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*Diatoms of the marine littoral of Stanley's
Cove in St Helena Bay, C. P., South Africa.*

M. H. GIFFEY.

Diatoms of the Marine Littoral of Steenberg's Cove in St. Helena Bay, Cape Province, South Africa

MALCOLM H. GIFFEN

*University of Fort Hare, Cape Province and Council for Scientific and Industrial Research,
National Institute for Water Research, Pretoria, South Africa*

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In a series of previous investigations of the marine littoral of the South African coast, the author has made observations at various localities along the shores of the Eastern Cape Province, namely the Gulu River Estuary (1963), the Umkantzi River estuary and beach at Kidd's Beach (1967), the Kowie River estuary (1970a) and at Gordon's Bay in False Bay (1971a). All these stations are situated along the shores of the Indian Ocean in the comparatively warm waters of the Mocambique Current. A series of observations, however were made at Sea Point near Cape Town (1970b) which is a cold water station, washed by the Benguella Current, a cold upwelling of the South Atlantic Ocean. The result of this enquiry has led the author to make a series of collections of diatom material up the west coast of the Cape Province, thus extending knowledge of the diatom flora of the South Atlantic Ocean. This report concerns a number of samples taken from the shore at Steenberg's Cove in St. Helena Bay.

St. Helena Bay, a very large inlet on the west coast of Cape Province, is situated about 18° E longitude and 32° 40' S latitude and is well protected from the weather, but on account of a very low mean annual rainfall of about 300 mm, was not exploited as a harbour or township until recently when a fishing harbour was built and an important fish canning and fishmeal industry was established. There are some evident signs of interference with the natural habitat from pollution by fish offal and waste fish oils. The coast is mostly rocky and the heavy Atlantic waves are smoothed by an extensive growth of the large kelps, *Laminaria pallida* GREVILLE and *Ecklonea buccinalis* (LIN.) HORNEM. Rock pools contain luxuriant growths of smaller algae accompanied on certain habitats by sponges.

The following samples were collected from rocky pools and from various seaweeds along the beach below the Steenberg's Hotel. The first number represents the herbarium number from the GIFFEN Collection, the second is the field number.

619 (SH 8) from *Cladophora rugulosa* MARTENS, *Chordiariopsis capensis* (KÜTZING) KYLIN, including small sponges growing on rocks in pools. A very rich sample in which 74 species were identified.

620 (SH 9) from *Cladophora rugulosa* in similar situations to sample 619 above. A fairly rich sample in which 42 species were determined, amongst which the most frequent species were *Rhabdonema arcuatum*, *Pleurosigma intermedium*, and *Cocconeis* spp.

621 (SH 10) from *Corallina* sp., *Caulacanthus divaricatus* (SUHR.) PAPENF., and small sponges. 45 species identified which included a great number of interesting species containing seven of the eleven new species published in this paper.

623 (SH 12) from *Polysiphonia virgata* (AGARDH) SPRENG., epiphytic on *Laminaria pallida*. This sample consisted of 33 identified species chiefly of epiphytic genera such as *Grammatophora* spp., *Cocconeis californica* var. *kerguelensis* HEIDEN & KOLBE, *Rhoicosphenia Adolphi* M. SCHMIDT R. *flexa* GIFFEN, *Campyloneis Grevillei* (W. SMITH) GRUNOW.

624 (SH 13) as above from *Polysiphonia virgata*. This proved not to be very rich in species, 20 only being recorded but *Cocconeis californica* var. *kerguelensis* completely dominated the flora.

625 (SH 14) from sandy bottoms of small pools in the rocks. From the diatom flora this locality received brackish or fresh water by seepage. The flora was mixed marine littoral and brackish water species and was very rich, 65 species being identified including *Pleurasigma* spp., *Trachyneis aspera*, *Tropidoneis pusilla*, *Navicula* spp.

627 (SH 16) from a small *Rhodophyte* (? *Placophora* sp.) epiphytic on *Ecklonea buccinalis*. This diatom flora was an almost pure culture of *Licmophora partita* n. sp., only nine other species were recorded.

The systematic results have been arranged in alphabetical order for convenience. References to original descriptions and figures have only been given where species are of recent origin or have not yet been reported in well known modern literature or not previously recorded by the author. Certain well known cosmopolitan species described and figured effectively in HUSTEDT 1930 and 1927-1964, may be dealt with without citation.

Systematic part

Achnanthes BORY 1822.

A. brevipes AGARDH. Not common. — 619, 620, 621, 625.

A. brevipes var. *intermedia* (KÜTZING) CLEVE.

This variety occurred more frequently than the type, but was more local preferring very slightly brackish water. — 620, 621, 625.

A. groenlandica (CLEVE) GRUNOW (cf. CLEVE 1895, 195; HUSTEDT 1927—1964, part 2, 421, Fig. 874).

Specimens which I have assigned to this species differ somewhat in size and density of their striae from the type description but the general shape and particularly the structure of the transapical chambers are identical with those of *A. groenlandica*, that is, the chambers show the characteristic double rows of faint areolae as seen in that species. In size the South African material varies from 14—28 μm long and 4.5—6 μm broad, i. e. it barely reaches the minimum described length (30 to 60 μm in HUSTEDT or 40—60 μm in CLEVE) and only just the minimum breadth. The transapical rows or areolae vary from 6—8 in 10 μm on the rapheless valves (epitheca) in the largest specimens to 10 in 10 μm in the smallest individuals. The transapical rows of puncta of the raphe valves (hypotheca) vary from 8—10 in 10 μm . The intercalary bands of the girdle, few in number, and more or less 8 in 10 μm are more closely punctate, with 10—12 puncta in 10 μm . Whether the South African material should be separated as a new species is a difficult question as the Southern hemisphere forms show great variability in most of the dimensions and individuals can be found to fit in between it and the Northern forms of *A. groenlandica*. At the most I propose to designate the South African form as n. f. *meridiana* which differs from the type in its smaller size viz. 14—28 μm long and closer transapical rows of areolae 6—8 in 10 μm on the rapheless valve and 8—10 in 10 μm on the raphe valve. — Figs. 1—4. — 619, 620, 621, 625.

Actinocyclus EHRENBERG 1838.

A. subtilis (GREGORY) RALFS (cf. HUSTEDT 1927—1964, part 1, 534, Fig. 304; GIFFEN 1970a, 264).

Widespread in South African marine littoral and strongly brackish estuarine waters. Rare in two samples from St. Helena Bay. — 619, 620.

Actinopterychus EHRENBERG 1839.

A. senarius (EHRENBERG) EHRENBERG (cf. HENDEY 1937: 271; HUSTEDT 1927—1964, part 1, 475, Fig. 264 as *A. undulatus* (BAILEY) RALFS; GIFFEN 1970a, 264).

Diameter ca. 30 μm , never abundant. — 621.

A. splendens (SHADBOLT) RALFS (cf. HUSTEDT 1927 to 1964, part 1, 478, Fig. 265; PERAGALLO 1897—1908, Pl. 111, Fig. 6, as *A. glabratus* GRUNOW).

Widespread in South African littoral and plankton. In the sample the individuals were small with diameters 38—40 μm (10 sectors). — 625.

Amphiprora EHRENBERG 1843.

A. sulcata O'MEARA (cf. CLEVE 1894, as *A. gigantea* var. *sulcata*; PERAGALLO 1897—1908, Pl. 38, Figs. 1—3; HUSTEDT 1955, 37; GIFFEN 1971a, 2, Fig. 2). — 619.

Amphora EHRENBERG 1840.

A. angusta (GREGORY) CLEVE 1895: 135. — 619.

A. angusta var. *Eulensteinii* GRUNOW (cf. CLEVE 1895: 135; A. SCHMIDT, Atlas, T. 25, Figs. 1—3, T. 40, Figs. 35—37; GIFFEN 1971a, 2).

These specimens fall within the size range of CLEVE'S description (l. c.) being 96—112 μm long but most were somewhat more slender i. e. from 7 to 10 μm broad. The transapical striae are 14—15 in 10 μm , slightly closer than described, but these forms cannot be separated. — Fig. 5. — 620, 625.

A. bigibba GRUNOW (cf. CLEVE 1895: 120; HUSTEDT 1955, 40, Pl. 14, Figs. 19—25; GIFFEN 1971a, 2).

Dimensions: length 17 μm , breadth 10 μm in the widest part, 4 μm in the constriction, transapical striae 17 in 10 μm . — Fig. 6. — 621.

A. exigua GREGORY (cf. GIFFEN 1963, 217, Figs. 17, 18; 1971a, 2).

Very tolerant of varying salinities and common under estuarine and littoral conditions in South African waters. — 621, 623, 625.

Amphora belenensis n. sp.

Frustule elliptical, 10—20 μm long, 8—10 μm broad. Pleural side simple. Valves lunate with convex dorsal and slightly concave ventral margins, 10—20 μm long, 3—4 μm broad. Axial area narrow on both sides of the raphe somewhat closer to the ventral margin. Transapical striae 17—20 in 10 μm crossed by a lanceolate blank band across the dorsal striae, with a unilateral central area in the middle of the ventral striae. Type slide 621/2 in the GIFFEN collection. Iconotype Figures 7—9.

Frustulae ellipticae 10—20 μm longae, 8—10 μm latae, leateris pleuralis connectivae simplicis. Valvae semi-ellipticae marginibus dorsalibus convexis ventralibus directis sive leviter concavis, 10—20 μm longae, 3—4 μm latae. Area axialis anguste utriusque raphis, ad marginem ventralem leviter approximatum, area centralis in latere ventrale solum evoluta quadrata, marginem valvae ventralem attingens. Striae transapicales 17—20 in 10 μm , latere dorsali area longitudinali modice lata interrupta.

Habitat: in aquis marinis litoralibus Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, provincia Capense.

Typus: praeparatum no. 621/2 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 7—9.

This species occurred plentifully in the material. It bears some resemblance to very small forms of *A. ovalis* KÜTZING, particularly to var. *libyca* EHRENBERG except that there is no central area and they belong to very different ecological habitats. — Figs. 7—9. — 619, 621.

A. laevis var. *laevissima* (GREGORY) CLEVE. 1895: 130 (cf. A. SCHMIDT, Atlas, T. 26, Figs. 3, 13, 14). — Rare in 621.

A. micrometra GIFFEN 1967, 253, Fig. 17.

This species, recently described from Kidd's Beach on the east coast (Indian Ocean) of the Cape Province is one of the smallest species of *Amphora*, being only 6—11 μm long and 2.5 μm broad with ca. 30 transapical striae in 10 μm . It is easily overlooked and though recorded in the samples as infrequent may be more abundant. Dimensions of the Steenberg's Cove material were 8—10 μm long, 3 μm broad, striae 27 in 10 μm . — 619, 620.

A. proteus GREGORY (cf. CLEVE 1895: 103; GIFFEN 1970a, 267, Fig. 19). Always rare in the material. — 619, 620.

A. proteus var. *contigua* CLEVE (cf. GIFFEN 1971a, 3).

As stated in a previous paper the author doubts whether these varieties viz. var. *contigua* CLEVE 1895: 102, and var. *ocellata* PERAGALLO 1897—1908. Pl. 44, Figs. 21, 22, and var. ?, Fig. 23, can be separated from each other and should be considered as belonging to the type. — 619, 621, 625.

Arachnoidiscus BAILEY 1849.

A. ornatus EHRENBERG (cf. GIFFEN 1967, 254).

A widespread epiphyte on a variety of seaweeds in South African marine littoral. — 623.

Berkeleya GREVILLE 1827.

B. rutilans (TRENTEPOHL) GRUNOW (cf. GIFFEN 1970b: 89; HUSTEDT 1927—1964, part 2, 720, Fig. 1093 as *Amphipleura rutilans* (TRENT.) CLEVE).

The author has placed all species described under the generic name *Amphipleura* KÜTZING (1844) in the legitimate genus *Berkeleya* GREVILLE (1827). The species was frequent in only one sample. — 625.

Biddulphia GRAY 1821.

B. obtusa (KÜTZING) RALFS (cf. A. SCHMIDT, Atlas, T. 120, Figs. 20—24 as *B. Roperiana* GREVILLE; T. 122, Figs. 30, 31; HENDEY 1964, 104; HUSTEDT 1927—1964, 848, Fig. 502 as *B. aurita* var. *obtusa* (KÜTZ.) HUSTEDT).

Differences in shape, punctation and particularly in the life form viz. in zig-zag and not in chain formation tend to separate *B. obtusa* from *B. aurita* (LYNGBYE) BRÉBISSEON. This species is widespread and not infrequent in the South African littoral. — 619, 620, 621, 625.

B. pulchella GRAY (cf. HUSTEDT, l. c. part 1, 832, Fig. 490; GIFFEN 1963, 222). Widespread and also often abundant as an epiphyte on South African seaweeds. — 619.

Caloneis CLEVE 1891.

C. fusoides (GRUNOW) HEIDEN & KOLBE 1928, 627 (cf. CLEVE 1894: 133 (*Navicula fusoides* GRUNOW); HENDEY 1951, 57, Pl. 17, Fig. 14; 1964, 229).

This species seems to be somewhat variable in size and width of the axial area and particularly in the number of striae in 10 μm . In CLEVE's description (l. c.) the striation is given as 21—25 in 10 μm . HENDEY records the number as 18—21 in 10 μm . In the South African examples all the individuals seen and measured had 15—17 striae in 10 μm . In spite of the variation there is, however, no doubt as to its identity. Dimensions: 40—56 μm long, 9—10 μm broad, transapical striae 15—17 in 10 μm . — Fig. 10. — 619, 620, 623.

C. liber (W. SMITH) CLEVE (cf. CLEVE 1895: 54; CHOLNOKY 1963, 41; GIFFEN 1970b, 89).

Most of the individuals seen and measured would fit into the description of *C. liber* var. *linearis* (GRUNOW) CLEVE. However there are always present a number of individuals which link up the two species viz. *Navicula liber* W. SMITH and *Navicula linearis* GRUNOW, so much so that the author in a previous paper has included *N. linearis* (*C. liber* var. *linearis*) in the older taxon as *C. liber* (W. SM.) CLEVE. — 619, 620, 621, 625.

Campyloneis GRUNOW 1862.

C. Grevillei (W. SMITH) GRUNOW (cf. CLEVE 1895, 167; HUSTEDT 1927—1964, part 2, 320, Fig. 782; HENDEY 1964, 184, Pl. 27, Figs. 9—11).

This species is extremely variable in size and markings and varies from narrow elliptical to almost completely circular forms, giving rise to several so-called varieties. CLEVE describes four of these, which are reduced to one "var. *regalis* (GREVILLE) CLEVE" by HUSTEDT. HENDEY places them, and I am in complete agreement with his decision, all under the one species. This taxon is one of the commonest epiphytes along all regions of the South African coast and is often extremely abundant, causing a distinct yellowing of the thalli of such *Chlorophyta* as *Caulerpa filiformis* (SUHR.) HERING and *C. Bartoniae* G. MURRAY which live in quiet gullies among the rocks around mean low tide level. — 619, 620, 621, 623, 624, 625.

Cocconeis EHRENBERG 1838.

C. californica GRUNOW (cf. CLEVE 1895: 171 as *C. scutellum* var. *californica* GRUNOW; A. SCHMIDT, Atlas, T. 191, Figs. 40—43; HUSTEDT 1927—1964, part 2, 343, Fig. 796; GIFFEN 1970b, 90, Figs. 9, 10).

This species was recorded from South African waters recently at Sea Point near Cape Town but seems to be

fairly widely distributed along the Atlantic (west) coast of South Africa. — 619, 621.

C. californica var. *kerquelenensis* HEIDEN & KOLBE 1928, 585, T. 5, Fig. 109 (GIFFEN 1970b, 90, Fig. 11).

This variety proved more abundant and widespread than the type and in a previous paper (l. c.) one illustration (Fig. 11) showed this variety. It is much more variable and extreme reductions in striation are illustrated here (Figs. 11, 12). There is however, an unbroken series of variations to the type and the varietal name cannot be upheld except as a matter of convenience. — Figs. 11, 12. — 619, 620, 621, 623, 624, 625.

C. costata GREGORY (cf. HUSTEDT 1927—1964, part 2, 332, Fig. 785). — 619, 620, 621, 623, 625.

C. dirupta GREGORY var. *flexella* (JANISCH & RABENHORST) GRUNOW (cf. HUSTEDT l. c. 355, Fig. 809d—i). — 619, 620, 621, 625.

C. distans GREGORY (cf. HUSTEDT l. c. 343, Fig. 797; 1955, 17, Pl. 4, Figs. 4, 5).

Only the rapheless valves were recognised as the species was extremely rare in the samples. Dimensions: ca. 40 μm long, 18 μm broad, rows of puncta 5.5—6 in 10 μm in 4 longitudinal rows. — 621, 623.

C. nitens EDSBAGGE 1966, 65, Pl. 1, Fig. 6, Pl. 2, Fig. 6. The forms which I have assigned to this species occurred in great numbers in two samples and agree so closely that there seems to be no doubt of their identity. The only difference, however, in the South African specimens is the presence in the raphe valve of a furrow or blank band (rim), crossing the transapical striae near the margin. This is not shown in EDSBAGGE's drawings (l. c. Pl. 1, Fig. 6) but is probably just indicated in the photograph (Pl. 2, Fig. 6). — Figs. 13—15. — 619, 621.

C. pellucida GRUNOW (cf. HUSTEDT 1927—1964, Part 2, 357, Fig. 812). — 621, 625.

C. pinnata GREGORY (cf. HUSTEDT l. c. 330, Fig. 783).

Individuals were somewhat narrower than described but otherwise identical. Only the final two or three puncta of the marginal striae were double. Dimensions: 21 μm long, 10 μm broad, transapical striae 5—6 in 10 μm . Puncta 10 in 10 μm . — 621.

C. pseudomarginata GREGORY var. *intermedia* GRUNOW (cf. HUSTEDT 1927—1964, Part 2, 360 without Figure; A. SCHMIDT, Atlas, T. 194, Fig. 1; GIFFEN 1970b: 90, Fig. 12, 1971a, 5).

In the two papers mentioned above, the author recorded from material originating from Sea Point near Cape Town and from Gordon's Bay in False Bay, forms of *C. pseudomarginata* with exceptionally wide side areas on the rapheless valve and in one paper (1970b) an individual rapheless valve was figured (l. c. Fig. 12). In the discussion, also *C. nidulus* EDSBAGGE (1966, 64, Pl. 5, Fig. 5; Pl. 2, Fig. 5) was correlated with *C.*

pseudomarginata described above. Further much richer material has however shown that *C. nidulus* EDSBAGGE is not conspecific with the forms from South Africa previously assigned to *C. pseudomarginata* (vide GIFFEN 1970b, 1971a). *C. nidulus* differs from *C. pseudomarginata* var. *intermedia*, which, however, it closely resembles in that *C. nidulus* has a straight raphe whereas the var. *intermedia* has a slightly sigmoid raphe although the rapheless valves would be extremely difficult to separate.

In discussing *C. duplex* A. SCHMIDT (Atlas, T. 194, Fig. 1) which is placed with *C. pseudomarginata* var. *intermedia* by CLEVE (1895: 178). SCHMIDT quotes GRUNOW who remarks in part "Gregory's Abbildung eines ganzen Exemplars dieser Art ist sehr unvollkommen, paßt aber ungezwungen auf Formen bei denen die inneren 2 Begleitstreifen fast verschwinden . . . Dieser steht meiner *C. pseudomarginata* var. *intermedia* am nächsten". Cleve quotes "Cape of Good Hope" in his distribution of the variety. — Figs. 16—18. — 619 to 625.

C. scutellum EHRENBERG. — 619, 620, 621, 625.

C. scutellum forma *klinoraphis*.

A considerable number of large valves of this taxon showed the oblique raphe which has been described in *C. placentula* EHRENBERG var. *klinoraphis* GEITLER (cf. HUSTEDT 1927—1964, Part 2, 348, Fig. 803). This oblique raphe and pseudoraphe was also observed in *C. dirupta* GREGORY var. *flexella* JAN. & RABENH.) GRUN. in the material from this same region. The term "*klinoraphis*" should therefore, in my opinion be dropped as a varietal epithet and merely used as a descriptive term for an abnormality common to many of the species of this group of *Cocconeis*. — 619, 621.

C. scutellum var. *parva* GRUNOW ex CLEVE. — 619.

C. stauroneiformis (VAN HEURCK) OKONO 1957: 217, Fig. 2 (cf. HENDEY 1964, 180; HUSTEDT 1927—1964, Part 2, 339, Fig. 792; GIFFEN 1971a, 5).

The author of the epithet "*stauroneiformis*" is in some doubt. W. SMITH 1953: 22, suppl. Pl. 30 separates from *C. scutellum* " β . nodule dilated into a stauros" without an epithet.

C. St. Pauli HEIDEN & KOLBE 1928, 588, Pl. 5 (35), Figs. 110, 110a. Synonym: *Cocconeis sublittoralis* HENDEY, 1951: 44, Pl. 13, Figs. 1—9; 1964, 181, Pl. 28, Figs. 14—17 (cf. GIFFEN 1970b, 90, Fig. 13; A. SCHMIDT, Atlas, T. 321, Fig. 17 without name). HEIDEN & KOLBE described and figured *C. St. Pauli* from material collected in the tidal zone of St. Paul Island crater and from Simon's Bay, Cape of Good Hope. This species has all the characteristics viz. shape, dimensions (length 21—40 μm , breadth 13—23 μm) striation (areovalve) 6—8.5 in 10 μm , curved pseudoraphe, large areolae at each end which characterises *Cocconeis sublittoralis* HENDEY. The striation of the raphovalve 7.5—8.5 is also so close that the difference cannot be regarded as

significant. I am therefore of the opinion that the two species are identical. As *C. St. Pauli* is the older name it must be applied to the species and *C. sublittoralis* HENDEY becomes a synonym. The South African material, the identity of which I have no doubt, falls well within the limits of length and breadth, although the transapical striae are somewhat finer, approaching the outer limit described by HEIDEN & KOLBE, that is ca. 8–9 in 10 μm on the areovalve and 9 on the raphovalve. The figures are drawn from a single cell. — Figs. 31, 32. — 632.

Coscinodiscus EHRENBERG 1938.

C. excentricus EHRENBERG (cf. HUSTEDT 1927–1964, Part 1, 388, Fig. 201; PERAGALLO 1897–1908, Pl. 116, Figs. 3, 4).

As previously recorded the South African representatives of this species are nearly always very small and at the minimum described sizes, usually 20–30 μm in diameter with closer rows of areolae, 7–8 in 10 μm in the middle and 10 in 10 μm at the margin. — 620, 621, 625.

C. excentricus var. *fasciculatus* HUSTEDT 1927–1964, Part 1, 390, Fig. 202.

Diameter of the South African specimens is 20–25 μm with tangential rows of areolae 6 in 10 μm . — 619.

C. marginatus EHRENBERG (cf. HUSTEDT l. c. Part 1, 416, Fig. 223).

Dimensions 32 μm in diameter, areolae rows 4 in 10 μm that is, smaller than described with closer areolation. — 620, 621, 625.

C. nitidus GREGORY (cf. HUSTEDT l. c. Part 1, 414, Fig. 221; PERAGALLO 1897–1908, Pl. 117, Fig. 12).

Small forms 14–15 μm in diameter, with areolae 10 in 10 μm , and marginal puncta 20–21 in 10 μm . Rare in the samples. — Fig. 19. — 621.

C. perforatus EHRENBERG (cf. HUSTEDT 1927–1964, Part 1, 445, Fig. 245; PERAGALLO 1897–1908, Pl. 117, Fig. 9; A. SCHMIDT, Atlas, T. 64, Figs. 12–14). — Rare in one sample. — 621.

Cyclotella KÜTZING 1834.

C. striata (KÜTZING) GRUNOW (cf. HUSTEDT 1927–1964, Part 1, 344, Fig. 176; GIFFEN 1970b: 91, Fig. 19).

The individuals assigned to this species are all very small with diameters 7.5–8 μm , and with 18–20 marginal striae in 10 μm . These striae are very irregular in length and not always parallel to the radii as in the type. In the Sea Point material the central field was flat but in the St. Helena samples the central field was faintly decorated with puncta (as in *C. stelligera* CLEVE & GRUNOW). Again the individuals in the sample were so scarce that little more than the above facts could be established. — Fig. 20. — 621.

Denticula KÜTZING 1844.

D. subtilis GRUNOW (cf. GIFFEN 1963, 227, Fig. 46). — 623, 625.

Dimerogramma RALFS 1861.

D. inane GIFFEN 1970b, 91, Figs. 20, 21.

A fairly widespread and characteristic species of the South Atlantic littoral, characterised by the almost complete absence of markings, which are restricted to a few scattered puncta along the intercalary bands of the girdle. — Fig. 21. — 619, 621, 624, 627.

Diploneis EHRENBERG 1844.

D. lineata (DONKIN) CLEVE (cf. HUSTEDT 1927–1964, Part 2, 677, Fig. 1069; GIFFEN 1970b, 91). — 621, 625.

D. lineata var. *pusilla* (DONKIN) CLEVE (cf. GIFFEN 1970b, 91, Fig. 24). — 619.

D. notabilis (GREVILLE) CLEVE (cf. HUSTEDT l. c. Part 2, 683, with no figure; CHOLNOKY 1963, 48, Fig. 22; GIFFEN 1967, 260).

Widespread although never abundant in South African marine littoral. — 625.

D. novaeseelandiae (A. SCHMIDT) HUSTEDT (cf. HUSTEDT 1927–1964, Part 2, 681, Fig. 1073; GIFFEN 1970a, 274, Fig. 31). — 621, 625.

D. papula (A. SCHMIDT) CLEVE var. *constricta* HUSTEDT 1927–1964, Part 2, 680, Fig. 1071; GIFFEN 1970a, 274, Fig. 32). — 621.

D. Schmidtii CLEVE (cf. HUSTEDT 1927–1964, Part 2, 701, Fig. 1083; CLEVE 1894, 89, Pl. 1, Figs. 20, 21; HEIDEN & KOLBE 1928, 613).

Previously recorded only by HEIDEN and KOLBE (l. c.) from Simon's Bay in False Bay, Cape Province. The species is characterised by the very irregular poroids on either side of the raphe canals. — Fig. 22. — 619, 621, 625.

D. Smithii (BRÉBISSEON) CLEVE var. *pumila* (GRUNOW) HUSTEDT 1927–1964, Part 2, 647, Fig. 1052 d, e.

Not uncommon in South African material from the littoral regions. — 620, 621, 625.

D. splendida (GREGORY) CLEVE var. *puella* (A. SCHMIDT) CLEVE (cf. HUSTEDT l. c. 714, Fig. 1089d; GIFFEN 1970b, 92, Fig. 25). — 625.

D. vacillans (A. SCHMIDT) CLEVE (cf. HUSTEDT l. c. 662, Fig. 1060a–d).

Widespread along the South African littoral from Natal (West Indian Ocean) to St. Helena Bay (South Atlantic). — 619, 621.

Entopyla EHRENBERG 1841.

E. australis EHRENBERG var. *incurvata* (ARNOTT) GRUNOW (cf. FRICKE in A. SCHMIDT, Atlas, T. 230, Figs. 12–16; GIFFEN 1970b, 92).

This organism has been previously recorded from Sea Point near Cape Town by the author and from Walvisch Baai (Walvis Bay), South West Africa in A. S. Atlas.

Fragilaria LYNGBYE 1819.

F. pinnata EHRENBERG (cf. HUSTEDT 1927—1964, Part 2, 160, Fig. 671; HUSTEDT in A. SCHMIDT, Atlas, T. 297, Figs. 65—72 as var. *elliptica* (SCHUMANN) CARLSON; T. 298, Figs. 61—65, 67, 70, 74).

The forms seen are all very small usually from 7 μm to 20 μm long, some of which have been previously placed in the var. *elliptica* (v. s.), now included with the type. — 621, 625.

Glyphodesmis GREVILLE 1862.

G. distans (GREGORY) GRUNOW in VAN HEURCK (1880) Synopsis, T. 36, Figs. 15—16 (cf. HUSTEDT 1927—1964, Part 2, 125, Fig. 647; PERAGALLO 1897—1908, Pl. 82, Figs. 19, 20 (Fig. 20 as *D. costatum* PERAG.)).

Only a single specimen was seen but there is no doubt as to its identity. Careful observation, in phase contrast, shows that the transapical ribs are decorated with a double row of alternating puncta, a fact that does not seem to have been commented upon previously. — Fig. 25. — 619.

Gomphonema AGARDH 1824.

G. exiguum KÜTZING (cf. CLEVE 1894: 188; GIFFEN 1963, 230, 1970a, 275).

All the material shows only very small specimens 8 to 11 μm long. — 619, 625.

G. kamtschaticum GRUNOW (cf. CLEVE 1894: 118; M. SCHMIDT in A. SCHMIDT, Atlas, T. 213, Figs. 46—51; GIFFEN 1970b, 92, Figs. 27, 28). — 619, 623.

G. pseudoseptatum GIFFEN 1970b, 92, Figs. 29—32.

This species has proved to be somewhat widespread along the South Atlantic shores of South Africa. — Figs. 23, 24. — 619, 620, 621, 623, 625.

Grammatophora EHRENBERG 1839.

G. angulosa EHRENBERG var. *islandica* (EHRENBERG) GRUNOW (cf. HUSTEDT 1927—1964, Part 2, 40, Fig. 565; PERAGALLO 1897—1908, Pl. 88, Figs. 14, 15).

This variety differs from the type only in the number of transapical striae in 10 μm and a somewhat more robust appearance and wider valve. *G. angulosa* is so variable in size and also in the number of transapical striae, 14—20 in 10 μm that the slightly more robust specimens with 9—12 striae in 10 μm seem scarcely to be significant. — 619, 620, 623.

G. marina (LYNGBYE) KÜTZING (cf. HUSTEDT 1927 to 1964, Part 2, 43, Fig. 569). — 619, 621, 623.

G. maxima GRUNOW (cf. HUSTEDT *ibid.* 44, Fig. 572). — 621, 623, 624.

Gyrosigma HASSALL 1845.

G. tenuissimum (W. SMITH) CLEVE (cf. W. SMITH 1853, I, 67, Pl. 22, Fig. 213; CLEVE 1894, 117; GIFFEN 1963, 232, Fig. 52).

This is not infrequent in the South African littoral and estuarine waters on both the Indian and South Atlantic coasts. — 619, 621.

G. mediterraneum CLEVE 1894, 121; PERAGALLO 1897 to 1908, Pl. 36, Figs. 7—9).

I have no doubt of the identity of a number of individuals which occurred in one sample and which I have assigned to this species. They are an almost exact fit in shape, dimensions and the curvature of the raphe in girdle view (which led to the classical name "*Rhoicosigma*" for these organisms). The South African examples, however, only reached the minimum length described by CLEVE. The dimensions in the South African specimens were 115—120 μm long, 18 μm broad, transapical striae 21 in 10 μm , longitudinal striae 30 in 10 μm which is very slightly closer than in the description (T/L: 18/25 in CLEVE l. c.). The longitudinal striae are more or less parallel to the very sigmoid raphe with a strong tendency to considerable undulations. — Fig. 26. — 619.

Hantzschia GRUNOW 1880.

H. insolita GIFFEN 1967, 262, Figs. 39—41.

This species, first recorded from the Eastern Cape Province (Kidd's Beach), is characterised by transapical striae of single rows of puncta which become double rows of small alternating puncta over the carinal canal. It was scarce in the western coastal material. — Fig. 27. — 625.

Hemidiscus WALLICH 1860.

H. cuneiformis WALLICH (cf. HUSTEDT 1927—1964, Part 1, 904, Fig. 542; HENDEY 1937, 264; 1964, 94, Pl. 22, Fig. 9; BODEN 1950, 398, Fig. 82).

This species has recently been reported by BODEN (l. c.) from the plankton of the west coast of South Africa. HENDEY 1937, reports that the great number of species and varieties which have been established rely on variable characteristics and whose specimens formed "a series of intermediate forms that made it impossible to recognise the value of the nomenclatural species and varieties". As would be expected of a planktonic species, it was very scarce in the littoral zone. — 620.

Hyalodiscus EHRENBERG 1845.

H. ambiguus GRUNOW (cf. PERAGALLO 1897—1908, Pl. 119, Fig. 19). TAKANO (1962, 32, Fig. 2) has an excellent photograph of this species from seaweeds of Japan. In MOREIRA (1966, Pl. IV, Fig. 1) is a photograph labelled *H. stelliger* BAILEY, which is undoubtedly *H. ambiguus* GRUNOW. This species is widespread along the western Cape coast but does not seem to have been previously recorded. — 619, 620, 621, 623, 624, 625.

Licmophora AGARDH 1827.

L. Ehrenbergii (KÜTZING) GRUNOW f. *Grunowii* (MERESCHKOWSKI) HUSTEDT (cf. HUSTEDT 1927—1964, Part 2, 70, Fig. 594; GIFFEN 1971a, 6, Figs. 26, 27).

This organism was never common in any of the samples, although fairly widespread. — 620, 623, 624, 625.

L. opephoroides GIFFEN 1970b, 93, Figs. 35—37.

This species, first recorded from Sea Point near Capetown, was not frequent and occurred in only one sample. — 621.

Licmophora partita n. sp.

Frustules cuneate in girdle view, truncate at the upper end, slightly rounded at the corners, septa very short, intercalary bands straight, ca. 10 in 10 μ m, striae 17—20 in 10 μ m. Valve clavate, upper apex broadly rounded, base subacute or rounded, margins usually straight, occasionally slightly narrowed, tapering towards the apex and base. Surface with narrow silicified transapical ribs 10—11 in 10 μ m, perpendicular to the apical axis, radiate at the ends, 20—22 in 10 μ m, pseudoraphe very narrow, usually visible only at the apex and base of valve, where there are prominent mucilage pores often surrounded by a ring of very small and obscure puncta.

Type slide 627 in the Giffen Collection. Iconotype Figures 28—30. Frustulae in visu connectivale cuneatae, apicibus plus minusve truncatis, angulis modice rotundatis. Septae brevissimae copulae directae circiter 6 in 10 μ m, striatae, striis 17—20 in 10 μ m. Valvae clavatae apicibus obtuse-rotundatis, ad basem subacutis sive rotundatis marginibus pleurumque directis aliquando modice angustioris ad apicem basemque versus attenuatae. Superficies valvae costis transapicalibus valde silicificatis 10—11 in 10 μ m ad lineam mediam directis ad apices radiantibus. Inter costas striae punctorum 20—22 in 10 μ m. Pseudoraphe angustissime ad apicem basemque tantum visibilis pori mucosi conspicui in apicibus punctis parvis cingens.

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, provincia capensis.

Typus: praeparatum 627 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 28—30.

This species is very closely allied to *L. Juergensii* AGARDH (cf. HUSTEDT 1927—1964, Part 2, 63, Fig. 586) and can be readily confused with it. It differs, however, in the distinctive structure of the valve surface which is ribbed with narrow transapical silicious bars which number 10—11 in 10 μ m as against the transapical rows of puncta in *L. Juergensii* which number 14—18 in 10 μ m. The puncta in *L. partita* n. sp. are spaced 20—22 in 10 μ m whereas in *L. Juergensii* they are 16—22, mostly 16 in South African material. The striae on the intercalary bands also differ, being 17—20 in *L. partita*, and 24—27 in 10 μ m in *L. Juergensii*. In one sample no. 627 from which the type slide was

prepared, the species occurred in vast numbers. It also was fairly widespread in the region under review. — Figs. 28—30. — 621, 623, 624, 625, 627.

Melosira AGARDH 1824.

M. nummuloides (DILLWYN) AGARDH (cf. HUSTEDT 1927—1964, Part 1, 231, Fig. 95; GIFFEN 1967, 265; 1970b, 94; CHOLNOKY 1963, 52).

Widespread in the South African littoral. — 619, 620, 621, 625.

M. sol (EHRENBERG) KÜTZING (cf. HUSTEDT 1927 to 1964, Part 1, 270, Fig. 115; PERAGALLO 1897—1908, Pl. 119A, Fig. 10; CHOLNOKY 1960, 51).

This species, previously recorded by CHOLNOKY from Natal and later in the plankton of the Indian Ocean near the South African shore by TAYLOR (1960), occurred fairly frequently in a number of samples from the western Atlantic coast of South Africa. — 619, 623, 624, 627.

Navicula BORY 1824.

N. agnita HUSTEDT 1955, 27, Pl. 9, Figs. 10—12 (cf. CHOLNOKY 1968, 44, Fig. 50).

This species occurred somewhat infrequently in the material examined, but was widespread in the region. — Fig. 31. — 619, 620, 621, 623, 625.

Navicula assuloides n. sp.

Valve lanceolate with moderately convex surface and subacute ends, 24—30 μ m long, 4—5.5 μ m broad, raphe straight or slightly curved by the convexity of the valve, central pores moderately close, terminal fissures small or obscure, axile area narrow, central area lanceolate. Transapical striae 12 in 10 μ m in the middle to 15 in 10 μ m towards the ends, radiate throughout, longitudinal striae ca. 24 in 10 μ m. Type slide 623/2 in the Giffen Collection. Iconotype: Figures 32—34. Valvae lanceolatae, superficie modice convexo apicibus subacutis non protractis, 24—30 μ m longae 4—5.5 μ m latae. Raphe directa, filiformis sive modice subarcuata potius centralibus modice approximatis, fissuris terminalibus parvis, indistinctae. Area axialis anguste linearis, centralis parva lanceolata. Striae transapicales in media parte 12 in 10 μ m ad apices versus usque ad 15 in 10 μ m, radiantibus, costae longitudinales circiter 24 in 10 μ m.

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove, in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 623/2 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 32—34.

N. assuloides is closely related to *N. assula* CHOLNOKY (1963, 153, Fig. 35; 1968, 45, Fig. 55) but differs from it in the completely and somewhat strongly radiate striae, the wider lanceolate axile area and the rhombic central area, caused by the shortening of the middle 3 or 4 striae. — Figs. 32—34. — 621, 623.

N. biflexa (A. SCHMIDT) GIFFEN (cf. A. SCHMIDT, Atlas T. 193, Fig. 25 as *Cocconeis biflexa* A. S.; HUSTEDT 1955b, 130, Figs. 6–8; 1927–1964, Part 3, 379, Fig. 1467 as *Navicula Schonkenii* HUSTEDT).

The identity and nomenclature of the species has recently been clarified by the author, 1970b, 94, Fig. 64. Frequent in one sample. — 623.

N. cancellata DONKIN. — 619, 623, 625.

N. comoides (ÅGARDH) PERAGALLO 1897–1908, Pl. 8, Fig. 13 without description under “*N. (Schizonema) comoides*”, (cf. HUSTEDT 1927–1964, Part 3, 304, Fig. 1423).

Widespread in South African waters. — 623, 624.

Navicula debissa n. sp.

Valve lanceolate with slightly produced apices 25 to 35 μm long, 5.5–6 μm broad. Raphe straight, filiform with moderately approximate central pores and small hooked terminal fissures. Central area large widening gradually into a lanceolate central area almost one third of the width of the transapical axis of the valve. Transapical striae radiate throughout 11 in 10 μm in the middle to 17 at the ends of the valve, longitudinal striae more or less parallel about 17 in 10 μm .

Type slide 621/2 in the Giffen Collection. Iconotype Figures no. 35, 36. Valvae lanceolatae apicibus modice protractis 25–35 μm longae, 5.5–6 μm latae. Raphe directa filiformis, pori centrales modice approximatae, pori terminales fissuris terminalibus parvis curvatis muniti. Area axialis apud polos anguste linearis, in distantia breve a polis dilatata aream late lanceolatum formans. Striae transapicales radiantes in media parte 11 in 10 μm ad apices versus densiores usque ad 17 in 10 μm , costae longitudinales plus minusve parallelae circiter 17 in 10 μm .

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis. Typus praeparatum no. 621/2 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 35, 36.

N. debissa n. sp. has somewhat of the appearance of the smaller specimens of *N. palpebralis* (BRÉBISSEON) ex W. SMITH but although it fits within the minimum lengths recorded, its width is barely half that of any recorded description of the species. The striae have about the same density i. e. 11 in 10 μm (10–12 in 10 μm), but the usual shortened striae in the centre are absent. The raphe is seen to be enclosed in a very narrow axial rib widening slightly around the central nodule. — Figs. 35, 36. — 621.

N. dissipata HUSTEDT 1927–1964, Part 3, 549, Fig. 1587 (cf. CHOLNOKY 1968, 50, Figs. 66, 67).

CHOLNOKY records this species from St. Lucia Lagoon, Natal. The specimens from the west coast agree fairly closely with HUSTEDT's description and dimensions but show a somewhat curved incrassate raphe and central

pores. The side areas are narrow. Dimensions 14 μm long, 5 μm broad, transapical striae 17 in 10 μm . Very scarce. — Fig. 37. — 621.

N. Gregorii RALFS (cf. CLEVE 1895, 30; CHOLNOKY 1963, 58, Fig. 51; GIFFEN 1970b, 94, Fig. 40 as *N. cancellata* var. *Gregorii* RALFS 1971a, 7, Fig. 28 also as *N. cancellata* var. *Gregorii*).

Widespread and often abundant in the South African littoral — 621, 625.

N. inflexa GREGORY (cf. CLEVE 1895, 31; A. SCHMIDT, Atlas, T. 46, Figs. 69, 70; GIFFEN 1970b, 94, Figs. 41–43). As yet this species has only been recorded in South Africa from the Atlantic shores near Capetown (GIFFEN l. c.) but is probably widespread along the west coast of the Cape province. — 619, 621, 623, 624, 625, 627.

N. longa (GREGORY) RALFS (cf. GIFFEN 1970a, 283, Fig. 53).

Recorded from many localities on the east coast of the Cape Province and often abundant, but scattered and scarce on the Atlantic (western) coast. — 621.

N. mollis W. SMITH. — 619, 620, 623, 624.

Navicula nasuta n. sp.

Valve strongly convex, lanceolate with acute rounded apices 55–65 μm long, 9.5–10 μm broad. Raphe straight, filiform with approximate central pores, terminal fissures small or obscure. Axial area asymmetric lanceolate, scarcely widened to a central area, very narrow on one side of the raphe, about one quarter to one third of the width of the other side of the valve. Transapical striae 10 in 10 μm , longitudinal striae conspicuous, forming longitudinal more or less straight parallel lines, 25–27 in 10 μm .

Type slide 621/2 in the Giffen Collection. Iconotype Figures no. 38, 39. Superficies valvae valde convexae, lanceolata apicibus non protractis acutiuscule rotundatis 55–65 μm longae, 9.5–10 μm latae. Raphe directa, filiformis poris centralibus approximatis fissuris terminalibus parvis indistinctis. Area axialis asymmetrica, latere uno lanceolata, latere altero angustissime. Striae transapicales 10 in 10 μm , valde radiantes, costae longitudinales distinctissime plus minusve raphe parallelae, 25–27 in 10 μm .

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis. Typus: praeparatum no. 621/2 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 38, 39.

This new species is somewhat similar in appearance to *N. Stompsii* CHOLNOKY (1963, 66, Figs. 77, 78) but differs from it by the characteristic unilateral axial area and closer striation. It was frequent in the type material. — Figs. 38, 39. — 619, 621.

N. nautica CHOLNOKY 1963: 62, Fig. 64 (cf. GIFFEN 1967, 270, Fig. 68).

Typical specimens reaching to maximum length viz. 50 μm and 11 μm broad, with transapical and longitudinal striae 15 in 10 μm were observed in several samples. — Fig. 40. — 619, 620, 621.

N. phyllepta KÜTZING (cf. CLEVE 1895, 22 as *N. lanceolata* var. *phyllepta* (KÜTZ.) CLEVE; HENDEY 1964, 190, Pl. 37, Fig. 3).

The many individuals of *N. phyllepta* seen in the material undoubtedly belong to this species although they are mostly very slightly narrower in width viz. 7.5 μm against 8–9 μm in the description. The striation also, is slightly coarser 15 in 10 μm : (CLEVE gives the number as 18 in 10 μm , HENDEY as 13–14 in 10 μm). This species does not seem to have been previously reported from South African waters. — Figs. 41, 42. — 625.

N. porotzkajae O. KORETKEVICH (1959, 1960 vide NIKOLAJEV 1967, 45–50 with Figure (in Russian) = *N. complanatula* HUSTEDT 1962 in HUSTEDT 1927–1964, 338, Fig. 1450).

NIKOLAJEV has shown that HUSTEDT's *N. complanatula* was prepublished by KORETKEVICH in 1959 and the earlier name must be used for this species. As *N. complanatula* HUSTEDT, this species was previously recorded by the author (1967, 266). In the material under examination it was abundant. — Figs. 43, 44. — 625.

N. Hansenii O. MØLLER 1950, 205, Fig. 10 (cf. GIFFEN 1970a, 285, Figs. 60–62 as *N. pseudoincerta* GIFFEN).

This very small *Navicula* was described from the Kowie River in the Eastern Cape Province as a new species but was subsequently correctly identified as *N. Hansenii*. Its presence on the Atlantic coast in great numbers indicates that the centre of distribution as yet recorded belong to the colder waters of the Atlantic Ocean rather than to the warmer Indian Ocean. The abundant material seen in the present samples, shows that the valves grow in bands showing a *Fragilaria*-type colony building. This growth-form led to the generic name *Diadesmis* KÜTZING (1844) which is now discontinued (cf. *N. confervacea* (KÜTZ.) GRUNOW HUSTEDT 1927 to 1964, 205, Fig. 1234 for comparison). — Figs. 45, 46. — 619, 623.

N. salinarum GRUNOW f. *angustiora lanceolata* HUSTEDT (1955, 27, Pl. 7, Fig. 25 (cf. GIFFEN 1967, 273; 1970a, 286). — 621.

N. vittata (CLEVE) HUSTEDT (cf. CLEVE 1894, 80, Pl. I, Fig. 15 as *Diploneis ?bioculata* GRUNOW var. *vittata* CLEVE; HUSTEDT 1955, 22, Pl. 8, Figs. 3–5, 12).

This species, previously recorded by CHOLNOKY (1963: 71, Fig. 86) from Steenbras was represented in only one sample from St. Helena Bay. — Fig. 47. — 625.

Nitzschia HASSALL 1845.

N. acuminata (W. SMITH) GRUNOW (cf. HUSTEDT 1930, 401, Fig. 764; HUSTEDT in A. SCHMIDT. Atlas, T. 331, Fig. 16).

Rather frequent. Widely distributed in the South African littoral and estuarine waters. — 619, 620, 621, 625.

Nitzschia aestatis n. sp.

Cells in girdle view rectangular-linear with more or less parallel margins and rounded truncate ends. Intercalary bands about 15 in 10 μm . Valve linear with parallel or slightly curved margins 44–50 μm long, 4–5 μm broad. Keel excentric, carinal puncta small oblong to roundish in shape, rather irregular, 12–17 (15) in 10 μm , striae very fine not visible.

Type slide 621/2, in the Giffen Collection. Iconotype Figures no. 48, 49. Frustulae in visu connectivale lineari-rectangulatae marginibus plus minusve parallelis apicibus rotundatis truncatis, copulae circiter 15 in 10 μm . Valvae lineari-lanceolatae marginibus parallelis sive modice curvatis 44–50 μm longae, 4–5 μm latae. Carina excentrica, punctis carinalibus anguste oblongis sive rotundatis irregulariter positis 12–17 (15) in 10 μm , striae transapicales delicatissimae, inconspicuae.

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 621/2 in collectione Giffen, Fort Hare, C. P.

Iconotype: Figurae nostrae no. 48, 49.

This species is related to *N. parallela* HUSTEDT (1955, 45, Pl. 15, Fig. 12) but is much finer and less silicified in structure, with closer carinal puncta and striae not visible. — Figs. 48, 49. — 619, 621.

N. Brittonii HAGELSTEIN (1938, 393, Pl. 7, Fig. 14) (cf. HUSTEDT 1955, 46, Pl. 15, Figs. 7, 8).

HUSTEDT l. c. states that this diatom has hitherto only been known from the Atlantic coast of central America and Beaufort, North Carolina. Its discovery on the Atlantic shore of South Africa greatly extends its distribution. As HUSTEDT mentions in his account, it is very variable in size. Dimensions of the South African material are 14–24 μm long, 6–7 μm broad, i. e. small specimens, with carinal pores 10 in 10 μm and striae 25–28 in 10 μm . — Fig. 50. — Rare in 619.

Nitzschia cacumina n. sp.

Valve lanceolate, very slightly constricted in the middle of the keel, tapering to the acute apices, 30–40 μm long, 6–7 μm broad. Keel slightly excentric, carinal puncta small somewhat elongate, 12–15 in 10 μm , median pores moderately widely separated. Transapical striae delicate, ca. 30 in 10 μm , faintly and closely punctate.

Type slide: 625/1 in the Giffen Collection. Iconotype Figures no. 51, 52. Valvae in facie connectivale visae lanceolatae leviter in media parte carinae ad apices acutas gradatim protractae, 30–40 μm longae, 6–7 μm latae. Carina modice excentrica, media constricta punctis carinalibus parvis leviter elongatis, 12–15 in 10 μm , mediis duobus remotioribus. Striae trans-

apicales delicatissimae leviter confertimque punctatis. Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 625/1 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 51, 52.

This new species is somewhat similar to *N. Brittonii* HAGELSTEIN but is considerably more delicate in structure and does not possess the central "nodule" described by HAGELSTEIN (v. s.). — Figs. 51, 52. — 625.

N. closterium W. SMITH = *Cylindrotheca closterium* (W. SMITH) REIMANN & LEWIN (cf. GIFFEN 1967, 274). — 621.

N. communis RABENHORST (cf. GRUNOW in CLEVE & GRUNOW 1880, 97; HUSTEDT in A. SCHMIDT, Atlas, T. 348, Figs. 10—19). — 625.

N. composita GIFFEN 1971a, 8, Figs. 42, 43.

This species was described from material collected at Gordons' Bay in False Bay, Cape Province and is characterised by carinal costae crossing from the keel to the margin. Between the ribs usually there are two finely punctate transapical striae. Dimensions: 60 to 70 μm long, 6—7 μm broad ribs 9—11 and striae ca. 20 in 10 μm . — Fig. 53. — 619.

N. constricta GREGORY (cf. PERAGALLO 1897—1908, Pl. 70, Figs. 8—10; HUSTEDT in A. SCHMIDT, Atlas, T. 333, Fig. 8). — 620, 621, 625.

N. distans GREGORY (cf. PERAGALLO l. c. Pl. 73, Fig. 3; GIFFEN 1963, 254, Fig. 85; 1971a, 9). — 620, 621.

N. distantoides HUSTEDT 1958, 171, Fig. 161; CHOLNOKY 1963, 72, Figs. 90, 91, with emended description; GIFFEN 1967, 274, Figs. 83, 84).

The specimens seen in the material conformed more closely with the emended description by CHOLNOKY (1963, l. c.) reaching to about 60 μm long, whereas in material examined from the eastern Cape Province (GIFFEN 1967, 274) the maximum length measured up to 96 μm , giving a further emendation to the original description of HUSTEDT i. e. 32—96 μm long 3.5—5 μm broad, carinal pores 2.5—5 in 10 μm . It was not common in the St. Helena region. — 619.

N. frustulum (KÜTZING) GRUNOW var. *subsalina* HUSTEDT (1930, 415, Fig. 796; GIFFEN 1963, 245; 1967, 275). Infrequent in slightly brackish water. — 625.

N. hybrida GRUNOW (cf. HUSTEDT 1930, 406, Fig. 778; GIFFEN 1967, 275; 1970a, 289). — 620, 621.

N. hybridaeformis HUSTEDT 1955, 44, Pl. 5, Figs. 9—11 (cf. CHOLNOKY 1968, 73, Fig. 133).

Typical specimens were seen in several samples, although occasional individuals differed in slightly wider carinal puncta and transapical striae. Dimensions: 68—72 μm

long, 6—8 μm broad, carinal puncta 8—10 in 10 μm , transapical striae 27—33 in 10 μm . — 621, 625.

N. incrustans GRUNOW 1862, 579, Pl. 12, Fig. 35; cf. CHOLNOKY 1968, 73, Figs. 134—138; GIFFEN 1971a, 9, Figs. 44, 45). — 619, 623.

N. littoralis GRUNOW (cf. PERAGALLO 1897—1908, Pl. 69, Figs. 15—18; VAN HEURCK (Treatise) 1896, 385, Pl. 15, Fig. 496 as *N. tryblionella* var. *littoralis* GRUN.).

The individuals I have assigned to this species are similar in shape and structure to *N. littoralis* GRUN. but equal only the smallest dimensions taken from PERAGALLO's drawings i. e. 40 μm long, 12 μm broad, carinal puncta 8, transapical striae "very variable". HENDEY's description (1964, 277) gives lengths of 50—100 and breadth 20—27 μm in British material. There is, however, no doubt that the South African specimens belong to *N. littoralis* GRUNOW. — Figs. 54, 55. — 619, 621.

N. longissima (BRÉBISSON) RALFS (cf. HUSTEDT in A. SCHMIDT, Atlas, T. 335, Figs. 1, 2; GIFFEN 1967, 276; 1970a, 291). — 619, 621, 625.

N. media HANTZSCH (cf. PERAGALLO 1897—1908, Pl. 72, Fig. 12; GIFFEN 1971a, 9, Figs. 49, 50). — 620, 621.

N. miserabilis CHOLNOKY 1963, 74, Fig. 95 (cf. GIFFEN 1967, 276, Figs. 88, 89).

The individuals seen at St. Helena Bay are somewhat smaller than originally described, with closer carinal pores, but otherwise identical with the Steenbras type (CHOLNOKY l. c.). It is widespread in South African littoral. — 619, 621.

N. obtusa W. SMITH var. *scalpelliformis* GRUNOW (cf. GIFFEN 1967, 247).

As stated previously (GIFFEN l. c.) this species is a brackish water form with considerable tolerance to varying changes of salinity. It is widespread in brackish estuaries and littoral pools. — 621.

N. ovalis ARNOTT (cf. HUSTEDT 1930, 417, Fig. 808; CHOLNOKY 1963, 75, Fig. 97; 1971a, 10).

N. ovalis was not frequent in either the Gordon's Bay (GIFFEN 1971a) or in the St. Helena samples. Those seen have slightly closer carinal puncta 15 in 10 μm as against 13 in 10 μm . — 625.

N. panduriformis GREGORY (cf. GIFFEN 1970b, 95; 1971a, 10). — 621.

N. panduriformis var. *abrupta* PERAGALLO (1897—1908, Pl. 70, Fig. 7).

The examples observed fitted into PERAGALLO's var. *abrupta*. These are smallish forms with a very deep fold but otherwise identical with the type. — 621.

Nitzschia proceroides n. sp.

Valve linear-lanceolate, gradually tapering towards the narrow capitate ends, 90—120 μm long, about 5—6 μm

broad. Keel excentric, carinal puncta rather strong 5—6 in 10 μm , narrower than the openings between them. Transapical striae 12—15 in 10 μm , clearly punctate, puncta 13—15 in 10 μm in irregularly undulate longitudinal rows crossed in the middle (apical axis) by an indistinct fold.

Type slide: 619/5 in the Giffen Collection. Iconotype: Figures no. 56—58.

Valve lineari-lanceolatae ad apices subcapitatas versus paulatim angustiores, 90—120 μm longae, circiter 5—6 μm latae, distincte plicatae. Carina excentrica punctis carinalibus 5—6 in 10 μm validis. Striae transapicales distincte punctatis, puncta 15—16 in 10 μm , super plica inconspicuis, striarum reliquis partibus valde punctatis, striis longitudinalibus irregulariter undulatis decussatae 13—15 in 10 μm .

Habitat: in aquis marinis loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 619/5 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 56—58.

This new species is similar to *N. procera* HUSTEDT (1955, 47, Pl. 16, Figs. 6, 7) and to *N. Stompsii* CHOLNOKY (1963: 75, Figs. 101, 102) but shows a much denser and coarser structure than either of these species. There is also a similarity to *N. grossestriata* HUSTEDT (1955: 46, Pl. 16, Figs. 8—10) but this is not capitate nor folded and has wider carinal pores and striae. It differs also from *N. valida* CLEVE & GRUNOW (cf. PERAGALLO, Pl. 74, Fig. 3) which has 3—4 carinal pores and ca. 18 striae in 10 μm . — Figs. 56—58. — 619, 625.

N. pseudohybrida HUSTEDT 1955: 45, Pl. 15, Figs. 3—4 (cf. GIFFEN 1967, 277, Fig. 93). — 619, 625.

Nitzschia sibula n. sp.

Valves broadly linear-lanceolate with cuneate-apiculate apices, valve margins straight, parallel or slightly concave in the middle, 30—36 μm long, 7—8 μm broad. Keel excentric, carinal puncta 10—12 in 10 μm small more or less rectangular, the two median puncta much elongated along the apical axis. Transapical striae 22—25 in 10 μm , crossed by a broad longitudinal fold. Striae clearly punctate in irregular longitudinal lines. Type slide: 621/1 in the GIFFEN Collection. Iconotype Figures no. 59, 60.

Valvae late lineari-lanceolatae apicibus cuneato-apiculatis, marginibus directis parallelis sive in media parte modice concavis, 30—36 μm longae 7—8 μm latae, valde plicata. Carina excentrica, punctis carinalibus 10—12 in 10 μm parvis plus minusve rectangularis mediis duobus valde apicaliter elongatis. Striae transapicales 22—25 in 10 μm , super plica inconspicuis, striis longitudinalibus tenuibus irregulariter undulatis decussatae.

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 621/1 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 59, 60.

This new species is similar to *N. aerophila* HUSTEDT (1942: 70, Fig. 46; cf. CHOLNOKY 1960a, 90, Figs. 269, 270; 1968, 67, Figs. 108—111) but differs in the broader and deeper fold, wider striation and the characteristic elongated central pores. — Figs. 59, 60. — 619, 621.

N. sigma (KÜTZING) W. SMITH (cf. HUSTEDT 1930, 420, Fig. 813). — 619, 620, 621, 625.

N. sigma var. *rigida* (KÜTZING) GRUNOW (cf. PERAGALLO 1897—1908, Pl. 74, Figs. 8, 9, as *N. rigida* KÜTZ.; GIFFEN 1970a, 293).

This variety is rightly included in the type by HUSTEDT 1930, 420. — 625.

N. socialis GREGORY (cf. PERAGALLO l. c. Pl. 73, Figs. 7, 8; GIFFEN 1967, 278; 1970a, 293).

N. spathulata BRÉBISSEON in W. SMITH (cf. GIFFEN 1963, 248, Fig. 94).

Very rare in the material, but usually widespread on sandy beaches in the South African littoral. — 625.

Nitzschia steenbergensis n. sp.

Valve linear to linear-lanceolate with elongated produced acute or slightly capitate apices 48—54 μm long, 5—6 μm broad. Keel excentric, carinal puncta small 9—11 in 10 μm , median pores not more widely separated. Transapical striae 24—25 in 10 μm , clearly punctate, puncta in undulating rows ca. 17 in 10 μm .

Type slide no. 621/2 in the Giffen Collection. Iconotype Figures 61, 62.

Valvae lineari-lanceolatae ad apices subcapitatas versus paulatim angustiores 48—54 μm longae, 5—6 μm latae. Carina excentrica, punctis carinalibus parvis 9—11 in 10 μm , mediis duobus non remotioribus. Striae transapicales 24—25 in 10 μm distincte punctatae, striae longitudinales leniter undulatae circiter 17 in 10 μm .

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis. Typus: praeparatum no. 621/2 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 61, 62.

This new species is closely related to *N. Steynii* CHOLNOKY (1966, 201, Figs. 96—103) but differs in its ecological habitat (hotsprings) and *N. Stompsii* CHOLNOKY which possesses wider carinal pores and closer transapical striae. — Figs. 61, 62. — 619, 621, 625.

N. Stompsii CHOLNOKY 1963: 75, Figs. 100—102; GIFFEN 1967, 279, Fig. 97). — Rare in one sample. — 625.

Nitzschia vulpeculoides n. sp.

Valve linear-lanceolate, constricted in the middle with apices acute, obliquely rounded, 70—95 μm long, 6—8 μm broad in the widest part, 4—6 μm at the

constriction. Keel excentric with 7—9 round to oval carinal puncta in 10 μm , the median pores somewhat wider spaced. Transapical striae very faint about 27—30 in 10 μm , very faintly punctate in two systems crossing one another obliquely (quincunx).

Type slide no. 625/1 in the Giffen Collection. Iconotype Figures no. 63—65.

Valvae in facie connectivale visae lineari-lanceolatae media parte constrictae apicibus acutis oblique rotundatis 70—95 μm longae, 6—8 μm latae. Carina excentrica, punctis carinalibus 7—9 in 10 μm oblongis sive rotundatis mediis duobus leniter remotioribus. Striae transapicales delicatissime, costae longitudinales aequidistantes sed oblique, systema unum punctorum in quincunx positorum efficientes itaque superficies valvae cum striis punctatis, obliquis decussatis ornatus esse conspiciuntur.

Habitat: in aquis marinis Oceani Atlantici loci Steenberg's Cove dicti in sinu St. Helena, Provincia Capensis.

Typus: praeparatum no. 625/1 in collectione Giffen, Fort Hare, C. P.

Iconotypus: Figurae nostrae no. 63—65.

This new species should be placed with the section "*Bilobatae*" GRUNOW. It is similar to *N. vulpecula* Giffen (1967, 280, Figs. 100, 101) which however possesses a longitudinal fold and slightly elongated carinal puncta and was placed in the section "*Dubiae*" GRUNOW. The presence of a quincunx arrangement of puncta on the transapical striae arises in different sections e. g. in *N. fasciculata* GRUNOW in the more or less slightly sigmoid section "*Sigmata*" GRUNOW, *N. vulpecula* GIFFEN in the "*Dubiae*" and *N. Fogedi* M. MØLLER (1950, 212, Fig. 14) and *N. vulpeculoides* n. sp. belong to the "*Bilobatae*". — Fig. 62—65. — 625.

Opephora PETIT 1888.

O. gemmata (GRUNOW) HUSTEDT (cf. GIFFEN 1967, 280, Fig. 103; 1971a, 10). — 620, 624.

O. Martyi HÉRIBAUD (cf. HUSTEDT 1927—1964, Part 2, 135, Fig. 654; GIFFEN 1967, 281, Fig. 104). — 621.

O. pacifica (GRUNOW) PETIT (cf. HUSTEDT 1955, 13, Pl. 4, Figs. 47—49; GIFFEN 1967, 280, Fig. 102).

Careful observation clearly established the double rows of puncta in the transapical striae as described by HUSTEDT l. c. The specimens varied greatly in size from 10 μm to over 40 μm long with very short transapical striae 6—8 in 10 μm . Widespread and variable. — Figs. 66, 67. — 619, 620, 621, 623, 624, 625.

Pleurosigma W. SMITH 1852.

P. acutum NORMAN (cf. PERAGALLO 1897—1908, Pl. 31, Figs. 14, 15; CLEVE 1894, 42; GIFFEN 1970a, 295). — 619.

P. formosum W. SMITH 1853, 63, Pl. 20, Fig. 195 (cf. CLEVE 1894, 45; PERAGALLO 1897—1908, Pl. 30, Figs. 1, 2; GIFFEN 1970a, 296; 1971a, 11).

This species, one of the largest seen in the material was never frequent in any sample. Dimensions (local) 186—192 μm long, 32 μm broad, striae transapical/oblique: 12/10, 13/10, 15/10. — 619, 621.

P. intermedium W. SMITH (cf. GIFFEN 1970b, 95, Fig. 46).

The author considers, after the examination of a great number of individuals from Sea Point near Cape Town (GIFFEN l. c.) and also material from the St. Helena region, that the var. *mauritanum* GRUNOW should be included in the type to which it is related by a series of intermediate steps, the only difference between the type and the so-called variety being its narrower width. — 619, 621, 624.

P. Normanii RALFS in PRITCHARD (cf. CLEVE 1894, 40; PERAGALLO 1897—1908, Pl. 32, Figs. 4—6 as *P. affine* var. *Normanii*; HENDEY 1964, 244; GIFFEN 1970a, 297. — 619, 620, 625.

P. obscurum W. SMITH 1852: 8, Pl. 1, Fig. 11 (cf. CLEVE 1894, 43; PERAGALLO l. c. Pl. 31, Fig. 3).

Dimensions: 112—116 μm long, 20 μm broad, transapical/oblique striae = 20/25 in 10 μm . I have some doubt as to the identity of this form which does not completely agree with the description in CLEVE l. c. but is extremely close to that of PERAGALLO l. c. the ratio of transapical to oblique striae being almost identical. — 619.

P. rigidum W. SMITH 1853, I, 64, Pl. 20, Fig. 198; cf. CLEVE 1894, 39; PERAGALLO l. c., Pl. 33, Figs. 13—15; GIFFEN 1970a, 297).

Dimensions: 260—264 μm long, 40 μm wide, striation: transverse/oblique = 18/18; 17/18. — 619, 621.

P. strigosum W. SMITH (cf. GIFFEN 1963, 250, Fig. 99). — 619, 621.

Pseudonitzschia PERAGALLO 1897—1908.

P. australis FRENGUELLI (cf. HUSTEDT 1955, 43, Pl. 15, Fig. 1; PERAGALLO 1897—1908, Pl. 72, Figs. 25—29).

There is some doubt as to the identity of the specimens I have placed under the specific name *P. australis* FRENGUELLI.

PERAGALLO (l. c.) who instituted the genus *Pseudonitzschia* figures on Pl. 72, Figs. 25—29, three species and two varieties viz.

P. migrans CLEVE 11 transapical striae.

P. sicula CASTRACANE 7.5 striae.

P. sicula var. *bicuneata* GRUNOW 8 striae.

P. seriata CLEVE 16 striae.

P. seriata var. *fraudulenta* CLEVE 23 striae.

The South African examples more or less match in shape Figures 26 and 27 i. e. *P. sicula* and var. but possess somewhat finer striation; also matching in

shape are Figures 28 and 29, *P. seriata* and its var. *fraudulenta* but the striae are far too fine for the South African material, viz. 16–23 in 10 μm . HUSTEDT (1955) above reporting on *P. australis* FRENG. states that “the striae are somewhat denser than given by FRENGUELLI 12–14 instead of 10 in 10 μm but this difference is of no taxonomic value”. My specimens further fall within the limits given for striation of *P. australis* FRENG. but all individuals seen are almost twice as broad as the organism drawn by HUSTEDT on Pl. 5, Fig. 1, which measures 83 μm long by 3 μm broad. The dimensions of the St. Helena Bay material are 92–118 μm long, 7–8 μm broad with 11 transapical striae in 10 μm . Until further information about the genus is available I propose to adopt the cited name for the South African species. I believe this to be the first recording of the genus in South African waters. — Fig. 68. — 620, 621, 625.

Pyxidicula EHRENBERG 1833.

P. mediterranea GRUNOW (cf. HUSTEDT 1927–1964, Part 1, 300, Fig. 137; GIFFEN 1970a, 298). Very rare in the material. — 621.

P. minuta GRUNOW (cf. HUSTEDT 1927–1964, Part 1, 301, Fig. 139; CHOLNOKY 1960, 114, Fig. 333; GIFFEN 1967, 283).

As stated previously by the author l. c. much of the South African material observed from various sources on the coasts e. g. Kidd's Beach (1967) in the Eastern Cape Province, Sea Point near Cape Town (1970b) and Gordon's Bay (1971a, 11) in False Bay provide specimens which link up *P. africana* CHOLNOKY with *P. minuta* GRUNOW. Certain members which have rows of areolae of 6–7 in 10 μm link *P. minuta* with *P. mediterranea* GRUNOW. — 627.

Rhabdonema KÜTZING 1844.

R. arcuatum (LYNGBYE) KÜTZING (cf. HUSTEDT 1927 to 1964, Part 2, 20, Fig. 549a, b; GIFFEN 1970b, 95, Fig. 47; FRICKE in A. SCHMIDT, Atlas, T. 220, Figs. 3–22).

As stated in a previous paper, the forms of this species vary very greatly in size, many being completely typical, some being only half the published size, rarely reaching 20 μm in length. — 620, 624.

R. arcuatum var. *robustum* (GRUNOW) HUSTEDT 1927 to 1964, Part 2, 20, Fig. 550; FRICKE in A. SCHMIDT, Atlas, T. 221, Figs. 17–20 as *R. robustum* GRUN.; GIFFEN 1970b, 95).

The variety is very much more abundant and widespread in the St. Helena material than the type. — 619, 620, 621, 623, 625.

Rhoicosphenia GRUNOW 1860.

R. Adolphi M. SCHMIDT in A. SCHMIDT, Atlas, T. 213, Figs. 20–23 (GIFFEN 1970b, 96, Figs. 51–54).

A number of very large specimens were observed viz. to 44 μm long and 6 μm broad with transapical striae

9 in 10 μm . The species is widespread and often abundant in the samples. — 619 to 627.

R. flexa GIFFEN 1970b, 96, Figs. 55–58.

This recently published new species is similar to *R. curvata* (KÜTZING) GRUNOW but differs in wider transapical striae, 9–10 in 10 μm which are coarsely punctate. This taxon occurred almost always associated with the above recorded species *R. Adolphi* M. SCHMIDT, also often in abundance. — 619 to 627.

Stauroneis EHRENBERG 1843.

S. decipiens HUSTEDT 1927–1964, Part 2, Bd. 6 (1959): 827, Fig. 1170.

This species which occurred rarely in one sample (621) and abundantly in another (625) was very variable in size. Many examples could be found which were completely typical and identical with the description e. g. 35 μm long, 3–5 μm broad with 24 transapical striae in 10 μm ; many others, however, were much more robust viz. 60 μm long, 8 μm wide with 20 transapical striae in 10 μm and punctate 20 in 10 μm . These are linked with typical examples and to accommodate them the original description should be emended: length 30–60 μm , breadth 3–8 μm , transapical striae clearly punctate, 20–24 in 10 μm . — Figs. 69–71. — 621, 625.

Stephanopyxis EHRENBERG 1844.

S. turris (GREVILLE & ARNOTT) RALFS (cf. HUSTEDT 1927–1964, Part 1, 304, Fig. 140).

This is a somewhat doubtful identification as the cells are only 5–6 μm in diameter and 4–6 μm long, with spines about 10 per cell. The cell sculpturing was not visible. Only two individuals were observed. — 621.

Synedra EHRENBERG 1830.

S. tabulata (AGARDH) KÜTZING var. *fasciculata* (KÜTZING) GRUNOW. — 619, 620.

Thalassiosira CLEVE 1873.

T. decipiens (GRUNOW) JÖRGENSEN (cf. HUSTEDT 1927 to 1964, Part 1, 322, Fig. 158; CHOLNOKY 1968, 91).

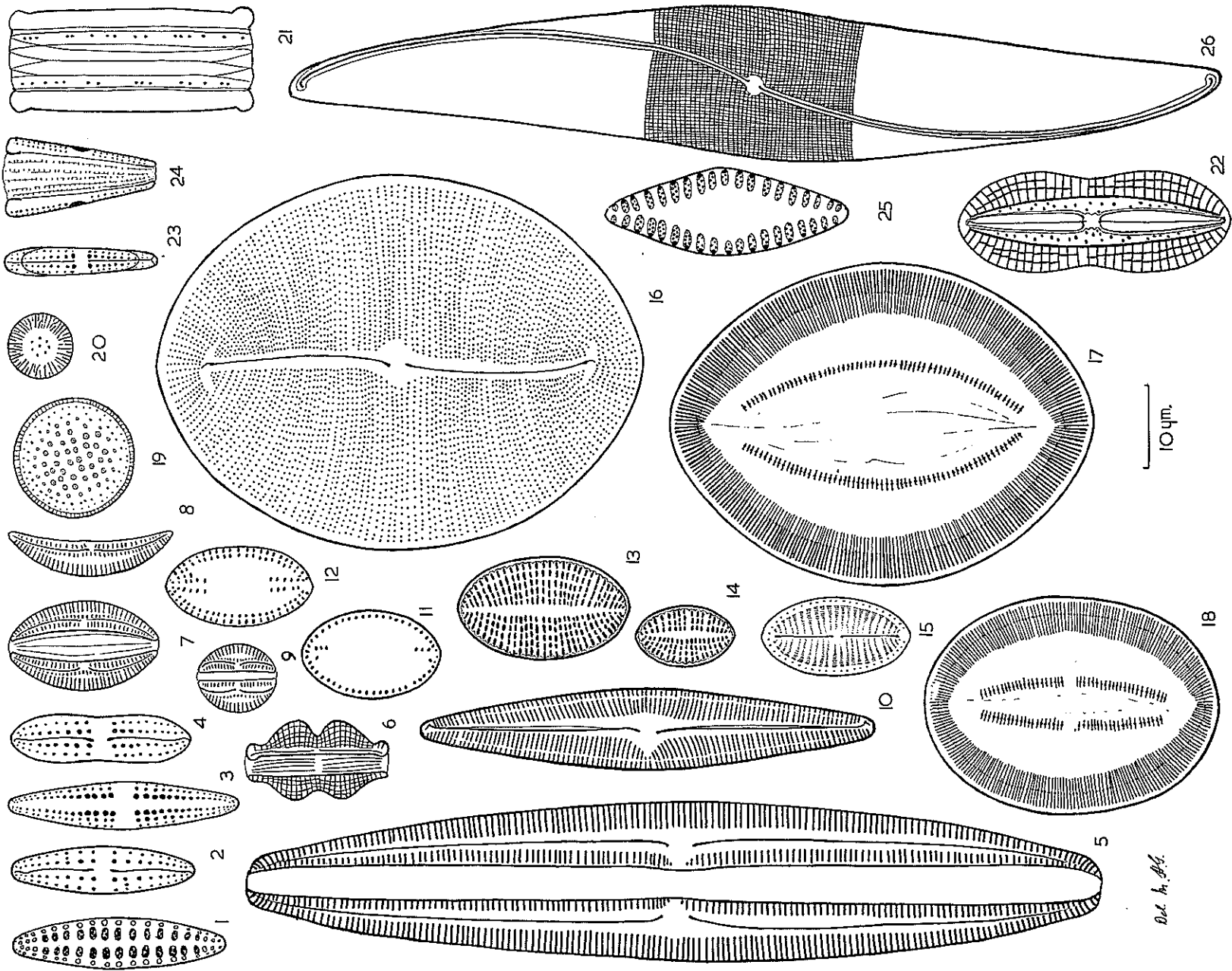
CHOLNOKY records this species from the St. Lucia Lagoon, Natal from brackish water. Dimensions of the St. Helena Bay examples: diameter 18 μm , areolae 10–15 in 10 μm . — 619.

T. Nordenskiöldii CLEVE (cf. HUSTEDT l. c. 321, Fig. 157 A. SCHMIDT, Atlas, T. 225, Figs. 8–15).

T. Nordenskiöldii is usually recorded from Northern Seas, but typical individuals were seen in the material from the cold South Atlantic waters in St. Helena Bay. — 621.

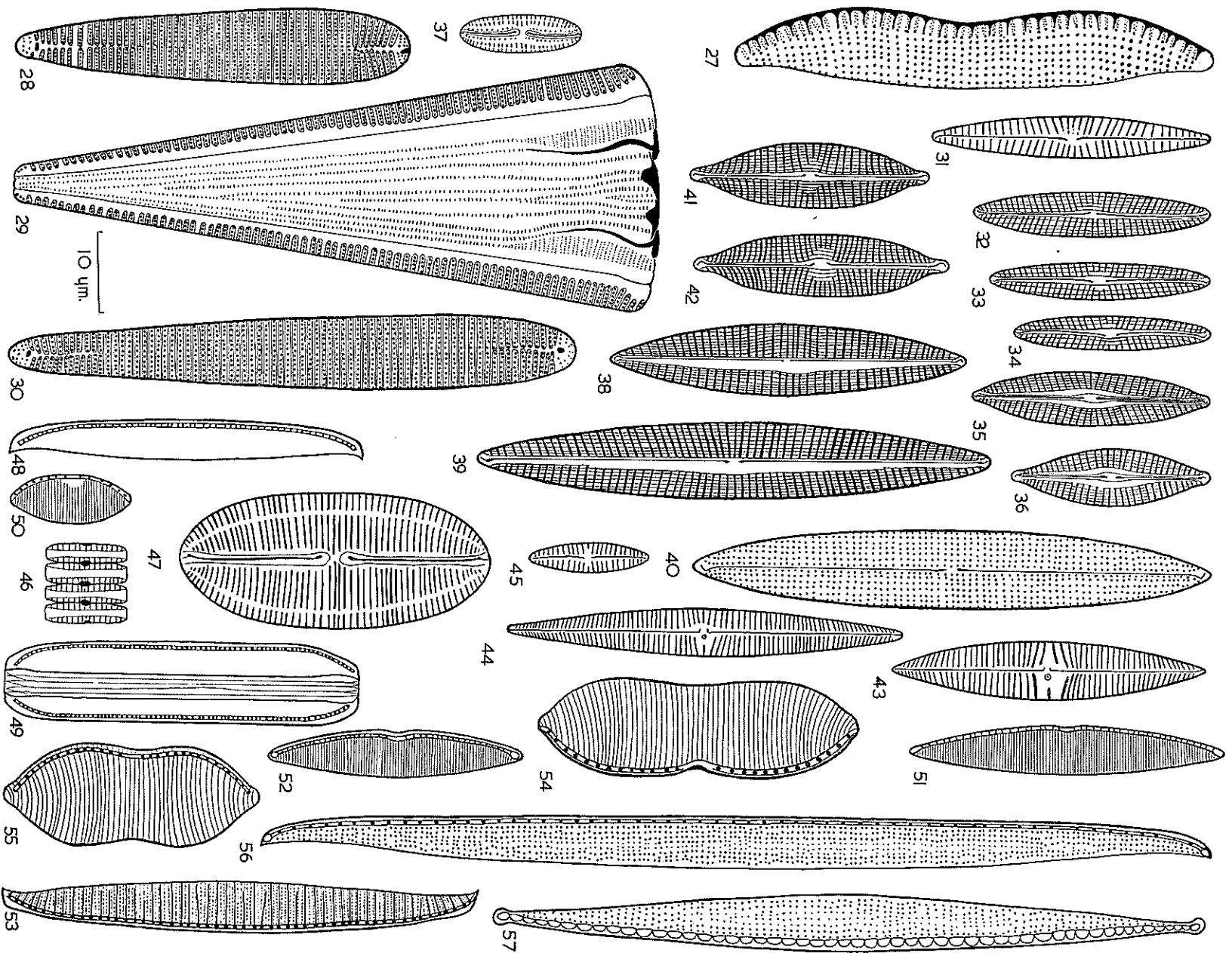
Trachyneis CLEVE 1894.

T. aspera (EHRENBERG) CLEVE (cf. GIFFEN 1963, 255, Figs. 106, 107).



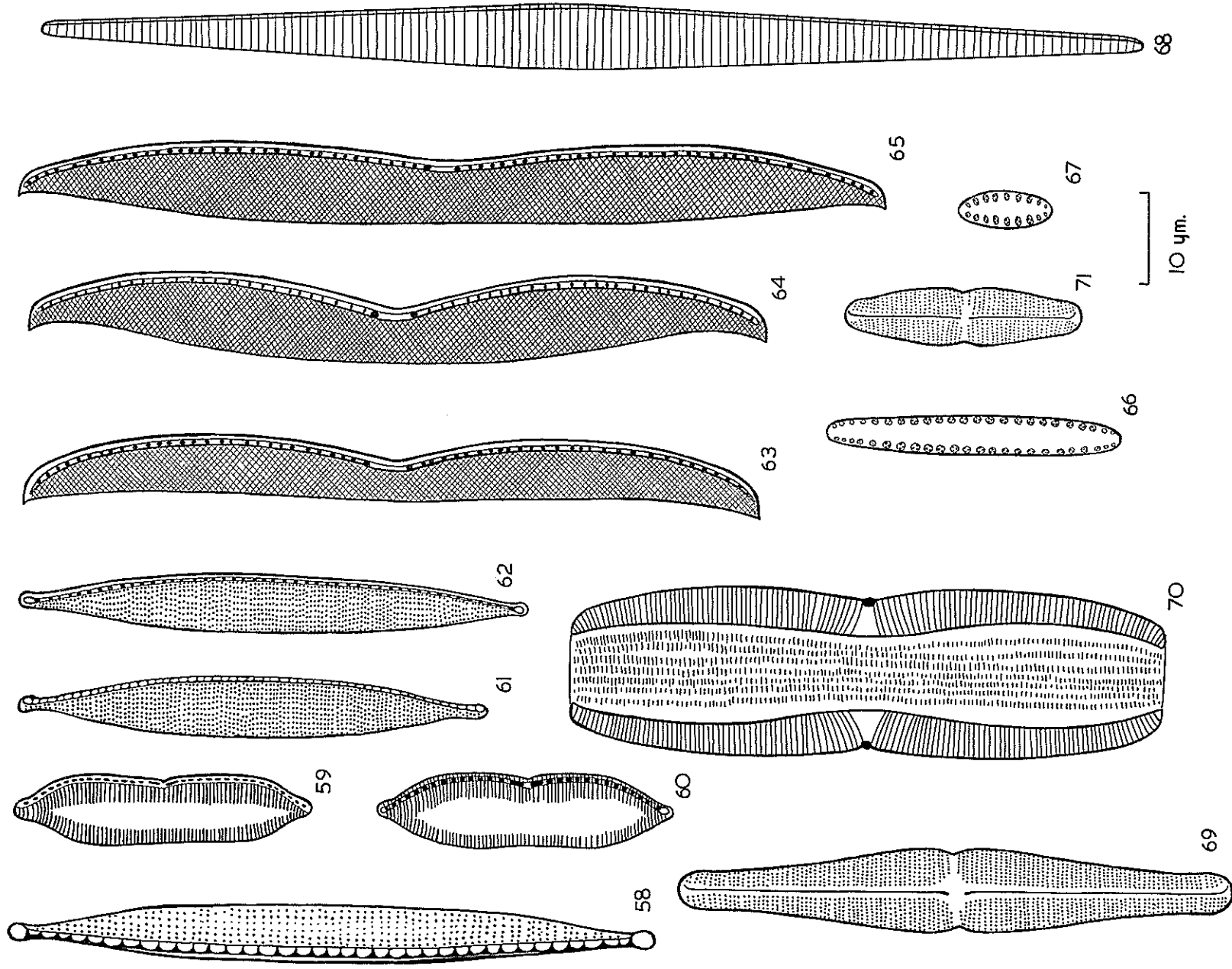
Pl. 1. 1—4. *Achnanthes groenlandica* n. f. *meridiana*. 5. *Amphora angusta* var. *Eulersteini* GRUNOW. 6. *A. bigibba* GRUNOW. 7—9. *A. helenensis* n. sp. 10. *Caloneis fusoides* (GRUNOW) HEIDEN + KOLBE. 11, 12. *Cocconeis californica* var. *Kerguelensis* HEIDEN + KOLBE. 13—15. *C. nitens* EDSBAGGE. 16—18. *C. pseudomarginata* var. *intermedia* GRUNOW.

19. *Cocconeis nitida* GREGORY. 20. *Cyclotella striata* (KÜTZING) GRUNOW. 21. *Dimerogramma irane* GIFFEN. 22. *Diploneis Schmidtii* CLEVE. 23, 24. *Gomphonema pseudoseptatum* GIFFEN. 25. *Glyptodesmis distans* (GREGORY) GRUNOW. 26. *Gyrosigma mediterraneum* CLEVE.



Pl. 11.-27. *Hantzschia insolita* GIFFEN. 28—30. *Lichonophora partita* n. sp.
 31. *Navicula agrata* HUSTEDT. 32—34. *N. assuloides* n. sp. 35, 36. *N. de-*
missa n. sp. 37. *N. dissimula* HUSTEDT. 38, 39. *N. rosalia* n. sp. 40.
N. maritica CHOLUNOVY. 41, 42. *N. phyllipia* KÜTZING. 43, 44. *N. porretz-*

kujeae O. KORETKEVICH. 45, 46. *N. Hansenii* O. MÖLLER. 47. *N.*
vittata (CLEVE) HUSTEDT. 48, 49. *Nitzschia costalis* n. sp. 50. *N.*
Brittonii HAUGLSTREIN. 51, 52. *N. cacumina* n. sp. 53. *N. composita*
 GIFFEN. 54, 55. *Nitzschialis* GRUNOW. 56, 57. *N. proceroides* n. sp.



PL. III: 58. *N. proceroides* n. sp. 59. 60. *N. sibula* n. sp. 61. 62. *N. steenbergensis* n. sp. 63—65. *N. vulperritoides* n. sp. 66. 67. *Opephora pacifica*

(GRUNOW) PETIT. 68. *Pseudonitzschia australis* FRENGUELLI. 69—71. *Stauroneis decipiens* HUSTEDT.

Wide spread and often abundant. Very variable in form, giving rise to a great number of unnecessary varieties. — 619 to 625.

Triceratium EHRENBERG 1841.

T. favus EHRENBERG (cf. HUSTEDT 1927—1964, Part 1, 789, Fig. 463; A. SCHMIDT, Atlas, T. 82, Figs. 1, 3, 4).

This was very scarce and only found in one sample. — 621.

Tropidoneis CLEVE 1891.

T. pusilla (GREGORY) CLEVE (cf. CLEVE 1894, 26; PERAGALLO 1897—1908, Pl. 39, Figs. 17, 18 as *T. lepidoptera* var. *pusilla* GREGORY; HENDEY 1964, 256, Pl. 27, Fig. 1, 2).

This was observed in abundance in one sample: striae 15—18 in 10 μ m. — 625.

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Sets of slides used in the preparation of this work have been presented to the British Museum, London, The Riksmuseet in Stockholm, the Senckenberg Museum in Frankfurt a. M. and the collection of the C. S. I. R. in Pretoria. The type slides mentioned in the text are in the Giffen Collection, University of Fort Hare.

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