1894, 93; cf. Hustedt, l. c. 682, fig. 1074).

The species, which has very rarely been observed in South African material, was scarce in both samples. The variety *oblonga* Heiden, described from Simon’s Bay, Cape Province is much more common. — 617, 639.

D. Oestrupi Hustedt, 1927–1966, part 2, 694, fig. 1079.

This cold water arctic species was very rare in the material only a single specimen being observed. There seems to be no doubt as to its identity for it fits the description and dimensions which were 70 μm long, 20 μm broad, transapical ribs 9 in 10 μm . A number of arctic species have been recorded from the west coast of the Cape Province where the upwelling of the cold Benguela Current forms a suitable habitat for these cold water species. — 634.

D. papula (A. Schmidt) Cleve, 1895, 85. (cf. Hustedt, l. c. 679, fig. 1071; A. Schmidt, Atlas, T. 7, fig. 45–47 as *Navicula papula*). Wide-spread and not uncommon in the marine littoral of South Africa. — 617, 636.

D. Smithii (Brébisson) Cleve, 1895, 96. (cf. Hustedt, l. c. 647, fig. 1051).

Wide-spread. Most of the individuals observed could be placed with var. *recta* Peragallo (cf. Hustedt, l. c. fig. 1052b). — 634, 636, 638, 639, 640.

D. vetula var. *americana* Hustedt, 1955, 21, Pl. 6, fig. 17, 18. (cf. Giffen, 1975, p. 80 Fig. 48, 49).

The author (1974 l. c.) places Hustedt’s *D. vetula* var. *americana* f. *minutissima* with the variety as there seems to be no break in size from the form to the variety. — 634, 636, 638.

Fragilaria Lyngbye 1819.

F. crotonensis Kitton (cf. Hustedt, 1927–1966, part 2, 143, fig. 568).

Wide-spread in the marine littoral of the South African coasts. Hustedt gives its distribution in “leicht brackigen Buchten” but in these regions it inhabits fairly brackish water to full coastal seawater. — 617, 635, 636, 640.

F. lapponica Grunow. (cf. Hustedt, l. c. 170, fig. 678).

I have no doubt as to the identity of these forms I have assigned to this species as they are identical in shape and dimensions with both Hustedt’s figures and measurements. However, the only doubt I have, concerns the distribution which Hustedt gives as “besonders in stehenden und langsam fließenden Gewässern ...”. The South African forms are marine littoral i. e. with a salinity little less than that of “standard sea water” (cf. Harvey, 1945, p. 18) owing to dilution by river inflow, (Taylor, 1966). In some recent work viz. Miller, U. 1964 records *Fragilaria lapponica* from marine clays (fossil) in Sweden. Foged, 1969, places *F. lapponica* in his halobion spectrum as indifferent and in 1970 as halophilous. It is possible that the presence of this species in a euhalobion habitat has been overlooked. Fig. 27. — 617 (rare).

F. pinnata Ehrenberg (cf. Hustedt, 1927–1966, part 2, 160, fig. 671 a–i). The specimens seen are all small and match Hustedt, fig. 671 a, b, e, f. The species is very wide spread and represented along all parts of the South African littoral. — 638, 640, 666.

Glyphodesmis Greville 1862.

G. distans (Gregory) Grunow (cf. Hustedt, 1927–1966, part 2, 125, fig. 647; Peragallo, 1897–1908, Pl. 83, fig. 19, 20; Giffen, 1973, 37, fig. 25). Wide-spread and frequently abundant. — 634, 636, 638, 639, 664, 665.

Gomphonema Agardh 1824.

G. exiguum Kützing (cf. Cleve, 1894, 188; A. Schmidt, Atlas, T. 233, fig. 28, 29; Giffen, 1963, 230).

Wide-spread but never very abundant in the material. — 636, 665.

G. kamtschaticum Grunow (cf. Cleve, 1894, 188; M. Schmidt in A. Schmidt, Atlas, T. 213, fig. 46–51; Giffen, 1970b, 92, fig. 27, 28). — 617.

G. pseudoseptatum Giffen, 1970b, 92, fig. 29–32.

The species is characterised by pseudosepta at the ends of the valve and central area a somewhat narrow fascia. The species is a small one 12–25 μm long, 2,5–3,5 μm broad with 15–16 transapical striae in 10 μm . These form two rows of puncta alongside the raphe. The species has been recorded from several localities on the South African coast. — 617. Fig. 28.

Grammatophora Ehrenberg 1839.

G. angulosa Ehrenberg var. *islandica* (Ehr.) Grunow. (cf. Hustedt, 1927–1966, part 2, 40, fig. 565). — 617, 635.

G. marina (Lyngbye) Kützing (cf. Hustedt, l. c. 43, fig. 569). — 640.

G. maxima Grunow (cf. Hustedt, l. c. 44, fig. 572). — 617.

G. oceanica (Ehrenberg) Grunow (cf. Hustedt, l. c. 45, fig. 573). — 634, 636.

G. oceanica var. *macilenta* (W. Smith) Grunow (cf. Hustedt, l. c. 47, fig. 574). — 635.

Gyrosigma Hassall 1845.

G. diversatum Giffen, 1970a, 276, fig. 35, 36. This species, originally described from material from the Kowie River estuary on the Indian Ocean coast, is characterised by a progressive change in the number of longitudinal striae from the raphe where they are about 15 in 10 μm to 20–25 in 10 μm near the margin. In the present materials the dimensions were 104 μm long, 19 μm broad, striae transapical to longitudinal 18:19 in 10 μm at the raphe to 18:27 in 10 μm at the margin. Not frequent in sample 638.

G. Spenceri (W. Smith) Cleve, 1894, 117. (cf. Peragallo 1897–1908, Pl. 34, fig. 18–20; Hustedt, 1930, 225, fig. 336). Dimensions of the local material: 68–72 μm long, 8–9 μm wide, transapical to longitudinal striae 21–24 : 24–27 in 10 μm . Wide-spread and often frequent. – 638.

G. subangustatum Hustedt, 1955, 35, Pl. 10, fig. 10. The individuals observed differed from the original description only in the very slightly wider transapical striae 24 in 10 μm , against 28 in 10 μm , the longitudinal striae were very fine. Dimensions 68–88 μm long, 8–14 μm broad i. e. somewhat wider than in the original description, transapical striae 24 in 10 μm . Not frequent in the material. This species has not previously recorded from South African waters. – 634, 636, 664.

G. tenuissimum (W. Smith) Cleve, 1894, 117; (cf. Giffen, 1963, 232, fig. 52). – 636.

Hantzschia Grunow 1880.

H. marina (Donkin) Grunow (cf. Peragallo 1897–1908, Pl. 71, fig. 19, 20; Giffen, 1963, 233, fig. 58; Hendey, 1964, 285, Pl. 33, fig. 12). – 617, 634, 636.

H. virgata (Roper) Grunow (cf. Hustedt 1930, 395, fig. 752; Cholnoky, 1968, 40). Previously recorded from the east coast (Giffen 1967) at Kidd's Beach and by Cholnoky l. c. from the St Lucia Lagoon Natal. The var. *virgata* seems to be much less wide-spread in South Africa than the var. *gracilis* Hustedt. – 636.

Hyalodiscus Ehrenberg 1845.

H. ambiguus Grunow (cf. Peragallo, 1897–1908, Pl. 119, fig. 19; Giffen, 1973, 37). Wide-spread and often frequent. – 664.

Licmophora Agardh 1827.

L. communis (Heiberg) Grunow (cf. Hustedt, 1927–1966, part 2, 79, fig. 640). Mostly small specimens usually less than the minimum length of 25 μm given by Hustedt, occurred in the samples. Dimensions 20–22 μm long, 6 μm broad, striae varying from 12 in 10 μm at the base to 24 (30) at the broad apex. 636 (rare), 664.

L. Ehrenbergii (Kützing) Grunow f. *Grunowii* (Mereschk.) Hustedt (cf. Hustedt l. c. 70, fig. 594; Giffen, 1973, 38). Wide-spread but never frequent. – 664, 665.

L. gracilis (Ehrenberg) Grunow var. *anglica* (Kützing) Peragallo 1897–1908, Pl. 84, fig. 13 (cf. Hustedt l. c. 60, fig. 583). – 665.

L. Pfannkucheae Giffen, 1970, 278, fig. 41, 42. First described from the east coast of the Cape Province, this species seems to be wide spread. At first glance it strongly resembles *L. flabellata* (Carmichael) Agardh (Hustedt l. c. 58, fig. 581) with which it can easily be confused. *L. Pfannkucheae* however differs in much coarser striation viz. 25 in 10 μm , (whereas Hustedt gives 30–33 in 10 μm for *L. flabellata*) and in the presence of a row of distinct mucilage pores alongside the pseudoraphe. – 664, 665.

Melosira Thwaites 1856.

M. dubia Kützing (cf. Hustedt, 1927–1966, part 1, 234, fig. 97; Giffen 1963, 234, fig. 59, 60). Not uncommon in the material. – 638, 639, 640.

M. nummuloides (Dillwyn) C. A. Agardh (cf. Hustedt, l. c. 231, fig. 95; Giffen 1967, 265; 1970a, 280). Wide-spread in the South African littoral and often frequent in the samples. – 638, 639, 640, 664, 666.

M. sol (Ehrenberg) Kützing (cf. Hustedt, ibid. 270, fig. 115; Peragallo, 1897–1908, Pl. 119A, fig. 10; Giffen, 1973, 38). Wide-spread in the South African littoral and from the plankton of the Agulhas Bank (Taylor, 1960). – 634, 638, 639, 640.

M. sulcata (Ehrenberg) Kützing (cf. Hustedt, l. c. 276, fig. 119; Giffen, 1967, 265).

A very variable species with a number of described forms which are of no significance and should perhaps be disregarded. – 638, 639, 640.

Mastogloia Thwaites 1856.

M. exigua Lewis (cf. Hustedt, 1927–1966, part 2, 569, fig. 1003; Giffen, 1963, 234; 1967, 264).

Wide-spread and often abundant in brackish littoral and estuarine waters. – 636.

M. Gieskesii Cholnoky, 1963b, 172, fig. 40–46.

I include this species with some doubt for although my examples are extremely close to Cholnoky's figures and description there are slight differences which may possibly be of specific importance. In the South African specimens the lyrate markings are somewhat more pronounced than shown in the original figures and secondly the striation is slightly coarser viz. 27 as against the New Guinea type of 30–32 in 10 μm . Fig. 29–31. – 639.

M. pseudoexigua Cholnoky (1956, 75, fig. 78; 1959, 33, fig. 172–175). Not uncommon in one sample: 639. Fig. 32–34.

Navicula Bory 1824.

N. abrupta (Gregory) Donkin (cf. Cleve, 1895, 61; A. Schmidt, Atlas, T. 3, fig. 1, 2; Hustedt, Kieselalg. part 3, 516, fig. 1558; Giffen, 1963, 235, fig. 63).

Wide-spread and often frequent. – 634, 635, 636, 639, 664.

N. abunda Hustedt 1955, 27, Pl. 9, fig. 10–12 (cf. Cholnoky 1968, 44, fig. 50; Giffen, 1967, fig. 53). This species is apparently wide-spread in South Africa but always seems to be somewhat rare. Cholnoky noted that the length could be extended to 55 μm in the Natal material. In the western coast samples here investigated, the dimensions were 35–40 μm long, 6 μm broad, striae 10–11 in 10 μm , at the ends slightly convergent. – 617.

N. agnita Hustedt, 1955, 27, Pl. 9, fig. 14–16 non *N. agnita* Hustedt, 1927–1966, part 3, 668, fig. 1668 (cf. Cholnoky, 1968, 44, fig. 51; Giffen, 1973, 38, fig. 31).

In 1964 Hustedt published a new species of *Navicula* under the name *N. agnita* n. sp. thereby creating an illegitimate homonym. This later species will require to be given a new name. The legitimate species is widespread in the South African littoral but always few in numbers. – 617.

N. Baileyi Cholnoky 1968, 51, = *N. granulata* Bailey (cf. Cleve, 1895: 48; Hustedt, 1927–1966, part 3, 702, fig. 1696; Giffen, 1963, 237).

Cholnoky states l. c. "Die Bailey'sche Benennung muß wegen '*Navicula granulata* Ehrenberg 1836' [= *Epithemia granulata* (Ehrenberg) Kützing] verändert werden, da Ehrenberg das Epithet schon vor Bailey in derselben Gattung verwendet hat. Ich schlage den Namen *N. Baileyi* nomen novum vor".

Wide-spread but never frequent. – 636, 638.

N. biflexa (A. Schmidt) Giffen, 1970b, 94, fig. 64. (cf. A. Schmidt, Atlas, T. 193, fig. 25; *N. Schonkenii* Hustedt, 1955b, 130, fig. 6–8; 1927–1966, part 3, 379, fig. 1467; Cholnoky, 1963, 65, fig. 74, 75).

This small species which has had a somewhat chequered career, occurred in considerable numbers in the sample and appears to be wide-spread along the Atlantic littoral of South Africa. – 617.

N. cancellata Donkin (cf. Cleve, 1895, 30; Giffen 1967, 266, 1970a, 280, 1970b, 94). Wide-spread and often abundant. – 634, 636, 664.

N. cingulatoides Cholnoky, 1963, 54, fig. 38; 1968, 46, fig. 58; Giffen, 1971, 7, fig. 29).

A small species distributed in most of the littoral but somewhat rare in the samples. The original description which gave an incorrect number of striae was corrected in Cholnoky, 1968, 46. – 617.

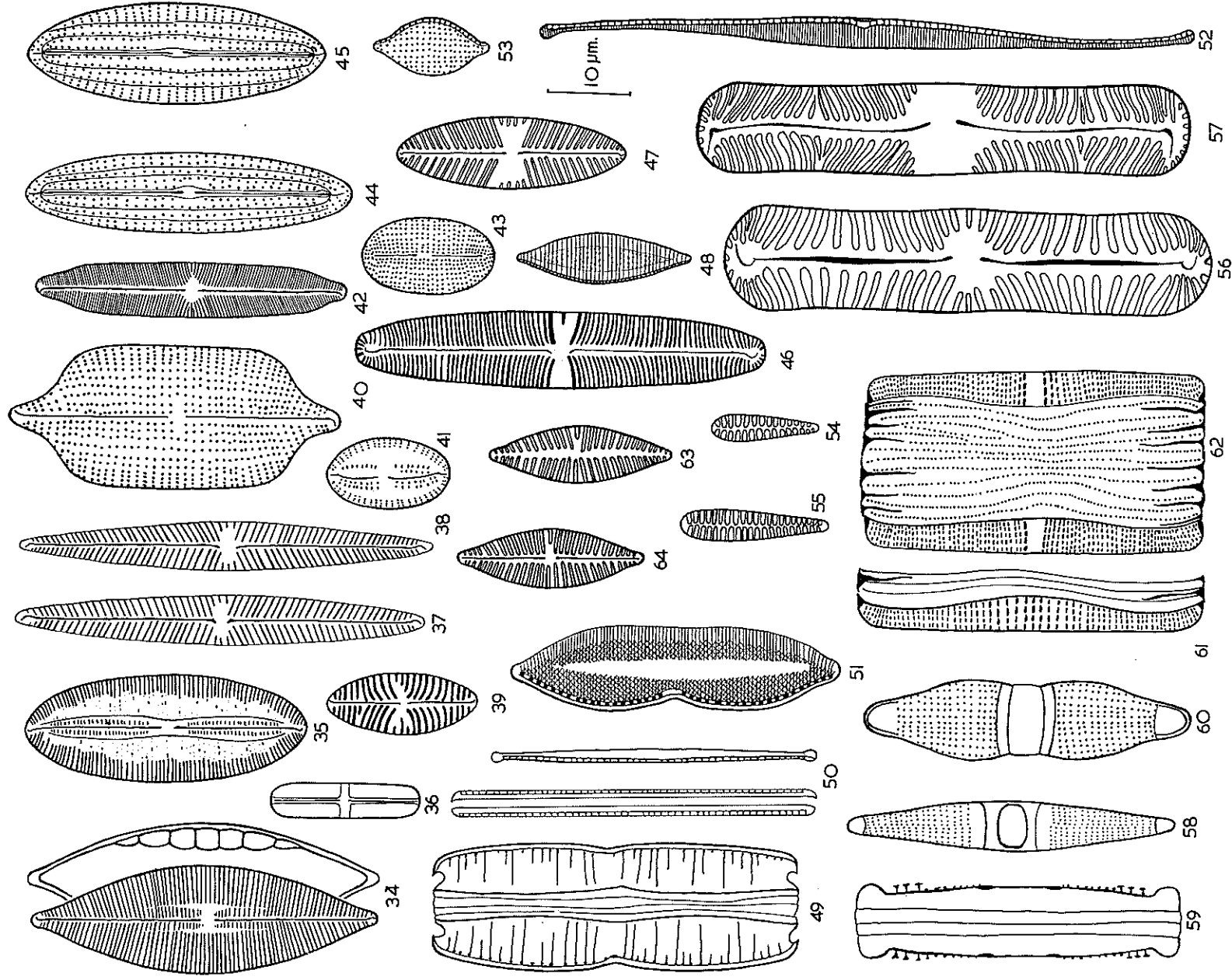


Plate II.

34. *Mastogloia pseudoexigua* 35. *Navicula hyalinula* de Toni 36. *N. Jungii* Krasske 37, 38. *N. lanceolata* var. *tenella* A. Schmidt 39. *N. lusoria* Giffen 40. *N. maculosa* Donkin 41. *N. melanocephala* Giffen 42. *N. osterosa* n. sp. 43. *N. Patrickae* Hustedt 44, 45. *Cymatoneis circumvallata* Cleve 46. *N. pseudoinflata* Giffen 47. *N. speibonae* Giffen 48. *Nitzschia adducta* Hustedt 49. *N. erosa* Giffen 50. *N. marginata* Hustedt 51. *N. rorida* Giffen 52. *N. sigmaformis* Hustedt 53. *H. subpunctata* Cholnoky 54, 55. *Opephora parva* (Grunow) Krasske 56, 57. *Pinnularia rectangularata* (Greg.) Rabenhorst 58, 59. *Plagiogramma appendiculatum* Giffen 60. *Pl. oceanum* Giffen 61, 62. *Siriarella aberrans* n. sp. 63, 64. *Achnanthes hauckiana* var. *rostrata* Schulz.

- N. clamans* Hustedt, 1927–1966, part 3, 179, fig. 1313; Cholnoky, 1959, 36, fig. 191, 192; Giffen, 1970a, 281, fig. 45, 46. Typical examples were seen somewhat larger but with 18 striae in 10 μm , thus agreeing with Hustedt's original description. — 617, 664.
- N. clavata* Gregory (cf. Cleve, 1895, 61; Hustedt l. c. 444, fig. 1509; Heiden & Kolbe 1928, 616; Giffen, 1975, 82). Previously recorded from Saldanha Bay as very scarce, the occurrence at this station was similarly very rare. — 636.
- N. clipeiformis* König (cf. Hustedt, l. c. 552, fig. 1589; Giffen, 1975, 82, fig. 59, 60). Typical examples were observed in fair numbers with transapical striae 21 in 10 μm . Previously recorded from Saldanha Bay. — 665.
- N. cruciculoides* Brockmann (cf. Hustedt l. c. 320, fig. 1437; Giffen, 1967, 266; 1970a, 281, fig. 48). A widely spread littoral species but never frequent in any sample. — 636.
- N. dehissa* Giffen, 1973, 39, fig. 35, 36. (cf. Giffen, 1975, 83, fig. 63). Previously recorded from several stations along the west (Atlantic coast). — 617.
- N. Gregorii* Ralfs in Pritchard (cf. Cleve, 1895, 30 as *N. cancellata* var. *Gregorii*; Peragallo, 1897–1908, Pl. 13, fig. 9 as *N. cancellata* vars. *apiculata* and *subapiculata*, Giffen 1973, 39). Usually found everywhere in the South African littoral and often abundant. — 634, 635, 638, 639, 665.
- N. guttata* Grunow (cf. Cleve, 1895, 34; A. Schmidt, Atlas, T. 46, fig. without name; Giffen, 1971, 7, fig. 31). A. Schmidt's figure shows some what protracted ends but is otherwise identical. Recorded from several localities in the South African littoral, both from Atlantic and Indian ocean shores. — 636, 638.
- N. Hansenii* M. Møller, 1950, 205, fig. 10 (synonym *N. pseudo-incerta* Giffen, 1970a, 285, fig. 60–62; Giffen, 1963, 240 Fig. 74, 75 erroneously as *N. mollis* W. Smith). Widely distributed in the South African littoral and often abundant. — 634, 636, 638, 639, 640, 664, 665.
- N. humerosa* Brébisson. — 634, 635, 636, 638.
- N. hyalinula* de Toni (cf. Hustedt, 1927–1966, part 3, 554, fig. 1591. Synonym: *N. hyalina* Donkin Q. J. M. S. 1. ns. 1861, 10. Pl. 1, fig. 6 (non *N. hyalina* Kützing), *Diploneis hyalina* Cleve 1894, 80; *Nav. hyalina* Donkin, Hendey 1964, 215, Pl. 37, fig. 6). In Giffen, 1975, the author points out that Hustedt's figure (fig. 1591) shows the border between the striae and the hyaline area as a sharp line. In the South African material this boundary is more or less wavy due to irregular lengths of the marginal striae. Also in many cases the rows of widely distant puncta may reach almost to the raphe. Larger puncta are sometimes present. Rare in the sample. Fig. 35. — 636.
- N. inflexa* (Gregory) Donkin (cf. Cleve, 1895, 31; Hendey, 1964, 197., Pl. 30, fig. 7; Giffen, 1970b, 94, fig. 41, 42). Reported earlier from similar habitat amongst Rhodophytes which are epiphytic on *Ecklonea buccinalis* (L.) Hornem. on the west coast of South Africa. — 617.
- N. Johanrossii* Giffen 1967, 268, fig. 63, 64. (cf. Giffen, 1971, 7, fig. 32). Apparently widely distributed and reported from both east and west coasts. It was rare in the local material. — 664, 665.
- N. Jungi* Krasske (cf. Hustedt, 1927–1966, part 3, 146, fig. 1278a). I have no doubt that the forms I have assigned to *N. Jungi* Krasske belong to this species. They are almost identical in shape and size and in the almost structureless hyaline appearance of the valve and the transapical central area. They were frequent in the sample. Fig. 36. — 640.
- N. lanceolata* (Ag.?) Kützing var. *tenella* A. Schmidt, Atlas, T. 47, fig. 45, 46. (cf. Cleve, 1895, 46). Several individuals, which appear almost identical with the description and figures of the above variety, were observed in one sample and, although *N. lanceolata* is regarded as a fresh water species, several of its varieties are from brackish water. I have placed the South African forms here with some reservation as too few individuals were seen to be completely certain of their identity. Fig. 37, 38. — 617.
- N. litorecola* Hustedt, 1955, 23, Pl. 8, fig. 13, 14. (cf. Giffen, 1963, 240, fig. 73). Wide-spread but never very abundant in the South African littoral. In a number of cases the individuals are longer and occasionally broader than in the original description. The number of transapical striae is also variable from 15–20 in 10 μm . (cf. Hustedt, 22–25 in 10 μm). — 634, 636.
- N. longa* Gregory (cf. Cleve, 1895, 27 as *N. directa* var. *remota* Cl. Peragallo, 1897–1908, Pl. 12, fig. 1). I cannot see why Cleve placed these species with *N. directa* W. Smith for both the original description and figure of Gregory (1856, 47, Pl. V, fig. 18) show definitely radiate transapical striae, Hustedt (1955, 28, Pl. 9, fig. 1) also upholds *N. longa* in describing *N. longa* var. *irregularis* Hustedt. This species is very widely spread in South African waters and often abundant. — 617, 634, 635, 636, 639, 665, 666.
- N. lusoria* Giffen, 1975, 84, fig. 75–77. Recently described from Langebaan, in Saldanha Bay, this small species was rare in sample. Fig. 39. — 617.
- N. lyra* Ehrenberg f. *elliptica* A. Schmidt (cf. Hustedt, 1927–1966, part 3, 506, fig. 1551) Not uncommon. — 636.
- N. maculosa* Donkin (cf. Hustedt, l. c. 729, fig. 1708). Often confused with *N. granulata* Bailey = *N. Baileyi* Cholnoky. Fig. 40. — 634, 636.
- N. melanocephala* Giffen, 1975, 84, fig. 78–80. (cf. Cholnoky 1960, 249, fig. 22 under *N. carminata* var. *africana*; non *N. carminata* var. *africana* Cholnoky 1959, 35, fig. 189, 190). The author pointed out (Giffen, l. c.) that Cholnoky had included under one name, two closely related forms which however differed in several important characters justifying their specific separation. Fig. 41. — 634, 638, 664, 665.
- N. mutica* Kützing f. *typica* (cf. Cleve 1894, 129; Hustedt, 1927–1966, part 3, 583, fig. 1502a–f). A fresh water species occasionally found in slightly brackish water but here displaced. — 638.
- N. nasuta* Giffen, 1973, 39, fig. 38, 39. The species is characterised by an asymmetric unilateral central area, transapical and longitudinal striae strong and clear. First recorded and described from St. Helena Bay in the neighbourhood. — 636, 639.
- N. nautica* Cholnoky, 1963, 62, fig. 64 (cf. Giffen, 1967, 270, fig. 68; 1970b, 94). Wide-spread in South Africa. — 636.
- N. normalis* Hustedt, 1955, 29, Pl. 9, fig. 3. (cf. Cholnoky, 1963, 62, fig. 65; Giffen, 1967, 270, fig. 70; 1970a, 284). Dimensions: 40 μm long, 8 μm broad, transapical striae 11, longitudinal striae 27 in 10 μm , that is somewhat smaller than the original description. — 636.
- N. ny* Cleve, 1894, 75, Pl. I, fig. 24. (cf. Hustedt, 1927–1966, part 3, 369, fig. 1459). One or two individuals, which were completely typical of the species, were observed. The species was rare in the region and it is my opinion that it has not previously been recorded from Southern Africa. — 617.
- N. orthoneoides* Hustedt, 1955, 31, Pl. 7, fig. 14. (cf. Hustedt, 1927–1966, part 3, 345, fig. 1455; Giffen, 1967, 270, fig. 70). Very rare in the material and also reported previously as very rare on the east coast (Indian Ocean). — 636.
- Navicula osterosa* n. sp. Valve linear with cuneate slightly produced rounded ends, 38–40 μm long, 7 μm broad. Raphe straight, filiform, central pores moderately close, terminal fissures small, curved. Axial area narrow, central area small circular. Transapical striae 24 in 10 μm in the middle, to ca. 40 or more at the ends radiate throughout, in the middle somewhat stronger and alternately longer and shorter, longitudinal striae very fine not visible. Type slide No. 636/16 in the Giffen Collection. Iconotype figures No. 42.
- N. osterosa* n. sp. *Valvae linearis apicibus cuneatis rotundatis leniter productis, 38–40 μm longae, 7 μm latae. Raphe directa filiformis poris centralibus modice approximatis, fissuris terminalibus parvis. Area axialis angustissima area centralis parva*

rotundata, striae transapicales in media parte valvae validior, alternatim longiores brevioresque, 24 in 10 μm , ad polos usque ad 40 in 10 μm , in toto longitudine valvae radiantis.

Habitat: in aquis marinis Oceani Atlantici in lacunae Saldanha loci Oesterwal dicti, Provincia Capensis.

Typus: praeparatum No. 636/6 in collectione Giffen, Fort Hare, Provincia Capensis. Iconotypus: figurae nostrae No. 42.

This species belongs to the section *Naviculae subtilissimae* Hustedt and resembles *N. Jaagii* Meister, which however has much finer transapical striae and is an alpine fresh water form, and also *N. bryophila* J. B. Petersen a smaller, narrower species with striation finer and convergent at the ends.

N. palpebralis Brébisson ex W. Smith (cf. Hende, 1964, 216, Pl. 34, fig. 13, 14; Peragallo, 1897–1908, Pl. 10, fig. 17–24; Giffen, 1975, 86, fig. 84). A very variable species of which several described varieties could be separated in the material. As Hende states, the variation is such that if the individuals are carefully selected to fit the descriptive terms used, several varieties can be found. However if the whole population is considered the terms are totally inadequate. The species was fairly frequent in the material and is wide-spread in South Africa. — 634, 636.

N. Patrickae Hustedt, 1955, 26, Pl. 8, fig. 16. (cf. Hustedt, 1927–1966, part 3, 64, fig. 1648).

Several individuals of this species were observed in one sample from apparently a similar habitat to that of Hustedt, i.e. from mud on beaches. Other than slightly wider striation i.e. 15 in 10 μm as against 20 in 10 μm (Hustedt), the South African forms are identical. The species is distinguished from other small elliptical members of the *Naviculae Punctatae* by the very short axes of the raphe. Dimensions of the local forms: 16–18 μm long, 9–10 μm broad, transapical striae 15 and puncta 15 in 10 μm . Fig. 43. — 639.

N. pennata A. Schmidt (cf. Cleve, 1895, 32; Peragallo, 1897–1908, Pl. 11, fig. 25, 26).

Always rare but fairly widely distributed in South Africa. — 634, 636.

N. peregrina (Ehrenberg) Cleve (cf. Hustedt, 1930, 300, fig. 516; Hende, 1951, 52, Pl. 16, fig. 5, Pl. 17, fig. 12). Wide-spread. — 664.

N. ponticola Giffen, 1970a, 284, fig. 100, 101. (cf. Giffen, 1975, 85, fig. 87).

This species, first described from the Kowie River, Eastern Cape Province, is now recorded from the west coast Atlantic shore. It is possibly wide spread on the South African littoral. In A. Schmidt Atlas (T. 2, fig. 34 as *N. lyra* var. *elliptica*) is figured a form from Zanzibar. This form is certainly not a variety of *N. lyra* (see Hustedt, 1927–1966 vol. 3, 510, note at foot of page on this figure). It is however identical with the above species *N. ponticola* and the Hustedt figure refers to the local species. — 634, 639.

N. pseudogamma Giffen, 1967, 272, fig. 76, 77. (cf. Giffen 1970a, 285). This species is characterised by the terminal fissures in contrary directions. It is apparently wide-spread occurring on both the Indian and Atlantic shores. — 634, 636.

N. pseudoinflata Giffen, 1975, 87, fig. 90–93.

Recently described from a station in Saldanha Bay, this species is closely related to *N. ulvacea* (Dickie) Cleve, *N. subinflata* Grunow and *N. subinflatoidea* Hustedt (Hustedt, 1927–1966, part 3, 289, 292, and 294 with figs. 1413, 1415, 1416), but differs from all these in the structure of the central area where it is bounded by several strong and somewhat irregular striae. Fig. 46. — 664.

N. pseudony Hustedt, 1955, 23, Pl. 8, fig. 11. (cf. Hustedt, 1927–1966, part 3, 370, fig. 1460).

The local specimens agree in all characters but for much closer striae 21 in 10 μm which actually places it close to *N. ny* Cleve which has 24 in 10 μm . The species has been previously recorded from several regions in South Africa by the author and by Cholnoky (1968) from the St. Lucia Lagoon, Natal, a similar habitat. — 617, 634, 636, 664, 665.

N. pseudosalinarum Giffen, 1975, 87, Fig. 94–96.

A recently described species from the same region (Langebaan) which is very similar to *N. salinarum* but much smaller and more delicate in structure. Dimensions: 24–35 μm long, 6–7 μm

broad, transapical striae 20 in 10 μm , alternately longer and shorter in the middle. — 617.

N. raphoneis (Ehr.?) Grunow (cf. Cleve, 1895, 36, Pl. I, fig. 30; Giffen, 1971, 7, fig. 33–35).

Frequent in some samples. — 634, 636, 639, 665.

N. Reichardtii Grunow in V. H. Syn. 1880, T. 10, fig. 9, (cf. Hustedt, 1927–1966, part 3, 366, fig. 1458).

This species is very similar to *N. ny* Cleve but lacks the short transapical striae in the side areas which forms a structureless space. The species seems to be very rare in the South African littoral not having been previously recorded. — 638.

N. rhombica Gregory (cf. Cleve, 1894, 152; Peragallo, 1897–1908, Pl. 8, fig. 10; Hustedt, l.c. 325, fig. 1441). — 634.

N. salinarum Grunow (cf. Cleve, 1895, 19; Hustedt, 1930, 295, fig. 498; Giffen, 1970a, 286).

Frequent and wide-spread in South Africa. — 639, 665.

N. salinicola Hustedt (cf. Hustedt 1939, 638, fig. 61–69; Giffen, 1963, 242, fig. 79, 80; Cholnoky, 1960a, 78, fig. 242). Wide-spread and often frequent. — 635.

N. scopulorum Brébisson in Kützing Sp. Alg. (cf. Hustedt, 1927–1966, part 3, 25, fig. 86). — 636, 664.

N. speibonae Giffen, 1970b, 94, fig. 44, 45.

This species described first from the cold Atlantic waters near Cape Town is characterised by lanceolate-elliptical valves with strongly radiate transapical striae 10 in 10 μm , of which the 4 or 5 middle striae are considerably shortened to form a large quadrate fascia almost reaching the margin. Dimensions: 28 μm long, 8.5 μm broad, transapical striae 10 in 10 μm . Fig. 47. — 639.

N. subforcipata Hustedt 1927–1966, part 3, 533, fig. 1569, (cf. Giffen, 1973, 8, fig. 41; 1975, 88, fig. 120).

Wide-spread and often frequent. — 665.

N. versicolor Grunow (cf. Cleve, 1895, 65, 66; Hustedt, l.c. 529, fig. 1567).

Not previously recorded from the South African littoral but not infrequent in the material. — 634, 636.

N. viminoides Giffen, 1975, 88, fig. 99–101.

Previously recorded from a station in the same region (Langebaan, Saldanha Bay). *N. viminoides* is a small species 10–14 μm long, 5.5–6 μm broad with 12 transapical striae in 10 μm , transverse in the middle to slightly radiate at the ends, longitudinal striae well marked. The middle striae tend to fail somewhat forming a lanceolate central area. — 617.

N. vittata (Cleve) Hustedt. (cf. Hustedt 1955, 22, Pl. 8, fig. 3–5, 12; Cleve, 1894, 80, Pl. I, fig. 15; Cholnoky 1963, 71, fig. 86; Giffen, 1973, 40, fig. 47).

Wide-spread and not uncommon in the samples. — 634, 638, 640.

Nitzschia Hassall 1845.

N. acuminata (W. Smith) Grunow (cf. Hustedt, 1930, 401, fig. 764; Giffen, 1970a, 287). — 617, 638, 665.

N. adducta Hustedt, 1955, 43, Pl. 15, fig. 21, 22.

Typical examples of this species were observed in one sample. The species does not seem to have been recorded previously from the South African littoral. Length 21–22 μm , breadth 5–6 μm transapical striae 18 in 10 μm , carinal pores 18 in 10 μm . Fig. 48. — 638.

N. aerophila Hustedt 1942b, 70, fig. 46, (cf. Cholnoky 1960,

90, fig. 269, 270; 1968, 67, fig. 108–111; Giffen, 1975, 88). Cholnoky (1960 l.c.) records this species from the brackish waters of Natal and (1968, l.c.) from the St. Lucia Lagoon, Natal which is also brackish. In this paper Cholnoky also emends the description to include a larger variation of dimensions viz. 20–50 μm long, 7.5–11 μm broad, carinal pores 13 in 10 μm , transapical striae ca 27 in 10 μm . The local examples fall into these limits, being closer to the minimum measurements. — 617.

N. aestatis Giffen, 1973, 40, fig. 48, 49.

This species, previously recorded from neighbouring regions may prove fairly wide-spread along the Atlantic coast of the Western Cape Province. — 639.

N. closterium W. Smith (= *Cylindrotheca closterium* (W. Smith) Reimann & Lewin). (cf. Giffen, 1967, 274). — 636, 639.

- N. cocconeiformis* Grunow (cf. Peragallo, 1897–1908, Pl. 75, fig. 15; Cholnoky, 1955, 20, fig. 36, 37; Giffen, 1963, 244). A typical brackish water species common throughout the South African littoral and estuaries but very variable in size and shape. — 638.
- N. composita* Giffen 1971, 8, fig. 42, 43. Typical and numerous examples were observed. The author now adds to the original description "girdle view with intercalary bands 15 in 10 μm " and gives emended measurements: 60 to 290 μm long 4–8 μm broad, striae 20–30 in 10 μm . The species is very variable the largest individuals apparently occurring in brackish waters. It seems also to be wide-spread, having been observed in material from Mauritius and Seychelles (Giffen *ms*). — 636, 664.
- N. distans* Gregory var. *tumescens* Grunow (cf. Peragallo, 1897–1908, Pl. 73, fig. 1, 2; Heiden & Kolbe. 1928, 664; Giffen, 1963, 245, fig. 85). Not uncommon in the material. The type is fairly wide-spread in South Africa but this seems to be the first record of the variety. — 634, 636, 664.
- N. distantoides* Hustedt, 1958, 171, fig. 161 (cf. Giffen, 1967, 274, fig. 83, 84; Cholnoky, 1963, 72, fig. 90, 91). The author l.c. emended both Hustedt's and Cholnoky's descriptions to include considerably longer forms. The South African specimens range from 50–96 μm long, 5 μm wide, carinal pores 2.5 to 5 in 10 μm . The species is wide-spread. — 636.
- N. elliptica* Hustedt var. *alexandrina* Cholnoky, 1958, 258, fig. 29, 30 (cf. Cholnoky, 1963b, 246, fig. 25–27; Giffen, 1970a, 588). Wide-spread in both eastern and western coasts of the Cape Province. — 639.
- N. erosa* Giffen, 1967, 274, fig. 85–87. Described from the East coast, the species is characterised by the ends of the valve which are oblique with small rounded sinuses close to the margin and producing a more or less S-shaped end. Fig. 49. — 634, 636.
- N. frustulum* (Kütz.) Grunow. — 664.
- N. frustulum* var. *subsalina* Hustedt. — 664.
- N. hybrida* Grunow (cf. Hustedt, 1930, 406, fig. 778; Peragallo, 1897–1908, Pl. 70, fig. 29). The forms seen in one sample were considerably larger than previously observed i.e. up to 128 μm long with a maximum width of 12 μm , somewhat wider carinal pores 9–10 in 10 μm and transapical striae the usual 24–27 in 10 μm . These are considerably larger than described by Hustedt, 1930 l.c., but there is no doubt as to their identity. — 638.
- N. hybridaeformis* Hustedt, 1955, 44, Pl. 15, fig. 9–11. A few fairly large forms which I have, with considerable doubt, assigned to the species, were observed in one sample. They are inseparable in size, shape and the irregularity and number of carinal pores but the transapical striae could not be resolved even with phase-contrast. I hesitate to separate these forms from *N. hybridaeformis* Hustedt but must regard them as an African form. — 638.
- N. incrustans* Grunow (cf. Cholnoky, 1968, 73, fig. 134–138; Giffen, 1971, 9, fig. 44, 45. Peragallo, Pl. 73, fig. 16 as *N. lanceolata* var. *incrustans* Cl. et Grunow). Wide-spread and often abundant. — 664.
- N. laevis* Hustedt, 1939, 662, fig. 116–118, (cf. Cholnoky 1968, 74, fig. 141; Giffen, 1967, 276). Wide-spread and frequent. — 664.
- N. lanceolata* W. Smith (cf. Peragallo, 1897–1908, Pl. 73, fig. 20, 21; Giffen, 1967, 276). Wide-spread. — 638, 665.
- N. litoralis* Grunow (cf. Peragallo, l.c. Pl. 69, fig. 15–18; Giffen, 1973, 41, fig. 54, 55). — 617.
- N. longissima* (Bréb.) Ralfs (cf. Hustedt in A. Schmidt, Atlas, T. 335, fig. 1, 2; Giffen, 1967, 276; 1970a, 291). The length of some of the examples seen reached to around 330 μm long. The species was not infrequent in the material. — 638, 664, 665.
- N. marginata* Hustedt, 1955, 46, Pl. 16, fig. 11, 12. Numerous examples were seen in one sample. The habitat of the South African forms is apparently similar to that of Hustedt's Beaufort, North Carolina specimens, that is, from a muddy beach. The dimensions of the local examples are 32–48 μm long, 2–3 μm broad, carinal pores 12 in 10 μm . These fit in with the original description very closely. This seems to be the first recording of the species outside the North American region. Fig. 50. — 635.
- N. martiana* Agardh (cf. Peragallo, 1897–1908, Pl. 72, fig. 20; Giffen, 1971, 9, fig. 48). Dimensions: length to 120 μm , breadth 4 μm , carinal pores 5–6 in 10 μm , somewhat irregularly spaced. Previously recorded only from the South coast. — 636, 640.
- N. obtusa* W. Smith. — 638.
- N. obtusa* var. *scalpelliformis* Grunow (cf. Hustedt in A. Schmidt, Atlas, T. 336, fig. 22–26). Usually very much more abundant along the South African coasts than the type. Brackish and estuarine. — 638, 664.
- N. ovalis* Arnott (cf. Hustedt, 1930, 417, fig. 808; Cholnoky, 1963, 75, fig. 97). Although recorded from several localities in South Africa the species seems never to be frequent in the samples. — 639.
- N. perpusilla* Rabenhorst (cf. Hustedt, 1930, 349 as *N. frustulum* var. *perpusilla*; Cholnoky, 1966a, 202). As Cholnoky notes, this should be regarded as a separate species from *N. frustulum* (Kütz.) Grunow. It is more a brackish water or estuarine species than a marine littoral form. — 639, 640, 665.
- N. procera* Hustedt, 1955, 47, Pl. 16, fig. 6, 7; Giffen, 1970a, 292, fig. 79; 1971, 10, fig. 51). The species is fairly wide-spread in South Africa. Most examples are more or less typical but usually shorter than the original description viz. 63–68 μm long and somewhat broader i.e. 5.5–6 μm broad, carinal pores 7–8 in 10 μm , transapical striae 27–30 in 10 μm , longitudinal striae very fine. — 665.
- N. pseudohybrida* Hustedt, 1955, 45, Pl. 15, fig. 3–4. (cf. Giffen, 1967, 277, fig. 93). Most of the examples that have been observed are fairly typical but frequently coarser individuals are seen that are 25–50 μm long, 6–8 μm broad with carinal pores 13–15 in 10 μm and striae 27–30 in 10 μm . — 634, 638, 664.
- N. rorida* Giffen, 1975, p. 90, fig. 103, 104). This species was recently described from Langebaan in the Saldanha Lagoon. It is characterised by the striation in three systems, transverse and oblique (quincunx). It is similar to *N. ruda* Cholnoky (1968, 79, fig. 144–146) but considerably larger with coarser striation and a distinct longitudinal fold. The carinal pores are much the same in number and type. It was rare in one sample. Dimensions: 40 μm long, 10 μm wide 8 μm at the constriction, carinal pores 10 in 10 μm , striae 24 in 10 μm . Fig. 51. — 617.
- N. sigma* (Kütz.) W. Smith. — 636.
- N. sigmaformis* Hustedt, 1955, 47, Pl. 16, fig. 2, 3. (cf. Giffen, 1967, 278, fig. 95). The species was previously recorded with some doubt (Giffen 1967 l.c.) but further observations serve to link up the doubtful examples, which usually show very slightly capitate ends, with those that conform to Hustedt's diagnosis. The species is apparently wide-spread, occurring on both the east and west coasts of the Cape Province. Fig. 52. — 634, 636.
- N. socialis* Gregory (cf. Peragallo, 1897–1908, Pl. 72, fig. 7, 8; Giffen, 1973, 42). Cosmopolitan, wide-spread in South Africa. — 636, 638.
- N. socialis* var. *massiliensis* Grunow (cf. Peragallo, l.c. Pl. 72, fig. 10). The variety differs from the type only in closer striation and somewhat closer spaced carinal pores. Measured examples show that the type and variety are linked by an unbroken series in the keel points and the striation and separation is not really justified. — 634, 664, 665.
- N. spatulata* Brébisson in W. Smith (cf. Peragallo, l.c. Pl. 73, fig. 4; Giffen, 1963, 248, fig. 94). Wide-spread and not uncommon on sand and mud. — 634, 638, 665.
- N. steenbergensis* Giffen, 1973, 42, fig. 61, 62. In the original description the dimensions were given as 48–54 μm long, 5–6 μm broad, carinal pores small 9–11 in 10 μm ,

transapical striae 24–25 clearly punctate, puncta in undulate rows. In the present material many valves were of much greater length, up to 136 μm long, 4 μm wide, carinal pores 9 in 10 μm , striae 24 in 10 μm . These forms cannot be separated except in length, so the original diagnosis should be emended to include individuals up to 136 μm long. — 664.

N. Stompsii Cholnoky, 1963, 75, fig. 100–102. (cf. Giffen, 1967, 279, fig. 97).

Wide-spread in South African littoral on both east and west coasts, not uncommon. — 638, 664, 665.

N. subpunctata Cholnoky, 1960, 104, fig. 314; 1962b, 60, fig. 100; 1968, 80, fig. 149.

In his figures and description Cholnoky states that he was not able to see the carinal puncta. In the material under review, they are also obscure but occasionally a cell, probably lying in a favourable position, showed a keel with 18 puncta in 10 μm . Dimensions: 12–13 μm long, 7–8 μm broad, carinal puncta 17–18 in 10 μm , transapical striae 17–18 in 10 μm . Fig. 53. — 638.

N. Vidovichii (Grunow) Peragallo (cf. Peragallo 1897–1908, Pl. 72, fig. 13. Giffen, 1967, 279).

Wide-spread and frequent. — 636, 664, 665.

N. vulpeculooides Giffen, 1971, 42, fig. 63–65.

This species, a member of the section *Bilobatae* Grun. is characterised by a quincunx arrangement of the striae. It has not hitherto been found outside the west coast (Atlantic) of Southern Africa. — 634, 636.

Opephora Petit 1888.

O. parva (Grunow) Krasske, 1939, 359, Pl. 10, fig. 8–10 (cf. Peragallo, 1897–1908, Pl. 83, fig. 5 as *Grunowia parva* (Grun.) H. van Heurck; Salah, 1972, 156, Pl. 1, fig. 3 as *O. parva* (H.V.H.) Krasske; Cholnoky 1955, 21, fig. 39 only as *O. angusta* Chol.; 1959, 61, fig. 323–325 as *O. pacifica* (Grun.) Petit; Edsbacke, 1966, 57, Pl. 1, fig. 1, Pl. 2, fig. 2 as *O. lineata*; Giffen, 1967, 281, fig. 102, as *O. pacifica*; Hustedt, 1955, 13, Pl. 4, fig. 47 only). Considerable confusion exists over the nomenclature of this small species. Hustedt, l.c. added to the confusion by including in *O. pacifica* in his monograph of the Beaufort N. C. diatoms, fig. 47 which agrees with *O. parva* in all characters. This led Cholnoky to sink *O. angusta* Cholnoky in *O. pacifica*. Giffen, 1967 followed suit. Edsbacke 1966 l.c. published *O. lineata* Edsbacke which seems to agree in all characters with *O. parva* and probably belongs here also. Hustedt, 1927–1966, part 2, 137 places *Grunowia parva* (Grun.) Peragallo among doubtful species and suggests confusion with a form of *Fragilaria pinnata* Ehr. I think the weight of evidence however is against his decision and we can accept *O. parva* (Grun.) Krasske as an acceptable species. Dimensions: 8–13 μm long, 2–3 μm broad, transapical striae 9–12 (10–11) in 10 μm , pseudoraphe very narrow to moderately narrow, striae with a tendency to overlap at the ends. Fig. 54, 55. — All samples 617–666.

O. gemmata (Grunow) Hustedt. (Hustedt, 1927–1966, part 2, 136, fig. 657; Giffen, 1967, 280, fig. 103).

Wide-spread and often abundant but rare in the local samples. — 638.

O. Martyi Héribaud (cf. Hustedt, l.c. 135, fig. 654; Giffen, 1967, 281, fig. 104). — 638, 664, 665.

O. pacifica (Grun.) Petit (cf. Hustedt, l.c. 135, fig. 655; 1955, 13, Pl. 4, fig. 48, 49 but not fig. 47 which is *O. parva* (see above); Giffen, 1967, 280, fig. 102).

The species is wide-spread and often abundant in the South African littoral. — 636, 638.

O. Schwartzii (Grun.) Petit (cf. Hustedt, 1955, 13, Pl. 4, fig. 46; Henedy, 1970, 125, Pl. 5, fig. 50; Giffen, 1975, 91, fig. 108). Recorded previously in the same region as rare (Giffen, 1974). Several examples were observed in the region under review. The valves show the double rows of puncta mentioned and figured by Hustedt very clearly. Dimensions: to 80 μm wide, transapical striae 3 in 10 μm . — 636, 638, 639.

Pinnularia Ehrenberg 1843.

P. ambigua Cleve, 1895, 94; Hustedt in A. Schmidt, Atlas T. 313, fig. 20, 21; Giffen, 1970a, 294, fig. 60.

Typical examples were observed but were not frequent in the samples. — 636.

P. rectangulata (Gregory) Rabenhorst, 1864, p. 215; *Navicula rectangulata* Gregory, 1857a, 479, Pl. 9, fig. 7. Henedy, 1964, 233, Pl. 34, fig. 10; Giffen, 1967, 282, fig. 109.

Amongst the many examples of this species were a number of forms in which the central area was extended to the margins. These are very like *P. cruciformis* (Donk.) Cleve which however differs in the more tapering ends and closer striation. In an earlier paper the author (1967) incorrectly placed this fasciate form with *P. cruciformis* and figured it as such (see Giffen, 1967, 282, fig. 108). The fasciate form is shown in fig. 57. Fig. 56, 57. — 636.

Plagiogramma Greville 1859.

P. appendiculatum Giffen, 1975, 91, fig. 109–112.

This recently described species is characterised by the possession of appendages along the margins of the valve. Seen in girdle view they appear as short peltate bodies but in valve view as marginal puncta. The species has been recorded in several localities and is probably widely distributed. Fig. 58, 59. — 634, 636, 639, 664, 665.

P. occasum Giffen, 1975, 91, fig. 113–116.

A newly described species from the same region as the above i.e. Saldanha Bay. This species is characterised by a rhombic lanceolate valve, constricted in the middle with tapered to slightly produced ends. Transapical striae radiate, 12–13 in 10 μm . It was frequent in the material and appears widely distributed in the Atlantic littoral of South Africa. Fig. 60. — 635, 636, 638, 639.

P. pygmaeum Greville (cf. Hustedt, 1955, 11, Pl. 4, fig. 30–34. 1927–1966, part 2, 108, fig. 634; Giffen, 1975, 92, fig. 117). Recorded earlier from the same region. — 634, 636, 639.

P. Vanheurckii Grunow (cf. Hustedt 1927–1966, part 2, 112, fig. 638; Boden, 1950, 405, fig. 85; Giffen, 1971, 10, fig. 52, 53). Wide-spread in South African littoral and plankton. It was somewhat scarce in the local material. — 617.

Pleurosigma W. Smith 1852.

P. aestuarii Brébisson (cf. Cleve, 1894, 42; Peragallo, 1897–1908, Pl. 33, fig. 9; Giffen, 1970a, 295).

The species is wide-spread in South Africa on both western and eastern coasts. It also appears to be very variable in size and particularly in the striation. — 634, 635.

P. (Donkinia) carinatum Donkin (cf. Cleve, 1894, 44; Hustedt, 1955, 36, Pl. 12, fig. 3; Giffen, 1967, 282, fig. 110; Henedy, 1970, 153, as *Donkinia carinata* (Donkin) Ralfs).

In the South African material the striation shows considerable variation from transverse: oblique 17/18, 18/18, 21/21. — 634, 635, 636.

P. elongatum W. Smith (cf. Cleve, 1894, 38; Peragallo, l.c. Pl. 31, fig. 11, 12; Giffen 1970a, 296). — 665.

P. intermedium W. Smith (cf. Cleve, 1894, 34 as *P. nubecula* var. *intermedium* W. Sm. Giffen, 1963, 250, fig. 97).

This species and its var. *mauritanica* Grunow (Hustedt, 1955, 35, Pl. 10, fig. 12) were dealt with in Giffen, 1970b, 95, fig. 46, where the author, after examination of a considerable number of individuals, came to the conclusion that the variety, which is linked up with the type by an unbroken series of intermediate forms, should be included in the type. — 635.

P. Normanii Ralfs in Pritch. (cf. Cleve, 1894, 40; Peragallo, 1897–1908, Pl. 32, fig. 4–6 as *P. affine* var. *Normanii*; Giffen, 1970a, 297). Wide-spread. — 634.

P. strigosum W. Smith (cf. Cleve, 1894, 41; Peragallo, l.c. Pl. 32, fig. 22–23; Giffen, 1963, 250, fig. 99). Wide-spread. — 636, 638, 664.

Pseudonitzschia H. Peragallo 1897–1908.

P. ? australis Frenguelli (cf. Hustedt, 1955, 43, Pl. 15, fig. 1; Giffen, 1973, 43, fig. 68).

The author l.c. discussed the discovery of a species of *Pseudonitzschia* in the South African littoral which differs in some characters from those described, being intermediate between

certain described species, and adopted the above name until more is known of the genus, its species and variations. A fragment, easily recognizable, was observed in one sample. — 634.

Pyxidicula Ehrenberg 1883.

P. minuta Grunow (cf. Hustedt 1927–1966, part 1, 301, fig. 139; Giffen, 1967, 283).

As stated previously much of the South African material seen by the author here and in other localities, link up *P. minuta* Grun. with *P. africana* Cholnoky. Some individuals with areolae rows of 6–7 in 10 μm also connect with *P. mediterranea* Grun. The forms observed in the local samples were more or less 24 μm in diameter with 6.5 rows of areolae in 10 μm . — 617.

Rhabdonema Kützing 1844.

R. arcuatum (Lyngbye) Kützing (cf. Hustedt, 1927–1966, part 2, 20, fig. 549; M. Schmidt in A. Schmidt, Atlas, T. 220, fig. 3–22). This species is very variable in size. Hustedt, l.c. gives the range as 40 to 150 μm in length, but the South African material shows forms only half the length described viz. rarely reaching 20 μm (Giffen, 1973, 44). Such small forms were present in the samples examined here. — 638.

R. arcuatum var. *robustum* (Grunow) Hustedt (cf. Hustedt, 1927–1966, part 2, 20, fig. 550; Fricke in A. Schmidt, Atlas, T. 221, fig. 17–20 as *R. robustum* Grun. Giffen, 1970b, 95). Wide-spread and often abundant, although rare in the local samples. — 617.

R. minutum Kützing (cf. Hustedt, l.c. 18, fig. 584a–d; Giffen, 1975, 93).

Not uncommon in the samples. In Giffen 1975, it is reported as abundant and very variable in size, from 10–70 μm . — 636, 638.

Rhoicosphenia Grunow 1860.

R. Adolphi M. Schmidt in A. Schmidt, Atlas, T. 213, fig. 20–23; Giffen, 1970b, 96, fig. 51–54.

Wide-spread in the South African littoral but infrequent in the local material. — 617.

R. curvata (Kützing) Grunow (cf. Hustedt, 1927–1966, part 2, 430, fig. 879; Cholnoky, 1963, 77).

Cholnoky, who first reported this species from South Africa regarded it as a displaced fresh water species. Hustedt, in his note on distribution places it as a brackish water form. There is no doubt that the examples seen in one sample from a brackish station are autochthonous. — 636.

R. flexa Giffen, 1970b, 96, fig. 55–58.

This species differs from the well-known *R. marina* (W. Sm.) M. Schmidt in the strongly radiate, coarsely punctate and wider transapical striae, 8–12 in 10 μm . — 617.

R. marina (W. Smith) M. Schmidt in A. Schmidt, Atlas, T. 213, fig. 28–34; Hustedt, l.c. 432, fig. 880; Giffen, 1975, 93). Recently reported by the author from Saldanha Bay and always rare. — 634, 636.

Rhopalodia O. Muller 1895.

R. gibberula (Ehr.) O. Muller (cf. Hustedt, 1930, 391, fig. 742). — 638, 639, 665.

R. musculus (Kütz.) O. Muller. (cf. Hustedt, l.c. 392, fig. 745). — 638, 664.

Stauroneis Ehrenberg 1843.

S. africana Cleve, 1881, 15, Pl. 3, fig. 42. (cf. Cleve, 1894, 145.

St. salina sensu Hustedt 1927–1966, 786, fig. 1133 non *S. salina* Wm. Smith, 1853, 60, Pl. 19, fig. 188. Hendey, 1964, 219). Hendey l.c. gives an account of *S. africana* Cleve and the confusion of that species with *S. salina* W. Smith. In *S. africana* the striae are somewhat finer i.e. 20–25 in 10 μm and the stauron is narrow, reaching the margin towards which it narrows slightly. In *S. salina* the stauron widens somewhat towards the margins where it is mostly interrupted by short striae, either on one side or on both sides of the valve. Incidentally the type locality is Zwartkops (Swartkops) Cape Province. — 634, 636, 638, 664, 665.

S. decipiens Hustedt (cf. Hustedt, 1927–1966, part 2, 827, fig. 1170; Giffen, 1973, 44, fig. 69–71).

Present in only one sample and not frequent. — 664.

S. Gregorii Ralfs in Pritchard, f. *linearis* Hustedt, 1927–1966, part 2, 791, fig. 1136.

Typical examples were seen, somewhat shorter than described, viz. 60–65 μm long 9 μm broad, with 15–16 transapical striae in 10 μm . Not uncommon. — 634.

S. salina Wm. Smith (cf. Hendey, 1964, 211). — 638.

Striatella Agardh 1832.

Striatella aberrans n. sp.

Frustule in girdle view rectangular with rounded corners 28–42 μm long 15–22 μm broad. Intercalary bands numerous 8–10 in 10 μm , clearly punctate puncta 21 in 10 μm . Valve extremely convex V-shaped in cross section, 28–42 μm long, estimated total width 7–8 μm . Axial area narrow, expanded unilaterally into a fascia reaching the margin. Transapical striae on the fasciate side 18 in 10 μm in the middle parallel, to 24 in 10 μm at the ends apparently radiate, clearly punctate about 12 in 10 μm , forming undulate longitudinal lines, on the other side of the pseudoraphe more widely spaced and stronger in the middle 8–9 in 10 μm to 18 in 10 μm at the ends.

Type slide 636/12 in the Giffen Collection, iconotype figures Nos. 61, 62.

Striatella aberrans n. sp.

Frustula in fascia connectivale visum rectangulata angularis rotundatis 28–42 μm longa, 15–22 μm lata. Copulae pleurae numerosae 8–10 in 10 μm , valde punctatae, punctis circiter 21 in 10 μm . Valvae maxime convexae V-formatae 28–42 μm longae, latae valvorum incognita (fortasse 7–8 μm). Area axiali angustissima area centrali latera una fascia rectangulata ad marginem attingens composita, in latera altera fascia nulla. Striae transapicales in latera fasciata in media parte 18 in 10 μm parallela, ad polos radiantes 24 in 10 μm , distincte punctatae, striis longitudinales leniter undulatae. In latera non-fasciata striae transapicales in media parte valde 8–9 in 10 μm ad polos 18 in 10 μm . Habitat: in aquis marinis Oceani Atlantici in lacunae Saldanha, loci Oesterwal dicti, Provincia Capensis. Typus: praeparatum 636/12 in collectio Giffen, Fort Hare, Provincia Capensis. Iconotypus: figurae nostrae N.s 61, 62.

Striatella aberrans n. sp. does not seem to be closely related to any described taxon although in the unilateral fascia it resembles somewhat *S. Hustedtiana* Patrick (1970, 498, fig. 1 A & B).

The cell is very narrow from side to side being only 4–5 μm , making the valve an inverted V-shape. In spite of a considerable search no valve view could be obtained and the total breadth of the valve had to be estimated. It was not uncommon in the material. The figures show a complete cell from one side and a portion of another from the opposite side. Fig. 61, 62. — 636.

S. delicatula (Kützing) Grunow. (cf. Hustedt, 1927–1966, part 2, 33, fig. 561; Cholnoky, 1968, 89, fig. 163; Giffen 1971, 11). Wide-spread and often frequent. The South African examples are very variable in size and also in the number of striae in 10 μm , e.g. Sea Point 15 in 10 μm , Gordon's Bay 20 in 10 μm , Saldanha Bay to 24 in 10 μm . — 638.

S. unipunctata (Lyngbye) Agardh (cf. Hustedt, l.c. 32, fig. 560; Giffen, 1967, 265). — 634, 636, 664.

Surirella Turpin 1828.

S. fastuosa (Ehrenberg) Kützing. (cf. Peragallo, 1897–1908, Pl. 68, fig. 5, 6, 7).

Wide-spread and often abundant. — 638.

S. gemma (Ehrenberg) Kützing. (cf. Peragallo. l.c. Pl. 68, fig. 4; Giffen, 1967, 286).

Wide-spread and often abundant in the South African littoral and estuaries. — 636, 638.

Synedra Ehrenberg 1830.

S. tabulata (Agardh) Kützing. (cf. Hustedt, 1927–1966, part 2, 218, fig. 710a–d; A. Schmidt, Atlas, T. 304, fig. 6–12 as *Synedra affine* Kg; Giffen, 1963, 254).

This is the most wide-spread and abundant species of *Synedra* to be found in the South African littoral. — 634–638, 664–666.

S. tabulata var. *fasciata* (Kützing) Grunow (cf. Hustedt l.c. 218, fig. 710i–l; Giffen, 1967, 254). — 638, 639, 640.

Trachyneis Cleve 1894.

T. aspera (Ehrenberg) Cleve (cf. Cleve, 1894, 191; A. Schmidt, Atlas, t. 48, fig. 21, 22 as *Navicula aspera* Ehr); Giffen, 1963, 258, fig. 106, 107).

Wide-spread and abundant. — 634, 636, 638, 639, 640, 664, 666.

T. spei-bonae Giffen, 1970b, 97, fig. 62, 63. This is a small species never frequent in any sample and as yet confined to the Atlantic coast of the Cape Province. — 617.

Triceratium Ehrenberg 1841.

T. alternans Bailey (cf. Hustedt, 1927–1966, part 1, 825, fig. 488; Peragallo, Pl. 103, fig. 1; Giffen, 1975, 94).

As yet the genus has only been recorded from the Atlantic coast of the Cape Province, not infrequent. — 664.

T. reticulatum Ehrenberg (cf. Hustedt, 1927–1966, part 1, 823, fig. 485, 486; Peragallo, Pl. 104, fig. 7–9; Giffen, 1975, 94).

Typical examples were observed and were not infrequent. — 664, 665.

Tropidoneis Cleve 1891.

T. lepidoptera (Gregory) Cleve (cf. Cleve, 1894, 25; Peragallo, Pl. 39, fig. 3–7; Giffen, 1963, 255).

Widely distributed and often abundant. — 634, 639.

T. pusilla (Gregory) Cleve (cf. Cleve, 1894, 26; Peragallo, Pl. 39, fig. 17–18 as *T. lepidoptera* var. *pusilla* Greg.; Giffen, 1973, 48). Often abundant. — 634, 636, 664.

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References

- Brockmann, Chr. 1950. Die Watt-Diatomeen der Schleswig-Holsteinischen Westküste. *Senckenb. Naturf. Ges.* 478: 1.
- Castracane, A. F. 1886. Report on the Diatomaceae. Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873–1876. *Challenger Reports*, Botany 2.
- Cholnoky, B. J. 1955. Diatomeen aus salzhaltigen Binnengewässern der Kaap-Provinz in Südafrika. *Ber. d. Deutsch. Bot. Ges.* 68: 11–23.
- Cholnoky, B. J. 1959. Neue und seltene Diatomeen aus Afrika IV: Diatomeen aus der Kaapprovinz. *Österr. Bot. Zeitschr.* 106, 1–69.
- Cholnoky, B. J. 1960a. Beiträge zur Kenntnis der Diatomeenflora von Natal. *Nova Hedwigia* 2: 1–128.
- Cholnoky, B. J. 1960b. Beiträge zur Kenntnis der Ökologie der Diatomeen in dem Swartkops-Bache nahe Port Elizabeth (Südost-Kaapland). *Hydrobiologia* 16: 229–287.
- Cholnoky, B. J. 1963a. Beiträge zur Kenntnis des marinen Littorals Südafrika. *Bot. Mar.* 5: 38–83.
- Cholnoky, B. J. 1963b. Zur Kenntnis der Diatomeenflora von Holländisch-Neu-Guinea. *Nova Hedwigia* 5: 157–198.
- Cholnoky, B. J. 1968. Die Diatomeenassoziationen der Santa Lucia Lagune in Natal (Südafrika). *Bot. Mar.* 11 (Suppl.): 1–121.
- Cleve, P. T. 1881. On some new and little known Diatoms. *Bih. Svenska Vetensk. Akad. Handl.* NF 18 (5): 1–28.
- Cleve, P. T. 1894/95. Synopsis of the naviculoid diatoms. Part 1. *K. Svenska. Vetensk. Akad. Handl.* NF 26 (2): 1–194; Part 2. *ibid.* NF 27 (3): 1–219.
- Cox, E. J. 1975. A reappraisal of the genus *Amphipleura* Kütz using light and Electron microscopy. *Br. phycol. J.* 10: 1–12.
- De Toni, G. B. 1894. *Sylloge Algarum omnium hucusque cognitarum*. 2. Bacillariae, sect. 3. Patavia.
- Donkin, A. S. 1861. On the marine Diatomaceae of Northumberland, with a description of several new species. *Quart. Journ. Microsc. Sci.* N.S. 1: 1–15. Pl. 1.
- Edsbagge, H. 1966. Zur Ökologie der marinen angehefteten Diatomeen. *Botanica Gothoburgensia* VI: 1–139, t. 1–7.
- Giffen, M. H. 1963. Contributions to the diatom flora of South Africa. I. Diatoms of the estuaries of the Eastern Cape Province. *Hydrobiologia* 21: 201–265.
- Giffen, M. H. 1967. Contributions to the Diatom flora of South Africa. III. Diatoms of the marine littoral regions at Kidd's Beach near East London, Cape Province. *Nova Hedwigia* 13: 245–292.
- Giffen, M. H. 1970a. Contributions to the diatom flora of South Africa. IV. The marine littoral diatoms of the Estuary of the Kowie River, Port Alfred, Cape Province. *Beihfte zur Nova Hedwigia* 31 (Fr. Hustedt Gedenkband): 239–312.
- Giffen, M. H. 1970b. New and interesting marine and littoral diatoms from Sea Point near Cape Town, South Africa. *Bot. Mar.* 13: 87–99.
- Giffen, M. H. 1971. Marine and littoral diatoms from the Gordon's Bay region of False Bay, Cape Province, South Africa. *Bot. Mar.* 14: 1–16.
- Giffen, M. H. 1973. Diatoms of the marine littoral of Steenberg's Cove in St. Helena Bay, Cape Province, South Africa. *Bot. Mar.* 16: 32–48.
- Giffen, M. H. 1975. An account of the littoral diatoms from Langebaan, Saldanha Bay, Cape Province, South Africa. *Bot. Mar.* 18: 71–95.
- Harvey, H. W. 1945. *Recent Advances in the Chemistry and Biology of Sea Water*. Cambridge University Press.
- Heiden, H. and R. W. Kolbe. 1928. Die marinen Diatomeen der deutschen Südpolar-Expedition, 1901–1902. Erich von Drygalski (Ed.). *Bd. 8 (Botanik)* (5): 447–715.

- Hendey, N. I. 1951. Littoral Diatoms of Chichester Harbour with special reference to fouling. *Journ. Roy. Microsc. Soc.* Ser. III, 71: 1-86.
- Hendey, N. I. 1964. *An Introductory Account of the Smaller Algae of British Coastal Waters*. Part V: Bacillariophyceae (Diatoms). Ministry of Agriculture, Fisheries and Food. i-xxii, 1-317. London.
- Hendey, N. I. 1970. Some littoral diatoms of Kuwait. *Nova Hedwigia*, Beihefte, 31 (Fr. Hustedt Gedenkband): 107-167.
- Hustedt, F. 1927-1966. Die Kieselalgen. Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und der Schweiz. Bd. VII, part I, i-xii, 1-920; part II, i-ix, 1-845; part III, 1-816. Leipzig.
- Hustedt, F. 1930. Bacillariophyta (Diatomaceae). Die Süßwasserflora Mitteleuropas. Heft 10, zweite Aufl. Prof. A. Pascher (Ed.). i-viii, 1-466. Jena.
- Hustedt, F. 1939. Die Diatomeenflora des Küstengebietes der Nordsee vom Dollart bis zur Elbmündung. *Abh. Naturw. Ver. Bremen* 31: 572-677.
- Hustedt, F. 1955. Marine littoral diatoms of Beaufort, North Carolina. *Duke University Marine Station Bulletin* 406: 1-67.
- Hustedt, F. 1959. Die Diatomeenflora der Unterweser von der Lesummündung bis Bremerhaven mit den Unterläufen der Hunte und Geeste. *Ver. Inst. für Meeresf. Bremerhaven*. 6: 13-176.
- Mölder, K. and R. Tynni. 1967-1970. Über Finnlands rezente und subfossile Diatomeen, parts I-VI, *Bull. Geol. Soc. Finland*.
- Møller, M. 1950. Diatoms of the Praestø Fiord. *Folia Geographica Danica* 3: 187-238. Copenhagen.
- Peragallo, H. and M. 1897-1908. *Diatomées marines de France et des districts maritimes voisins*. Text 1-111, 1-393, 1-xii, 1-48, Atlas pl. 1-137. Grez-sur-Loing.
- Ratray, J. 1888. A revision of the genus *Aulacodiscus* Ehr. *J. Roy. Microsc. Soc.* 8: 337-382.
- Salah, M. M. 1952. Diatoms from Blakeney Point, Norfolk. New species and new records for Great Britain. *Journ. Roy. Microsc. Soc.* 72: 155-169.
- Salah, M. M. 1955. Some new diatoms from Blakeney Point Norfolk. *Hydrobiologia* 7: 88-102.
- Schmidt, A. 1872-1959. *Atlas der Diatomeen-Kunde*. Fortgesetzt durch M. Schmidt, F. Fricke, H. Heiden, O. Müller und F. Hustedt. Aschersleben und Leipzig.
- Smith, W. 1853-1856. *A synopsis of the British Diatomaceae* Vol. I, 1853; Vol. II, 1856. London.
- Taylor, F. J. R. 1966. Phytoplankton of the South Western Indian Ocean. *Nova Hedwigia* 12: 433-476.
- Van Heurck, H. 1880-1881. *Synopsis des Diatomées de Belgique*. Texte 1-235, Atlas 1-120 pl. Anvers.
- Van Heurck, H. 1896. A Treatise on the Diatomaceae. i-xx, 1-558, and plates 1-35.

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