

New and Interesting Marine and Littoral Diatoms from Sea Point, near Cape Town, South Africa

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Dedicated to B. J. Cholnoky on the occasion of his seventieth birthday, 27th June 1969

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During a visit to Cape Town in December 1967, the opportunity was seized to visit the sea shore at Seapoint, a suburb and seaside resort near Cape Town, for the purpose of obtaining fertile class material of *Laminaria*, *Ecklonia* and *Polysiphonia* which are readily collected from drifting seaweeds torn from the vast kelp beds just offshore.

At the same time three samples of diatom material were collected from the drift seaweed.

591. Scrapings of a small epiphytic Rhodophyte from the stipes and "fronds" of *Ecklonia buccinalis* (L.) HORNE. 592. From mats of *Chlorophyta* chiefly *Chaetomorpha* sp., and *Enteromorpha* sp. from a rock pool almost certainly contaminated with fresh water either from springs or rain water drains. (Dominant here was *Achnanthes brevipes* and vars.).

602. Obtained from plants of *Polysiphonia virgata* (AGARDH) Spreng., usually found epiphytic on *Laminaria* and *Ecklonia* stipes. (Dominant in the sample was *Licmophora Juergensii* AGARDH).

The west coast of South Africa is influenced by the South Atlantic Ocean which flows northwards up the west coast as the Benguela Current, finally reaching the Cape Peninsula in which the City of Cape Town is situated on the shores of Table Bay. Some 65 kilometers to the south of Cape Town are the twin capes, Cape Point and Cape McLeer which go to make up the wellknown Cape of Good Hope. To the east of this Cape is False Bay which is strongly influenced by the warm waters of the Indian Ocean. It is from this Cape Peninsula region, both from Cape Town (Table Bay) and Simonstown (False Bay) that many of the classic collections recorded as "Cape of Good Hope" were obtained, for such exploring expeditions as "Valdivia" (KARSTEN), "Novara" (GRUNOW), "Gazelle" (JANISCH), and "Challenger" (CASTRACANE) called at the Cape. In recent years collections of littoral marine diatoms have been made in this immediate region by CHOLNOKY (1959 e. g. Camps Bay, Hout Bay, Kommetjie, Smitswinkel Bay, 1963 e. g. Gordons Bay and Steenbras River mouth).

A comparison of the sea temperatures between those of Table Bay and Simons Bay (GILCHRIST 1905) shows that the waters of the Atlantic coast of the Cape Peninsula are

several degrees colder than that of the Eastern shore. These differing temperatures are repeated in the divergent floras and faunas of the two sides of the coast.

In seeking an explanation for this diversity attention is at once drawn to the fact that a warm Indian Ocean current, part of the Equatorial Surface Drift, washes the shores of Natal and of the south eastern and southern coast of the Cape Province at least as far as Cape Agulhas. This current is known as the Mozambique current in the East and as the Agulhas current in the South of the Cape. On the other hand, the western shores of the Province are subjected to the cooling influence of the cold Benguela Current, usually considered part of the Antarctic Drift but more likely the effect of the upwelling of colder and deeper water under the influence of the prevailing winds, chiefly the South Easterly Trades.

Tab. 1
Showing the average temperatures per month over a period of three years

	Simons Bay °C	Table Bay °C
January	18.8	15.0
February	18.5	15.0
March	17.0	14.0
April	15.5	13.0
May	14.5	12.8
June	13.3	12.5
July	12.3	11.7
August	13.3	13.0
September	14.0	14.3
October	15.0	14.5
November	15.5	14.9
December	17.3	15.1

(Adapted from GILCHRIST 1905)

In the systematic part of this work which follows, a number of diatoms are recorded which seem to have a distribution chiefly in colder waters.

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 in HUSTEDT 1930 and 1927—1964. For convenience of reference, genera and species are reported in alphabetical order.

Achnanthes BORY 1822.

A. brevipes AGARDH. — 591.

A. brevipes var. *intermedia* (KÜTZING) CLEVE. — 591.

A. promunturii n. sp. — Frustule in girdle view slightly bent, showing strongly convex valves and connecting zone with several rows of areolae. Valves rhombic-lanceolate to linear-lanceolate, in short specimens almost elliptical, 20–42 μ long, 10–11 μ broad, with obtuse rounded ends. Rapheless valve with radiate striae, 7–8 in 10 μ of coarse puncta 7–8 in 10 μ elongated towards the margin, smaller and circular near the narrow lanceolate pseudoraphe. On either side of the margin is a large circular or horseshoe shaped area or marking. Raphe valve with straight raphe, central pores moderately distant, terminal pores small curved, axial area narrow, lanceolate, central area a broad transverse fascia reaching the margin. Transapical striae radiate 10 in 10 μ , ending somewhat distant from the margin leaving a hyaline rim, puncta 15 in 10 μ in more or less straight longitudinal lines. — Type slide No. 602 in the GIFFEN Collection.

Frustula in visu connectivale leviter flexa valvis valde convexis et pleura seriibus nonnullis areolarum munita. Valvae rhomboideo-lanceolatae sive lineari-lanceolatae, cellularum brevium paene ellipticae, 20–42 μ longae, 10–11 μ latae, apicibus late obtuseque rotundatibus. Areovalva striis radiantibus, 7–8 in 10 μ , crasse punctatis, punctis distinctis 7–8 in 10 μ , ad marginem valvae transapicaliter elongatis, minoribus rotundisque ad aream axialem angustam, lanceolatam versus. In lateribus utribus in parte mediana valvae signa instar soleae ferreae sive circularia striationem diriment. Rhaphovalva: rraphe directa, poris centralibus modice distantibus, fissuris terminalibus parvis, leviter arcuatis, area axialis anguste lanceolata, area centralis vitta una margines laterales attingens. Striae transapicales radiantes, 10 in 10 μ , margines non attingentes, aream angustam, hyalinam margine parallelam et continentem formantes. Striae ex punctis distinctis circiter 15 in 10 μ , in lineis plus minusve directis rraphe parallelis ordinatis compositae esse conspiciuntur.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 602 in collectione GIFFEN, Fort Hare, Cape Province.

Iconotypus: figurae nostrae no. 1–4.

This species is characterized by the two circular or horseshoe shaped marks on either side of the centre of the rapheless valve (cf. *A. lanceolata* (Brébisson) GRUNOW in which the mark is unilateral). The strongly convex valves were often seen to be cracked by pressure from the coverslip. — 602 — Figs. 1–4.

Actinocyclus EHRENBERG 1838.

A. octonarius EHRENBERG (cf. EHRENBERG 1838; 172, Pl. 21, fig. 7; HUSTEDT 1927–1964, part 1: 525, fig. 298 as *A. Ehrenbergii* RALFS; HENDEY 1964: 83, Pl. 24,

fig. 3). — This species has been reported from plankton of both Atlantic and Indian Ocean coasts of South Africa. The forms seen in the Cape Town material are characteristically variable in the number of striae bundles and the distribution of the puncta. — 591.

A. subtilis (GREGORY (RALFS) cf. HUSTEDT 1927–1964, part 1: 534, fig. 304; GIFFEN 1969: in press). — Previously recorded from brackish waters in estuaries in the Eastern Cape Province (Kowie River). Diameter 64 μ , striae 12 in 10 μ . — 582.

Actinoptychus EHRENBERG 1839.

A. senarius EHRENBERG (cf. HENDEY 1937; 271; HUSTEDT 1955: 7; 1927–1964, part 1: 475, fig. 264 as *A. undulatus* KÜTZING). — This has been previously recorded by several authors both from plankton of both oceans and from the littoral, possibly washed onto the shore. — 591, 592.

A. splendens (SHADBOLT) RALFS (cf. HUSTEDT 1927 bis 1964, part 1: 478, fig. 265). — 591, 592.

Amphora EHRENBERG 1840.

A. angusta (GREGORY) CLEVE var. *Eulensteini* GRUNOW (cf. CLEVE 1895: 135; A. SCHMIDT, Atlas: T. 25, figs. 1–3, T. 40, figs. 35–37). — Typical forms of *A. angusta* were not recorded from the material under review but a very few individuals of the var. *Eulensteini* GRUNOW were observed. These were identical with CLEVE's description (l. c.) and the figures in A. SCHMIDT, Atlas. Dimensions: 120 μ long, 6–7 μ broad with 12 dorsal and 15 ventral striae in 10 μ . — 591.

A. pusio CLEVE (1895: 102, Pl. 3, fig. 40; PERAGALLO 1897–1908: Pl. 44, fig. 8). — Numerous examples were seen in one sample which agree very closely with the description of *A. pusio* CLEVE, except that the ventral striae are shorter leaving a somewhat wider axial area than shown in CLEVE's figure. In fact they resemble var. *parvula* FLÖGEL (cf. PERAGALLO, l. c.: Pl. 44, figs. 9–10) which shows this same rather wider axial area. The individuals were small, 12 to 15 μ long, transapical striae 14–15 in 10 μ . It occurred in a brackish water sample which is in agreement with CLEVE's habitat. — 592.

A. profusa n. sp. — Valves with convex dorsal margin, straight or slightly convex ventral margin, and somewhat produced apices, 20–24 μ long, 4–4.5 μ broad. Raphe straight, parallel with and nearer to the ventral margin. Axial area narrow on the dorsal side, slightly wider around the central nodule, wide on the ventral side, with a few puncta on either side of the central area. Transapical striae on the dorsal side strong, 7–8 in 10 μ , longitudinal striae not visible, on the ventral side 10 in 10 μ , broken by a wide central area. Frustules not seen but several valves showed segments of the girdle attached with moderately large round puncta. — Type slide No. 591 in the GIFFEN Collection.

Valvae marginibus dorsalibus convexis, ventralibus directis sive levissime convexis, apicibus leviter protractis 20–24 μ longae, 4–4.5 μ lataeque. Rraphe directa, margine ventrale parallela et eum approximata. Area

axialis in latere dorsale angusta, apud nodulum centalem leviter dilatata, in latere ventrale lata, in media parte absentia striarum medianarum nonnullarum aream centalem, punctis nonnullis separatis munitam formans. Striae transapicales lateris dorsalis crassae, 7—8 in 10 μ , costae longitudinales invisibiles, lateris ventralis densior positae, circiter 10 in 10 μ , in media parte area centrale lata interruptae. Frustula tota non observata, sed valvae nonnullae cum connectivis nonnullis adiunctis, punctis modice magnis munitis in praeparato praesentes sunt. Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Cape Province.

Iconotypus: figura nostra no. 8.

CHOLNOKY (1968: 236) in describing a new species of *Ampbora* (*A. Ferrazae* CHOLNOKY) remarks with great significance the necessity of using complete specimens, particularly the girdle view (pleural side) in the diagnosis of a new species of *Ampbora*. In the case of *A. profusa* only a segment of the girdle is seen to give an indication of the true description and a complete diagnosis must await further study of richer material. The epithet "*profusa*" was used in the sense of "widely spaced" striae. — 591—Fig. 8.

A. Sydowii CHOLNOKY (1963b: 237, Pl. 8, figs. 3—6). A few valves were seen in one sample which agree very closely with the description of *A. Sydowii* CHOLNOKY, in shape and size. The transapical striae were 15—16 in 10 μ on the dorsal side, but no puncta could be made out on the ventral margin. The striae on the dorsal side were crossed by a blank line near the margin. The habitat of *A. Sydowii* is within keeping as the locus classicus is on the Atlantic coast of South West Africa and from highly mineralized estuarine water. Dimensions: 30—32 μ long, 5 μ broad, dorsal striae 15—16 in 10 μ , crossed by a blank band. — 592.

Arachnoidiscus BAILEY 1849.

A. ornatus EHRENBERG (cf. GIFFEN 1967: 254). — Wide spread in South African marine littoral. — 591.

Berkeleya GREVILLE 1827.

I propose to restore the legitimate generic name *Berkeleya* GREVILLE for those diatoms which have been placed under the generic name *Amphipleura* KÜTZING. *Berkeleya* has 17 years priority over *Amphipleura* and there is no valid reason for this latter name to be upheld as neither the reasons given by CLEVE (1894: 125), nor by HUSTEDT (1927—1964, part 2: 720) are sufficient for the name *Amphipleura* to be conserved.

This will entail the following nomenclatural changes: *Berkeleya pellucida* (KÜTZING) nova combinatio (Basionym: *Frustulia pellucida* KÜTZING, Linnaea, Vol. 8, 1833: 543, T. I, F. 11 = *Amphipleura pellucida* KÜTZING 1844); *Berkeleya Lindheimeri* (GRUNOW) nova combinatio (Basionym: *Amphipleura Lindheimeri* GRUNOW, Ver. Zool.-Bot. Ges., Wien, 1862: 469, T. 13, F. 11).

B. capensis n. sp. — Valves linear to linear-lanceolate with obtuse rounded ends, 20—36 μ long, 5—6 μ broad. Raphe branches about one third of the length of the valve, central pores somewhat enlarged, terminal pores moderately distant from the ends of the valve, axial area very narrow, central area absent. Transapical striae distinctly punctate, 15 in 10 μ in the middle where they are at right angles to the axis, to about 20 in 10 μ towards the ends where they are radiate; in girdle view short pseudosepta are seen at the ends of the valve, girdle segments 2—3, punctate along the margins. — Type slide No. 591 in the GIFFEN Collection.

Valvae lineares sive lineari-lanceolatae apicibus obtuse rotundatis, non protractis, 20—36 μ longae, 5—6 μ latae. Longitudo fissurarum raphae circiter partem tertiam longitudinis valvae occupans, pori centrales modice tumescentes, pori terminales ab margine terminali mediocriter distantes. Area axialis angustissima, centralis nulla. Striae transapicales distincte punctatae, in parte media valvae 15 in 10 μ , parallelae, ad polos versus densior positae, usque ad 20 in 10 μ , radiantes. In visu connectivale poli cellulae pseudosepto bene visibile ornati. Pleura ex copulis 2—3, margine punctatis composita est.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Cape Province.

Iconotypus: figurae nostrae no. 5—7.

I have placed this new species in the genus *Berkeleya* although there are several points in which it differs from that genus. These are seen in the robust valves with distinctly punctate somewhat coarse striae which are parallel in the middle and strongly radiate towards the ends. The valves also possess distinct pseudosepta. The structure of the central nodule, however, places it with that group of genera containing *Berkeleya*, *Frustulia*, *Frickea* and *Brebbissonia*, and in its raphe it shows closest affinity with *Berkeleya*. — 591 — Figs. 5—7.

Biddulphia S. F. GRAY 1821.

B. aurita (LYNGBYE) BRÉBISSE & GODEY var. *obtusa* (KÜTZING) HUSTEDT. (cf. GIFFEN 1967: 255). — Wide spread and frequent. — 591, 592.

Caloneis CLEVE 1891.

C. liber (W. SMITH) CLEVE (1894: 54; HENDEY 1964: 230, Pl. 29, figs. 2, 3). — A study of South African material of *Caloneis liber* (W. SMITH) CLEVE shows that there are forms which are truly representative of "*Navicula liber* W. SMITH" and also members which are not less identical with "*Navicula linearis* GRUNOW". HENDEY (l. c.) figures these forms under the names *Caloneis liber* (W. SMITH) CLEVE, and *C. linearis* (GRUNOW) BOYER. These should be regarded as the more or less extreme ends of the form cycle of a very variable organism. These end forms occur in South African waters but are linked by intermediate stages so that there is no justification in separating *N.*

liber and *N. linearis*. *Navicula linearis* is a latter synonym and I include it in *Caloneis liber* (W. SMITH) CLEVE. — 591.

Campyloneis GRUNOW 1862.

C. Grevillei (W. SMITH) GRUNOW. — 591.

Chaetoceros EHRENBERG 1844.

C. cinctus GRAN (cf. HUSTEDT 1927—1964, part 1: 748, fig. 432a; GIFFEN 1967; 257: fig. 24). — As in previous observations by the author, the resting spore stage (Dauerspore) has been recorded. — 602.

Cocconeis EHRENBERG 1838.

C. californica GRUNOW (cf. CLEVE 1895: 171 as *C. scutellum* var. *californica*; A. SCHMIDT, Atlas: T. 191, figs. 40—43; HUSTEDT 1927—1964, part 2: 343, fig. 796). — This species, which is characterized by the irregular dispersal of puncta on the rapheless valve, does not seem to have been previously recorded from South African waters. In some extreme cases the puncta of the striae are restricted to one punctum on the margin and one or two at the pseudoraphe. Frequent in one sample. — 591, 602 (rare). — Figs. 9—11.

C. costata GREGORY (cf. HUSTEDT 1927—1964, part 2: 332, fig. 785; GIFFEN 1969: in press). — This appeared frequently in two samples and as previously recorded by the author is generally smaller than described. The characteristic double rows of puncta, particularly on the rapheless valve tend to be obscure in the rather prominently marked striae. — 592, 602.

C. heteroidea HANTZSCH (cf. HUSTEDT 1927—1964, part 2: 356, fig. 811). — Rare in one sample. — 602.

C. pellucida GRUNOW. — Widespread in South African littoral on both the Atlantic and Indian Ocean coasts. — 591.

C. pseudomarginata GREGORY (cf. HUSTEDT 1927—1964, part 2: 359, fig. 813; GIFFEN 1969: in press). — The species was previously recorded from the Kowie River estuary Eastern Cape Province by the author and was almost identical with the description and figures in authoritative literature. In the samples under review, however, a few examples were seen which showed varying divergence from normal, particularly in the width of the pseudoraphe which is excessively wide, occupying almost one quarter of the width of the valve. The blank band delimiting the depressed area also is extremely wide. Whether this extreme form (figured) can be regarded as a variety is uncertain as too little is known of its variations. — 592. — Fig. 12.

C. scutellum EHRENBERG. — 591, 592.

C. scutellum var. *stauroneiformis* W. SMITH. — 592.

C. sublitoralis HENDEY (1951: 44, Pl. 13, figs. 1—9; 1964: 181, Pl. 28, figs. 14—17). — In terms of "Principal V" in "Division 1" of the International Code which reads as follows: "Scientific names of taxonomic groups are treated as Latin regardless of their derivation". The epithet "litoralis" is derived from the Latin "litos" and not from the French-English "littoral" and HENDEY's epithet must be corrected to read *Cocconeis sublitoralis*

HENDEY. — In one sample there occurred forms of which only the upper or rapheless valves were seen, which seem to agree so closely with HENDEY's figures and description, that I have very little doubt in identifying the South African specimens with *C. sublitoralis* HENDEY. The rapheless valves seen were 35—37 μ long, 23 μ broad with 5—6 rows of areolae in 10 μ . The pseudoraphe has the same slight excentricity and curve shown in HENDEY's figures and the large terminal unilateral areolae are clearly seen. — It is of interest to note that FRICKE in A. SCHMIDT, Atlas: Pl. 231, fig. 17 (1902) figures a doubtful species, which from the figure measured 70 μ long, 40 μ broad with 6 rows of areolae in 10 μ , which has the same shape, more or less similar dimensions (somewhat larger) and the two characteristic unilateral areolae. FRICKE places it with *Entopyla ocellata* var. *calitrana*, from the Cape of Good Hope. In my opinion, FRICKE's unnamed specimen belongs to *Cocconeis sublitoralis* HENDEY. — 602 — Fig. 13.

Coscinodiscus EHRENBERG 1838.

C. excentricus EHRENBERG (cf. HUSTEDT 1927—1964, part 1: 388, fig. 210; CHOLNOKY 1968: 27). — This species has been recorded from the plankton of both Oceans washing the shores of South Africa (BODEN 1950: 340; TAYLOR 1966: 454 as *C. eccentricus* EHR. = *C. excentricus* auct. nonnull.; and by CHOLNOKY 1968: 27). — HENDEY (1964: 80, Pl. 24, fig. 7) remarks that the specific epithet is often wrongly spelt "eccentricus". For the same reasons as is set forth under *Cocconeis sublitoralis* HENDEY, "excentricus" is the correct Latin form of the word and must be used as the epithet and not "eccentricus" which is the Italian form of the word. — 592.

C. Kuetzingii A. SCHMIDT (Atlas: T. 57, figs. 17, 18; HUSTEDT 1927—1964, part 1: 398, fig. 209). — Previously recorded from plankton along the South African coasts. — 591.

C. marginatus EHRENBERG (cf. GIFFEN 1969: in press). — 591, 592.

Cuneolus novum genus.

Frustules in girdle view weakly cuneate and slightly bent, showing intercalary bands and short pseudosepta. Valves ovate asymmetric (heteropolar) on the transapical axis, upper end broadly rounded, lower end cuneate to subacute. Raphe median, upper portion shorter than the basal, similar in both convex and concave valves. Surface of the valve striate.

Frustula in visu pleurale leviter cuneiformia et itaque leviter arcuata connectivis nonnullis et pseudoseptis brevibus munita. Valvae heteropolares oviformes, termino apicale late rotundato, basale cuneato sive subacuto. Raphe in linea mediana valvae decurrens, directa fissura in parte apicale brevior quam in parte basale, in valvis utribus aequabiliter evoluta. Superficies valvae striatione ornata.

Typus generis: *Cuneolus minutus* n. sp.

C. minutus n. sp. — Frustules wedge-shaped, weakly bent, 10—11 μ long, about 4—5 μ broad, tapering to about

3 μ at the foot, with short septa at the ends and 2 to 3 faint intercalary segments, faintly punctate. Valves highly convex, asymmetric, narrow-ovate, 10–12 μ long, 3–3.5 μ broad, apex broad, rounded, tapering to an acute rounded base. Axial area very narrow, central area a broad fascia widening towards the margin. Rraphe straight, central pores moderately distant, terminal pores ending near the margin, obscure. The arms of the raphe are in the ratio 4:3 or 5:3. Transapical striae 15 in 10 μ in the middle to 17 in 10 μ at the ends, radiate, curved, generally somewhat stronger near the raphe. Both the convex and the concave valves are identical. — Type slide No. 591 in the GIFFEN Collection.

Frustula cuneata, leviter arcuata, 10–11 μ longa, in parte latissima 4–5 μ lata, ad polum basalem usque ad circiter 3 μ angustata. Pleura ex connectivis subtiliter punctatis duobus sive tribus composita. Valvae valde convexae, asymmetricae, anguste ovatae, 10–12 μ longae, 3–3.5 μ latae, apice late rotundato, base angustiore sed itaque regulariter rotundata. Area axialis angustissima, area centralis vitta una lata, ad margines valvae versus dilatata. Rraphe directa, poris centralibus modice distantibus, poris terminalibus margines approximatis, indistinctis. Ratio longitudinum fissurae apicalis: fissurae basalis 3:4 sive 3:5. Striae transapicales in media parte valvae 15, ad polos versus 17 in 10 μ , radiatae curvataeque, ad raphem versus incrassatae. Structura valvarum cellulae unae perfecte consimilis.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 14–18.

This new genus and species combines in some extent the characters both of *Gomphonema* in the shape of the frustule and valve but is separated from that genus by the heteropolar structure and the bent frustule. It also shows similarity to *Rhoicosphenia* in the bent frustule but is separated by the identical convex and concave valves. It can however be assigned to neither, hence the necessity to erect a genus to include it and any related forms. — 591 — Figs. 14–18 (fig. 14–16 1000/1, figs. 17, 18 2000/1).

Cyclotella KÜTZING 1834.

C. stelligera CLEVE and GRUNOW. — A displaced fresh water species. — 591.

C. striata (KÜTZING) GRUNOW (cf. A. SCHMIDT, Atlas: Pl. 223, figs. 9–14; HUSTEDT 1927–1964, part 1: 344, fig. 176). — A single individual was observed which I have assigned to this species with considerable doubt. The diameter was 7.5 μ with striae 18 in 10 μ , irregular in length and trending to be stronger towards the centre of the disc than at the margin. It is smaller than the type and the radial striae are considerably closer. With the discovery of further material it may possibly be shown to be a new species. — 591 — Fig. 19.

Denticula KÜTZING 1844.

D. subtilis GRUNOW. — 591.

Dimerogramma RALFS 1861.

D. inane n. sp. — Frustule in girdle view rectangular with straight margins and slightly projecting rounded corners, 8–30 μ long, 4–8 μ , rarely more than 10 μ broad. Longitudinal divisions of the girdle 8–10 in 10 μ , the two outermost marked with a series of irregular distinct puncta ca. 8 in 10 μ . Valve linear or linear-lanceolate, 8–30 μ long, 3–4 μ broad with bluntly rounded ends. Striae invisible but a shadowy, narrow pseudo-raphe sometimes visible in phase-contrast. — Type slide No. 602 in the GIFFEN Collection.

Frustula in visu pleurale rectangularia marginibus directis et angulis rotundatis, leviter protuberantibus, 8–30 μ longa, 4–8, perraro 10 μ sive plus quam 10 μ lata. Copulae pleurae 8–10 in 10 μ duobus externis punctis distinctis, irregulariter distributis, circiter octo in 10 μ ornatis. Valvae lineares sive lineari-lanceolatae, 3–4 μ latae, apicibus obtuse rotundatis. Striae invisibiles sed illuminatione phasencontrast dicta nonnumquam margines areae axialis angustae discernibiles.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 602 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 20–22.

Diploneis EHRENBERG 1844.

D. bombus EHRENBERG. — 602.

D. crabro EHRENBERG var. *pandura* (BRÉBISSON) CLEVE (1894: 100; A. SCHMIDT, Atlas: Pl. 11, figs. 1, 2, 4, 8, 9, 23, T. 69, fig. 14; PERAGALLO 1897–1908: pl. 15, figs. 11, 12). — A few specimens of this variety of *D. crabro* were seen in one sample. Typical material of the type was not observed. Dimensions of the Cape Town specimens were 65 μ long, 18–20 μ wide, transapical ribs 7 in 10 μ . — 591 — Fig. 23.

D. lineata (DONKIN) CLEVE f. *pusilla* CLEVE (1894: 85). — In one sample individuals were noted which I have assigned to *D. lineata* (DONKIN) CLEVE because of their shape and the possession of a longitudinal rib which almost bisects the transapical ribs. Though they obviously belong to *D. lineata*, they are considerably smaller in size and have 10–11 transapical ribs in 10 μ . CLEVE (l. c.) regarded such individuals as a form and included them as f. *pusilla* CLEVE. HUSTEDT (1927–1964, part 2: 677) in his description of the typical species remarks that *D. lineata* f. *pusilla* CLEVE from the Galapagos Islands requires closer examination. It is true that no intermediate forms were seen and until further individuals are discovered linking up *D. lineata* and f. *pusilla* I propose to follow CLEVE. Dimensions 30–32 μ long, 10–12 μ broad, striae 10–11 in 10 μ . — 591 — Fig. 24.

D. Smithii (BRÉBISSON) CLEVE. — Widespread. — 591; *D. Smithii* f. *cuneata* (A. CLEVE) HUSTEDT (cf. GIFFEN 1963: 228, fig. 47; 1967: 261). — Widespread in South African waters but almost always very scarce. — 591.

D. splendida (GREGORY) CLEVE var. *puella* (A. SCHMIDT) CLEVE (cf. A. SCHMIDT, Atlas: Pl. 12, fig. 13, Pl. 69, fig. 15; HUSTEDT 1927—1964, part 2: 714, fig. 1089d). — Typical examples were found in the Cape Town material but were always scarce. — 591 — Fig. 25.

Entopyla EHRENBERG 1841.

E. australis EHRENBERG var. *incurvata* (ARNOTT) GRUNOW (cf. FRICKE in A. SCHMIDT, Atlas: Pl. 230, figs. 12—16). — This large diatom has been previously recorded and figured from South West Africa (Walfisch Baai) by FRICKE (l. c.). Dimensions up to 192 μ long, chambers 2.2 in 10 μ . — 591, 602.

E. ocellata (ARNOTT) GRUNOW (cf. FRICKE in A. SCHMIDT Atlas: T. 231, figs. 1—6; HUSTEDT 1927—1964, part 2: 8, fig. 543a—c). — In a former paper the author (GIFFEN 1967: 261, fig. 36) recorded and figured a portion of a valve which was tentatively assigned to *E. ocellata* var. *calitrana* FRICKE (in A. SCHMIDT, Atlas: Pl. 261, fig. 36). Examination of the typical material seen in these Cape Town samples proves that the 1967 determination was incorrect and the specimen from Kidd's Beach, Eastern Cape Province is probably a new species as previously suggested. Dimensions of the Cape Town material: 80—92 μ long, 18—20 μ broad, cells 3 in 10 μ , striae 18 and puncta 20 in 10 μ . — 602 — Fig. 26.

Gomphonema AGARDH 1824.

G. kamtschaticum GRUNOW (cf. CLEVE 1894: 188; M. SCHMIDT in A. SCHMIDT, Atlas: T. 213, figs. 46—51). — The observed individuals of this species were identical in shape with the drawings of M. SCHMIDT (l. c.) but varied considerably in size from 24 to 44 μ in length. The strongly radiate striae were 11—12 in 10 μ in the middle to 15—17 in 10 μ at the ends. There is however, no doubt as to their identity. — 591 — Figs. 27, 28.

G. pseudoseptatum n. sp. — Frustule in girdle view weakly clavate, showing strong pseudosepta at the ends, intercalary girdle bands 10—12 in 10 μ , punctate with ca. 20 puncta in 10 μ . Valves linear or linear-lanceolate tapering very gradually from the rounded apex to the slightly produced or rostrate base. 12—25 μ long, 2.5—3.5 μ broad. Axial area narrow, central area a moderately broad fascia. Transapical striae 15—16 in 10 μ , slightly radiate in the middle and apex to parallel near the base which is hyaline through the absence of the last 2 or 3 striae. Visible striae consisting of 2 puncta, the one near the raphe strong, the other near the margin smaller and weaker. At the ends of the valve the pseudosepta can be clearly seen. — Type slide No. 591 in the GIFFEN Collection.

Frustula in visu pleurale leviter cuneiformia, pseudoseptis bene evolutis ad apicem et basem versus munita. Connectivae seriebus punctorum circiter 20 in 10 μ ornatae, 10—12 in 10 μ . Valvae lineares sive lineari-lanceolatae ab apicibus rotundatis gradatim ad polum basalem angustiores leviter protractam versus angustatae, 12—25 μ longae, 2.5—3.5 μ latae. Area axialis angusta, area centralis vitta una modice lata, margines valvae attingens. In partibus medianibus striae trans-

apicales 15—16 in 10 μ , hic et in apice leviter radiantes, ad basem versus parallelae. Basis absentia striarum ultimarum hyalina. Striae punctis duobus compositae esse conspiciuntur. Punctum marginale minus et minus distinctum, alterum prope aream axialem maius et validius. Ad polos versus pseudosepta distincta visibilia sunt.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 29—32.

This new species somewhat resembles *G. exiguum* KÜTZING (cf. CLEVE 1894: 188; GIFFEN 1963: 230) but differs in the somewhat wider transapical striae and the wide central fascia. It differs from *G. aestuarii* CLEVE (1894: 188; cf. GIFFEN 1967: 262, fig. 37) in the radiate striae and wider fascia. From both of these species it is separated by the strongly marked terminal pseudosepta. Although terminal septa are not unknown from some species of *Gomphonema*, viz. *G. intricatum* KÜTZING, the development in this species *G. pseudoseptatum* is very pronounced and characteristic. — 591, 602 — Figs. 29—32.

Grammatophora EHRENBERG 1841.

G. angulosa EHRENBERG. — 591, 602.

G. Carteri n. sp. — Frustule in girdle view rectangular with small rounded corners, internal septa with a single moderately strong undulation, short striae in single rows of puncta lie between the septa and the valve margin. Valve with short pseudosepta. Valve linear-lanceolate with broadly rounded ends, 19—75 μ long, 8—10 μ broad. Transapical striae strong, broad, 7—8 in 10 μ , clearly punctate with double rows of alternating puncta (quincunx), puncta 15 in 10 μ . Pseudoraphe narrow but clearly defined, hyaline polar areae moderately small. — Type slide No. 602 in the GIFFEN Collection.

Frustula in visu connectivale rectangulata, angulis parvis rotundatis, septis undula una mediocriter curvata munita. Inter marginem valvae et septa striae ex punctis uniseriatis compositae faciem pleuralem ornant. Valva pseudoseptis brevibus munita, lineari-lanceolata, apicibus late, regulariterque rotundatis, 19—75 μ longae, 8—10 μ latae. Striae transapicales validae, crassae, 7—8 in 10 μ , ex punctis distinctis in seriebus duobus et in quincunx ordinatis compositae. Area axialis angusta sed distincta, areae hyalinae polares mediocres.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 602 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 33 et 34.

This species of *Grammatophora* is unusual in possessing the characteristic transapical striae with double rows of quincunx puncta. It occurred in large numbers in one

sample. — I have great pleasure in naming this new species after JOHN R. CARTER, the eminent British diatomist as a mark of my appreciation of his friendship. — 602 — Figs. 33, 34.

G. maxima GRUNOW (cf. PERAGALLO 1897—1908: Pl. 87, fig. 18; HUSTEDT 1927—1964, part 2: 44, fig. 572). — Typical examples were seen in two samples but were not frequent. Dimensions up to 100 μ long, striae 25—26 in 10 μ . This species was recorded earlier from Walfish Bay (South West Africa) by LEUDUGER-FORTMOREL (1898: 25). — 591, 592.

G. serpentina (RALFS) EHRENBERG (cf. HUSTEDT 1927 by 1964, part 2: 49, fig. 577; PERAGALLO 1897—1908: Pl. 88, figs. 1—9). — Abundant in two samples. CHOLNOKY (1963: 51) records the var. *pusilla* (GREVILLE) PERAGALLO from Steenbras, South Western Cape and mentions that the species had not until then been recorded from South African waters. — 591, 592.

G. serpentina var. *pusilla* (GREVILLE) PERAGALLO. — Small individuals of this variety, sometimes less than the 25—50 μ given for length (HUSTEDT l. c.: 50) are easily overlooked when both *G. serpentina* var. *pusilla* and *G. angulosa* are present in a sample. They can only be distinguished by counting the striae viz. 14—20 in 10 μ for *G. angulosa* and 22—25 in 10 μ for *G. serpentina* var. *pusilla*. — 591, 592.

G. undulata EHRENBERG. — Widespread in South Africa. — 591, 592.

Hyalodiscus EHRENBERG 1845.

H. radiatus (O'MEARA) GRUNOW (cf. HUSTEDT 1927 bis 1964, part 1: 295, fig. 135; PERAGALLO 1897—1908: Pl. 119, fig. 6). — A few individuals were observed which I have assigned to this species with some doubt. In size, the diameter is a little less than described being about 38 μ , but the umbilicus is considerably smaller being only about one quarter to one third of the diameter rather than half as in typical specimens. The rows of areolae agree in number and direction with that of authoritative descriptions. In my opinion this species has not previously been recorded from South African waters. — 592.

Licmophora AGARDH 1827.

L. gracilis (EHRENBERG) GRUNOW (cf. PERAGALLO 1897 by 1908: Pl. 84, figs. 10—12; HUSTEDT 1927—1964, part 2: 60, fig. 583). — This species occurred in one sample and was very rare. Dimensions: length 36 μ , breadth 7 μ , striae 20 in 10 μ , punctate in faint wavy lines. These specimens are smaller than given in HUSTEDT's description and would fit into *L. grandis* var. *anglica* PERAGALLO but for the coarser striae. — 602.

L. Juergensii AGARDH (cf. HUSTEDT 1927—1964, part 2: 63, fig. 586; PERAGALLO 1897—1908: Pl. 84, figs. 4 and 5). — In one of the Cape Town samples this species occupied the place of a dominant taxon, occurring in great numbers. It differs from completely typical material in having coarser transapical and longitudinal striae viz. 11—12 in 10 μ instead of 14—18 in 10 μ . This

change in the number of striae in warm temperate to subtropical waters of South Africa has been commented on by the author on several occasions in a number of wellknown genera and species (cf. GIFFEN 1963, 1967). *L. Juergensii* AGARDH has not previously been recorded from South Africa. — 591, 592 (infrequent), 602.

L. mibecula (KÜTZING) GRUNOW. — 602 (rare).

L. opephoroides n. sp. — Frustules cuneate with more or less truncate apex tapering to a narrow rounded base (small cells almost triangular). Internal septa one or two, moderately strong, deeply intrusive, intercalary bands few, hyaline. Valve clavate with blunt rounded apex, gradually tapering to a narrow, slightly concave base, 30—72 μ long, 8—11 μ broad in the widest part. Transapical striae strong, equidistant throughout, 7—8 in 10 μ , striae consisting of faint double rows of alternating puncta. Pseudopore narrow but distinct. At the base is a wellmarked mucilage pore, surrounded partly by a few very small puncta. — Type slide No. 602 in the GIFFEN Collection.

Frustula cuneata apice plus minusve truncato, ad basem angustam rotundatam versus attenuata. Cellulae parvae paene triangulares esse conspiciuntur. In cellulis septum unum sive septa duo visibiles. Septa longa, modice crassa, connectivae non numerosae, hyalinae. Valvae claviformes apicibus obtuse rotundatis, ad basem angustam versus attenuatae. Margines valvae prope basem levissime concavi. Valvae 30—72 μ longae, in parte latissima 8—11 μ latae. Striae transapicales distinctae, in tota longitudine valvae aequidistantes, 7—8 in 10 μ , seriebus duobus punctorum subtilium alternantium compositae. Area axialis angusta sed distincta. In base valvarum porus mucilaginis punctis nonnullis subtilibus circumdatus bene visibilis.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 602 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 35—37.

When first observed in valve view this new species was assigned to the genus *Opephora*, until material showing the septa and girdle view of the cells confirmed that it belonged to *Licmophora*. As the valve shows all the characters of *Opephora*, confusion can readily arise unless the girdle view is seen. Otherwise the only other character in the valve is the presence in some of the septa. The double rows of faint puncta between the transapical costae are difficult to resolve even with phase contrast. The figures tend to exaggerate their clarity. — 602 — Figs. 35—37.

Mastogloia THWAITES 1856.

M. ciskeiana GIFFEN (1967: 264, figs. 43—45). — One or two cells of a *Mastogloia* were observed in one sample which I assign to the above species. The differences between the Cape Town specimens and the originals of *M. ciskeiensis* are so slight that it seems ridiculous to separate

them. The Cape Town forms differ in the shape which is linear-oblong rather than linear-lanceolate. Dimensions: 50 μ long, 10—11 μ broad, transapical striae 27 in 10 μ , chambers 10—12 in 10 μ . My doubt lies mostly in the ecology of the organisms. The material of the originals from the Eastern Cape Province is associated with the warm Indian Ocean and estuarine conditions, whereas the Cape Town form is from cold sea water from the Atlantic whose maximum temperature rarely reaches the minimum for the Indian Ocean in the Eastern Cape. — 592 — Figs. 38, 39.

Melosira AGARDH 1824.

M. nummuloides (DILLWYN) AGARDH. — 591.

M. octogona A. SCHMIDT. — 602.

Navicula BORY 1824.

N. abrupta (GREGORY) DONKIN. — 591.

N. biflexa (A. SCHMIDT) nova combinatio (basonym: *Cocconeis biflexa* A. SCHMIDT, Atlas: Pl. 193, fig. 25, 1894 = *Cocconeis Wrightii* O'MEARA 1867: 246, Pl. 7, fig. 6 = *Orthoneis Wrightii* CLEVE 1895: 149 = *Navicula Schonkenii* HUSTEDT 1955b: 130, figs. 6—8, 1927—1964, part 3: 379, fig. 1467; cf. CHOLNOKY 1963: 65, figs. 74, 75). — The species was originally described by O'MEARA (Quarterly Journ. Microsc. Soc., n. s., Vol. 7, 1867: 246, Pl. 7, fig. 6) as *Cocconeis Wrightii*. It was placed in *Orthoneis* as *Orthoneis Wrightii* by CLEVE. HUSTEDT showed that it belonged to *Navicula* and, as the name *Navicula Wrightii* was already preoccupied by O'MEARA for another species, proposed the new name *Navicula Schonkenii* HUSTEDT. A. SCHMIDT in Atlas: Pl. 193, fig. 25 (1984) figured *Cocconeis biflexa* A. SCHMIDT which is identical in shape and size and whose dimensions viz. 15 μ long, 10 μ broad and with 8 striae in 10 μ , and also the presence of a similar H-shaped area correspond perfectly with *Orthoneis Wrightii* CLEVE, respectively with *Navicula Schonkenii* HUSTEDT. In addition A. SCHMIDT gives the locality of his specimen as "Cap", which also supports the view of their identity. CLEVE (1895: 196) places *Cocconeis biflexa* A. SCHMIDT as a species imperfectly known and therefore not admitted to his monograph, although *Cocconeis bixexa* was not less known than *Cocconeis Wrightii*. As the epithet "*biflexa*" predates HUSTEDT's epithet ("*Schonkenii*"), the valid name of the species should be *Navicula biflexa* (A. SCHMIDT) nova combinatio. — *N. biflexa* occurred in large numbers in all samples and showed considerable variation in size and striation. The peculiar H-formation of the central area of the valve is, as CHOLNOKY remarks not always a characteristic feature. — Fig. 64 — 591, 592, 602.

N. cancellata DONKIN. — 591.

N. cancellata var. *Gregorii* RALFS (cf. CLEVE 1895: 30; A. SCHMIDT, Atlas: Pl. 46, figs. 41, 42, 71, 72; PERAGALLO 1897—1908: Pl. 13, fig. 9, left, as *N. cancellata* var. *apiculata* GREGORY). — The genus *Navicula* was surprisingly scarce in the material under review, only nine species belonging to that genus being recorded amongst some 89 species of other genera. A few examples of the

above variety were seen. Dimensions 40 μ long, 10 μ broad, striae 9—10 in 10 μ . — 591.

N. complanatulata HUSTEDT (1927—1964, part 3: 338, fig. 1163; cf. GIFFEN 1967: 226). — This species has been previously recorded and it was reported that it was scarce in the material. In the Cape Town samples it was also very rare. — 591.

N. fromenterae CLEVE (1895: 32, Pl. 1, fig. 33; HUSTEDT 1955a: 29, Pl. 7, figs. 28, 29; CHOLNOKY 1960: 59, figs. 185, 186; GIFFEN 1969: figs. 50, 51). — This species is widespread in South African marine littoral. The spelling of the epithet is in doubt and has been discussed by CHOLNOKY (l. c.). — 592.

N. inflexa (GREGORY) DONKIN (cf. CLEVE 1895: 31; A. SCHMIDT, Atlas: Pl. 46, figs. 69, 70; PERAGALLO 1897 to 1908: Pl. 113, fig. 3; HENDEY 1964: 197, Pl. 30, fig. 7). — This species, which has not previously been recorded from South Africa, differs from CLEVE's description in only one point, being shorter in length. The species is characterized by the thickened and enlarged terminal nodules which are unilaterally incurved and can be seen in both girdle and valve views. None of the figures quoted above make this clear, although it is mentioned by HENDEY. — 591 — Figs. 41—43.

N. nautica CHOLNOKY. — Widespread in South Africa. — 591.

N. speibonae n. sp. — Valve lanceolate to narrow elliptical with obtuse rounded ends, 27—56 μ long, 7—8 μ broad. Raphe straight or apparently slightly curved owing to the convex surface of the valve, central pores moderately close, terminal pores small hooked. Axial area narrow, central area a broad fascia widening outwards and almost reaching the margin, where it is delimited by 4—5 very short marginal striae on each side. Transapical striae 10—11 in 10 μ in the middle, 13—15 in 10 μ at the ends, strongly radiate throughout, longitudinal costae very fine, ca. 30 in 10 μ . — Type slide No. 591 in the GIFFEN Collection.

Valvae lanceolatae sive anguste ellipticae, apicibus obtuse rotundatis, 27—56 μ longae, 7—8 μ latae. Rraphe directa sive in positionibus declivibus nonnullis valvarum leviter curvata apparens, quia superficies valvae valde convexa est. Pori centrales raphae modice approximatae, pori terminales fissuris terminalibus curvatis muniti. Area axialis angusta, linearis, area centralis vitta una transversalis margines valvae paene attingens, lata, ad margines versus dilatata. In area centrale apud margines striae brevissimae 4—5 visibiles sunt. Striae transapicales in parte mediana valvae 10—11, ad polos versus 13—15 in 10 μ , in tota longitudine valvae valde radiantes, costae longitudinales subtilissimae, circiter 30 in 10 μ .

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.

- Iconotypus: figurae nostrae no. 44 et 45.
This new species is related to *N. cancellata* DONKIN but differs in its somewhat less silicified valves, its closer striae, which are more strongly radiate, and the very wide central area. — 591, 602 — Figs. 44, 45.
- Nitzschia* HASSALL 1845.
N. angularis W. SMITH (cf. CHOLNOKY 1968: 67, fig. 112). — CHOLNOKY reports that the species has rarely been seen in South African waters. — 591.
N. laevis HUSTEDT. — 602.
N. panduriformis GREGORY (cf. VAN HEURCK 1899: 386, Pl. 15, fig. 500; PERAGALLO 1897—1908: Pl. 70, fig. 5). — The forms observed were smaller than described in VAN HEURCK l. c. but were identical with PERAGALLO's figure. — 591.
N. sigma (KÜTZING) W. SMITH. — 592.
Opephora PETIT 1888.
O. gemmata (GRUNOW) HUSTEDT. — 592.
O. Martyi HÉRIBAUD. — 591.
O. pacifica (GRUNOW) PETIT. — 591, 592, 602.
Pleurosigma W. SMITH 1852.
P. intermedium W. SMITH var. *mauritanum* GRUNOW (cf. HUSTEDT 1955a: 35, Pl. 10, fig. 12; syn. *P. nubecula* var. *mauritanum* GRUNOW in CLEVE 1894: 35). — This group of species represented by *P. intermedium* W. SMITH, *P. nubecula* W. SMITH and their varieties present a complex problem in their taxonomic relationships. They have been variously presented as varieties of each other differing only in size, a character which, in this genus, is very difficult to apply (cf. HUSTEDT 1942, GIFFEN 1963 on the size of *P. delicatulum*, and also with regard to the numbers of striae; cf. GIFFEN 1967). — HENDEY (1964: 244) after examination of W. SMITH's slides and slides made from SMITH's materials (No. B. M. 23656, B. M. 23654, B. M. 216) considers that *P. intermedium* and *P. nubecula* are identical and unites them under the name *P. intermedium* using the earlier epithet which is in W. SMITH 1853 No. 6 on p. 64 (*P. nubecula* is No. 7 on the same page). — CLEVE also makes a number of varieties of *P. nubecula* of doubtful taxonomic value (cf. CLEVE 1894: 35). Among these is *P. nubecula* var. *mauritanum* GRUNOW (M. S.) which differs from *P. nubecula* and *P. nubecula* var. *intermedia* only in possessing narrower valvae namely 12—13 μ as against 16—20 μ . HUSTEDT briefly describes and figures *P. intermedium* var. *mauritanum* GRUNOW and states that it differs from the type only by its more slender valves and suggests that it would be better regarded as a forma than a variety. This variety seems to have been recorded only from Mauritius and North Carolina and now for the first time from Africa, in all cases labelled very scarce or rare. Further discoveries may link up the variety more closely with its type, although from the dimensions of the South African specimens, in width 13—16 μ , fit very neatly between the 12—13 μ of the var. *mauritanum* and the 20—22 μ of the type. There seems very little to justify the retention of the variety. — 592 — Fig. 46.
- Podosira* EHRENBERG 1840.
P. hormoides (MONTAGNE) KÜTZING (cf. HUSTEDT 1927 to 1964, part 1: 283, fig. 123). — Previously recorded from the Kowie River, Eastern Cape Province. — 591.
P. Montagnei KÜTZING. — 602.
Pseudoemmotia GRUNOW 1865.
P. doliolus (WALLICH) GRUNOW. — Rare. — 591.
Pyxidicula EHRENBERG 1833.
P. minuta GRUNOW (cf. HUSTEDT 1927—1964, part 1: 301, fig. 139). — Dimensions: 24 μ in diameter, areolae 6.5 in 10 μ . Rare. — 591.
Rhabdonema KÜTZING 1844.
R. arcuatum (LYNGBYE) KÜTZING (cf. FRICKE in A. SCHMIDT, Atlas: Pl. 220, figs. 3—22). — The Cape Town specimens are, in some respects, anomalous being less than half the minimum length described by HUSTEDT (cf. HUSTEDT 1927—1964, part 2: 20, fig. 594a, b). They are, however, very closely matched by the figures by FRICKE l. c., particularly figs. 5 and 5a as *R. Crozierii* EHRENBERG and fig. 18 (*R. arcuatum*). Dimensions of the Cape specimens: length 18 μ , breadth 18 μ , areolae 8 in 10 μ . — 591 — Fig. 47.
R. arcuatum var. *robustum* (GRUNOW) HUSTEDT (1927 to 1964, part 2: 20, fig. 550; FRICKE in A. SCHMIDT, Atlas: Pl. 221, fig. 17—20 as *R. robustum* GRUNOW). — Typical specimens of this variety were seen and were not infrequent. — 591.
R. scabellum n. sp. — Frustule in girdle view quadrangular with slightly convex valve margins and rounded corners. Girdle with numerous intercalary segments 8—10 in 10 μ , at one end of each a moderately intrusive septum and a single foramen. The margins of the segments with a row of small puncta ca. 30 in 10 μ . Valves linear with slightly convex margins and obtuse rounded ends, 13—35 μ long, 5.5—6 μ broad. Valve surface with transapical rows of puncta, 17—18 in 10 μ , puncta 22—24 in 10 μ . Pseudoraphe obscure or absent, hyaline areas at the poles moderately small. — Type slide No. 591 in the GIFFEN Collection.
Frustula in visu pleurale quadrata marginibus valvulibus leviter convexis, angulis rotundatis. Pleura connectivis numerosis, 8—10 in 10 μ , ad terminum unum septo mediocriter longo et foramine singulo munitis. Margines connectivarum series punctorum subtilium, circiter 30 in 10 μ ferentes. Valvae lineares marginibus lateralibus leviter convexis, apicibus regulariter rotundatis, 13 to 35 μ longae, 5.5—6 μ latae. Superficies valvae seriebus transapicalibus punctorum, 17—18 in 10 μ , ornata. Puncta 22—24 in 10 μ . Area axialis indistincta sive nulla, areae hyalinae apud polos modice parvae.
Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.
Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.
Iconotypus: figurae nostrae no. 48—50.

This new species, *Rhabdonema scabellum* is a small species related to *R. minutum* KÜTZING but differs in the linear shape of the valves, the very much closer transapical rows of puncta and the finer punctuation. It was frequent in the material. — 591 — Figs. 48—50.

Rhoicosphenia GRUNOW 1860.

R. Adolphi M. SCHMIDT in A. SCHMIDT, Atlas: Pl. 213, fig. 20—23. — This species, originally described from material from Hobart, Tasmania, occurred frequently in one sample. The Cape specimens vary much more in length than shown in M. SCHMIDT's figures but the number of striae in 10 μ on both valves is identical, as is the position and length of the raphe. Dimensions in the South African material: 13—28 μ long (usually about 21 μ), 3.5—4.5 μ broad, striae on the convex valve 12 in 10 μ in the middle portion to 17 in 10 μ at the ends around the very short arms of the raphe; on the concave (raphe) valve 13 in 10 μ in the middle to 15 in 10 μ at the ends of the valve. — 602 — Figs. 51—54.

R. flexa n. sp. — Frustule arcuate and cuneate in girdle view with internal septa at the ends, margins of the septa punctate. Valves dissimilar, clavate with broad rounded apex and acute sometimes slightly concave base, 20 to 52 μ long, 5—6.5 μ broad. Concave valve with straight raphe, central pores moderately close, terminal pores hooked (when visible), axial area narrow dilated into a lanceolate central area, in some cases a narrow fascia reaching the margins. Transapical striae somewhat coarsely punctate, 8 in 10 μ in the middle to 12 in 10 μ at the ends, the two striae on each side of the middle stronger than the rest, striae radiate throughout. Convex valve with short raphe axes about one quarter of the length of the valve at the basal end, apical end without visible raphe. Axial area very narrow, central area absent. Transapical striae 12—13 in 10 μ , clearly punctate, at right angles to the apical axis in the middle, strongly radiate at the basal end of the valve. — Type slide No. 591 in the GIFFEN Collection.

Frustula arcuata cuneiformia septis terminalibus munita, marginibus septorum punctatis. Valvae dissimiles, claviformes, apicibus late regulariterque rotundatis, base acuta, marginibus lateralibus ad basem versus concavis, 20—52 μ longae, 5—6.5 μ latae. Rraphe valvae concavae directa, poris centralibus modice approximatis, fissuris terminalibus in hamum curvatis nonnumquam visibilibus. Area axialis anguste linearis, in media parte valvae dilatata fere aream centalem lanceolatam formans. Area centralis interdum vitta una margines valvae attingens. Striae transapicales distincte punctatae, in media parte valvae 8, ad polos versus 12 in 10 μ , in tota longitudine valvae radiant. In utribus lateribus valvae concavae stria una mediana crassior quam aliae. Valva convexa in parte basale raphem brevem, quartum longitudinis valvae occupantem ferens, in vicinitate apicis fissura raphae non visibilis. Area axialis anguste linearis, area centralis nulla. Striae transapicales 12—13 in 10 μ , distincte punctatae, in media parte valvae parallelae, ad basem versus valde radiant.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 55—58.

Rhoicosphenia flexa resembles *R. curvata* (KÜTZING) GRUNOW in shape and size but differs in several important characters. The striae are much wider and punctuation coarse. The transapical striae are strongly radiate throughout in the concave valve; parallel in the middle and radiate only at the ends in the convex valve. In the convex valve the apical raphe axis is either absent or very short and hidden by the strongly curved apex. — 591, 602 (scarce) — Figs. 55—58.

Stauroneis EHRENBERG 1843.

S. constricta (EHRENBERG? W. SMITH) CLEVE (1894: 145; cf. HUSTEDT 1927—1964, part 2: 825, fig. 1168). — Only two individuals of this species were seen, one in girdle view and one in valve view, but together yielding sufficient data to make their assignment to *S. constricta* a matter of very little doubt. The valve showed a very slight difference from HUSTEDT's figure in that there was a very slight constriction in the centre of the valve. Dimensions: 32—40 μ long, 6 μ broad, transapical striae 25 in 10 μ , parallel, very slightly convergent at the ends. — 592 — Figs. 59, 60.

Surirella TURPIN 1828.

S. ovalis BRÉBISSEON. — Displaced from fresh or slightly brackish water — 591.

S. scopuli n. sp. — Valva heteropolar, oval with broadly rounded apical pole and a much narrowed, sharply rounded basal pole, 24 μ long, 17 μ broad. Alae weakly developed, alar canals delicate, short, occupying one third of the breadth of the valva, about 37 in 100 μ . — Type slide No. 591 in the GIFFEN Collection.

Valvae heteropolar, polo apicale late rotundato, basale angustato, acute rotundato, 24 μ longae, 17 μ latae. Alae haud evolutae, canales alarum subtiles, breves, tertiam latitudinis valvae occupantes, circiter 37 in 100 μ . Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFEN, Fort Hare, Provincia Capensis.

Iconotypus: figura nostra no. 61.

Synedra EHRENBERG 1830.

S. formosa HANTZSCH (cf. GIFFEN 1967: 287). — 602.

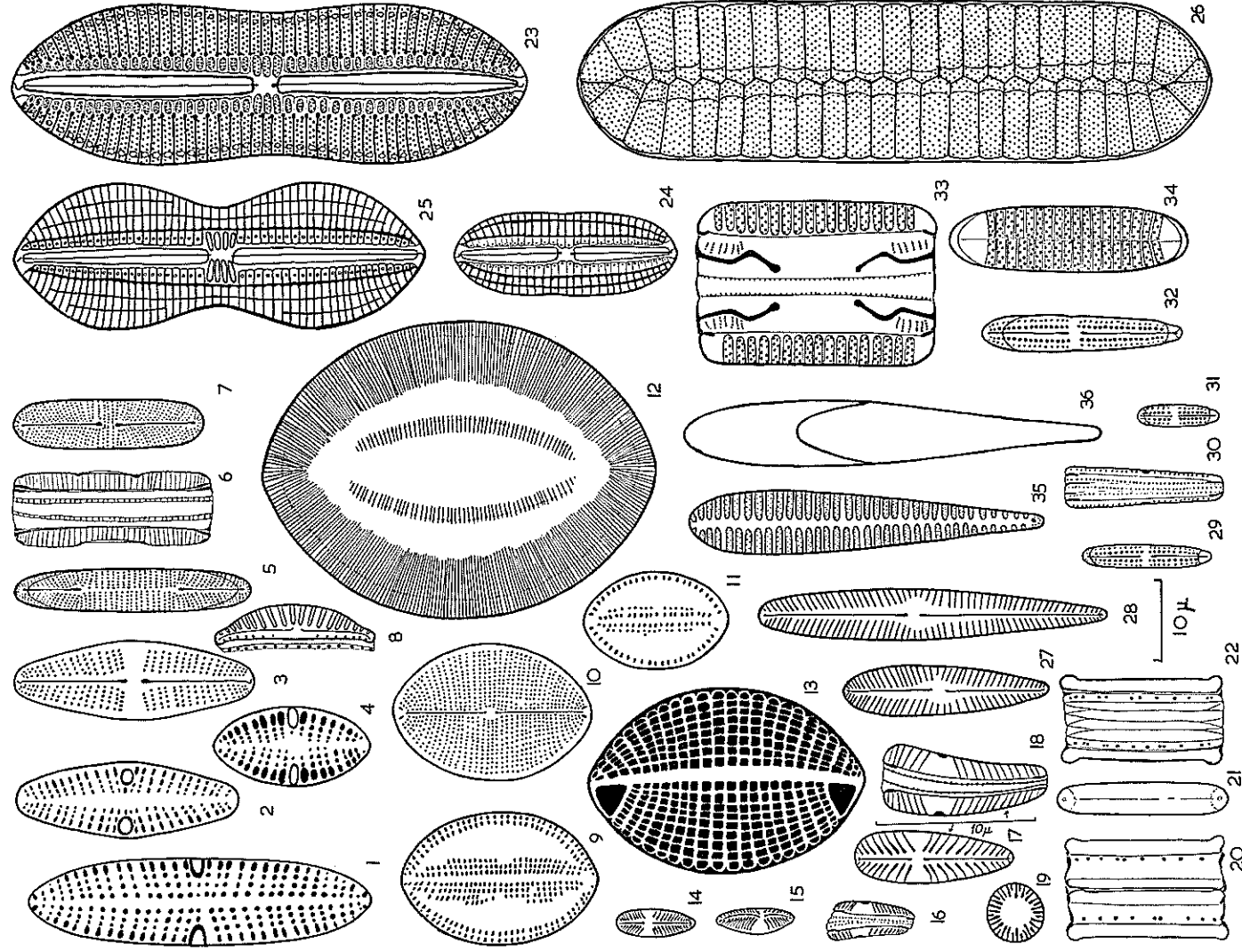
S. tabulata (AGARDH) KÜTZING var. *fasciculata* (KÜTZING) GRUNOW. — 592.

Thalassiothrix CLEVE and GRUNOW 1880.

T. Frauenfeldii GRUNOW. — 591.

Trachyneis CLEVE 1894.

T. aspera (EHRENBERG) CLEVE. — Specimens measured up to 128 μ long. Widespread. — 591, 592.

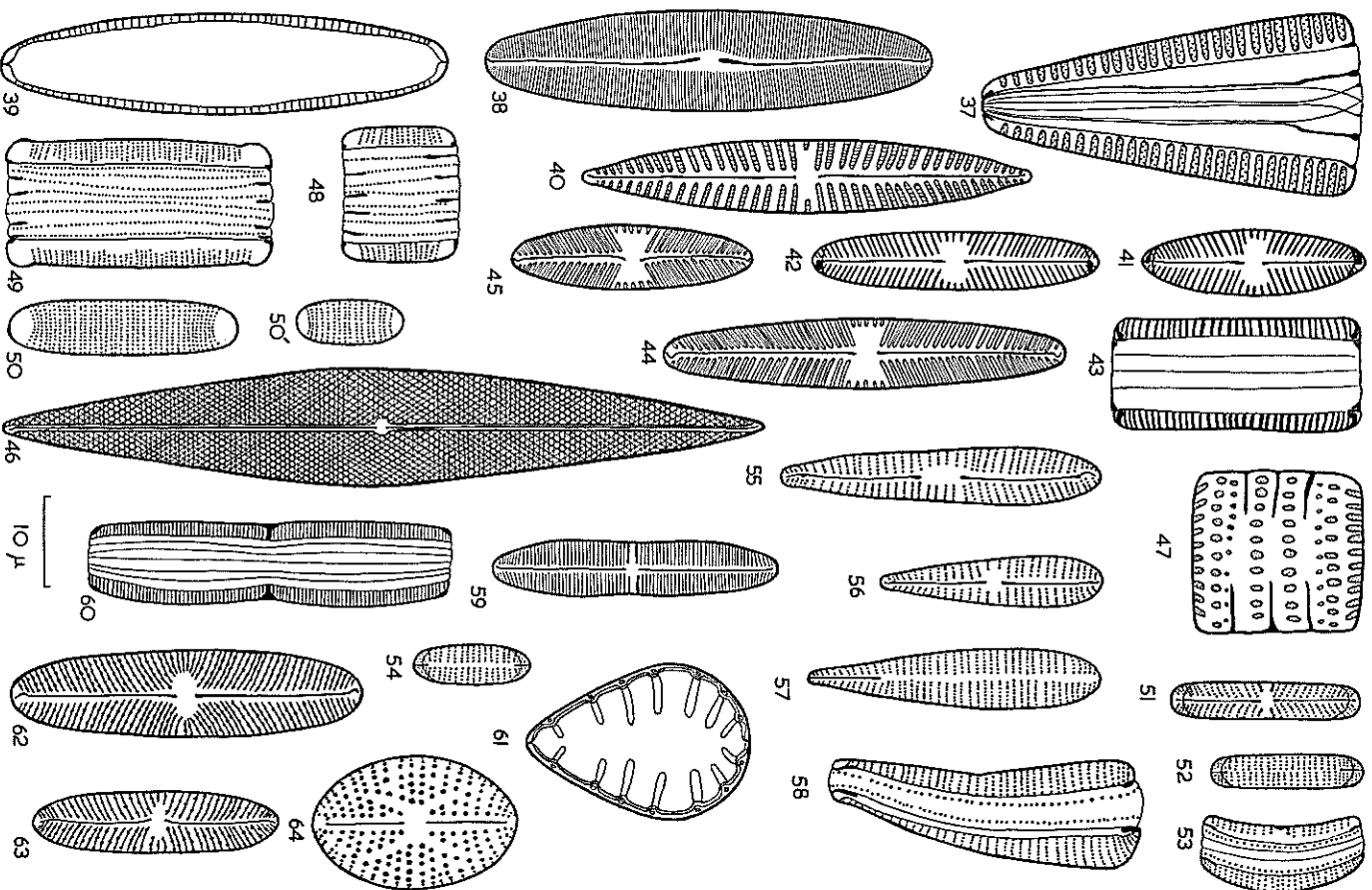


1—4. *Achnanthes pronunturii* n. sp. 5—7. *Berkeleya capensis* n. sp. 8. *Amphora profusa* n. sp. 9—11. *Cocconeis californica* GRUNOW. 12. *C. pseudomarginata* GREGORY. 13. *C. subtilioralis* HENDEY. 14—18. *Cuneolus minutus* n. gen. et sp. 19. *Cyclotella striata* (KÜTZING) GRUNOW. 20—22. *Dimerogramma inare* n. sp. 23. *Diploneis crabro* var. *pandura* (BRÉBISSON) CLEVE. 24. *D. itreata* f. *pusilla* CLEVE. 25. *D. splendida* var. *puella* (A. SCHMIDT) CLEVE. 26. *Entopylia ocellata* (AR NOTT) GRUNOW. 27, 28. *Gomphonema kamtschaticum* GRUNOW. 29—32. *G. pseudoseptatum* n. sp. 33, 34. *Grammatophora Carteri* n. sp. 35—36. *Licmophora opephorooides* n. sp.

T. speibonae n. sp. — Frustule in girdle view quadrangular, slightly constricted in the middle, connecting zone usually very wide so that valves are rarely seen in front view. Valves linear elliptical, distinctly convex, with obtuse rounded ends, 28—40 μ long, 10—11 μ broad. Raphe more or less straight with moderately close central pores and hooked terminal pores. Axial area narrow, gradually widening into a small circular central area. Transapical costae 15 in 10 μ , radiate throughout,

costal alveolae forming oblique rows. — Type slide No. 591 in the GIFFEN Collection.

Frustula in visu pleurale quadrangularia, in media parte leviter constricta, pleura fere latissima, itaque visus valvales rarissimi. Valvae lineari-ellipticae, convexae, polis obtuse rotundatis, 28—40 μ longae, 10—11 μ latae. Rraphe plus minusve directa, poris centralibus modice approximatis, fissuris terminalibus in hamum curvatis. Area axialis anguste linearis, ad nodulum centralem ver-



37. *Limnophora opephoroides* n. sp. 38, 39. *Mastogloia cistekiensis* GIFFEN. 40. *Navicula cancellata* var. *gregorii* RALFS. 41—43. *N. inflexa* (GREGORY) DONKIN. 44, 45. *N. speibornae* n. sp. 46. *Pleurosigma intermedium* var. *mauritianum* GRUNOW. 47. *Rhodonema arcuatum* (LYNGBYE) KÜTZING. 48—50. *R. scabellum* n. sp. 51—54. *Rhicosphenia Adolphi* M. SCHMIDT. 55—58. *R. flexa* n. sp. 59—60. *Stauroneis constricta* (W. SMITH) CLEVE. 61. *Sarrilla scopuli* n. sp. 62, 63. *Trachyneis speibornae* n. sp. 64. *Navicula biflexa* (A. SCHMIDT) nov. comb.

sus gradatim in arcam centralem parvam, circularem dilatata. Costae transpirales circiter 15 in 10μ , in tota longitudine valvae radiantes, alveolis in seriebus obliquis ordinatis munitae.

Habitat: in aquis marinis Oceani Atlantici apud promunturium Sea Point dictum prope oppidum Cape Town Africae Meridionalis.

Typus: praeparatum no. 591 in collectione GIFFENI, Fort Hare, Provincia Capensis.

Iconotypus: figurae nostrae no. 62 et 63.

T. speibornae seems to be one of the smallest of the very variable species and varieties of *Trachyneis*. It differs from *T. aspera* (EHRENBERG) CLEVE in the shape of the central area and the very much closer costae. It strongly resembles *Navicula clepsydra* DONKIN var. (A. SCHMIDT, Atlas: T. 48, fig. 38) which is figured from Cape material, although CLEVE (1894: 193) in a note under *T. Debyi* LEUDIGER-FORMOREL states that "the figure in A. S.