Marine Littoral Diatoms from the Gordon's Bay, Region of False Bay
Cape Province, South Africa

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(Received: 5.2. 1970)

The Gordon’s Bay region occupies the north western corner of False Bay, a large rectangular bay, bounded on the west by the Cape Peninsula ending at Cape Point, on the east by the precipitous slopes of the Steenbras Mountains ending at Cape Hangklip, and in the north by the sandy beaches of the isthmus of the Cape Peninsula. Across the Bay in a south westerly direction from Gordon’s Bay, lies Simon’s Bay, a former British Naval base.

The waters of False Bay are comparatively warm as they consist of a small branch of the Agulhas Current (Mocambique Current) which divides at Cape Point and washes onto the bay, the other branch, abutting the cold Benguela Current of the Atlantic Ocean, turns southwards to be eventually lost. On occasions, however, after strong south easterly gales, the Benguela Current is diverted into False Bay bringing cold water from the Atlantic and with it certain species of diatoms as yet only recorded from the Atlantic coasts (cf. Giffen 1969: in press). The following are the species not previously recorded from the eastern Cape coasts by the author but reported from the Atlantic:

1. Cocconeis pseudomarginata GREGORY forms with very large blank bands across the striae of the epivalve, Diploneis lineata DONKIN, Licmophora fuergensis AGARDH, Nitzschia composita n. sp. (recently recorded from Saldanha Bay on the west coast), Rhizosolenia Adolphii M. SCHMIDT, Trachyneis speibaoni GIFFEN.

The most important recent collections of diatom material from False Bay are those of the „Gauss“, Dr. E. von Drygalski’s Deutsche Südpolar Expedition 1901—1903, worked by HEIDEN and KOLBE (1928) from large samples taken from Simon’s Bay. They reported 365 species of which 7 were mesohalobic, 15 were oligohalobic and the remainder euhalobic.

More recently CHOLNOXY (1963) dealt mostly with the mesohalobic material from Cape Hangklip, Steenbras and Gordon’s Bay, all within False Bay. In 1945 summer a large quantity of Dictyota dichotoma AGARDH was collected for University classwork in algal morphology and later formed the material for this investigation. Much of the Dictyota proved sterile and was set aside to be finally prepared as a diatom sample and preserved in the GIFFEN collection as sample 594. The algae was collected from a large tidal pool to the south of Gordon’s Bay village.

Systematic Part

References 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 Hustert 1930 (Bacillariophyta) and 1927—1966 (Kieselalgen). For convenience of reference genera and species are recorded in alphabetical order.

Actinocyclus Bory 1822.

Insistethis species seemstobevery variable — 19–25).

**PERAGALLO**

smallersizewithverymuchcloserstriae. 1955:40, P1.14, fig. HU5TEDT fig.65—67, 70—77; 102,P1.3,fig.40)fromwhichitdiffersinitsconsiderably

**SCHMIDT,** (1895:121). [**CLEvE** (1895:193; HUSTEDT 1927—1966, Part 1: 534, fig. 304; GIFFEN 1969a: in press). — This variety was very abundant and remarkably constant in size and density of striae. Dimensions: 16—20 μm long, 5—6 μm broad, transapical striae 10 in 10 μm on the epitheca and 12 in 10 μm on the hypotheca.

**Actinoeclythus Ehrenberg 1838.**

**A. subilis** (GREGORY) RALEF (cf. HUSTEDT 1927—1966, Part 1: 534, fig. 304; GIFFEN 1969a: in press). — This was rare in the sample but the species is widely distributed and often abundant in South African brackish and estuarine waters.

**Actinoeclythus Ehrenberg 1839.**

**A. adriaticae** GRUNOW var. *pumilus* GRUNOW (cf. HUSTEDT 1927—1966, Part 1: 481, fig. 269). — All the individuals observed were small with 6—10 segments, diameter from 20 to 25 μm, areolae 17—18 in 10 μm. The hyaline areas on the elevated segments were characteristically absent.


**Amphiprora Ehrenberg 1843.**

**A. sulcata** O'MEARA (cf. CLEVE 1894: 18 as *A. gigantea* var. *sulcata*; PERAGALLO 1897—1908: Pl. 38, fig. 1—3; HUSTEDT 1955: 37). — In phase contrast it can be seen that, between the costae of the valve, there are two rows of very faint decussating puncta. The species was not frequent in the sample. — Fig. 2.

**Amphora Ehrenberg 1840.**

**A. acutisulcata** KÜTZING (cf. CLEVE 1895: 121).

**A. angusta** (GREGORY) CLEVE (1895: 135; A. SCHMIDT, Atlas: T. 25, fig. 15). Widespread and very variable in South Africa. It was numerous in the sample.

**A. bigloba** GRUNOW (cf. A. SCHMIDT, Atlas: T. 25, fig. 65—67, 70—77; HUSTEDT 1955: 40, Pl. 14, fig. 19—25). — In size this species seems to be very variable in South Africa. In a previous paper (GIFFEN 1967: 251) the author reported individuals from the Eastern Cape Province from 7—20 μm long. CHOLNOY also (1963: 40) states that from the Steenbras area (close to Gordon's Bay) the specimens were exceptionally small often only 15 μm in length. Those seen in the investigated material agree in averaging 20—22 μm long.

**A. costata** W. SMITH (1853: 20, Pl. 30, fig. 253; A. SCHMIDT, Atlas: T. 25, fig. 29, 30 as *A. inflata* GRUNOW and PERAGALLO 1897—1908: Pl. 50, fig. 18—20 as *A. costata* var.). — Individuals which I have assigned to this species differ from the description in being somewhat shorter and possessing slightly closer striae along the ventral margin viz. 15 in 10 μm as against 10 in 10 μm. The puncta on the dorsal side are also closer. In general, however, the form and appearance are identical. The blank band across the upper portion as shown in the original figure and also seen in A. SCHMIDT, Atlas (L.c.) for *A. inflata* GRUNOW, included with *A. costata* by CLEVE, shows very clearly in the South African specimens. There is also a very fine line across the transapical striae of the dorsal side near the axial area. — Fig. 3.

**A. exilis** GREGORY (cf. CLEVE 1895: 123; GIFFEN 1963: 217, fig. 17, 18). — Moderately frequent and widespread in littoral and estuarine waters in South Africa.

**A. exilis** n. sp. — Frustule in outline broadly elliptical to almost spherical with slightly truncate ends, 6—11 μm long. Valve lunate with straight ventral margin and somewhat acute ends, 6—11 μm long, 2,5 μm broad. Axial area narrow on the dorsal side of the bacillate raphe, wider on the ventral side with a unilateral central area almost reaching the margin. Transapical striae ca. 30 in 10 μm on both dorsal and ventral sides. Interclary bands on the pleural side obscure but apparently simple.

Type slide 594/1 in the GIFFEN Collection. Iconotype: figures 5—7.

Frustula elliptica sive subspheirica, apicibus leviter truncatis, 6—11 μm longa, 4,5—6,5 μm lata. Valvae semiellipticae, margine ventrale directo, apicibus acutissimo rotundatis, 6—11 μm longae, circiter 2,5 μm latae. Fissurae oblongae bacillatæ curvatae, area axialis in lateris dorsale angusta, in ventrale latius, area centralis unilateraliter in lateres ventrales evoluta, marginem ventralem valvæ paene attingens. Striae transapicales in lateribus utribus radiantes, circiter 30 in 10 μm. Connectivæ lateris pleuralis hæd visibiles, sine structura visibili.

Habitat: in aquis marinis littorales Oceani Indici proprie Gordiens Bay in provincia Capense Occidentale Africæ Meridionalis. Holotypos: praeparatum no. 594/1 in collectione GIFFEN, Fort Hare, C. P.

Iconotypus: figurae nostræ no. 5—7.

This species occurred somewhat infrequently in the sample. It is apparently related to *A. puisto* CLEVE (1895: 102, Pl. 3, fig. 40) from which it differs in its considerably smaller size with very much closer striae. PERAGALLO...
A. submontana HUSTEDT (1949: 112, T. 11, fig. 4; CHOLNOY 1958: 103, fig. 1; 1966: 174, fig. 5). — A displaced fresh water species widespread in South African inland waters.

A. tenuilina GIFFEN (1969a: in press, fig. 21 = A. tenuisima GIFFEN 1967: 254, fig. 19—21 non HUSTEDT). — Not common in the sample and apparently widespread in South Africa although probably overlooked owing to its small size and somewhat delicate structure.

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African marine littoral and commonly found attached to seaweeds of various kinds.

*B. reticulata* Roper (cf. A. Schmidty, Atlas: T. 78, fig. 21—23, T. 84, fig. 15, 16, T. 121, fig. 11—15; Giffen 1963: 222; 1967: 255). — Widespread in South African waters, particularly in warm temperate regions e.g. shores of Indian Ocean. — Fig. 11, 12.

*C. Cleve* 1891.

C. liba (W. Smith) Cleve (1894: 54; Giffen 1969b: in press). — In a recent paper (in press) the author includes *C. liba var. linearis* (Grunow) Cleve with the type as South African material shows there is no justification for retaining it as a species or a variety.

*C. contigua* A. Schmidty (Atlas: T. 18, F. 19, 20). — This species which occurred frequently in the sample is related to the common Mediterranean species *C. adriatica* Grunow (cf. Peragallo 1897—1908: Pl. 53, fig. 4—7; A. Schmidty, Atlas: T. 16, fig. 13, 18) but differs in the strong canals which traverse the thirds of the valve surface between the margin and the central depression, the remaining third forming a strong short rib. The central depression is decorated with irregular reticulate markings (? wrinkles of fine folds). Between the main canals are 2—3 short canals. The spaces between the long canals are irregularly punctate, the puncta sometimes but not always forming radiate striae. Dimensions: from 60 to 76 mm on one axis to 60 to 80 mm at right angles, long canals 25 in 100 mm, short canals 37 in 100 mm. — Fig. 59.

*C. incerta* A. Schmidty (Atlas: T. 15, fig. 13—15, 19, 20, T. 207, fig. 14; C. sarnensis Grunow in Peragallo 1897—1908: Pl. 54, fig. 6—8). — This species was very scarce in the material and has only been reported previously by Heiden and Kolbe from Simons Bay (1928).

*C. Lorenzi*us Grunow (cf. A. Schmidty, Atlas: T. 14, F. 24, T. 18, fig. 4, T. 208, fig. 5; Peragallo 1897—1908: Pl. 55, fig. 8; Giffen 1969a: in press). — Previously recorded from Africa by Leuduger-Fortmorel (1898: 22) from the Congo and by Giffen (1969a) from the Eastern Cape coast. — Dimension: diameter 50 mm, ribs 35 in 100 mm at the margin, and over the central depression 6 in 10 mm.

*C. parvulus* W. Smith (1853: 30, Pl. 6, fig. 56; Peragallo 1897—1908: Pl. 54, fig. 9, Pl. 55, fig. 5, 6). — This species has been recorded from many parts of the South African marine littoral and brackish waters.

*C. C. Cleve* (1895: 167; Hustedt 1927—1966, Part 2: 321, fig. 781; Giffen 1967: 256). — This is an extremely variable species in size, number of transapical striae in 10 um and arrangement of the puncta on the epivalve, and it is possible that some of the varieties are not fully justified. This species has been recorded from several localities along the South African coast.

*Campsylospira* Grunow 1862.

*C. africana* n. sp. — Valve shortly and broadly lanceolate subulate with strongly convex dorsal and moderately curved ventral margin, apices slightly produced, acute or capitate, 15—25 mm long, 5—7 mm broad. Transapical striae in more or less straight rows 12—15 in 10 mm, longitudinal striae in rows following the curvature of the dorsal margin for several rows and becoming irregular or showing a more or less quincunx arrangement towards the ventral margin. Hyaline area absent.

Type slide 294/1 in the Giffen collection.

Iconotype: Figures No. 15—18.

Valvae late, asymmetric lanceolate subulate, or subulate, lanceolate, margine unio valde, alero leviter convexo, apicibus protractis, nonnumquam subcapitatis, 15—24 mm longae, 6—7 mm latae. Striae transapicalis ex punctis isolatis in linis transversalis directis, sive leviter irregularibus ordinatis compositae. Costae longitudinales latae, valde evoluate, in vicinitatim marginis margine parallelae, in partibus medianibus superficie valvae irregulariter undulatae, itaque puncta striarum transapicalium solum prope margines in seriebus regularibus, ceterum in irregulariter undulatis longitundinalibus ordinatae.

Habitat: in aquis marinis littoribus Oceani Indici prope Gordons Bay in provincia Capensis Acientiae Africae Meridionalis.

Holotypus: praeparatum no. 594/1 in collectione Giffen, Fort Hare C. P.

Iconotypus: figure nostra. No. 15—18.

This new species differs from the only European species *C. cymbelliformis* (A. Schmidty) Grunow (cf. Hustedt 1927—1966, Part 2: 128, fig. 650; Peragallo 1897—1908: Pl. 82, fig. 26) in shape and size, being more lanceolate than lunate or cymbiform. In size, most of the measured specimens are shorter than *C. cymbelliformis* which varies in length from 20 to 55 mm, and in breadth from 4—5 mm. Girdle views of the frustule were not seen clearly but showed a slightly curved form as is given in the generic description. From one of the obliquely placed frustules it is just possible that the two valves, convex and concave differ slightly also in shape, the convex valve being capitate and the concave valve with simple acute apices. Hustedt mentions that two other described species, descriptions and figures of which I have not seen, viz. *C. japonica* Tempsre & Brun and its var. *leptostigma* Cleve & Grove and *C. Peragalloi* Harebaud require further study. — Fig. 15—18.

*Ceratanus* Ehrenberg 1844.

Giffea: Marine Littoral Diatoms from the Gordon’s Bay Region of False Bay, Cape Province, South Africa

Clamachosphaeria Ehrenberg 1843.

C. mouillotera Ehrenberg (cf. Hustedt 1927—1966, Part 2: 89, fig. 625; Hustedt in A. Schmidt, Atlas: T. 307, fig. 1—9). — This species has been reported from many stations on both the Atlantic and Indian Ocean coasts of South Africa.

Cosconeis Ehrenberg 1838.

C. convexa Giffen (1967: 257, fig. 26—28). — C. convexus was first described from the Eastern Cape littoral where it was usually abundant. In the sample under investigation it occurred very rarely. The species is characterized by a highly convex raphesless valve with a series of narrow longitudinal blank bands across the transapical stria. The central area of the raph valve shows the middle stria alternately long and short. — Fig. 19, 20.


C. dirupta Gregory (cf. Cleve 1895: 175; Hustedt 1927—1966, Part 2: 354, fig. 809 a—c). — The species was common in the sample and has been reported from many localities along South African coasts.

C. dirupta var. flaccida (Janisch & Rabenhorst) Grunow (cf. Hustedt l. c.: fig. 809 e—i). — The variety usually accompanies the type.

C. dirpoides Hustedt (cf. Hustedt 1927—1964, Part 2: 356, fig. 810). — This small and very slightly silicified species occurred frequently in the sample. — Fig. 21, 22.

C. discrepans A. Schmidt (Atlas: T. 193, fig. 26, 27; cf. Giffen 1967: 258, fig. 31, 32). — This species recently rediscovered and described by the author from the Eastern Cape Province where it occurred abundantly, was observed occasionally in the sample. — Fig. 23, 24.


C. pseudomarginata Gregory (cf. Hustedt 1927—1966, Part 2: 359, fig. 813; Giffen 1969a: in press; 1969b: in press). — In a recent contribution (Giffen 1969a: in press) the author described and figured aberrant specimens of this species in which the so-called blank bands (furrows) across the transapical striae were much widened and the pseudoraphae became exceedingly wide. This form was also observed in the Gordon’s Bay sample, as well as typical examples. Edsall (1966: 64, Pl. 1, fig. 5, Pl. 2, fig. 5) describes and figures Cosconeis nuda Giffen which is identical in structure to that of the South African specimens, differing only in the density of the transapical striae viz. C. pseudo-

marginata 22 and 19 in 10 µm (outer and inner respectively) on the raphesless valve, 18 and 15 in 10 µm for C. nuda, and 24 and 18 in 10 µm for the Cape variation. The figure for the South African form was an extreme form of C. pseudomarginata linked to the type by intermediates, and thus in my opinion C. nuda Edsall should be included in C. pseudomarginata Gregory.


C. scutellum var. para Grunow (cf. Hustedt, l. c.: 338, fig. 791).

C. scutellum var. stauroneiformis (W. Smith) Rabenhorst (cf. Hustedt 1927—1966, Part 2: 339, fig. 792; Giffen 1967: 259). — Hendey (1964: 180) names this variety C. stauroneiformis (Van Heurck) Okuno, stating that from the study of electronmicrographs, Okuno (1957: 217, fig. 2) considers that this taxon differs sufficiently from C. scutellum to be regarded as separate and distinct. The epithet "stauroneiformis" seems to have been given by Rabenhorst (1864: 101) and not by W. Smith (1853: 22, suppl. pl. 30, fig. 34b) who separated the variety from C. marginata Ehrenberg as "B. nodule dilated into a stauros" without an epithet.


Coscinodiscus Ehrenberg 1838.

C. sectilis-iridis Ehrenberg (cf. Hustedt 1927—1966, Part 1: 454, fig. 252; A. Schmidt, Atlas: T. 63, fig. 6, 7, 9, T. 113, fig. 1, 3, 5, 20). — This planktonic diatom has been recorded from the East coast (Taylor 1966) and by Heiden and Kollie (1928) from Simon’s Bay. In the Gordon’s Bay area it should probably be regarded as displaced. Only one specimen was seen.

Cycliella Kützing 1834.

C. striata (Kützing) Grunow (cf. Hustedt 1927—1966, Part 1: 344, fig. 176a, b). — A typical brackish water species probably displaced from the mouth of the local stream, only a single example was observed.

Denticula Kützing 1844.

D. subsitlis Grunow. Widely distributed in South Africa.

Diploneis Ehrenberg 1844.


665, fig. 1062a). — *D. litteralis* occurred fairly frequently in the sample. Hustedt (l.c.) in his notes on the distribution of this diatom more or less restricted it to the North Atlantic and Arctic Oceans. A. Schmidt (l.c.) figured material from “Cap” (Cape of Good Hope) and Cleve gives several tropical localities. Dimensions: 24 µm long, 12—14 µm broad, transapical striae 12, puncta 20 in 10 µ. — Fig. 25.


*D. Smithii* (Björnsson) Cleve. — A widespread and estuarine species.

*D. vaclillans* (A. Schmidt) Cleve var. renitus A. Schmidt (cf. Hustedt 1927—1966, Part 2: 662, fig. 1060a—d; Giffen 1963: 228, fig. 49; Cholnoky 1968: 32). — Cholnoky considers that the more or less constricted forms which occur in many of the *Diplonema* species are usually connected to the type with a complete line of forms and as such should not be provided with varietal names. In the case of *D. vaclillans* var. renitus he considers it should be included in the type and the diagnosis emended. In the sample no typical unconstricted forms were seen.

*Gomphonema Agardh 1824.*


*Grammatophora Ehrenberg 1839.*

G. anglica Ehrenberg (cf. Grunow in van Heurck 1889—1881: T. 53, fig. 5; Peragallo 1897—1908: 357, T. 88, fig. 11—13, 18).

G. arcuata Ehrenberg (cf. Hustedt 1927—1966, Part 2: 42, fig. 567). — Typical examples of this species were seen but were never frequent.


*Gyrosigma Hassall 1845.*

G. Spenceri (W. Smith) Cleve (1894: 117; Peragallo 1897—1908: Pl. 34, fig. 22). — Cleve in his description states that the transverse striae are more distant than the longitudinal and measure 17:22, 21:24, in 10 µm in the type and in the var. exilis Grunow, 28—29 in 10 µm. In the reported individuals, which are otherwise identical, the transapical striae were 27 in 10 µm and the longitudinal striae could not be resolved, probably being more than 33 in 10 µm and very faint.

*Hantzschia Grunow 1880.*


H. marina (Donkin) Grunow (cf. Hustedt in A. Schmidt, Atlas: T. 345, fig. 4—7; Giffen 1963: 233, fig. 58). — In South Africa usually found on beach sands and at river mouths.

*Lithonema Agardh 1832.*


*Licmophora Agardh 1827.*

L. gracilis (Ehrenberg) Grunow var. anglica (Kützing) Peragallo (1897—1908: Pl. 84, fig. 13; cf. Hustedt 1927—1966, Part 2: 60, fig. 583). — This was not frequent in the sample but the individuals that were seen very closely agreed with the description, the dimensions being 25—27 µm long, 4 µm broad, transapical striae 27 in 10 µm.

L. Ehrenbergii (Kützing) Grunow f. Grunowii (Meischkowsky) Hustedt (cf. Hustedt 1927—1966, Part 2: 70, fig. 594). — Only two individuals were observed, one in valve view and one in girdle view, but there is no doubt as to their identity. The characteristic oblique striae on the side of the valve separate it from the recently described *L. opephoroides* Giffen (1969b: in press, fig. 35—37) which the valve view closely resembles, particularly as double rows of puncta can be seen between the transapical ribs (cf. Hustedt, l.c.: „Wahrscheinlich Doppelpunkte“) in phase contrast. — Fig. 26, 27.

L. Jurgenstii Agardh (cf. Hustedt 1927—1966, Part 2: 63, fig. 586; Peragallo 1897—1908: Pl. 84, fig. 4, 5; Giffen 1969b: in press). — The species has recently been reported (Giffen 1969b) from Sea Point near Cape Town and may prove widespread in South Africa, particularly in the colder coastal waters.

*Mastogloia T. N. Watling 1856.*


*Melosira Agardh 1824.*


dant and very variable in sculpture and diameter in South African littoral.

*Navicula Bory 1824.*


*N. abunda* Hustedt (1955: 27, Pl. 9, fig. 10—12; Giffen 1967: 265, fig. 53).

*N. cancellata* Donkin var. Gregorii Ralfs (cf. Cleve 1895: 30; A. Schmidt, Atlas: T. 46, fig. 41, 42, 71, 72; Giffen 1967: 266, as *N. cancellata var. subapiculata*). — The author (Giffen 1967, l. c.) wrongly quoted "var. subapiculata Grunow" which does not exist, for var. apiculata Grunow. This latter variety, together with var. apiculata have been included in *N. cancellata* by Cholnoky (1968a: 58) who also separates *N. Gregorii* Ralfs as an independent species (1963: 58, fig. 51). Dimensions of the Gordon's Bay examples: length 40—50 μm, breadth 8—10 μm, transapical striae 9—10 in the middle, and to 12 in 10 μm at the ends, lineolate, lineolate 18—20 in 10 μm. — Fig. 28.


*N. cingulatoides* Cholnoky (1963: 54, fig. 39; 1968a: 46, fig. 58). — This species was discovered at Roodels, which is not far from Gordon's Bay but has recently been reported by Cholnoky (1968a: 46) from Santa Lucia Lagoon in Natal. It is probable that the species will prove widespread in the marine littoral of South Africa. — Fig. 29.

*N. conoides* (Agardh?) Peragallo (1897—1908: Pl. 8, fig. 13; cf. Hustedt 1927—1966, Part 3: 304, fig. 1423; Giffen 1963: 238, fig. 69; Cholnoky 1968a: 47, fig. 97). — Frequent and widespread. The specimens seen were mostly 17—20 μm long, 5 μm broad with 17—20 transapical striae in 10 μm. The central area was somewhat wider than usually figured, almost in some cases a fascia, often with a shorter isolated stria in the middle. — Fig. 30.

*N. denticulata* Hustedt (1939: 627, fig. 105—107; Cholnoky 1960: 57, fig. 180; Giffen 1963: 236, fig. 66). — Not common in the material but widespread in South African coastal waters and seashore lagoons.


*N. Grevillei* (Agardh?) Heiberg (cf. Peragallo 1897—1908: 64, 65, Pl. 8, fig. 13, 14).

*N. guttata* Grunow (cf. Cleve 1895: 34; A. Schmidt, Atlas: T. 46, fig. 10 without name). — Several examples of this species were seen which differed from the figure in A. Schmidt (l. c.) in possessing rounded slightly obtuse ends, whereas the published figures show slightly protracted ends. In spite of these differences there is no doubt as to its identity. The species does not seem to have been previously recorded from South Africa. — Fig. 31.

*N. Jahaosia* Giffen (1967: 268, fig. 63, 64). — This recently described species which is characterized by a strongly convex and somewhat angular valve surface, leading to a crooked appearance of the striae, appeared to be scarce in the material. — Fig. 32.

*N. longa* (Gregory) Ralfs (cf. Gregory 1856: 47, Pl. 5, fig. 18; A. Schmidt, Atlas: T. 47, fig. 6, 8—10; Giffen 1969a: in press). — Cleve (1895 + 27) places this species under the name *N. directa* (W. Smith) Cleve var. *remota* Grunow. The author (Giffen, 1969a) considers that Gregory's species should be upheld.


*N. nautica* Cholnoky (1963: 62, fig. 64). — Fairly numerous and typical specimens occurred in the sample. The area under investigation is close to the "locus classicus" but it has been recorded from other localities in South Africa viz. Kidd's Beach, Eastern Cape (Giffen 1967) and Sea Point, near Cape Town, Southern Cape (Giffen, 1969a).

*N. peregrina* (Ehrenberg) Kützing (cf. Cleve 1895: 18; Hustedt 1930: 300, fig. 516; Hendey 1964: Pl. 30, fig. 12, 13).

*N. rhaphoneis* (Ehrenberg) Cleve (1895: 36, Pl. I, fig. 30). — Numerous specimens were observed which agree in shape, size and number of transapical striae with the description of this species. However, Cleve's description is restricted in the sizes given, for the Gordon's Bay examples vary from 13—30 μm in length (27 μm), 7,5 to 10 μm (11 μm) in breadth, transapical striae 9—10 in 10 μm (8 in 10 μm), with longitudinal stria 20—25 in 10 μm (lineolae 20 in 10 μm). In most cases the shape appears somewhat more convex than in Cleve's figure. — Fig. 33—35.


*N. sculpturatum* Brébisson (cf. Hustedt in A. Schmidt. Atlas: T. 394, fig. 1, 2; 1927—1966, Part 3: 25, fig,
N. sponsalla n. sp. — Frustule in girdle view arculate, subrectangular with moderately broad connecting zone, intercalary band simple. Valves elliptical to linear elliptical with regularly rounded ends, 22—40 µm long, 7—8 µm broad. Raphe filiform, straight or very slightly flexuose, axial area narrow widening slightly towards the centre, central area moderately large, quadrate due to the shortening of the middle 3—4 striae. Transapical striae radiate throughout, 13—15 in 10 µm, central 3 or 4 shortened and of uneven length, longitudinal striae not visible.

Type slide 594 in the Giffen Collection.
Iconotype: figures 37—39.

Frustula in visus connectivae arcuta, rectangula. Plura modica lata, zona connectiva simplex. Valvaelliptica sive lineari-elliptica apicibus regulariter rotundatis, 22—40 µm longae, 7—8 µm latae. Raphe filiformis, directa sive levissime flexuosa, area axialis anguste linearis, ad nodulum centralem versus lanceolatadilatata, area centrifalis mediocris, transversi oblongi, abbreviatae striationem mediocrum 3—4 parata. Striae transapicales in tota longitudine valvae radiantes, 13—15 in 10 µm, medianes 3 sive 4 abbreviata, inaequatilongae. Costae longitudinales invisibles.

Habitat: in aquis marinis littoralibus Oceani Indici prope Gordon's Bay in provincia Capense Occidentale Africae Meridionalis.

Holotypus: praeparatum no. 594 in collectione Giffen, Fort Hare, C. P.
Iconotypus: figurae nostrae no. 37—39.

Navicula sponsalla n. sp. belongs to a group of Naviculae which posses arculate frustules, hence the valves differ in curvature, one being convex, the other concave. Gronow (1863) devised the genus Rhioconis to include these bent diatoms. Cleve (1895: 10) placed them in his Naviculae lineolatae, except for one species (N. Gorkane Gronow) which fell more naturally into his Naviculae microstigmatae. It is in Cleve's introduction to this latter group that he states (1894: 143) "As to Rhioconis, this genus is also inadmissible, as it contains widely different forms and the degree of flexure in the frustule varies in the same species". Van Heurck in the "Treatise" (1889) accepts Rhioconis as a genus in his key to the genera (p. 152) and on p. 238 gives a brief description of the genus and a figure of Rhioconis Gorkane Gronow. Several species of Navicula with flexed frustules have been observed in South Africa (unpublished material) of which N. sponsalla n. sp. is the first to be described. It is very similar to N. Bollesana Gronow (Cleve 1895: 25; A. Schmidt, Atlas: T. 47, fig. 18) but differs in size, being considerably smaller and possessing 13—15 striae in 10 µm as against 8—11 in 10 µm. From N. sibrica Gronow (cf. Cleve 1895: 29) it differs its radiate transapical striae. It was scarce in the sample. — Fig. 37—39.

N. sibrica Cleve (1895: 31, with no figure; cf. Peragallo 1897—1908: 92, Pl. 12, fig. 15; Giffen 1963: 66). — First recorded from South African waters by Cleve from Stonehouse in the region under investigation. First African record by Leidiger-Fortymore (1898: 30) from St. Thome. Dimensions 88 µ long, 14 µm broad, stria 6—7 in 10 µm, lineolae 20—22 in 10 µm. — Fig. 40.

N. Stompsii Cleve (1963: 66, fig. 77, 78; cf. Giffen 1967: 273). — This species, previously described from the Knysna region of the South Coast by Cleve has been recorded from the eastern coasts where the individuals differed slightly from the original description in having somewhat closer transapical striae. The material from Gordon's Bay is identical with the original.

N. subforcipata Hustedy (1927—1966, Part 3: 533, fig. 1569). I have no doubt as to the identity of this species because the few examples seen fell completely within the dimensional limits of Hustedy's description. Dimensions: 16 µm long, 7 µm broad, transapical striae 15 in 10 µm, puncta ca. 30 in 10 µm. — Fig. 41.

Nitryxibas Hassal 1845.

N. comprisita n. sp. — Frustule in girdle view linear with rounded truncate ends. Valve lanceolate with capitate ends, 60—75 µm long, 4—7 µm broad. Keel moderately excentric, carinal puncta 9—11 in 10 µm, strong, with carinal costae crossing from the keel to the margin. Transapical striae faint, ca. 20 in 10 µm, with more or less 2 between each rib, very finely punctate.

Type: Slide 594 in the Giffen Collection.
Iconotype: Figures 42, 43.

Frustule in visus pleuralis linearis, apicibus rotundatis, truncatis. Valvae lanceolate, apicibus protractis, distincte capitatibus, 60—75 µm longae, 4—7 µm latae. Carina modice excentrica, pori carinales distincti, 9—11 in 10 µm, costis carinalibus marginae valva attingentibus connectae. Striae transapicales subtillis, circiter 20 in 10 µm, plurumque duo inter costas duas carinales, subtiliter punctatae.

Habitat: in aquis marinis littoralibus prope Gordon's Bay in Provincia Capense Occidentale Africae Meridionalis.

Holotypus: praeparatum no. in collectione Giffen, Fort Hare, C. P.
Iconotypus: figurae nostrae no. 42 et 43.

This new species is characterized by the transverse costae or ribs from the keel to the margin and the presence of either double rows of small puncta or two finely punctate transapical striae between the costae. The diatom is
weekly silicified and complete and unbroken specimens were difficult to find although it was not infrequent in the sample. — Fig. 42, 43.

*N. constricta* Gregory (cf. PERAGALLO 1897—1908: 270; PL 70, fig. 8—10; HUSTEDT in A. SCHMIDT, Atlas: T. 333, fig. 8). Widespread and often frequent in the South African marine littoral and river estuaries. In the sample, the observed individuals were mostly small being about 25 μm long with 15 transapical striae in 10 μm and the carinal pores 10 in 10 μm.

*N. dissipata* (Kützing) GRUNOW (in CLEVE & GRUNOW 1880: 90; in VAN HEURCK 1880—1881: 178, PL 63, fig. 1—3).

*N. distans* Gregory (cf. PERAGALLO 1897—1908: PL 73, fig. 5; GIFFEN 1963: 245, fig. 85). Since HUSTEDT's original description was published (l. c.) the diagnosis has been amended by CHOLNOKY and further information added by the author (GIFFEN, l. c.). The dimensions now accepted are: length 32—96 μm, 3,5—5,0 μm broad, carinal pores very irregular from 2,5 to 5 in 10 μm. The species was infrequent in the material and fell well within the limits of the new dimensions viz. 45—50 μm long, 5 μm wide, carinal pores 4—6 in 10 μm.

*N. dubia* W. SMITH (cf. HUSTEDT 1930: 403, fig. 770; PERAGALLO 1897—1908: PL 70, fig. 30). — A fresh to brackish water species probably displaced in the sample.

*N. frustulum* (Kützing) GRUNOW var. subtilis HUSTEDT (1930: 415, fig. 796; GIFFEN 1963: 245; 1967: 275). Since HUSTEDT's original description was published (l. c.) the diagnosis has been amended by CHOLNOKY and further information added by the author (GIFFEN, l. c.). The dimensions now accepted are: length 32—96 μm, 3,5—5,0 μm broad, carinal pores very irregular from 2,5 to 5 in 10 μm. The species was infrequent in the material and fell well within the limits of the new dimensions viz. 45—50 μm long, 5 μm wide, carinal pores 4—6 in 10 μm.

*N. Hustedtiana* Salah (1952: 166, PL 9, fig. 11 = N. Hustedtiana CHOLNOKY 1959: 50, fig. 313—315; HUSTEDT in A. SCHMIDT, Atlas: T. 330, fig. 12 as *N. punctata* (W. SMITH) GRUNOW var. minoris; GIFFEN 1967: 275). — The author (GIFFEN, l. c.) discussed the authority for the specific epithet. The species is not uncommon in brackish waters of estuaries and salt marshes. It was rare in the material in hand. Dimensions: 17 μm long, 7 μm broad, transapical striae 15 in 10 μm.

*N. hybrida* GRUNOW (cf. HUSTEDT 1930: 406, fig. 778; GIFFEN 1967: 275). Since HUSTEDT's original description was published (l. c.) the diagnosis has been amended by CHOLNOKY and further information added by the author (GIFFEN, l. c.). The dimensions now accepted are: length 32—96 μm, 3,5—5,0 μm broad, carinal pores very irregular from 2,5 to 5 in 10 μm. The species was infrequent in the material and fell well within the limits of the new dimensions viz. 45—50 μm long, 5 μm wide, carinal pores 4—6 in 10 μm.

*N. icrustata* (Kützing) GRUNOW var. densestriae (1862: 579, T. 12, fig. 35; cf. CHOLNOKY 1968: 73, fig. 134—138). — According to CHOLNOKY (l. c.) this species is well represented in African localities and apparently widespread in South African waters. Dimensions of local material: 12—16 μm long, 3,5 μm broad, carinal pores 5—7 in 10 μm. — Fig. 44, 45

*N. Lorenziana* GRUNOW (cf. HUSTEDT 1930: 423, fig. 820; PERAGALLO 1897—1908: PL 74, fig. 21—26). — The distinction between the varieties described in HUSTEDT (l. c.) and PERAGALLO (l. c.) seem to be inconsequential and the distinctions so slight as to make their separation unnecessary. The following table shows the intergrading of species and varieties: (Table)

The South African specimens appear to belong to *N. Lorenziana* GRUNOW, as they are closest in number of striae although shorter in length and with very slightly closer carinal pores. The species was not frequent in the sample.

*N. Lorenziana* GRUNOW var. incurva

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Length</th>
<th>Breadth</th>
<th>carinal pores</th>
<th>Striae</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>N. Lorenziana</em> var.</td>
<td>130—190</td>
<td>6—7</td>
<td>6—7</td>
<td>13—14</td>
</tr>
<tr>
<td>var. incurva</td>
<td>60—60</td>
<td>5</td>
<td>6—7</td>
<td>14—15</td>
</tr>
<tr>
<td>var. subtilis</td>
<td>65—160</td>
<td>3—6</td>
<td>6—8</td>
<td>17—19</td>
</tr>
<tr>
<td>var. densestriae</td>
<td>60—80</td>
<td>3—4</td>
<td>6—8</td>
<td>18—20</td>
</tr>
<tr>
<td>Gordon's Bay specimens</td>
<td>70—72</td>
<td>4</td>
<td>7—8</td>
<td>12—13</td>
</tr>
</tbody>
</table>

Theselasttwo

16, 1899: P1.

VANHEURCK

Notfrequent.

—

GLEN

17; 1930: 420; var.

N. sigma

1897—1908: P1. 32, fig. 16, 1927—1966; Part 2: 112, fig. 638; GRUNOW (in VANHEURCK)

intercedens

N. sigma

1969a: inpress).

GILFEN

53.

1899: 396, (KÜTZING)

rigida

var.

N. sigma

SMITH

(cf. HUSTEDT

W.

P. dc/lea/unm

P1.16, fig. 533).

1899: 420; 1930: 420, (KÜTZING)


GREGORY (cf. HUSTEDT

1955: 48; HUSTEDT

in A. SCHMIDT, Atlas: T. 335, fig. 4 as N. longissima f. costata HUSTEDT; GIFFEN 1969a: in press, fig. 84).

N. Videnichii (GRUNOW) PERAGALLO (GRUNOW in VAN HURCK 1880—1881: Pl. 67, fig. 7 as Homoecocdia

Videnichii GRUNOW; CHOLNOKY 1963: 76, fig. 103—105 and also P. 73, fig. 92 as N. kogynensis CHOLNOKY; GIFFEN 1967: 279). — Rare.

Oppphora PETIT 1888.

O. gymmata (GRUNOW) HUSTEDT (1927—1966, Part 2: 135, fig. 654; GIFFEN 1967: 281, fig. 102). — The specimens seen in the Gordon's Bay sample were very like those figured by the author (Giffen, l. c.) from the Eastern Cape Province viz. 192gmlong, 8—9gm broad, with 8—9 strong transapical striae in 10 μm with a somewhat narrow pseudoraphe. Frequent in the material.


Plagiogramma GREVILLE 1859.

P. Vanhureckii GRUNOW (cf. HUSTEDT 1927—1966, Part 2: 112, fig. 638; PERAGALLO 1897—1908: Pl. 82, fig. 6). — Small specimens were seen not infrequently in the material, most of which possessed a slightly oblique transapical pseudoseptum and somewhat broader ends than figured in either HUSTEDT (l. c.) or PERAGALLO (l. c.). Dimensions: 13—15 μm long, 5 μm broad, transapical striae ca. 12 in 10 μm. The species has been previously recorded from plankton in both Atlantic and Indian Oceans off South African shores. — Fig. 52, 53.

Plurisigma W. SMITH 1825

P. delicatulum W. SMITH (1853: 64, Pl. 21, fig. 202; cf. CLEVE 1894: 57; PERAGALLO 1897—1908: Pl. 32, fig. 16, 17; GIFFEN 1963: 250). — Not frequent.

P. foraminum W. Smith (1853: 63, Pl. 20, fig. 195; cf. Cleve 1894: 45; Peragallo 1897—1908: Pl. 30, fig. 1—3; Giffen 1969a: in press). — This was one of the largest diatoms seen in the sample. Length 274 μm, breadth 30 μm, striae, transverse 12 in 10 μm, oblique 10 in 10 μm, which is slightly coarser than given in Cleve (l.c.) or Peragallo (l.c.) i. e. 14 in 10 μm. The species was not common.

P. rigidum W. Smith (1853: 64, Pl. 20, fig. 198; cf. Cleve 1894: 39; Peragallo 1897—1908: Pl. 33, fig. 13—15; Giffen 1969a: in press). — Dimensions: 240—256 μm long, 38 μm wide, striae transverse: oblique as 18:19, 15:17, 15:15 in 10 μm which is somewhat coarser than described. It was not in frequent in the sample.

Podoscytis Bailey 1854.

P. spathulata (Shadbolt) Van Heurck (cf. Hustedt 1927—1966, Part 2: 133, fig. 653). — Typical specimens were seen in the material but were not abundant. This species does not seem to have been described from South African waters.

Pyxisdicula Ehrenberg 1833.


Rhaphioneis Ehrenberg 1844.

R. capensis A. Schmidt (Atlas: T. 193, fig. 18; cf. Giffen 1967: 284, fig. 114, 115). — This recently rediscovered species, figured by A. Schmidt (l.c.) in 1894, was described and figured by the author and has been shown to be fairly widespread in South African marine littoral.

R. mirabilis Giffen (1963: 251, fig. 100—102; 1967: 284, fig. 116, 117). — Widely distributed and very variable in length but smaller specimens can be confused with somewhat elongated individuals of R. swirella (Ehrenberg) Grunow. Frequent and widespread in South Africa.

R. superba (Janisch) Grunow (Janisch 1862: Pl. 2, fig. 8 as Cocconeis superba; Hustedt 1951: 305, fig. 1, 2; A. Schmidt, Atlas: T. 193, fig. 9—11 as Cocconeis superba Janisch and probably also, A. Schmidt, Atlas: T. 58, fig. 24—28 as Coscinodiscus cocconeiformis A. Schmidt; Giffen 1967: 284, fig. 118). — Widespread in the South African littoral, frequently on beach sands and often abundant.


Rhicosphenia Grunow 1860.

R. Adlphi M. Schmidt (in A. Schmidt, Atlas: T. 213, fig. 20—23; cf. Giffen 1969b: in press, fig. 51—54). — Recently reported from the Atlantic coast near Cape Town, where it occurred in great numbers, it was represented here by a very few individuals.

Striatella Agardh 1832.


Sutirella Turpin 1828.


S. fastuosa W. Smith (1828). — Typical specimens were seen in the material but were not abundant. This species does not seem to have been recorded from South Africa.

S. gemma Hustedt (1927—1966, Part 2: 195, fig. 690; Grunow 1880—1881: T. 42, fig. 1 as Cocconeis superba; Jánisch and probably also, A. Schmidt, Atlas: T. 193, fig. 9—11 as Coscinodiscus cocconeiformis A. Schmidt; Giffen 1967: 284, fig. 118). — Widespread in the South African littoral, frequently on beach sands and often abundant.

S. ibex Ehrenberg var. eunosta Wittrock (cf. A. Schmidt, Atlas: T. 4, fig. 1, 2 as S. eunosta A. Schmidt; Giffen 1963: 253, fig. 109). — Rare in the material but widespread in South African waters.

S. gemma (Ehrenberg) Kützing (cf. Giffen 1967: 286; 1969a: in press; Cholnoky 1960: 118, fig. 341). — This is one of the commonest species of Sutirella in the littoral of the Eastern Cape coasts and also the South Western regions.

S. ovallis Brébisson. — A displaced fresh or brackish water species.

S. scalaris Giffen (1967: 286, fig. 121—123). — Not infrequent in the sample. — Fig. 54.

Synedra Ehrenberg 1830.

S. guilloni (Bory) Ehrenberg (cf. Hustedt 1927—1966, Part 2: 195, fig. 690; Hustedt in A. Schmidt, Atlas: T. 306, fig. 9—13; Peragallo 1897—1908: Pl. 80, fig. 7; Grunow in Van Heurck 1880—1881: T. 42, fig. 1 as S. capensis). — The forms which I have assigned to this species differ from the authoritative descriptions (Hustedt, l.c., Van Heurck, l.c.) in one characteristic, that of the number of transapical striae in 10 μm. The dimensions of the South African specimens are: 45—140 μm long, 6—8 μm broad with 20 transapical striae in 10 μm, parallel but sometimes slightly radiate at the very ends, prominent mucilage pores are visible at the apices. The very fine striae compared with the 9—10 in 10 μm given in the description is somewhat difficult to accept but for the fact that Hustedt himself, a very accurate draughtsman, drew 13—16 striae in 10 μm at the very ends, prominent mucilage pores are visible at the apices. The very fine striae compared with the 9—10 in 10 μm given in the description is somewhat difficult to accept but for the fact that Hustedt himself, a very accurate draughtsman, drew 9—10 in 10 μm in his figures in A. Schmidt, Atlas: 306, figs. 9, 10, which is intermediate between the South African specimens and the type. I have not seen Grunow's description of S. capensis Grunow in Van Heurck (l.c.) which may be the same as those of my material. S. guilloni has been recorded by Heiden & Kolm (1928: 560) from Simon's Bay who give the striae as 9—11 in 10 μm. — Fig. 55, 56.
S. tabulata (Agardh) Kützing var. fasciata (Kützing) Grunow (cf. Hustedt 1927—1966, Part 2: 218, fig. 710a—n; Cholnoky 1968: 90). Cholnoky considers that the division of the species into so-called varieties is unnecessary and places the above variety with the type.

Thalassiothrix Cleve & Grunow 1880.


Trachyes Cleve 1894.


T. spiloboma Gifffen (1969b: in press, fig. 62, 63). — This recently described species is apparently the smallest and least silicified of the genus. It was not frequent in the sample. — Fig. 57.

T. velata A. Schmidt (Atlas: T. 48, fig. 33, 34 and 35—37 without name; Cleve 1894: 194). — This species differs from T. aspera in the shape and size of the central area which, here, is fairly small and circular or transapically slightly elongated. The number of striae is given by Cleve as 15—16 in 10μm for the named figures in A. S. Atlas i.e. fig. 33, 34 which is quite correct. Measurement of the remaining quoted figures viz. fig. 35—37, give 10—13 striae in 10μm, which is consistent with the observed South African specimens, which have a very constant number of 10 transapical striae in 10μm. Schmidt quotes his figures 35—37 as originating from the Cape of Good Hope. The description of T. velata A. Schmidt should be emended to include all specimens with transapical striae from 10—16 in 10μm. The species was frequent in the sample. — Fig. 58.

Triartium Ehrenberg 1841.

T. antediluvianum (Ehrenberg) Grunow (cf. Hustedt 1927—1966, Part 1: 810, fig. 472; A. Schmidt, Atlas: T. 99, fig. 1—4, 6—9, 20; Peragallo 1897—1908: Pl. 102, fig. 1—7 in both the last as Amphitrettas; Cholnoky 1963: 80). — Only one individual was seen which is consistent with the few reports of its presence and its scarcity in the samples. Heiden & Kolbe, 1928, report it from Simon’s Bay.


Acknowledgements

I wish to acknowledge my thanks and indebtedness to Professor J. M. de Wet, Rector of the University College of Fort Hate, Cape Province, at which institution this work was carried out, and to Dr. B. J. Cholnoky of the National Institute for Water Research, Council for Scientific and Industrial Research, Pretoria, for his encouragement and assistance.

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.

References