

BT

SOCIETAS PRO FAUNA ET FLORA FENNICA

ACTA
BOTANICA FENNICA

93

Rolf Grönblad (†) and Hannah Croasdale:
Desmids from Namibia (SW Africa)

SOCIETAS
PRO
FAUNA ET FLORA FENNICA

HELSINKI—HELSINGFORS
1971

ACTA BOTANICA FENNICA

1—19 vide Acta Botanica Fennica 20—50.

20—49 vide Acta Botanica Fennica 50—82.

50. **Hans Luther:** Verbreitung und Ökologie der höheren Wasserpflanzen im Brackwasser der Ekenäs-Gegend in Südfinnland. II. Spezieller Teil. 370 S. (1951).
51. **M. R. Droop:** On the ecology of Flagellates from some brackish and fresh water rockpools of Finland. 52 pp. (1953).
52. **Hans Luther:** Über *Vaucheria arrhyncha* Heidinger und die Heterokonten-Ordnung *Vaucheriales* Bohlin. 24 S. (1953).
53. **Ernst Häyrén:** Wasser- und Uferpflanzen aus dem Päijänne-Gebiet. 42 S. (1954).
54. **Lars Fagerström:** Växtgeografiska studier i Strömfors-Pyttis skärgård i östra Nyland med speciellt beaktande av lövängarna, artantalet samt en del arters fördelning och invandring. 296 s. (1954).
55. **Hans Luther:** Über Krustenbewuchs an Steinen fliessender Gewässer, speziell in Südfinnland. 61 S. (1954).
56. **Ilmari Hustich:** Notes on the growth of Scotch Pine in Utsjoki in northernmost Finland. 13 pp. (1956).
57. **Henrik Skult:** Skogsbotaniska studier i Skärgårdshavet med speciell hänsyn till förhållandena i Korpo utskär. 244 s. (1956).
58. **Rolf Grönblad, Gerald A. Prowse and Arthur M. Scott:** Sudanese Desmids. 82 pp. (1958).
59. **Max von Schantz:** Über das ätherische Öl beim Kalmus, *Acorus calamus* L. Pharmakognostische Untersuchung. 138 S. (1958).
60. **Harald Lindberg:** Växter, kända från Norden, i Linnés herbarium. *Plantae e septentrione cognitae in herbario Linnaei*. 133 pp. (1958).
61. **Alvar Palmgren:** Studier över havsstrandens vegetation och flora på Åland. I. Vegetationen. 268 s. (1961).
62. **Hans Luther:** Veränderungen in der Gefässpflanzenflora der Meeresfelsen von Tvärminne. 100 S. (1961).
63. **Rolf Grönblad:** Sudanese Desmids II. 19 pp. (1962).
64. **Veikko Lappalainen:** The shore-line displacement on southern Lake Saimaa. 125 pp. (1962).
65. **J. J. Donner:** The zoning of the Post-Glacial pollen diagrams in Finland and the main changes in the forest composition. 40 pp. (1963).
66. **Rolf Grönblad, Arthur M. Scott and Hannah Croasdale:** Desmids from Uganda and Lake Victoria, collected by Dr. Edna M. Lind. 57 pp. (1964).
67. **Carl Eric Sonck:** Die Gefässpflanzenflora von Pielisjärvi und Lieksa, Nordkarelien 311 S. (1964).
68. **F. W. Klingstedt:** Über Farbenreaktionen von Flechten der Gattung *Usnea*. 23 S. (1965).
69. **Arthur M. Scott, Rolf Grönblad and Hannah Croasdale:** Desmids from the Amazon Basin, Brazil, collected by Dr. H. Sioli. 94 pp. (1965).
70. **Teuvo Ahti:** *Parmelia olivacea* and the allied non-isidiate and non-sorediate corticolous lichens in the Northern Hemisphere. 68 pp. (1966).
71. **Simo Juvonen:** Über die die Terpenbiosynthese beeinflussenden Faktoren in *Pinus silvestris* L. 92 S. (1966).
72. **Leena Hämet-Ahti:** Some races of *Juncus articulatus* L. in Finland. 22 pp. (1966).
73. **Max von Schantz and Simo Juvonen:** Chemotaxonomische Untersuchungen in der Gattung *Picea*. 51 S. (1966).
74. **Ilkka Kytövuori and Juha Suominen:** The flora of Ikkalanniemi (commune of Virrat, Central Finland), studied independently by two persons. 59 pp. (1967).
75. **Leena Hämet-Ahti:** *Tripleurospermum* (Compositae) in the northern parts of Scandinavia, Finland and Russia. 19 pp. (1967).

ACTA BOTANICA FENNICA 93
EDITIT
SOCIETAS PRO FAUNA ET FLORA FENNICA

DESMIDS FROM NAMIBIA (SW AFRICA)

ROLF GRÖNBLAD (†) AND HANNAH CROASDALE

HELSINKI — HELSINGFORS
May 1971

Abstract

GRÖNBLAD, ROLF (†) & CROASDALE, HANNAH (Dept. Biol. Sci., Dartmouth Coll.): Desmids from Namibia (SW Africa). — Acta Bot. Fennica 93:1—40. 1971.

The desmids present in seven samples of algae from the Nkure-Nkuru region on the Okavango River in Namibia (South West Africa) are identified, described and discussed. 185 taxa are reported; the novelties are: *Closterium lunula* (Müll.) Nitzsch var. *maximum* Borge f. *crassissimum* Croasd. f. nov., *Cl. spetsbergense* Borge var. *laticeps* Grönbl. f. *maius* Croasd. f. nov., *Euastrum binale* (Turp.) Ehrbg. var. *juvae* Croasd. var. nov., *E. elegans* (Breb.) Kütz. var. *compactum* (Wolle) Krieg. f. *miriforme* Croasd. f. nov., *E. platycerum* Reinsch var. *obtusius* Grönbl. & Croasd. var. nov., *Cosmarium hellbergii* Grönbl. & Croasd. sp. nov., *Staurastrum cyclacanthum* West & West var. *africanum* Croasd. var. nov., *S. furcatum* (Ehrbg) Bréb. f. *richae* Croasd. f. nov. and *S. tumidum* Bréb. var. *bipapillatum* Croasd. var. nov.

Author's address: Dr. Hannah Croasdale, Department of Biological Sciences, Dartmouth College, Hanover, N. H. 03755, U.S.A.

Contents

Foreword by <i>Hannah Croasdale</i>	3
Introduction by <i>Hans Luther</i>	3
Desmid flora of the samples	4
Taxonomical part	6
Literature	24
Explanation of plates	26
Plates I—X	30
New name for a desmid described in Acta Bot. Fennica 69	40
Holotypes	40

Foreword

by HANNAH CROASDALE

The present paper is the fourth that the junior author has attempted to complete from notes and sketches left by Dr. Rolf Grönblad at the time of his death in 1962. As in the earlier papers, when she has had to furnish descriptions and names of novelties she has given or included herself as author, and when her judgement varied from that expressed by Dr. Grönblad she has usually quoted his opinion with her reasons for differing. She is honored by having been entrusted with these manuscripts and has tried to maintain the high standard set by Dr. Grönblad.

What is left of the material upon which this paper is based is stored in the Botanical Museum of the University of Helsinki (H).

Introduction

by HANS LUTHER

As a continuation of the studies of African desmids (from Sudan, Uganda, Lake Victoria and Sierra Leone), undertaken by Dr Rolf Grönblad and Mr A. M. Scott, the later ones after their death finished by Dr Hannah Croasdale, Dr Grönblad got in contact with Dr J. Håkan Hellberg, then physician of the Finnish missionary area in Okavango, Namibia (South West Africa) and asked him to collect algal samples.

Dr Hellberg sent six samples (nr 1—6), all from the shore of the river Okavango (on some maps named Cubango, which is its name in Portuguese). All samples are from the immediate vicinity of the missionary hospital at Nkure-Nkuru (earlier spelt Kuring-Kuru) which is on the Namibian side of the border river Okavango, about 2 km downstream from Cuangar, the nearest Portuguese station on the Angola side of the river. The samples were in 1960 collected in small vials (about 5 ml) which immediately were mailed to Finland. They were taken in the dry season (May-Sept.) partly at low water level isolated from the river. More exact information about the site of each sample is not available.

According to information kindly provided by Dr Hellberg (now in Geneva) the Nkure-Nkuru area annually gets about 25—30 inches of rain, but the river Okavango is principally fed by water from highlands in the interior of

Angola. The water level variation in the river between dry and wet seasons is usually about 5 meters, the maximal variation 7—8 meters. The river is 200—300 m broad and in dry seasons 2—4 m deep and in normal years discharges its waters into the Okavango Swamps in Botswana. In years with heavy rains it partly flows to the Zambesi river, through the Cuando river swamp in the Caprivi strip.

In May, 1961, the same area was visited by Professor Mikko Juva, who at the request of Professor Paavo Kallio in Turku sent him by airmail a sample of algae from Nkure-Nkuru (nr 7). The intention of Prof. Kallio was to use the material for cultures of desmids, but the vitality of the algae was not good enough to allow this. He preserved the algae in formalin and handed them over to Dr Grönblad.

Desmid flora of the samples

A figure for a taxon is noted only when it originated from the sample in question.

Nr. 1

Gonatozygon monotaenium — *Euastrum binale* var. *binale* f. — *E. denticulatum* — *E. denticulatum* f. — *E. evolutum* var. *glaziowii* f. *africanum* Fig. 18 — *E. praemorsum* f. Fig. 16 — *Cosmarium ?monodii* Fig. 65 — *Staurastrum gracile* f. Fig. 131 — *S. quadricornutum*.

Other algae: *Ankistrodesmus facatus* (Gorda) Ralfs — *Scenedesmus acutiformis* Schroeder — *S. quadricauda* (Turp.) Bréb.

Nr. 2

Cosmarium bioculatum — *C. blythii* — *C. capense* var. *nyassae* f. Fig. 61 — *C. margaritatum* Fig. 111 — *C. subauriculatum* var. *subauriculatum* Fig. 56 — *C. tenue* — *Staurastrum floriferum*.

Other algae: *Ankistrodesmus falcatus* (Gorda) Ralfs — *Scenedesmus acutiformis* Schroeder — *Scenedesmus brasiliensis* Bohlin.

Nr. 3

Cosmarium sp. — *Staurastrum inflexum*.

Other algae: »One blue-green alga ccc» (RG).

Nr. 4

Closterium cornu — *Cl. venus* var. *debeonica* — *Euastrum denticulatum* — *E. denticulatum* f. — *E. evolutum* var. *integrius* — *E. platycerum* var. *obtusius* — *E. spinulosum* subsp. *africanum* var. *minus* — *Cosmarium capense* var. *nyassae* Fig. 60 — *C. cruciferum* Fig. 52 — *C. pachydermum* var. *indicum* Fig. 59 — *C. platydesmium* Fig. 79, 143 — *C. pseudoretusum* var. *africanum* — *C. subauriculatum* var. *bogoriense* Fig. 57, 140 — *C. sub. tumidum* var. *borgei* f. Fig. 76 — *Staurastrum manfeldtii* Fig. 125 — *S. polymorphum* var. *polymorphum* Fig. 127.

Other algae: *Scenedesmus quadricauda* (Turp.) Bréb. — *Spirogyra* (»very thick») (RG).

Nr. 5

Spirotaenia condensata — *Gonatozygon brebissonii* — *G. monotaenium* — *Closterium libellula* var. *intermedium* — *Cl. navicula* — *Euastrum denticulatum* — *E. denticulatum* f. — *E. divergens* var. *rhodesiense* f. Fig. 35 — *E. elegans* var. *compactum* f. *miriforme* Fig. 25 — *E. platycerum* var. *obtusius* Fig. 40, 135 — *E. spinulosum* subsp. *africanum* var. *minus* Fig. 44, 45 — *E. truncatiforme* Fig. 33 — *Micrasterias decemdentata* Fig. 47 — *Cosmarium beatum* f. Fig. 91, 92 — *C. binum* f. Fig. 102 — *C. bituberculatum* Fig. 87 — *C. blythii* — *C. connatum* var. *connatum* Fig. 83 — *C. connatum* var. *depressum* Fig. 84, 144. — *C. controversum* Fig. 108 — *C. difficile* var. *sublaeve* f. Fig. 88 — *C. granatum* Fig. 73,

74 — *C. hammeri* — *C. hellbergii* Fig. 107 — *C. lundellii* var. *lundellii* f. Fig. 54 — *C. lundellii* var. *corruptum* Fig. 55 — *C. meneghinii* — *C. novae-semillae* — *C. pseudobroomei* var. *compressum* Fig. 110 — *C. pseudonitidulum* var. *angustissimum* Fig. 78 — *C. striolatum* var. *nordstedtii* Fig. 112 — *C. subcostatum* var. *beckii* — *C. trachypleurum* var. *spinosum* «f. 2» Fig. 96 — *C. ?venustum* var. *excavatum* f. Fig. 81 — *C. ?venustum* var. *minus* Fig. 82 — *C. sp.* — *Arthrodesmus ralfsii* var. *brebissonii* Fig. 114 — *Staurastrum dilatatum* var. *dilatatum* — *S. diptilium* var. *mossambicum* — *S. gracile* — *S. hexacerum* — *S. lapponicum* Fig. 119 — *S. leptocladum* var. *cornutum* — *S. orbiculare* var. *depressum* — *S. polymorphum* var. *cinctum* Fig. 130 — *S. tetracerum* — *Onychonema laeve* — *Spondylosium planum* — *Hyalotheca mucosa*.

Other algae: *Coelastrum microporum* Näg. — *Pediastrum boryanum* (Turp.) Menegh. — *P. tetras* (Ehrbg) Ralfs — *Scenedesmus armatus* (Chod.) G. M. Smith — *S. brasiliensis* Bohlin — *S. dimorphus* (Turp.) Kütz.

Nr. 6

Gonatozygon monotaenium — *Closterium venus* var. *debegeica* — *Euastrum attenuatum* var. *brasiliense* f. Fig. 30 — *E. spinulosum* Delp. subsp. *spinulosum* var. *burmense* Fig. 46 — *E. truncatiforme* Fig. 31 — *Cosmarium hammeri* — *C. humile* — *C. speciosum* — *C. subtumidum* var. *borgei* f. Fig. 75 — *Staurastrum dilatatum* var. *hibernicum* — *S. diptilium* var. *mossambicum* Fig. 122 — *S. quadricornutum* — *S. renardii* — *S. rugulosum*.

Nr. 7

Netrium digitus — *Gonatozygon monotaenium* — *Closterium acutum* — *Cl. cornu* — *C. cynthia* — *Cl. diana* — *Cl. gracile* Fig. 8 — *Cl. incurvum* — *Cl. jenneri* f. Fig. 5 — *Cl. kuetzingii* — *Cl. lanceolatum* var. *parvum* Fig. 6 — *Cl. libellula* var. *intermedium* — *Cl. lunula* var. *maximum* Fig. 9 — *Cl. lunula* var. *maximum* f. *crassissimum* Fig. 10 — *Cl. malinvernianum* Fig. 4 — *Cl. navicula* — *Cl. nematodes* — *Cl. parvulum* var. *angustum* — *Cl. ralfsii* var. *hybridum* — *Cl. setaceum* — *Cl. spetsbergense* var. *laticeps* f. *maius* Fig. 11 — *Cl. subulatum* Fig. 7 — *Cl. turgidum* Fig. 12 — *Cl. venus* var. *debegeica* Fig. 3 — *Cl. sp.* Fig. 1, 2 — *Pleurotaenium ovatum* var. *tumidum* Fig. 13 — *Euastrum ansatum* Fig. 15 — *E. binale* var. *binale* f. *gutwinskii* — *E. binale* var. *juvae* Fig. 28 — *E. denticulatum* f. Fig. 27 — *E. divergens* var. *ornatum* Fig. 34, 136 — *E. dubium* — *E. elegans* var. *elegans* f. — *E. elegans* var. *compactum* f. *miriforme* — *E. evolutum* var. *glaziowii* f. *africanum* Fig. 17 — *E. evolutum* var. *integrius* Fig. 19, 20 — *E. hypochondrioides* f. Fig. 36, 37 — *E. luetkemulleri* var. *carniolicum* f. Fig. 29 — *E. mononcyllum* var. *germanicum* Fig. 38, 39 — *E. platycerum* var. *eximium* Fig. 41 — *E. pulcherrimum* var. *ornatum* Fig. 21, 22 — *E. sibiricum* f. *africanum* Fig. 26 — *E. sinuosum* Fig. 14 — *E. spinulosum* subsp. *africanum* var. *africanum* Fig. 42, 137 — *E. spinulosum* subsp. *africanum* var. *minus* Fig. 43 — *E. truncatiforme* Fig. 32 — *E. umbonatum* Fig. 23, 24 — *Micrasterias pinnatifida* var. *incudiformis* f. Fig. 49 — *M. thomasiana* — *M. zeylanica* f. Fig. 48 — *Cosmarium abbreviatum* var. *minus* — *C. angulosum* Fig. 85 — *C. askenasyi* f. Fig. 62, 139 — *C. binum* Fig. 101 — *C. conspersum* var. *latum* — *C. contractum* var. *contractum* f. Fig. 66 — *C. ?contractum* var. *cracoviense* Fig. 67 — *C. contractum* var. *ellipsoideum* — *C. cucurbita* f. Fig. 50 — *C. decoratum* f. Fig. 103, 104 — *C. depressum* var. *minutum* Fig. 72 — *C. diplosporum* Fig. 51 — *C. exiguum* Fig. 89 — *C. goniodes* — *C. hammeri* var. *protuberans* Fig. 68 — *C. hammeri* var. *schmidlei* — *C. hellbergii* Fig. 105, 106 — *C. impressulum* — *C. kjellmanii* var. *ornatum* Fig. 100, 145 — *C. laeve* Fig. 90 — *C. medioscrobiculatum* var. *inflatum* Fig. 63, 64 — *C. ?monodii* — *C. norimbergense* — *C. obsoletum* Fig. 53 — *C. obtusatum* var. *obtusatum* — *C. obtusatum* var. *undulatum* Fig. 80 — *C. pachydermum* var. *pachydermum* Fig. 58 — *C. phaseolus* var. *minus* Fig. 41a — *C. pseudamoenum* — *C. pseudobroomei* var. *pseudobroomei* Fig. 109, 146 — *C. pseudoconnatum* Fig. 86 — *C. pseudo-retusiforme* — *C. pseudoretusum* var. *africanum* Fig. 69–71 — *C. punctulatum* var. *seriatum* f. Fig. 97 — *C. quinarium* f. Fig. 98 — *C. regnellii* — *C. striolatum* var. *nordstedtii* Fig. 113 — *C. subauriculatum* var. *subauriculatum* — *C. subauriculatum* var. *bogoriense* — *C. subprotumidum* var. *gregorii* — *C. subspeciosum* var. *validius* — *C. subtumidum* var. *minor* Fig. 77 — *C. taxichondrum* var. *haynaldii* f. Fig. 93 — *C. taxichondrum* var. *ocellatum* f. Fig. 94 — *C. trachypleurum* var. *spinosum* «f. 1» Fig. 95 — *C. vitiosum* Fig. 99 — *C. sp.* — *Xanthidium concinnum* var. *boldtianum* f. Fig. 115 — *Staurastrum alternans* Fig. 118 — *S. crenulatum* — *S. cyclacanthum* var. *africanum* Fig. 132 — *S. dejectum* var. *patens* — *S. dickiei* var. *rhomboideum* Fig. 116 — *S. disputatum* var. *sinense* — *S. floriferum* f. — *S. furcatum* f. *richae* Fig. 133 — *S. laeve* — *S. laeve* f. Fig. 121 — *S. leptocladum* var. *cornutum* — *S. mucronatum* — *S. orbiculare* var. *depressum* — *S. orbiculare* var.

hibernicum — *S. polymorphum* var. *polymorphum* Fig. 128 — *S. polymorphum* var. *cinctum* Fig. 129 — *S. pseudotetracerum* Fig. 123, 124 — *S. quadrangulare* var. *contectum* Fig. 120 — *S. quadricornutum* — *S. setigerum* — *S. subavicula* — *S. tohopekaligense* var. *trifurcatum* — *S. tumidum* var. *bipapillatum* Fig. 117 — *S. sp.* Fig. 126 — *Sphaerosoma granulatum* — *Onychonema filiforme* Fig. 134 — *O. laeve* var. *micracanthum* — *Hyalotheca dissiliens* var. *dissiliens* «forma minor» (RG) — *H. dissiliens* var. *hians* — *H. dissiliens* var. *tratica* — *Desmidium baileyi* — *D. coarctatum*.

Other algae: *Bulbochaete* sp. — *Chroococcus* sp. — *Coelastrum cambricum* Arch. — Diatoms — *Kirchneriella lunaris* (Kirchn.) Möb. — *Mougeotia* sp. — *Nephroclytium agarthianum* Näg. — *Oedogonium* sp. — *Oocystis solitaria* Wittr. — *Pediastrum boryanum* (Turp.) Menegh. — *P. simplex* Meyen — *P. tetras* (Ehrbg) Ralfs — *Scenedesmus arcuatus* Lemm. var. *platydiscus* G. M. Smith — *S. armatus* (Chod.) G. M. Smith — *S. brasiliensis* Bohlin — *S. dimorphus* (Turp.) Kütz. — *Sorastrum americanum* (Bohlin) Schmidle — *Spirogyra* sp. — *Trachelomonas australica* (Playf.) Defl. — *T. bacillifera* Playf. var. *ovalis* Playf. — *T. cylindrica* Ehrbg — *T. lemmermannii* Wolosz. — *T. sydneyensis* Playf. — *T. volvocina* Ehrbg.

Taxonomical part

Literature quotations for taxa are given when the taxon is not present in WESTS' Monograph or RABENHORST's Kryptogamenflora (KRIEGER 1935, 1937) or in KRIEGER & GERLOFF 1962, 1965, 1969.

All dimensions are given in microns (μm).

Abbreviations:

c	= circa	lat.	= width of cell
cpr	= with processes	long.	= length of cell
crass.	= thickness	spr	= without processes
csp	= with spines	ssp	= without spines
ist.	= width of isthmus	°	= degrees of arc

Spirotaenia condensata Bréb. Nr. 5

Netrium digitus (Ehrbg) Itzigs. & Rothe. Nr. 7.

Gonatozygon brebissonii De Bary. »Cellulis longissimis» (RG) Nr. 5.

Gonatozygon monotaenium De Bary. Nr. 1, 5, 6, 7.

Closterium acutum (Lyngb.) Bréb. Nr. 7.

Closterium cornu Ehrbg. Nr. 4, 7.

Closterium cynthia De Not. Nr. 7.

Closterium diana Ehrbg. Nr. 7.

Closterium gracile Bréb. Long. 147, lat. 4.6 (32 \times). Our form has narrower apices than the plants figured by KRIEGER (1937, p. 310, 30: 7—9), but RALFS (1848, p. 221) speaks of »a short beak», and this is shown by many authors. RG suggested »*Cl. pronum* Bréb. f.» but this species is much larger and relatively longer. Nr. 7. — Fig. 8.

Closterium incurvum Bréb. Nr. 7.

Closterium jenniferi Ralfs (*Cl. cynthia* De Not. var. *jenniferi* (Ralfs) Rabenh.) forma. A relatively thick form that is abruptly and extremely curved. Long. 84, lat. 15 ($5.6 \times$) lat. apic. c. 3, 190° . RG has said, in mss, »I would like to keep *Cl. cynthia* and *Cl. jenniferi* apart.» He suggested both »*Cl. jenniferi* var?» and »*Cl. venus* Kütz. var?» for this form, but the apices are very thick for *Cl. venus*. Nr. 7. — Fig. 5.

Closterium kuetzingii Bréb. Nr. 7.

Closterium lanceolatum Kütz. var. *parvum* West & West. Long. 158, lat. 22 ($7.2 \times$), lat. apic. 4, dorsal margin 33° , ventral margin 17° ; wall smooth; one crystal in terminal vacuole. RG suggested »*Cl. libellula* Focke var. *angustum* var. nov.,» but our plant has too great a difference in its degree of curvature of the dorsal and ventral margin. It seems to fit *Cl. lanceolatum* quite well except for its smaller size. Nr. 7. — Fig. 6.

Closterium libellula Focke var. *intermedium* (Roy & Biss) G. S. West. Nr. 5, 7.

Closterium lunula (Müll.) Nitzsch var. *maximum* Borge Long. 608, lat. 159 ($3.8 \times$). Nr. 7. — Fig. 9.

Closterium lunula (Müll.) Nitzsch var. *maximum* Borge forma *crassissimum* Croasd. forma nova. Nr. 7. — Fig. 10 (Holotype).

Forma magna crassissimaque. Long. 547, lat. 213 ($2.6 \times$).

This form has an exceptionally great relative breadth.

Closterium malinvernianum De Not. (*Cl. ehrenbergii* Menegh. var. *malinvernianum* (De Not.) Rabenh.). RG preferred to separate *Cl. ehrenbergii* and *Cl. malinvernianum*. Long. 562, lat. 122 ($4.6 \times$), 142° , 16—18 striae in $10 \mu\text{m}$ Nr. 7. — Fig. 4.

Closterium navicula (Bréb.) Lütkem. Nr. 5, 7.

Closterium nematodes Josh. Nr. 7.

Closterium parvulum Näg. var. *angustum* West & West. Nr. 7.

Closterium ralfsii Bréb. var. *hybridum* Rabenh. Nr. 7.

Closterium setaceum Ehrbg. Nr. 7.

Closterium spetsbergense Borge var. *laticeps* Grönblad (1921, p. 8, 5: 43) forma *maius* Croasd. forma nova. Nr. 7 — Fig. 11 (Holotype).

Forma multo maior, abruptius attenuata atque plus recurvata. Long. 714, lat. 80 ($8.9 \times$), lat. apic. 11, 55° , pyrenoides uniseriatae.

Our form is much larger, more abruptly tapered and more recurved. RG named it: »*Cl. ?spetsbergense* var. *laticeps*.» KRIEGER (1937, p. 305) puts this species (and variety) under *Cl. pseudolunula* Borge (1909, p. 3, Fig. 2), but this does not seem appropriate. BORGE (1911, p. 8, Fig. 5) also named *Cl. spetsbergense* and his original figures show them to be very different.

Closterium subulatum (Kütz.) Bréb. Long. 87, lat. 5 (17.4×), lat. apic. c. 1.5 μm. In our plant the cells are a little shorter than is typical, but the overall appearance is that of *Cl. subulatum*, which is RG's suggestion. Nr. 7. — Fig. 7.

Closterium turgidum Ehrbg. Lat. apic. c. 20, 8 striae in 10 μm. RG's figure is incomplete but helps confirm his identification. »Probably Nr. 7» (RG) — Fig. 12.

Closterium venus Kütz. var. *debegenica* Cholnoky (1954, p. 293, fig. 105, 106). Long. 112, lat. 16 (7×), 150°. Our specimen, being relatively shorter than the type, with less pointed apices, fits CHOLNOKY's variety very well. It differs from STRØM's (1926, p. 194, 2:13) f. *maior* in its greater curvature and from var. *apollonionis* Croasdale (1965, p. 310, I: 18—20) in its broader apices. Nr. 4, 6, 7. — Fig. 3.

Closterium sp. Long. 198, lat. 30 (6.6×), 125°, (or long 215, lat. 30 (7.2×), 150° if the lower semicell is assumed to be immature. Fig. 2 shows a reconstruction, bringing the cell to its presumed full size.) RG suggested »*Cl. malmei*» Borge, which, however, is broader with swollen apices and more costae. Ours has two costae in 10 μm. If, as it appears, girdle bands are lacking this seems closest to *Cl. pleurodermatum* West & West (1902, p. 1939, 18:12), differing in its straight ventral margin and more rounded apices. If girdle bands are present it might be a form of *Cl. regulare* Bréb., differing, however, in its greater curvature, fewer costae, and less angular apices. Nr. 7. — Fig. 1, 2.

Pleurotaenium ovatum Nordst. var. *tumidum* (Mask.) G. S. West. Long. 247, lat. 99 (2.5×), lat. apic. c. 21. Nr. 7. — Fig. 13.

Euastrum ansatum Ralfs. Long. 87, lat. 38 (2.3×), ist. 11, lat. apic. 17—18. Nr. 7. — Fig. 15.

Euastrum attenuatum Wolle var. *brasiliense* Grönblad (1945, p. 12, 3: 39) forma. Long. 52, lat. 35 (1.5×), ist. 12, lat. apic. 17. RG named this plant without comment; his figure is incomplete, but because of the closed sinus and relatively broad apical lobe it seems more appropriate to call it a forma. Nr. 6. — Fig. 30.

Euastrum binale (Turp.) Ehrbg var. *binale* forma. Nr. 1.

Euastrum binale (Turp.) Ehrbg var. *binale* f. *gutwinski* Schmidle. Nr. 7.

Euastrum binale (Turp.) Ehrbg var. *juvae* Croasd. var. nova. Nr. 7. — Fig. 28 (Holotype).

Cellula parva compressaque, omni angulo late rotundato, lateribus profundius concavis, isthmus latus, apex incisionem non profundam atque granulam submarginalem parvam utroque in incisionis latere habens. Long. 12.5, lat. 10.5 (1.19×) ist. 5, lat. apic. 9.5.

Cells small and compressed, with all angles broadly rounded and sides rather deeply concave, isthmus broad, apex with a shallow incision with a

small submarginal granule on either side. Named in honor of its collector, Professor Mikko Juva. RG also suggested that this might be a form of *E. angolense* (West & West) Krieg., which, however, is larger, relatively longer, and has its apical angles projected upward, effecting quite a different shape to the semicell.

Euastrum denticulatum (Kirchn.) Gay. Nr. 1, 4, 5.

Euastrum denticulatum (Kirchn.) Gay forma. A rather small form with reduced granulation. Long. 16—18, lat. 13—14 (1.23—1.28×), ist. 4—5, lat. lob. apic. 9—11. Nr. 1, 4, 5, 7. — Fig. 27.

Euastrum divergens Josh. var. *ornatum* (Borge) Schmidle. Long. 64, lat. 55 ssp. (1.16×), ist. 14, lat. lob. pol. 21. A large, ornate form. Nr. 7. — Fig. 34, 136.

Euastrum divergens Josh. var. *rhodesiense* Rich forma. A form with the basal lobe more developed, as in var. *ornatum*. Long. 52, lat. ssp 48—55, ist. 12—15, lat. lob. pol. 12—20. Nr. 5. — Fig. 35.

Euastrum dubium Näg. Nr. 7.

Euastrum elegans (Bréb.) Kütz. var. *elegans* forma. Nr. 7.

Euastrum elegans (Bréb.) Kütz. var. *compactum* (Wolle) Krieg. forma *miriforme* Croasd. forma nova. Nr. 5, 7. — Fig. 25 (Holotype, from Nr. 5).

Forma ornamentationem centralem asymmetricam praebens. Long. 26—27, lat. 19—20 (1.35—1.42×), ist. 4.5—6.

A form differing from WOLLE's original (*E. compactum* Wolle 1884, p. 107, 27: 28, 29) and the figure given by KRIEGER (1937, 82: 1, 2), in the flat base of the semicell, but very similar to plants figured by various authors from the tropics, except that the central ornamentation is regularly asymmetrical in the manner of *E. mirum* Behre (1956, p. 79, 9: 1). BOURRELLY & MANGUIN (1952, p. 226, 30: 571, 572) show a plant with a slight asymmetry.

Euastrum evolutum (Nordst.) West & West var. *glaziowii* (Börge.) West & West f. *africanum* Bourrelly (1957, p. 1061, 3: 27, 28). Long. 40—42, lat. 32—34 ssp (1.23—1.25×), ist. 7.5—8, lat. apic. 18—20. Our plants are somewhat more compressed than Bourrelly's form but otherwise resemble it very closely. RG suggested *E. flammeum* Josh., which, however, has a very different polar lobe and a paired central ornamentation. Nr. 1, 7. — Fig. 17, 18.

Euastrum evolutum (Nordst.) West & West var. *integrius* West & West. Long. 45—47, lat. 28—31 ssp (1.5—1.6×), ist. 7—9, lat. apic. 19—22. Nr. 4, 7. — Fig. 19, 20.

Euastrum hypochondroides West & West forma. A more compact form with the lateral lobes thicker, more sloping, and slightly bilobulate, the isthmus broader, the polar lobe broader and shorter, and with subapical denticulation in one or two horizontal rows. Long. 44—48, lat. 38—40 (1.2×), ist. 12—14, lat. apic. 13—15. Nr. 7. — Fig. 36, 37.

Euastrum luetkemuelleri Ducel. var. *carniolicum* (Lütkem.) Krieg. forma. A form differing in smaller size and less flat base of the semicell. Long. 22.5, lat. 14.5 (1.6×), ist. 4.5. Nr. 7. — Fig. 29.

Euastrum mononcyllum (Nordst.) Racib. var. *germanicum* Schmidle (= *E. germanicum* (Schmidle) Krieg.) Long. ssp 54—57, lat. ssp 47—48 (1.12—1.21×), ist. 12—13. RG (1960, p. 35) gives his reasons for preferring to retain the species *E. mononcyllum*. Nr. 7 — Fig. 38, 39.

Euastrum platycerum Reinsch var. *eximium* Grönbl. & Scott in GRÖNBLAD, PROWSE & SCOTT (1958, p. 14, 4: 47—49) forma. A form differing in being more angular, in having a longer polar lobe and in having paired spines on the lower margin of the basal lobe. Long. ssp. 64, lat. ssp 55 (1.16×), ist. 13, lob. pol. long. ssp 17, lat. ssp 14. Nr. 7. — Fig. 41.

Euastrum platycerum Reinsch var. *obtusius* Grönbl. & Croasdale. var. nova Nr. 4, 5. — Fig. 40 (Holotype, from Nr. 5), 135.

Varietas differens ut lobi laterales crassiores et bilobulati, sinus linearis, omnino inapertus, necnon ornamentatio centralis usque ad tres circulos granulorum praebens. Long. ssp 53—55, lat. ssp 49—50 (1.1×), ist. 12, lat. pol. lob. 18—19.

A variety differing in having its lateral lobes stouter and bilobulate, in having the sinus linear and closed throughout, and in having its central ornamentation showing up to three circles of granules.

Euastrum praemorsum (Nordst.) Schmidle forma. Differing from the original (*E. rostratum* v. *praemorsum* Nordst.) in being much smaller, relatively shorter, and showing a different facial ornamentation. Long. 50, lat. 35 (1.43×), ist. 9. This plant might nearly as well be considered a form of *E. umbonatum* West & West, which was an early suggestion of RG, or of *E. rostratum* Ralfs, which is HC's preference. Perhaps these three species should never have been separated. Nr. 1. — Fig. 16.

Euastrum pulcherrimum West & West var. *ornatum* Fritsch & Rich (1937, p. 171, fig. 7 C). Long. 40—45, lat. 27—30 (1.47—1.55×), ist. 7—9, lat. apic. 18—19. Our plants have less surface ornamentation than FRITSCH and RICH's, but agree well in general outline and smaller size. Very similar to this plant is *E. incertum* Fritsch & Rich f. *minus* Compère (1967, p. 229, fig. 208). Nr. 7. — Fig. 21, 22.

Euastrum sibiricum Boldt f. *africanum* Grönbl. & Scott in GRÖNBLAD, PROWSE & SCOTT (1958, p. 16, 2: 21—23). Long. 15, lat. 13.5, ist. 4.5. Our plant has its lobes somewhat less rounded and its ornamentation even more reduced. Nr. 7. — Fig. 26.

Euastrum sinuosum Lenorm. Long. 60, lat. 33 (1.8×), ist. 10, lat. apic. max. 14—16, min. 12—13. In its relatively long polar lobe our plant somewhat resembles forms described by SKUJA (1949, p. 114, 24: 5, 7) from Burma, but seems to lack all pores. It also resembles var. *dideltooides* Krieger (1932,

p. 214 22: 2) from Sunda. RG also suggested »*E. ansatum* Ehrbg f.», but in outline the cell much more closely resembles *E. sinuosum*. Nr. 7. — Fig. 14.

Euastrum spinulosum Delp. subsp. *spinulosum* var. *burmense* West & West. Long. 60, lat. 48 (1.25×), ist. 14. Differs from type in the presence of two small lateral tumors bearing granules, at base of semicell. Nr. 6, — Fig. 46.

Euastrum spinulosum Delp. subsp. *africanum* Nordst. var. *africanum* (1880, p. 9, 1: 16). Long. 86, lat. 82, ist. 22.5. Cell large, with notch at apex, rounded lobes and elaborate central ornamentation. KRIEGER (1937, p. 633) includes this with the species type, but HC agrees with the many authors who prefer to keep it separate. Nr. 7. — Fig. 42, 137.

Euastrum spinulosum Delp. subsp. *africanum* Nordst. var. *minus* Nordstedt (1880, p. 9). Long. 49—60, lat. 43—52, (1.0—1.7×), ist. 11—14. Similar to var. *africanum* but smaller, with ornamentation somewhat reduced and apical notch sometimes less definite. Nr. 4, 5, 7. — Fig. 44—45, 138.

Euastrum truncatiforme G. S. West. Long. 48—49, lat. 35—36 (1.36—1.37×), ist. 7—9, apex 23—24. Very close to the type but at the large end of the size range and varying in ornamentation. Note the different position of the central pore in each of the three figures. Nr. 5, 6, 7. — Fig. 31—33.

Euastrum umbonatum (West & West) Schmidle. Long. 51—59, lat. 29—35 (1.68—1.76×), ist. 8—13. Our plants agree quite well with Wests' original (*E. rostratum* Ralfs subsp. *umbonatum* West & West (1895, p. 51, 6: 16), particularly in the wide sinus between the two lateral lobes which later authors use to help separate it from *E. praemorsum* (Nordst.) Schmidle, although the WESTS do not mention this. For fig. 23 RG changed his identification from *E. praemorsum* to *E. umbonatum*, for fig. 24 he gave only the name *E. praemorsum*. HC believes that these are essentially the same plant and closer to *E. umbonatum*. Nr. 7. — Fig. 23, 24.

Micrasterias decemdentata (Näg.) Arch. Long. 68, lat. ssp. 62, ist. 15, lat. lob. pol. ssp. 49. RG called this plant »*M. zeylanica*» Fritsch (1907, p. 246), but it differs in having the lateral lobe divided, the extremity of each division being emarginate, and bearing two spines. Also the incision between the polar and lateral lobe is more open than in *M. zeylanica*. Nr. 5. Fig. 47.

Micrasterias pinnatifida (Kütz.) Ralfs var. *incudiformis* West & West forma. A large form, much broader than long, with one spine on the polar lobe and two spines on the lateral lobes. Long. 68, lat. ssp 87, csp 91, ist. 14, lat. lob. pol. ssp. 67, csp. 70. This is very like a form shown by BOURRELLY (1957, p. 1065, 5: 43) from the French Sudan. Nr. 7. — Fig. 49.

Micrasterias thomasi Arch. Nr. 7.

Micrasterias zeylanica Fritsch forma. A form approaching *M. decemdentata* (Näg.) Arch. Long. 50, lat. ssp. 53, ist. 15, lat. lob. pol. 42. RG called this

plant »*M. zeylanica*» but it seems to fall midway between this and *M. decemdentata*, having 8 spines per semicell, rather than the 6 of *M. zeylanica* or the 10 of *M. decemdentata*. The sinus openings are also intermediate. This plant closely resembles one from Uganda which RG called *M. zeylanica* and HC only reluctantly accepted (GRÖNBLAD, SCOTT & CROASDALE 1964, p. 16, 2: 34). Both plants might perhaps as well be classified as *M. decemdentata* var. *upsaliensis* Cleve in LUNDELL (1871, p. 16, 1: 7). Nr. 7. — Fig. 48.

Cosmarium abbreviatum Racib. var. *minus* (G. S. West) Krieg. & Gerl. Nr. 7.

Cosmarium angulosum Bréb. Long. 14, lat. 10, ist. 3. Nr. 7. — Fig. 85.

Cosmarium askenasyi Schmidle forma. A large form. Long. 186, lat. 148 (1.25×), ist. 58. Nr. 7. — Fig. 62, 139.

Cosmarium beatum West & West (1895, p. 60, 7: 8) forma. Long. 36, lat. 34, ist. 11—14, crass. including protuberances 16. A little larger and relatively broader than WESTS' species, with a single median truncate protuberance, and a larger verruca at each basal angle. Nr. 5. — Fig. 91, 92.

Cosmarium binum Nordst. Long. 52, lat. 39 (1.33×), ist. 15. Nr. 7. — Fig. 101.

Cosmarium binum Nordst. forma. Long. 73, lat. 53 (1.37×), ist. 20. Differs in having the vertical ridges smooth, also shown by COMPÈRE (1967, p. 218, fig. 172) from Lake Chad, Africa, and in having the cell relatively long, also shown by LIND (1967, p. 373, 4: 4, 4a) from E. Africa. Nr. 5. — Fig. 102.

Cosmarium bioculatum Bréb. Nr. 2.

Cosmarium bituberculatum Fritsch & Rich (1937, p. 181, 12: E, F). Long. 36, lat. 33, ist. 10. Our plant is slightly smaller than FRITSCH & RICH's (43—50×35—41), and shows the broadest part of the semicell about in the middle, not slightly above it. It seems closer to this plant, however, than to RG's suggestion of *C. pseudosulcatum* Rich in Fritsch & Rich (l. c. p. 194, 17:A) which is also larger, relatively longer, has a slightly elongate isthmus and nodular thickening on the wall at the isthmus and at the lateral and upper angles. Nr. 5. — Fig. 87.

Cosmarium blyttii Wille. Nr. 2, 5.

Cosmarium capense De Toni var. *nyassae* Schmidle (1902, p. 70, 2: 1). Long. 160, lat. 122 (1.3×), ist. c. 45. Our form differs from Schmidle's original only in the greater roundness of its semicells and very slight apical depression. Nr. 4. — Fig. 60.

Cosmarium capense De Toni var. *nyassae* Schmidle forma. Long. 163, lat. 142 (1.14×), ist. 50. Differing in the many scattered pyrenoids. RG describes the chloroplasts as »4 parietal plates». Nr. 2. — Fig. 61.

Cosmarium connatum Bréb. var. *connatum*. Long. 70, lat. 54 (1.3×), ist. 42. »In vertical view oval» (RG). It is regrettable that the chloroplast and wall

detail are not shown, but this is RG's determination, and seems correct. Nr. 5. — Fig. 83.

Cosmarium connatum Breb. var. *depressum* Irénée-Marie (1956, p. 90, I: 9). Long. 41, lat. 34 (1.2×), ist. 25. Cells much smaller, with truncate apex. Our form is smaller even than IRÉNÉE-MARIE's which is given as 50—52 μm × 44—45 μm, ist 26—26.5 μm. RG called this »*C. connatum* f. cf. var. *skujae*, var. *rotundatum*«. Nr. 5. — Fig. 84, 144.

Cosmarium conspersum Ralfs var. *latum* (Bréb.) West & West. Nr. 7.

Cosmarium contractum Kirchn. var. *contractum* forma. A form with two pyrenoids in each semicell. Long. 37, lat. 25, (1.48×), ist. 10. Nr. 7. — Fig. 66.

Cosmarium ?*contractum* Kirchn. var. *cracoviense* Raciborski (1885, p. 84, 10: 10), Long. 32, lat. 24 (1.33×), ist. 10. Without the end view identification is uncertain; our plant might possibly be a relatively long form of *C. pseudoprotuberans* Kirchn. Nr. 7. — Fig. 67.

Cosmarium contractum Kirchn. var. *ellipsoideum* (Elfv.) West & West. Nr. 7.

Cosmarium controversum W. West. Long. 96, lat. 70 (1.37×), ist. 28. RG on his list of findings, says »ad *C. decoratum*«, on his drawing he says »*C. controversum* (= *C. decoratum*?)« HC agrees that these two species are fundamentally similar, differing only in the triangular pits of *C. decoratum* West & West (1895, p. 61, 7: 21) which replace the small circular pores of *C. controversum* which RG shows in his drawing. Perhaps the two species should be combined, under the earlier name of *C. controversum*. Nr. 5. — Fig. 108.

Cosmarium cruciferum De Bary (*Penium cruciferum* (De Bary) Wittr.) Long. 19, lat. 11 (1.7×), ist. 9. Nr. 4. — Fig. 52.

Cosmarium cucurbita Bréb. forma. A form more tapered to a rounded apex, the sinus less notched. Long. 37, lat. 19, ist. 18. RG suggested also »*C. cucurbitinum* Biss.« which is possible, but this species is in general larger. Nr. 7. — Fig. 50.

Cosmarium decoratum West & West (1895, p. 61, 7: 21) forma. Long. 160, lat. 110, ist. 40. A form about twice as large as the type, the semicells more tapered to a narrower apex, the granules more numerous and sharper. Nr. 7. — Fig. 103, 104.

Cosmarium depressum (Näg.) Lund. var. *minutum* (Heimerl) Krieg. & Gerl. Long. 28, lat. 28, ist. 10, crass. 15. Nr. 7. — Fig. 72.

Cosmarium difficile Lütkem. var. *sublaeve* Lütkem. forma. Long. 35, lat. 29, ist. 6, with three horizontal rows of puncta across the face of the semicell. It differs in its slightly more tapered semicells and lack of apical wall thickening. RG suggested »*C. zonatum*« for the plant, and it seems to lie partway between this and *C. difficile*. HC, however, believes that it differs more sharply

from *C. zonatum* because of its closed sinus, smaller size, less strongly tapered cells and fewer rows of puncta. Nr. 5. — Fig. 88.

Cosmarium diplosporum (Lund.) Lütkem. Long. 57, lat. 29 ($2\times$), ist. 28. RG identified this plant with a »(?)» on his figure, without it on his list. The identification seems most probable, but without details of wall and chloroplast one cannot be sure. Nr. 7. — Fig. 51.

Cosmarium exiguum Arch. Long. 16.5, lat. 9 ($1.83\times$), ist. 4. Nr. 7. — Fig. 89.

Cosmarium goniodes West & West. Nr. 7.

Cosmarium granatum Bréb. Of this extremely variable species two forms were found: (Fig. 73) long. 39, lat. 24 ($1.62\times$), ist. 9, and (Fig. 74) long. 41.5, lat. 30 ($1.38\times$), ist. 10. Both these were from Nr. 7, and RG also reported the species from Nr. 5. — Fig. 73, 74.

Cosmarium hammeri Reinsch. Nr. 5, 6.

Cosmarium hammeri Reinsch var. *protuberans* West & West. Long. 28, lat. 20 ($1.4\times$), ist. 8. RG called this *C. subbinale* Lag. var. *abyssinicum* Lag. f. *minor* Schmidle, which KRIEGER & GERLOFF (1962, p. 104), have appropriately, made a synonym of *C. hammeri* var. *protuberans*. Unfortunately RG did not show the end view of the semicell, or pyrenoids, but the general outline, relatively greater length, and smaller size match very well with the figure in WEST & WEST (Monograph II, 62: 24). Nr. »probably» (RG) 7. — Fig. 68.

Cosmarium hammeri Reinsch var. *schmidlei* Grönbl. & Scott in GRÖNBLAD, PROWSE & SCOTT (1958, p. 27, 13: 163—165). Nr. 7.

Cosmarium hellbergii Grönbl. & Croasdale. sp. nov. Nr. 5, 7. Fig. 105—107 (107 = Holotype, from Nr. 5).

Semicellulae pyramidales, parte latissima ad basim ipsam, marginibus superioribus concavis; sinus linearis inapertusque per omnem aut maiorem partem longitudinis; apex rectus aut paululum undulatus. Semicellulae nodulum magnum in extremitate inferiori-exteriore, et 6—8 granula magna rotunda in superficie, 4 late dispersa trans partem inferiorem semicellulae atque 2—4 in ordine aut arcu horizontali trans partem superiorem, habentes. Semicellulae a latere visae angulariter circulares, in margine granulum ordinis superioris inferiorisque, atque nodulum basalem magnum superisthmialem praebentes. Chloroplastus ignotus. Long. 37—42, lat. 36—40, ist. 11—12.5, crass. c. 22.

Nomen huius speciei clar. Dr. J. H. Hellberg, qui anno 1960 partem magnam materiae in hac publicatione descriptae legit, honorat.

Semicells pyramidal with the broadest part at the very base and with concave upper margins; sinus linear and closed through all or most of its length; apex straight or slightly undulate. Semicells with large nodule at the lower outer extremity, and with 6—8 large round granules on the face: 4 widely-spaced in a horizontal row or arc across the upper part. Semicell in side view angularly circular, showing on the margin a granule from the upper and lower rows, and above the isthmus the large basal nodule. Chloroplast unknown. The species belongs probably to the *C. retusum* Perty group, coming closest

to *C. subdistichum* Raciborski (1892, p. 376, I: 29), and to *C. warmingii* Børgesen (1890, p. 946, 4: 34). But see also *Xanthidium heimii* Bourrelly (1961, p. 339, 18: 5—7).

Cosmarium humile (Gay) Nordst. Nr. 6.

Cosmarium impressulum Elfv. Nr. 7.

Cosmarium kjellmanii Wille var. *ornatum* Wille. Long. 23, lat. 22, ist. 7. — Fig. 100, 145.

Cosmarium laeve Rabenh. Long. 17.5—18, lat. 12—12.5 (1.4—1.5×), ist. 3.5—5. Nr. 7. — Fig. 90.

Cosmarium lundellii Delp. var. *lundellii* forma. A small form, apparently scrobiculate or punctate in the central area. Long. 47, lat. 50, ist. 28. RG suggested for this »*C. perforatum* Lund.», which implies that the central pores that he shows are scrobiculations. HC does not believe his plant is *C. perforatum*, which is typically of a very different shape, being angular, with wide open sinus, and is also much larger. Nr. 5. — Fig. 54.

Cosmarium lundellii Delp. var. *corruptum* (Turn.) West & West. Long. 59, lat. 48 (1.22×), ist. 25. RG did not name this plant. It resembles somewhat *C. pachydermum* Lund. var. *indicum* Iyengar & Vimala Bai, but in outline our plant more closely resembles *C. lundellii*, and its puncta are closer, and very prominent at the margin. Nr. 5. — Fig. 55.

Cosmarium margaritatum (Lund.) Roy & Biss. Long. 88, lat. 64 (1.37×), ist. 22. Our plant differs from the type as shown by the WESTS (Monograph IV, pp: 8, 10) and other authors, in being relatively longer and in having the sides of the semicell straight from rather square basal angles. Nr. 2 — Fig. 111.

Cosmarium medioscrobiculatum W. West var. *inflatum* Printz (1915, p. 18, 2: 17, 18). Long. 68—70, lat. 59—61 (1.11—1.18×), ist. 38—40. In size shape and ornamentation our plants seem very similar to this variety. RG suggested »var. *egranulatum* Gutw. forma in BOURRELLY & MANGUIN (1949, p. 187, 4: 46)». Nr. 7. — Fig. 63, 64.

Cosmarium meneghinii Bréb. Nr. 5.

Cosmarium monodii Bourrelly (1957, p. 1071, 10: 88). Long. 114, lat. csp 99, ist. 34. RG named this plant, with apparently some question in his mind. His sketch does not show the fine and coarse scrobiculations which partially characterize the species, but this feature is shown in the photo (Fig. 141). Nr. 1, 7. — Fig. 65, 141.

Cosmarium norimbergense Reinsch. Nr. 7.

Cosmarium novae-semlicae Wille. Nr. 5.

Cosmarium obsoletum (Hantzsch) Reinsch. Long. 49, lat. 55, ist. 32. Nr. 7. — Fig. 53.

Cosmarium obtusatum Schmidle var. *obtusatum*. Nr. 7.

Cosmarium obtusatum Schmidle var. *undulatum* Fritsch & Rich (1937, p. 190, 14: A, B). Long. 44, lat. 38 (1.16×), ist. 13. Lateral margins with only 5—6 undulations, apex also undulate. Nr. 7. — Fig. 80.

Cosmarium pachydermum Lund. var. *pachydermum*. Long. 76, lat. 58 (1.3×), ist. 25. Nr. 7. — Fig. 58.

Cosmarium pachydermum Lund. var. *indicum* Iyeng. & Vimala Bai. Long. 66, lat. 53 (1.25×), ist. 20. RG does not show punctation, which in this variety is fine and sparse, but the size, shape and proportions of the cell agree very well. For this plant RG suggested »*C. subcucumis*» Schmidle, which, however, is relatively longer. Nr. 4. — Fig. 59.

Cosmarium phaseolus Bréb. var. *minus* (Boldt) Krieg. & Gerl. Long. 22.2, lat. 21.5, ist. 6, crass. 13. The face view is not as good for *C. phaseolus* as the end view. RG suggested »*C. tumidum?*» Lund., which is, however, a larger and thicker plant. Nr. 7. — Fig. 41a.

Cosmarium platydesmium (Nordst.) Nordst. & Schmidle. Long. 49, lat. 42, ist. 22, wall scrobiculate. RG said »cf. *C. platydesmium* in SKUJA — Burma» (SKUJA, H. 1949, p. 134, 29: 1, 2). Nr. 4 — Fig. 79, 143.

Cosmarium pseudamoenum Wille. Nr. 7.

Cosmarium pseudobroomei Wolle var. *pseudobroomei*. Long. 38, lat. 39, ist. 13. Semicells rectangular with large granules in c. 14 vertical and also decussate rows; end view showing no median protuberance. Nr. 7. — Fig. 109, 146.

Cosmarium pseudobroomei Wolle var. *compressum* G. S. West (1907, p. 123, 7: 11). Long 27, lat. 28, ist. 12. Granules quite regularly arranged in 10 vertical rows of 4 granules each, 18—20 granules around the margin. Our plant agrees very well with WEST's except for its slightly smaller size and fewer, more regularly arranged granules. Nr. 5. — Fig. 110.

Cosmarium pseudoconnatum Nordst. Long. 66, lat. 47 (1.4×), ist. 38. Our plant is a little larger than the size given in WEST & WEST (Monograph III, p. 27), but even larger ones have been reported from the Sudan by GRÖNBLAD, PROWSE & SCOTT (1958, p. 31), and from Indonesia by SCOTT & PRESCOTT (1961, p. 66, 25: 4). The figure regrettably shows no details of chloroplast and wall structure, but the identification is RG's and seems plausible. Nr. 7. — Fig. 86.

Cosmarium pseudonitidulum Nordst. var. *angustissimum* Grönbl. in GRÖNBLAD, SCOTT & CROASDALE (1964, p. 22, 4: 63, 64). Long. 46, lat. 39 (1.18×), ist. 19. Cells a little smaller than the type and without thickening of the wall at the apex. Nr. 5. — Fig. 78.

Cosmarium pseudoretusiforme Grönblad (1921, p. 35, 7: 21—23). KRIEGER & GERLOFF (1965, p. 227) have changed the name of this plant to *C. geometricum* West & West var. *retusiforme* (Grönbl.) Krieg. & Gerl. HC believes that

GRÖNBLAD'S species should be retained, since it has a very different sinus and end view. Nr. 7.

Cosmarium pseudoretusum DuRoi. var. *africanum* (Fritsch) Krieg. & Gerl. (*C. hammeri* Reinsch var. *africanum* Fritsch). Long. 25—31, lat. 19—26.5 (1.1—1.37×), ist. 7—9. Some of our plants are slightly larger than var. *africanum*, and some are shown with two pyrenoids (Fig. 69), although one pyrenoid is typical for this species. Nr. 4, 7. — Fig. 69—71, 142.

Cosmarium punctulatum Bréb. var. *seriatum* Krieger (1932, p. 183, 12: 11) forma. Long. 16.5, lat. 19, ist. 7. Our form differs from KRIEGER'S form from the Sunda in the semicells being relatively broader and more pyramidal, and in there being more space between the three median rows of granules and the intramarginal granules. Other varieties and forms of *C. punctulatum* have been figured in the literature but none of this small size. RG did not suggest a name for this plant. Nr. 7. — Fig. 97.

Cosmarium quinarium Lund. forma. Long. 31, lat. 27 (1.15×), ist. 9. A small form, apparently lacking puncta between the large central granules. Nr. 7. — Fig. 97.

Cosmarium regnellii Wille. Nr. 7.

Cosmarium speciosum Lund. Nr. 6.

Cosmarium striolatum (Näg.) Arch. var. *nordstedtii* (Möbius) Krieger (1932, p. 186, 12: 2). Long. 83—94, lat. 52—57 (1.5—1.65×), ist. 40—45; with 21—26 granules on the margin of the semicell. Nr. 5, 7. — Fig. 112, 113.

Cosmarium subauriculatum West & West (1895, p. 55, 6: 31) var. *subauriculatum*. Long. 49—52, lat. 47—53, ist. 30—35. RG also suggested »*C. monodii* Bourr.» for one of these plants, but *C. monodii* is more than twice as large, with an open sinus. Nr. 2, 7. — Fig. 56.

Cosmarium subauriculatum West & West var. *bogoriense* (Bern.) Bourrelly (in BOURRELLY & MANGUIN 1949, p. 186, 4: 48, 49). Long. 47—51, lat. 48—50, ist. 32. Although the type has three teeth at the base of each lateral margin SKUJA (1949, p. 118, 25: 7, 8) shows a form like ours with only two. In the type the wall is widely punctate or scrobiculate which RG'S sketch does not show (but the photograph does). Nr. 4, 7. — Fig. 57, 140.

Cosmarium subcostatum Nordst. var. *beckii* (Gutw.) West & West. Nr. 5.

Cosmarium subprotumidum Nordst. var. *gregori* (Roy & Biss.) West & West. Nr. 7.

Cosmarium subspeciosum Nordst. var. *validius* Nordst. Nr. 7.

Cosmarium subtumidum Nordst. var. *borgei* Krieg. & Gerl. forma. Long. 28—30, lat. 22.5—24 (1.24—1.25×), ist. 7—8.5, crass. c. 17. This plant seems closest to var. *borgei* in its rounded apex and rather thick end view, but it resembles the type in its more pyramidal semicells. RG did not suggest a name. Nr. 4, 6. — Fig. 75, 76.

Cosmarium subtumidum Nordst. var. *minor* Ström (1920, p. 136, 2: 4a, 4b, 14). Long. 17, lat. 12.5 (1.36×), ist. 5. Our plant is relatively a little longer than STRÖM's and a little smaller, but otherwise fits quite well. HC does not agree with KRIEGER & GERLOFF (1962, p. 25) in their placing of this under *C. depressum* (Näg.) Lund. var. *planctonicum* Reverdin. The latter is relatively much shorter, with a truncate apex. RG suggested »*C. granatum* Bréb. forma» and *C. laeve* Rabenh.» Nr. 7. — Fig. 77.

Cosmarium taxichondrum Lund. var. *haynaldii* (Schaarschm.) Raciborski (1890, p. 88, I: 15) forma. Long. 26, lat. 27, ist. 9, crass. c. 15. Our form differs in the more dentate lateral margin. Except for the presence of three (not two) larger verrucae in the upper middle face of the semicell, and the closed isthmus, our form closely resembles var. *ambadiense* Grönbl. & Scott in GRÖNBLAD, PROUSE & SCOTT (1958, p. 33, 14: 191—193) which BOURRELLY (1961, p. 345) says should belong to the species *C. pseudotaxichondrum* Nordst. (1877, p. 20, 2: 5). LIND (1967, p. 367, 6: 10, 10a) shows a form very like ours, but smaller, and with the warts more pointed. Nr. 7. — Fig. 93.

Cosmarium taxichondrum Lund. var. *ocellatum* Schmidle (1898, p. 29, 2: 5, 19) forma. Long. 45, lat. 37 (1.2×) ist. 10. A larger form with fewer verrucae and puncta. For this plant RG said »cf. *C. wellheimii* Schmidle 1898, 2: 25», but HC thinks that because of the shape of the semicell it resembles more closely *C. taxichondrum* var. *ocellatum*. It is possible that some granules and ocelli were obscured by the chloroplast. However, HC agrees with SCHMIDLE (1898, p. 30) that this probably should be a separate species rather than a variety of *C. taxichondrum*. Nr. 7. — Fig. 94.

Cosmarium tenue Arch. Nr. 2.

Cosmarium trachypleurum Lund. var. *spinosum* West & West (1895, p. 66, 7: 17) »forma 1». Long. 42—46, lat. 42—44, ist. 13—14. A form with 9 central granules, with puncta between them, and 7—8 sharp granules on each margin. Nr. 7. — Fig. 95.

Cosmarium trachypleurum Lund. var. *spinosum* West & West »forma 2». Long. 42, lat. ssp 38, ist. 15. Differs in having the face of the semicell ornamented with sharp granules, uniform in size and rather evenly distributed in about 10 vertical and 5 horizontal rows. In addition there is one larger supraisthmial granule. WEST's variety, as well as typical *C. trachypleurum*, have normally a central ornamentation of larger flat granules. However, this was RG's choice, and SCOTT & PRESCOTT (1958, p. 52, 13: 12) and THOMASSON (1960, p. 18, 7: 24) show forms somewhat like ours. There seems to be no other species into which it fits better, and HC hesitates to create a new species from a single face view. Nr. 5. — Fig. 96.

Cosmarium venustum (Bréb.) Arch. var. *excavatum* (Eichl. & Gutw.) West & West forma. Long. 22, lat. 14.5 (1.5×), ist. 9. A small form with one

extra undulation on each side. RG seemed sure of this identification. HC doubts it because of the extra undulation. Except for the rounded upper angles it looks more like *Euastrum elobatum* (Lund.) Roy & Biss. SCOTT & PRESCOTT (1961, p. 26, 14: 1) named a var. *oculatum* of this species with an ocellus like ours, but the outline of their plant is quite different, being more like var. *simplex* Krieger. Without an end view a sure determination is impossible. Nr. 5. — Fig. 81.

Cosmarium venustum (Bréb.) Arch. var. *minus* (Wille) Krieg. & Gerl. Long. 21.5, lat. 15 (1.43×), ist. 4. Without an end view this cannot be identified surely. RG commented: »cf *Euastrum dubium* v. *tritum* West & West ?/ *Cosmarium*». To HC it has more the appearance of a *Cosmarium* than a *Euastrum* and seems in face view very like *C. cambricum* Cooke & Wills f. *minor* Turner (1892, p. 70, 10: 15) which KRIEGER & GERLOFF (1965, p. 201) include under *C. venustum* var. *minus*. Nr. 5. — Fig. 82.

Cosmarium vitiosum Scott & Grönblad (1957, p. 24, 9: 1—3). Long. 32, lat. 27, ist. 9. Out plant is a little smaller than the type, but otherwise it agrees very well. Nr. 7. — Fig. 99.

Cosmarium spp. Nr. 3, 5, 7.

Xanthidium concinnum Arch. var. *boldtianum* W. West forma. Long. 10.8, lat. ssp 11.5, csp 16, ist. 3.7. Our plant falls about midway between the species and var. *boldtianum*. It differs from the species in its larger size and longer lateral angles; it differs from var. *boldtianum* in the presence of a single minute spine at the apical angle. Nr. 7. — Fig. 115.

Arthrodesmus ralfsii W. West var. *brebissonii* (Racib.) G. M. Smith (1924, p. 130, 85: 14—16). Long. 33, lat. ssp. 30—35, csp 72—76, ist. 7—8, spines 14—26. Out plants are a little large. This is RG's name, but he added »*Staurodesmus glaber* var. *limnophilus* sec. TEILING» (1967, p. 559, 14: 7—14), which seems also correct for the followers of TEILING, of which HC is one.

Staurastrum alternans Bréb. Long. 29, lat. 32—33, ist. 11.5. Nr. 7. — Fig. 118.

Staurastrum crenulatum (Näg.) Delp. »forma KRIEGER, 1932» (RG). Nr. 7.

Staurastrum cyclacanthum West & West (1902, p. 189, 22: 18) var. *africanum* Croasd. var. nova Nr. 7. — Fig. 132 (Holotype).

Varietas a specie differens ut verrucae anuli apicalis magis irregulares elaborataeque, magna ex parte emarginatae, binae ternaeve; necnon verrucae ad originem processuum parvae emarginataeque, a vertice visae marginales; necnon nodus ad basim semicellulae ordinem interruptum 6 spinarum brevium, non granulorum, ab isthmo visae aspectu propriae; omni pari spinarum contra corpus non processum semicellulae late disposito, fert; necnon paucae spinae granulave infra omnem processum adsunt; necnon verrucae apicales supra processum non extendunt; postrema processus relative breviores, cellula 1.5 non 1.75 latiore quam longa.

A variety differing from the species in that the verrucae of the apical ring are more irregular and elaborate, mostly emarginate, in units of 2 or 3; and the verrucae at the origin of the processes are small, emarginate, marginal in vertical view, and the node at the base of the semicell bears an interrupted series of 6 short spines, not granules, which gives a unique appearance in the isthmial view, each widely spaced pair of spines being opposite the body (not process) of the semicell; there are also a few spines or granules below each process; and the apical verrucae do not extend out onto the process; and finally, the processes are relatively shorter, the cell being 1.5 not 1.75 times as broad as long. The closest relative is probably *S. floriferum* West & West (1896, p. 267, 18: 1) from which it differs in its converging processes which are spinose also on the lower surface and end in 4 (not 3) spines, and have marginal verrucae at their origin. For discussion of these species see THOMAS-SON (1960, p. 26).

Staurastrum dejectum Bréb. var. *patens* Nordst. Nr. 7.

Staurastrum dickiei Ralfs var. *rhomboideum* West & West. Long. 25, lat. ssp 27, csp 35, ist. 8. A little small but very characteristic in shape, with the straight lower margins and with the evenly convex apical margin of the semicell merging into the converging spines. Nr. 7. — Fig. 116.

Staurastrum dilatatum Ehrbg var. *dilatatum*. Nr. 5.

Staurastrum dilatatum Ehrbg var. *hibernicum* West & West Nr. 6.

Staurastrum diptilium Nordst. var. *mossambicum* (Schmidle) Grönbl. & Scott in GRÖNBLAD, PROWSE & SCOTT (1958, p. 39, 20: 290—292). Long. ssp 11, csp 19, lat. ssp 13, csp 19, ist. 8. This is RG's determination. He adds that his figure is poor and that his plant is tilted. Nr. 5, 6. — Fig. 122.

Staurastrum disputatum West & West var. *sinense* (Lütkem.) West & West. Nr. 7.

Staurastrum floriferum West & West (1896, p. 267, 18: 1). Nr. 2.

Staurastrum floriferum West & West forma. Nr. 7.

Staurastrum furcatum (Ehrbg) Bréb. forma *richae* Croasd. forma nova (including *S. furcatum* forma in Rich (1932, p. 175, 11: A—C)). Nr. 7. — Fig. 133 (Holotype).

Omnes processus crassi atque late bifurcati; necnon una spina deorsum versa supra isthmum sub omnem processum lateralem adest. Long. ssp 22—28, csp 42, lat. ssp 18—23, csp 26—40, ist. 8—13.

Processes all stout and widely bifurcate, with one additional downwardly directed spine above the isthmus under each lateral process. Our plant is so similar to the one shown by RICH (l. c.) from S. Africa, that it seems that the two could best be united into one form. Two other forms are known showing this extra spine: one from Newfoundland »*S. furcatum* var.?» (TAYLOR 1935, p. 191, 36: 11) with slender not wholly hollow processes, with a single

spine; and one from Japan: *S. furcatum* var. *iyaense* Hinode (1962, p. 35, 3: 98, 99) with two spines.

Staurastrum gracile Ralfs («small» RG). Nr. 5.

Staurastrum gracile Ralfs forma (ad var. *nanum* Wille accedens). Long 28, lat. csp 38, ist. 8. For this plant RG suggested «*S. margaritaceum* (Ehrbg) Menegh. cf. GRÖNBLAD (1956, p. 32, fig. 145—147, 152—159)». HC does not believe that this African form, and also most of RG's 1956 forms belong to *S. margaritaceum* because the cells are considerable broader than long, the processes are too slender, and the body of the cell is apparently unornamented. *S. gracile* is a much over-loaded species, but still seems more appropriate for this form than *S. margaritaceum*. Nr. 1. — Fig. 131.

Staurastrum hexacerum (Ehrbg) Wittr. Nr. 5.

Staurastrum inflexum Bréb. Nr. 3.

Staurastrum laeve Ralfs. Nr. 7.

Staurastrum laeve Ralfs forma. Long. ssp 20, csp 23, lat. ssp 15, csp 24, ist. 9.5. A form differing in the semicells having more erect sides and being provided with a supraisthmial spine; in vertical view it differs in the body wall being convex between the paired spines. Unfortunately in RG's sketches the face- and vertical views do not wholly agree. He called this plant «*S. sp.* ad *S. contectum* Turner». It might also be compared to *S. engleri* Schmidle (1898, p. 56, 4: 13) from Africa, which could probably be included in *S. laeve*. Nr. 7 — Fig. 121.

Staurastrum lapponicum Grönblad (1927, p. 29, 2: 106, 107). Long. 31, lat. 33, ist. 12. Nr. 5. — Fig. 119.

Staurastrum leptocladum Nordst. var. *cornutum* Wille. Nr. 5, 7.

Staurastrum manfeldtii Delp. Long. 38, lat. cpr 60, ist. 9. RG's figure is not very complete, and he did not attempt to name this plant, but the combination of the body walls of the semicell being parallel in the lower portion, with a cluster of granules below each process, and the processes being relatively short, horizontal and strongly ornamented points to this species. Nr. 4, — Fig. 125.

Staurastrum mucronatum Ralfs. Nr. 7.

Staurastrum orbiculare Ralfs var. *depressum* Roy & Biss. Nr. 5, 7.

Staurastrum orbiculare Ralfs var. *hibernicum* West & West. Nr. 7.

Staurastrum polymorphum Bréb. var. *polymorphum*. Long. 24—26, lat. cpr 27—36, ist. 9—10. RG suggested for one plant (Fig. 127) «*S. asterias* Nygaard» (1926, p. 232, 6: 62), from which it differs, however, in the lack of the characteristic verrucae at the origin of the processes, in the presence of spines at the ends of the processes, and in the smaller size. He also said «cf *S. hexacerum* (Ehrbg) Wittr. f. *pentagona* Krieger (1932, p. 201, 16: 18)» from which it differs in the face view which in our plant shows some slight differentiation

into body and processes. For the plant figured in fig. 128 he suggested »*S. margaritaceum* (Ehrbg) Menegh.?»), but HC believes that our plant does not belong here because of its greater relative breadth. Nr. 4, 7. — Fig. 127, 128.

Staurastrum polymorphum Breb. var. *cinctum* Messikommer (1963, p. 67, 2: 39). Long. 29—31, lat. cpr 36—42, ist. 10—11, 6—7 angular in vertical view. For the plant shown in Fig. 130 RG suggested »*S. asterias* Nygaard ex KRIEGER (1932, p. 193)» and he added: »cf also *S. subgemmaulatum* West & West 1895, p. 76». For the plant shown in Fig. 129 he suggested »*S. asterias* Nygaard (1926, p. 232)». HC believes that these plants are not *S. asterias* because they lack the diagnostic features of the verrucae at the origin of the processes and the lack of terminal spines. Also our plants show a supraisthmal circle of granules, not present in NYGGARD'S plant. From *S. subgemmaulatum* our plant differs also in the spinose ends of the processes and in the presence of a circle of granules above the isthmus. In appearance it is closest to MESSIKOMMER'S fig. (l.c.) but it is somewhat larger, with more processes. Nr. 5, 7. — Fig. 129, 130.

Staurastrum pseudotetracerum (Nordst.) West & West. Long. spr 17—19, lat. spr 16—17, cpr 23—28, ist. 8. Nr. 7. — Fig. 123, 124.

Staurastrum quadrangulare Bréb. var. *contectum* (Turn.) Grönblad (1945, p. 29, 12: 255). Long. 22, lat. ssp 22, csp 30. ist. 8. Our plant seems closest to *S. quadrangulare* var. *armatum* West & West (1896, p. 257, 16: 18) which THOMASSON (1963, p. 118) fittingly suggests should be included in this variety. Nr. 7. — Fig. 120.

Staurastrum quadricornutum Roy & Biss. Nr. 1, 6. 7.

Staurastrum renardii Reinsch. Nr. 6.

Staurastrum rugulosum Bréb. Nr. 6.

Staurastrum setigerum Cleve. Nr. 7.

Staurastrum subavicularia West & West. Nr. 7.

Staurastrum tetracerum Ralfs. Nr. 5.

Staurastrum tohopekaligense Wolle var. *trifurcatum* West & West. Nr. 7.

Staurastrum tumidum Breb. var. *bipapillatum* Croasd. var. nova. Nr. 7. — Fig. 117 (Holotype).

Varietas a specie differens ut multo minor, et papillae ad omnem angulum non singulae sed binae. Long. 70, lat. ssp 60, csp 64, ist. 39, semicellula a vertice visa triangularis.

Differing from the type in being much smaller and in having paired (not single) papillae at each angle. RG suggested »*S. prainii* West & West» (1907, p. 212, 16: 10), and the size is closer, but its shape is quite different, with its narrow isthmus and linear sinus.

Staurastrum sp. Long. 26, lat. cpr 30—34, ist. 8. Our plant is probably the same as *S. disputatum* West & West var. *annulatum* Rich (1939, p. 12, 3: A, B), which, however, HC feels is not a *S. disputatum* because the processes

are too distinct, and are truncate with small apical spines, and also there are apical verrucae. Perhaps a separate species could be made out of these, but RICH does not give dimensions and RG's figure is not clear in all its details. Nr. 7. — Fig. 126.

Sphaerosozma granulatum Roy & Biss. Nr. 7.

Onychonema filiforme (Ehrbg) Roy & Biss. Nr. 7. — Fig. 134.

Onychonema laeve Nordst. var. *laeve*. Nr. 5.

Onychonema laeve Nordst. var. *micracanthum* Nordst. Nr. 7.

Spondylosium planum (Wolle) West & West. Nr. 5.

Hyalotheca dissiliens (Sm.) Bréb. var. *dissiliens* »forma minor» RG (lat. 19). Nr. 7.

Hyalotheca dissiliens (Sm.) Bréb. var. *hians* Wolle. Nr. 7.

Hyalotheca dissiliens (Sm.) Bréb. var. *tatica* Racib. (»lat. 18» RG). Nr. 7.

Hyalotheca mucosa (Mert.) Ehrbg (»minor» RG). Nr. 5.

Desmidium baileyi (Ralfs) Nordstedt (1880, p. 4). Nr. 7.

Desmidium coarctatum Nordst. Nr. 7.

Other Algae

Ankistrodesmus falcatus (Corda) Ralfs — Nr. 1, 2.

Bulbochaete sp. — Nr. 7.

Chroococcus sp. — Nr. 7.

Coelastrum cambricum Arch. — Nr. 7.

Coelastrum microporum Näg. — Nr. 5.

Kirchneriella lunaris (Kirchn.) Möb. — Nr. 7.

Mougeotia sp. — Nr. 7.

Nephrocytium agardhianum Näg. — Nr. 7.

Oedogonium sp. — Nr. 7.

Oocystis solitaria Wittr. — Nr. 7.

Pediastrum boryanum (Turp.) Menegh. — Nr. 5, 7.

Pediastrum simplex Meyen. — Nr. 7.

Pediastrum tetras (Ehrbg) Ralfs. — Nr. 7.

Scenedesmus acutiformis Schroeder. — Nr. 1, 2.

Scenedesmus arcuatus Lemm. — Nr. 7.

Scenedesmus arcuatus Lemm. var. *platydiscus* G. M. Smith. — Nr. 7.

Scenedesmus armatus (Chod.) G. M. Smith. — Nr. 5, 7.

Scenedesmus brasiliensis Bohlin. — Nr. 2, 5, 7.

Scenedesmus dimorphus (Turp.) Kütz. — Nr. 5, 7.

Scenedesmus quadricauda (Turp.) Bréb. — Nr. 1, 4.

Sorastrum americanum (Bohlin) Schmidle. — Nr. 7.

- Spirogyra* sp. — Nr. 7.
Trachelomonas australica (Playf.) Defl. — Nr. 7.
Trachelomonas bacillifera Playf. var. *ovalis* Playf. — Nr. 7.
Trachelomonas cylindrica Ehrbg. — Nr. 7.
Trachelomonas lemmermannii Wolosz. — Nr. 7.
Trachelomonas sydneyensis Playf. — Nr. 7.
Trachelomonas volvocina Ehrbg. — Nr. 7.

Literature

- BEHRE, K. 1956: Die Süßwasseralgen der Wallacea-Expedition. — Arch. Hydrobiol. (Suppl.) 23: 1—104, 10 pl.
 BØRGESSEN, F. 1890: Desmidiaceae. — In: WARMING, E., Symbolae ad floram Brasiliae centralis cognoscendam. Part. 34. Videnskabelige Meddel. Naturhist. Foren. Kjøbenhavn 1890: 929—958, 4 pl.
 BORGE, O. 1909: Nordamerikanische Süßwasseralgen. — Arkiv Bot. 8(13): 1—29, 1 pl.
 — 1911: Die Süßwasseralgenflora Spitzbergens. — Videnskapselsk. Skrifter (I. Mat.-Naturv. Kl.) 1911(11): 1—39, 1 pl.
 BOURRELLY, P. 1957: Algues d'eau douce du Soudan Français, région du Macina (A.O.F.). — Bull. I.F.A.N. (A)19: 1047—1102, 21 pl.
 — 1961: Algues d'eau douce de la République de Côte d'Ivoire. — Bull. I.F.A.N. (A) 23: 283—374, 24 pl.
 BOURRELLY, P. & MANGUIN, E. 1949: Contribution a l'Étude de la Flore Algale d'eau douce à Madagascar: le Lac Tsimbazaza. — Mem. Inst. Sci. Madagascar (B) 2(2): 161—190, 7 pl.
 — 1952: Algues d'eau douce de la Guadeloupe. — 282 pp., 20 pl. Sedes, Paris.
 CHOLNOKY, B. J. 1954: Diatomeen und einige andere Algen aus dem »de Hoek«-Reservat in Nord-Transvaal. — Bot. Not. 1954: 269—296, 106 fig.
 COMPÈRE, P. 1967: Algues du Sahara et de la région du lac Tchad. — Bull. Jardin Bot. National Belgique 37: 109—288, 20 pl.
 CROASDALE, H. 1965: Desmids of Devon Is., N.W.T., Canada. — Trans. Amer. Microsc. Soc. 84: 301—335, 8 pl.
 FRITSCH, F. E. 1907: A general consideration of the subaerial and freshwater algal flora of Ceylon. A contribution to the study of tropical algal ecology. Part 1. — Subaerial algae of the inland fresh-waters. — Proc. R. Soc. (London) (B) 79: 197—254, 5 fig.
 FRITSCH, F. E. & RICH, F. 1937: Contributions to our Knowledge of the Freshwater Algae of Africa. 13. Algae from the Belfast Pan, Transvaal. — Trans. R. Soc. S. Africa 25: 153—228, 31 fig.
 GRÖNBLAD, R. 1921: New desmids from Finland and Northern Russia (with critical remarks on some known species.) — Acta Soc. Fauna Flora Fennica 49(7): 1—78 7 pl.
 — 1927: Beitrag zur Kenntnis der Desmidiaceen Schlesiens. — Soc. Sci. Fenn., Comment. Biol. 2(5): 1—39, 3 pl.
 — 1945: De Algis Brasiliensibus, praecipue Desmidiaceis, in regione inferiore fluminis Amazonae a Professore August Ginzberger (Wien) Anno MCMXXVII collectis. — Acta Soc. Sci. Fennicae (Nov. Ser. B) 2(6): 1—43, 16 pl.
 — 1956: Desmids from the United States, collected in 1947—1959 by Dr. Hannah Croasdale and Dr. Edwin T. Moul. — Soc. Sci. Fenn., Comment. Biol. 15(12): 1—38, 12 pl.
 — 1960: Contributions to the Knowledge of the Freshwater Algae of Italy. — Soc. Sci. Fenn., Comment. Biol. 22(4): 1—85, 14 pl.
 GRÖNBLAD, R., PROWSE, G. A. & SCOTT, A. M. 1958: Sudanese Desmids. — Acta Bot. Fennica 58: 1—82, 29 pl.
 GRÖNBLAD, R., SCOTT, A. M. & CROASDALE, H. 1964: Desmids from Uganda and Lake Victoria, collected by Dr. Edna M. Lind. — Acta Bot. Fennica 66: 1—57, 12 pl.

- HINODE, T. 1962: Desmids from the Iya District, Tokushima Prefecture. — *Hikobia* 3: 25—37, 3 pl.
- IRÉNÉE-MARIE, F. 1956: Les Cosmarium de la Région des Trois-Rivières. — *Hydrobiologia* 8: 79—154, 3 pl.
- KRIEGER, W. 1932: Die Desmidiaceen der Deutschen Limnologischen Sunda-Expedition. — *Arch. Hydrobiol. (Suppl.)* 11: 129—230, 24 pl.
- »— 1935, 1937: Die Desmidiaceen Europas mit Berücksichtigung der aussereuropäischen Arten. — In: Rabenhorst's Kryptogamenflora von Deutschland, Österreich und der Schweiz 13(1:1), Lief. 2: 225—376, 28 pl. (1935); Lief. 3—4: 377—712, 60 pl. (1937).
- KRIEGER, W. & GERLOFF, J. 1962, 1965, 1969: Die Gattung *Cosmarium*. — Lief. 1: 1—112, 23 pl. (1962); Lief. 2: 113—240, 20 pl. (1965); Lief. 3—4: 241—410, 29 pl. (1969). Cramer, Weinheim, Lehre.
- LIND, E. 1967: Some East African Desmids. — *Nova Hedwigia* 13: 361—387, 13 pl.
- LUNDELL, P. M. 1871: De Desmidiaceis quae in Suecia inventae sunt observationes criticae. — *Nova Acta R. Soc. Sci. Upsaliensis* (3) 8: 1—100, 5 pl.
- MESSIKOMMER, E. 1963: Beitrag zur Kenntnis der Algenverbreitung in der Westschweiz. — *Vierteljahrsschr. Naturf. Ges. Zürich* 108: 37—69, 3 pl.
- NORDSTEDT, O. 1877: Nonnullae algae aquae dulcis brasiliensis. Öfersigt Kungl. Vetenskaps-Akad. Förhandl. 1877 (3): 15—28, 1 pl., 6 textfig.
- »— 1880: De Algis et Characeis 1. De algis nonnullis, praecipue Desmidieis, inter *Utricularias* Musei Lugduno-Batavi. — *Lunds Univ. Årsskr.* 16: 1—13, 1 pl.
- NYGAARD, G. 1926: Plankton from two lakes of the Malayan Region. — *Videnskabelige Meddel. Dansk Naturhist. Foren. København* 82: 197—240, 8 pl.
- PRINTZ, H. 1915: Beiträge zur Kenntnis der Chlorophyceen und ihrer Verbreitung in Norwegen. — *Kongl. Norske Videnskabers Selsk. Skrifter* 1915 (2): 1—76, 4 pl.
- RACIBORSKI, M. 1885: De nonnullis Desmidiaceis novis vel minus cognitis, quae in Polonia inventae sunt. — *Pamiętnik Wydz. III Akad. Umiej. w. Krakowie* 10: 57—100, 5 pl.
- »— 1889: Desmidyje nowe (Desmidiaceae novae). — *Pamiętnik Wydz. III Akad. Umiej. w. Krakowie* 17: 73—113, 3 pl.
- »— 1892: Desmidya zebrane przez Dr. E. CIASTONIA w prodózy na okolo ziemi. — *Rosprawy Wydział. mat.-przyr. Akad. Umiej. Krakow* 22: 361—392, 2 pl.
- RALFS, J. 1848: The British Desmidieae. — XXII + 226 pp., 35 pl. London.
- RICH, G. 1932: Contributions to our knowledge of the Freshwater Algae of Africa 10. Phytoplankton from South African Pans and Vleis. — *Trans. R. Soc. S. Africa* 20: 149—188, 20 fig.
- »— 1939: Some desmids from the Transvaal. — *Trans. R. Soc. S. Africa* 27(1): 1—15, 3 fig.
- SCHMIDLE, W. 1898: Die von Professor Dr Volkens und Dr. Stuhlmann in Ost-Afrika gesammelten Desmidiaceen. — *Engler's Bot. Jahrb.* 26: 1—59, 4 pl.
- »— 1902: Algen, insbesondere solche des Plankton, aus dem Nyassa-See und seiner Umgebung, gesammelt von Dr. Fülleborn. — *Engler's Bot. Jahrb.* 32: 56—88, 3 pl.
- SCOTT, A. M. & GRÖNBLAD, R. 1957: New and interesting desmids from the southeastern United States. — *Acta Soc. Sci. Fennicae (N. Ser. B)* 2(8): 1—62, 37 pl.
- SCOTT, A. M. & PRESCOTT, G. W. 1958: Some freshwater algae from Arnhem Land in the northern territory of Australia. — *Rec. Amer.-Austral. Sci. Exped. Arnhem Land* 3: 8—136, 29 pl.
- »— 1961: Indonesian Desmids. — *Hydrobiologia* 17: 1—132, 63 pl.
- SKUJA, H. 1949: Zur Süßwasseralgenflora Burmas. — *Nova Acta R. Soc. Sci. Upsaliensis (Ser. IV)* 14(5): 1—188, 37 pl.
- SMITH, G. M. 1924: Phytoplankton of the Inland Lakes of Wisconsin Part II. Desmidiaceae. — *Wisconsin Geol. & Nat. Hist. Survey* 57(2): 1—227, 37 pl., 17 textfig.
- STRÖM, K. M. 1920: Freshwater algae from Caucasus and Turkestan. — *Nyt. Mag. Naturvidenskaberne* 57: 129—142, 2 pl.
- »— 1926: Norwegian Mountain Algae. — *Skr. Norske Videnskabs-Akad. Oslo (I. Mat.-Nat. Kl.)* 1926(6): 1—263, 25 pl.
- TAYLOR, W. R. 1935: The fresh-water algae of Newfoundland. II. — *Papers Mich. Acad. Sci., Arts & Lett.* 20: 185—230, 17 pl.

- TEILING, E. 1967: The desmid genus *Staurodesmus*. — Arkiv. Bot. (Ser. 2) 6(11): 467—629, 31 pl.
- THOMASSON, K. 1960: Notes on the plankton of Lake Bangweulu. Part 2. — Nova Acta R. Soc. Sci. Upsaliensis (Ser IV) 17(12): 1—43, 14 fig.
- »— 1963: Araucanian Lakes. Plankton studies in North Patagonia, with notes on terrestrial vegetation. — Acta Phytogeogr. Suecica 47: 1—139, 47 fig.
- TURNER, W. B. 1892: The Fresh-water algae (principally Desmidiaceae) of East India. — Kungl. Svenska Vetenskaps-Akad. Handl. 25(5): 1—187, 23 pl.
- WEST, G. S. 1907: Report on the Freshwater Algae, including phytoplankton, of the Third Tanganyika Expedition conducted by Dr. W. A. Cunningham 1904—1905. — J. Linn. Soc. London, (Bot.) 38: 81—197, 9 pl.
- WEST, W. & WEST, G. S. 1895: A Contribution to our Knowledge of the Freshwater Algae of Madagascar. — Trans. Linn. Soc. London, 2. Ser. (Bot.) 5: 41—90, 5 pl.
- »— 1896: On some North American Desmidiaceae. — Trans. Linn. Soc. London, 2. Ser. (Bot.) 5: 229—274, 7 pl.
- »— 1902: A Contribution to the Freshwater Algae of Ceylon. — Trans. Linn. Soc. London, 2. Ser. (Bot.) 6: 123—215, 6 pl.
- »— 1907: Algae from Burma. — Ann. R. Bot. Garden Calcutta 6: 175—249, 7 pl.
- »— 1904—1911: A Monograph of the British Desmidiaceae I—IV. — Ray Society, London.
- WEST, W., WEST, G. S. & CARTER, N. 1923: A Monograph of the British Desmidiaceae V. — Ray Society, London.
- WOLLE, F. 1884: Desmids of the United States and list of American Pediastrums. — XIV + 168 pp., 53 pl. Bethlehem, Pa.

Explanation of plates

PLATE I

- Fig. 1, 2. *Closterium* sp. × 350.
3. » *venus* Kütz. var. *debeigenica* Chohn. × 625.
4. » *malinvernianum* De Not. × 100.
5. » *jenneri* Ralfs forma × 625.
6. » *lanceolatum* Kütz. var. *parvum* West & West × 625.
7. » *subulatum* (Kütz.) Bréb. × 625.
8. » *gracile* Bréb. × 625.
9. » *lunula* (Müll.) Nitzsch. var. *maximum* Borge × 50.
10. » » var. *maximum* Borge f. *crassissimum* Croasd. forma nova × 50.
11. » *spetsbergense* Borge var. *laticeps* Grönbl. f. *maius* forma nova × 100.
12. » *turgidum* Ehrbg × 350.
13. *Pleurotaenium ovatum* Nordst. var. *tumidum* (Mask.) G. S. West × 100.

PLATE II

- Fig. 14. *Euastrum sinuosum* Lenorm. × 800.
15. » *ansatum* Ralfs × 800.
16. » *praemorsum* (Nordst.) Schmidle forma × 800.
- 17, 18. » *evolutum* (Nordst.) West & West var. *glaziowii* (Börges.) West & West f. *africanum* Bourr. × 800.
- 19, 20. » » var. *integrius* West & West × 800.
- 21, 22. » *pulcherrimum* West & West var. *ornatum* Fritsch & Rich × 800.
- 23, 24. » *umbonatum* (West & West) Schmidle × 800.
25. » *elegans* (Bréb.) Kütz. var. *compactum* (Wolle) Krieg. f. *miriforme* Croasd. forma nova × 1275.
26. » *sibiricum* Boldt f. *africanum* Grönbl. & Scott × 1275.
27. » *denticulatum* (Kirchn.) Gay forma × 275.

28. *Euastrum binale* (Turp.) Ehrbg var. *juvae* Croasd. var. *nova* × 800.
 29. » *luetkemuelleri* Ducel. var. *carniolicum* (Lütkem.) Krieg. forma
 × 1275.
 30. » *attenuatum* Wolle var. *brasiliense* Grönbl. forma × 800.

PLATE III

- Fig. 31—33. *Euastrum truncatiforme* G. S. West × 800.
 34. » *divergens* Josh. var. *ornatum* (Borge) Schmidle × 800.
 35. » » var. *rhodesiense* Rich forma × 800.
 36, 37. » *hypochondrioides* West & West forma × 800.
 38, 39. » *mononcyllum* (Nordst.) Racib. var. *germanicum* Schmidle × 800.
 40. » *platycerum* Reinsch var. *obtusius* Grönbl. & Croasd. var. *nova*
 × 800.
 41. » » var. *eximium* Grönbl. & Scott forma × 800.
 41a. *Cosmarium phaseolus* Bréb. var. *minus* (Boldt) Krieg. & Gerl. × 1000.

PLATE IV

- Fig. 42. *Euastrum spinulosum* Delp. subsp. *africanum* Nordst. var. *africanum* × 800.
 43—45. » » subsp. *africanum* Nordst. var. *minus* Nordst. × 800.
 46. » » subsp. *spinulosum* var. *burmense* West & West × 800.
 47. *Micasterias decedentata* (Näg.) Arch. × 800.
 48. » *zeylanica* Fritsch forma × 800.
 49. » *pinnatifida* (Kütz.) Ralfs. var. *incudiformis* West & West forma
 × 800.
 50. *Cosmarium cucurbita* Bréb. forma × 800.
 51. » *diplosporium* (Lund.) Lütkem. × 800.
 52. » *cruciferum* De Bary × 800.

PLATE V

- Fig. 53. *Cosmarium obsoletum* (Hantzsch) Reinsch × 700.
 54. » *lundellii* Delp. var. *lundellii* forma × 700.
 55. » » var. *corruptum* (Turn.) West & West × 700.
 56. » *subauriculatum* West & West var. *subauriculatum* × 700.
 57. » » var. *bogoriense* (Bern.) Bourr. × 700.
 58. » *pachydermum* Lund. var. *pachydermum* × 700.
 59. » » var. *indicum* Iyeng. & Vimala Bai × 700.
 60. » *capense* De Toni var. *nyassae* Schmidle × 225.
 61. » » var. *nyassae* Schmidle forma × 225.
 62. » *askenasyi* Schmidle forma × 700.
 63, 64. » *medioscrobiculatum* W. West var. *inflatum* Printz × 700.
 65. » ?*monodii* Bourr. × 400.

PLATE VI

- Fig. 66. *Cosmarium contractum* Kirchn. var. *contractum* forma × 800.
 67. » ?*contractum* var. *cracoviense* Racib. × 800.
 68. » *hammeri* Reinsch var. *protuberans* West & West × 800.
 69—71. » *pseudoretusum* Ducell. var. *africanum* (Fritsch) Krieg. & Gerl.
 × 800.
 72. » *depressum* (Näg.) Lund. var. *minutum* (Heimerl) Krieg. & Gerl.
 × 800.
 73, 74. » *granatum* Bréb. × 800.
 75, 76. » *subtumidum* Nordst. var. *borgei* Krieg. & Gerl. forma × 800.
 77. » » var. *minor* Ström × 800.
 78. » *pseudonitidulum* Nordst. var. *angustissimum* Grönbl. × 800.
 79. » *platydesmium* (Nordst.) Nordst. & Schmidle × 800.
 80. » *obtusatum* Schmidle var. *undulatum* Fritsch & Rich × 800.

81. *Cosmarium ?venustum* Bréb. var. *excavatum* (Eichl. & Gutw.) West & West forma $\times 1275$.
 82. » » var. *minus* (Wille) Krieg. & Gerl. $\times 1275$.
 83. » *connatum* Bréb. var. *connatum* $\times 800$.
 84. » » var. *depressum* Irénée-Marie $\times 800$.
 85. » *angulosum* Bréb. $\times 1275$.
 86. » *pseudocconnatum* Nordst. $\times 800$.
 87. » *bituberculatum* Fritsch & Rich $\times 800$.
 88. » *difficile* Lütkem. var. *sublaeve* Lütkem. forma $\times 800$.
 89. » *exiguum* Arch. $\times 1275$.
 90. » *laeve* Rabenh. $\times 1275$.

PLATE VII

- Fig. 91, 92. *Cosmarium beatum* West & West forma $\times 800$.
 93. » *taxichondrum* Lund. var. *haynaldii* (Schaarschm.) Racib. forma $\times 800$.
 94. » » var. *ocellatum* Schmidle forma $\times 800$.
 95. » *trachypleurum* Lund. var. *spinosum* West & West »forma 1» $\times 800$
 96. » » var. *spinosum* West & West »forma 2» $\times 800$.
 97. » *punctulatum* Bréb. var. *seriatum* Krieg. forma $\times 1275$.
 98. » *quinarium* Lund. forma $\times 800$.
 99. » *vitiosum* Grönbl. & Scott $\times 800$.
 100. » *kjellmanii* Wille var. *ornatum* Wille $\times 1275$.
 101. » *binum* Nordst. $\times 1275$.
 102. » » forma $\times 1275$.
 103, 104. » *decoratum* West & West forma $\times 275$, $\times 400$.
 105—107. » *hellbergii* Grönbl. & Croasd. sp. nova $\times 800$.

PLATE VIII

- Fig. 108. *Cosmarium controversum* W. West $\times 800$.
 109. » *pseudobroomei* Wille var. *pseudobroomei* $\times 800$.
 110. » » var. *compressum* G. S. West $\times 800$.
 111. » *margaritatum* (Lund.) Roy & Biss. $\times 800$.
 112, 113. » *striolatum* (Näg.) Arch. var. *nordstedtii* (Möbius) Krieg. $\times 800$, $\times 400$.
 114. *Arthrodesmus ralfsii* W. West var. *brebissonii* (Racib.) G. M. Smith $\times 800$.
 115. *Xanthidium concinnum* Arch. var. *boldtianum* W. West forma $\times 1275$.
 116. *Staurastrum dickiei* Ralfs var. *rhomboideum* West & West $\times 800$.
 117. » *tumidum* Bréb. var. *bipapillatum* Croasd. var. nova $\times 800$.
 118. » *alternans* Bréb. $\times 800$.
 119. » *lapponicum* Grönbl. $\times 800$.

PLATE IX

- Fig. 120. *Staurastrum quadrangulare* Bréb. var. *contectum* (Turn.) Grönbl. $\times 1000$.
 121. » *laeve* Ralfs forma $\times 1000$.
 122. » *dipitium* Nordst. var. *mossambicum* (Schmidle) Grönbl. & Scott $\times 1000$.
 123, 124. » *pseudotetracerum* (Nordst.) West & West $\times 1000$.
 125. » *manfeldtii* Delp. $\times 800$.
 126. » sp. $\times 800$.
 127, 128. » *polymorphum* Bréb. var. *polymorphum* $\times 800$.
 129, 130. » » var. *cinctum* Messik. $\times 800$.
 131. » *gracile* Ralfs forma $\times 800$.
 132. » *cyclacanthum* West & West var. *africanum* Croasd. var. nova $\times 800$.
 133. » *furcatum* (Ehrbg) Bréb. f. *richae* Croasd. forma nova $\times 800$.
 134. *Onychonema filiforme* (Ehrbg) Roy & Biss. $\times 1400$.

PLATE X

- Fig. 135. *Euastrum platycerum* Reinsch var. *obtusius* Grönbl. & Croasd. var. nova $\times 425$.
136. » *divergens* Josh. var. *ornatum* (Borge) Schmidle $\times 375$.
137. » *spinulosum* Delp. subsp. *africanum* Nordst. var. *africanum* $\times 450$.
138. » » subsp. *africanum* Nordst. var. *minus* Nordst. $\times 375$.
139. *Cosmarium askenasyi* Schmidle forma $\times 100$.
140. » *subauriculatum* West & West var. *bogoriense* (Bern.) Bourr. $\times 425$.
141. » ?*monodii* Bourr. $\times 450$.
142. » *pseudoretusum* Ducl. var. *africanum* (Fritsch) Krieg. & Gerl. $\times 450$.
143. » *platydesmium* (Nordst.) Nordst. & Schmidle $\times 425$.
144. » *connatum* Bréb. var. *depressum* Irénée-Marie $\times 775$.
145. » *kjellmanii* Wille var. *ornatum* Wille $\times 450$.
146. » *pseudobroomei* Wille var. *pseudobroomei* $\times 775$.

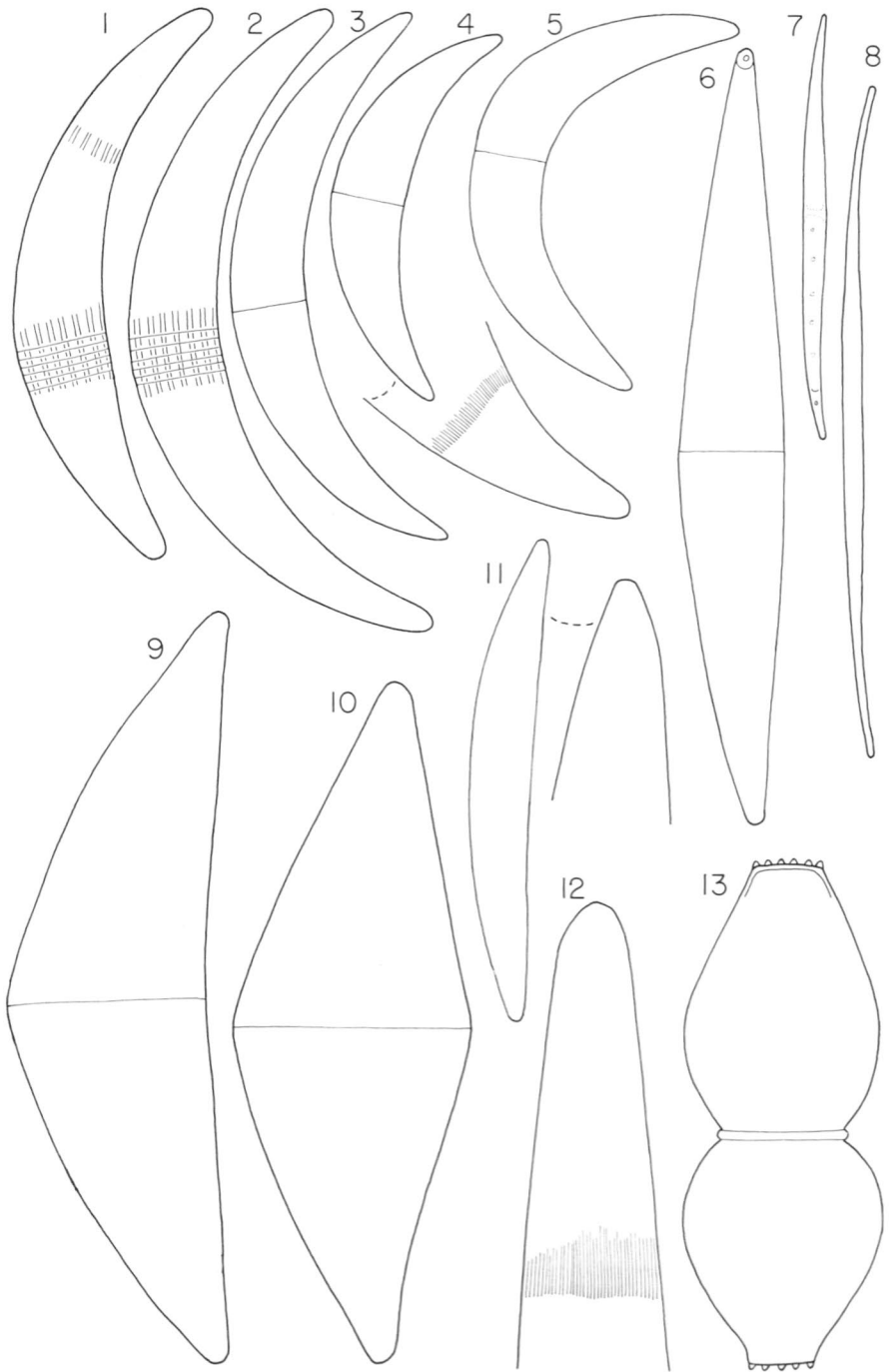
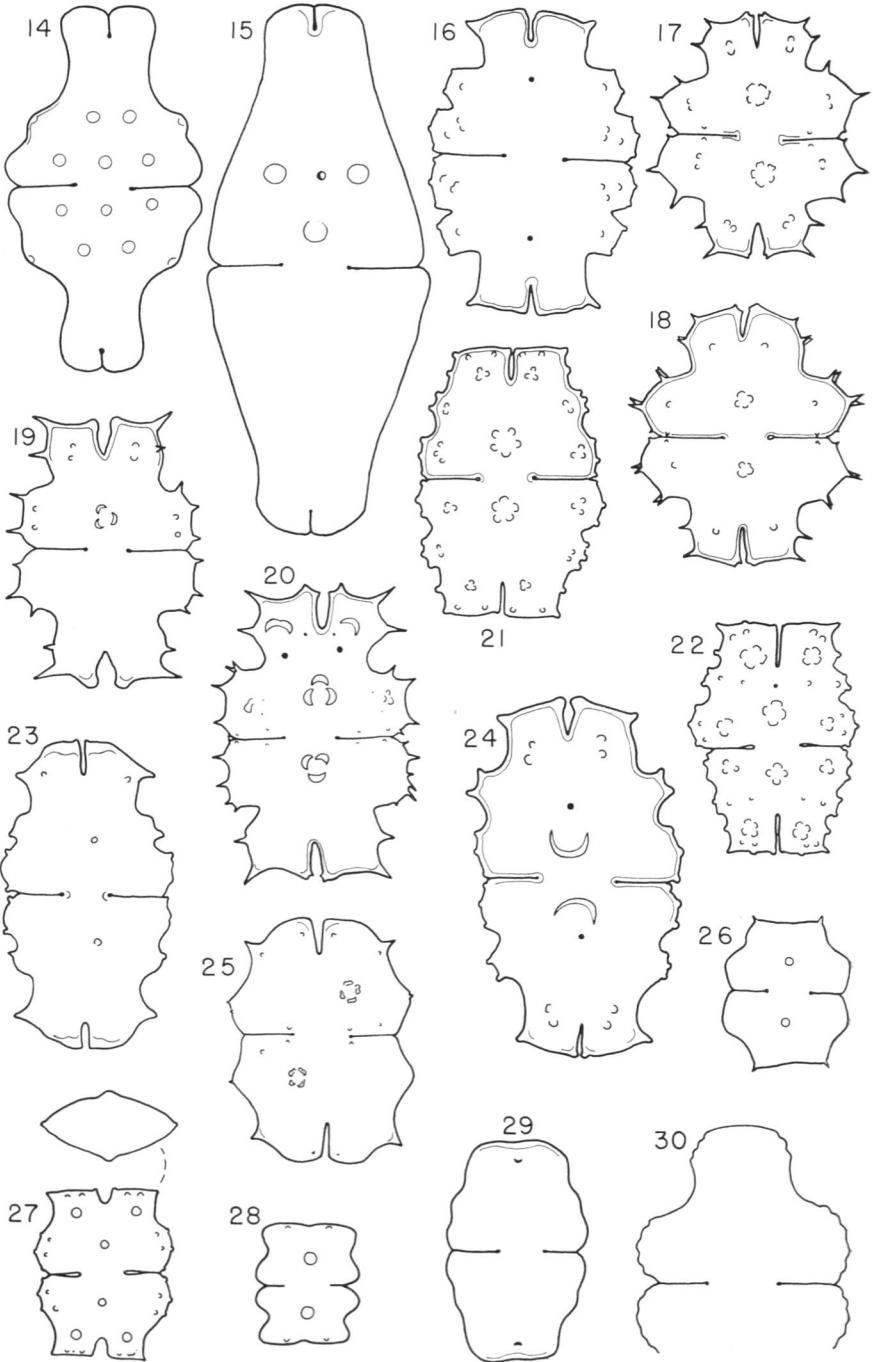


PLATE II



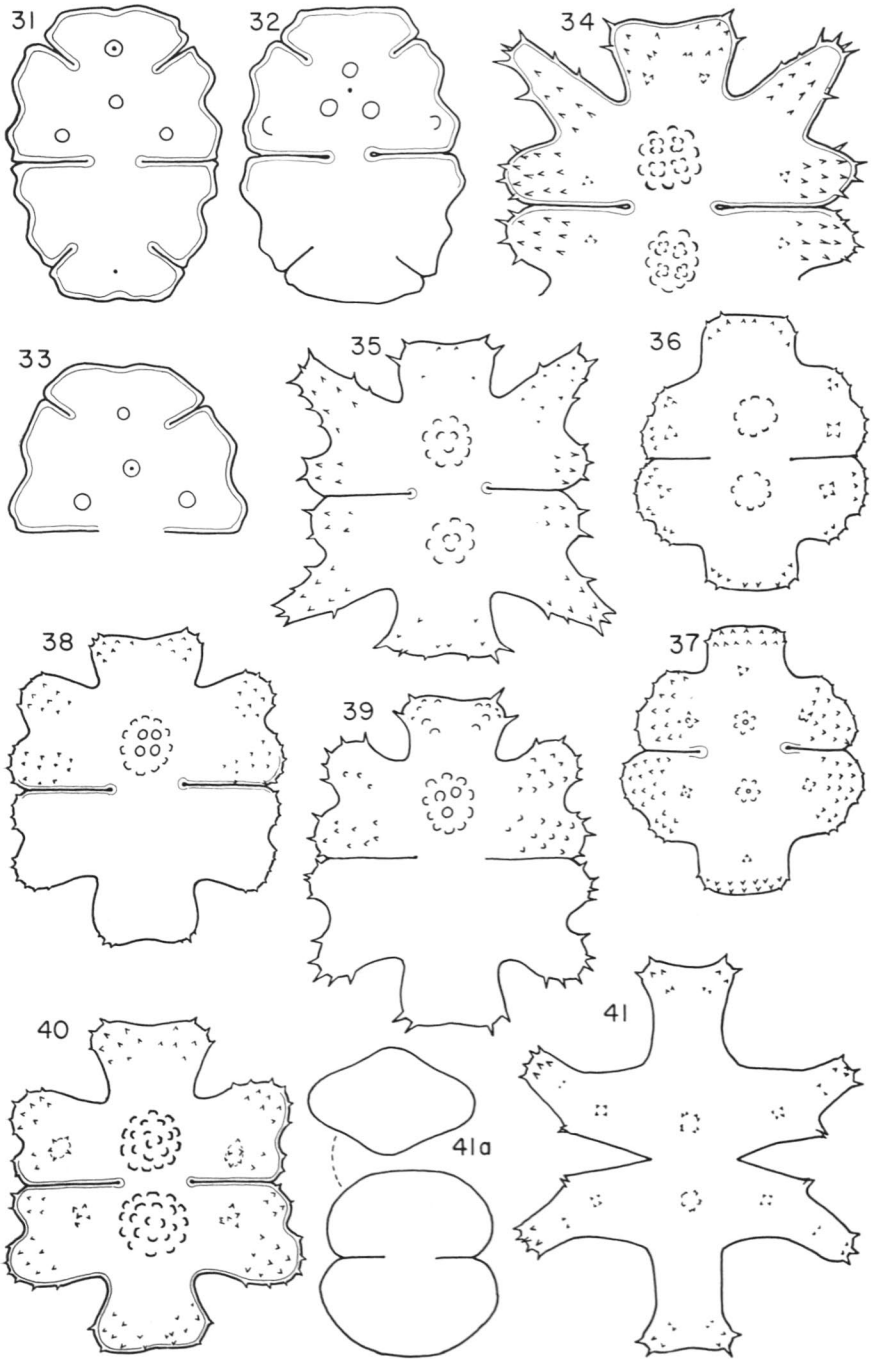
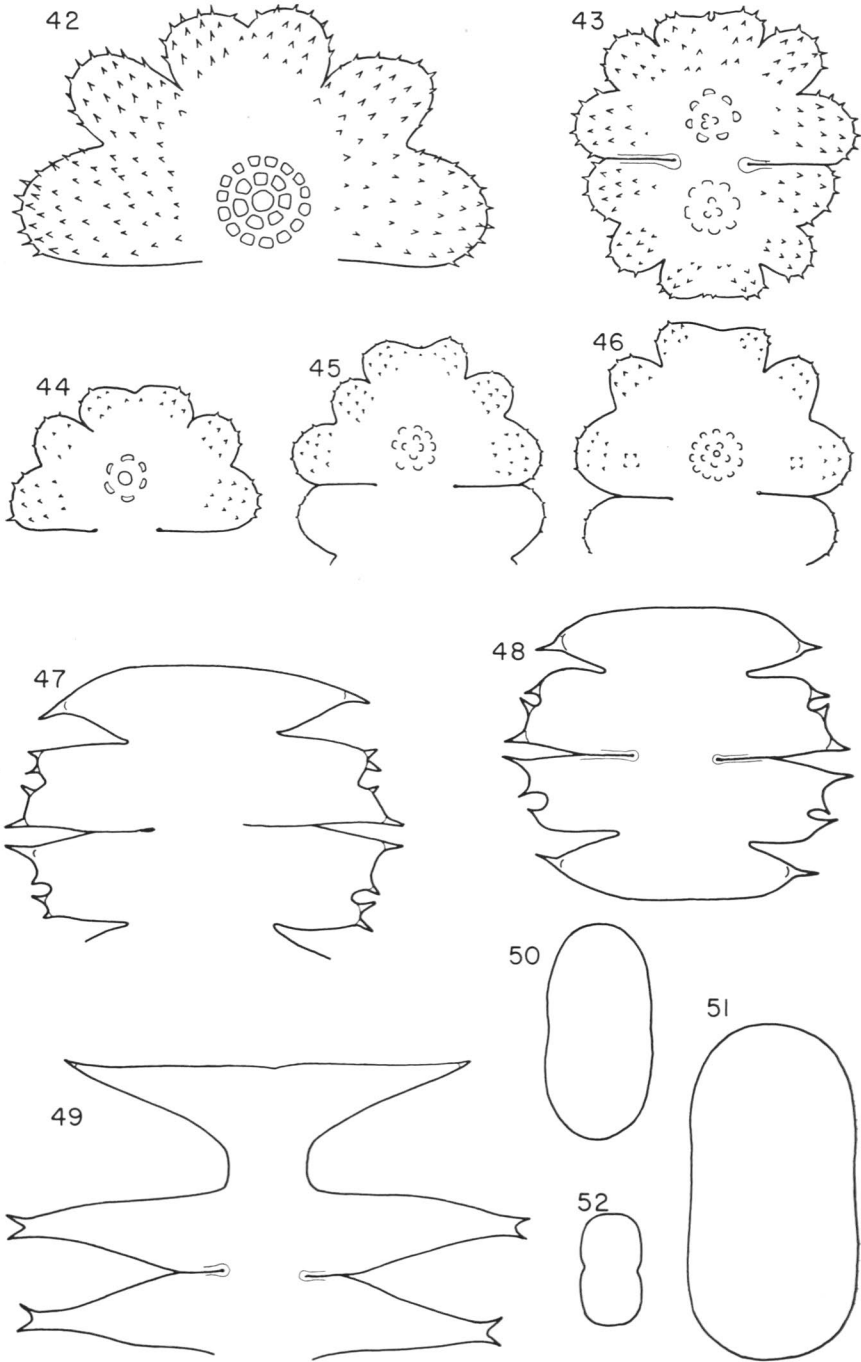


PLATE IV



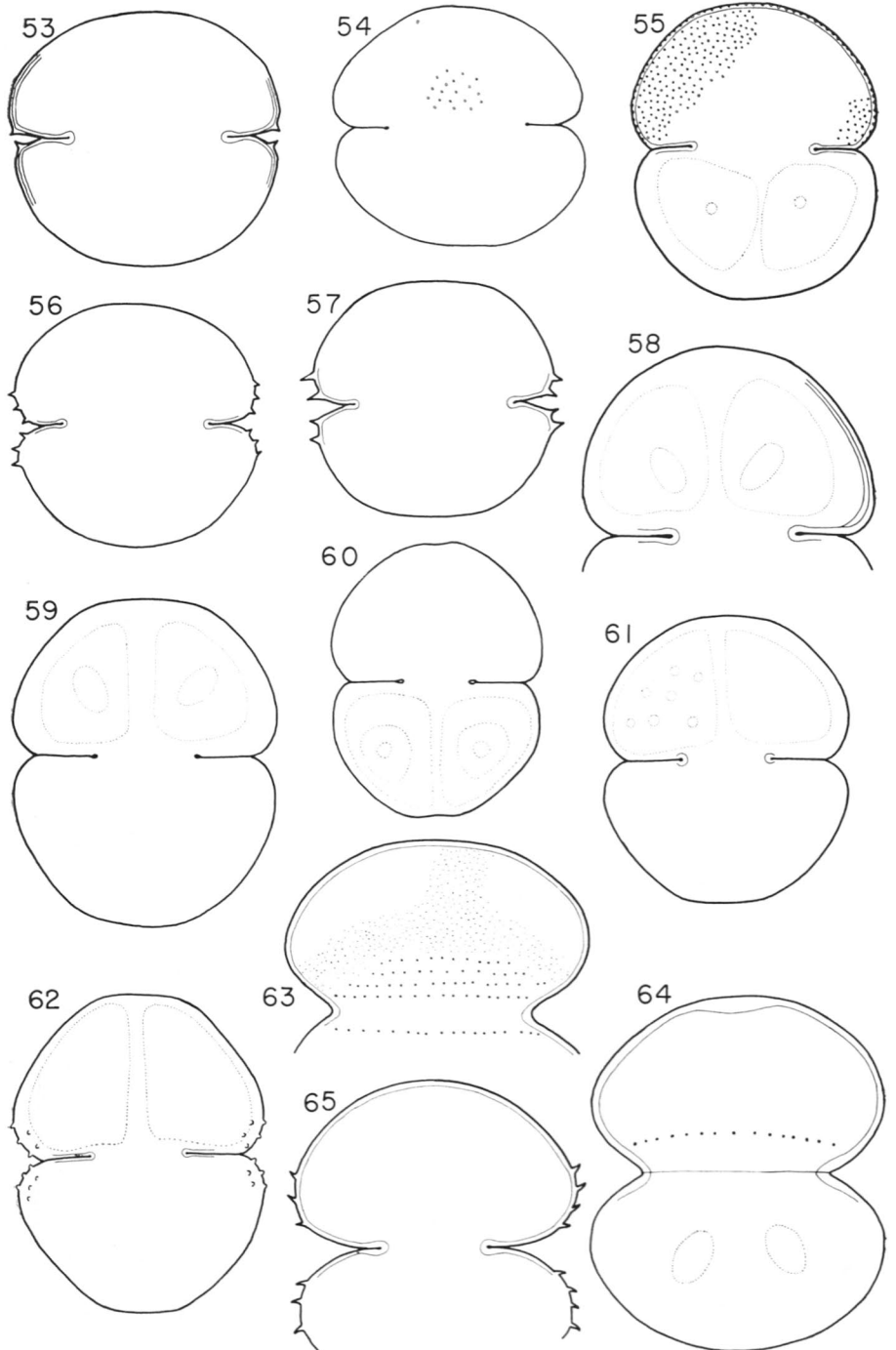
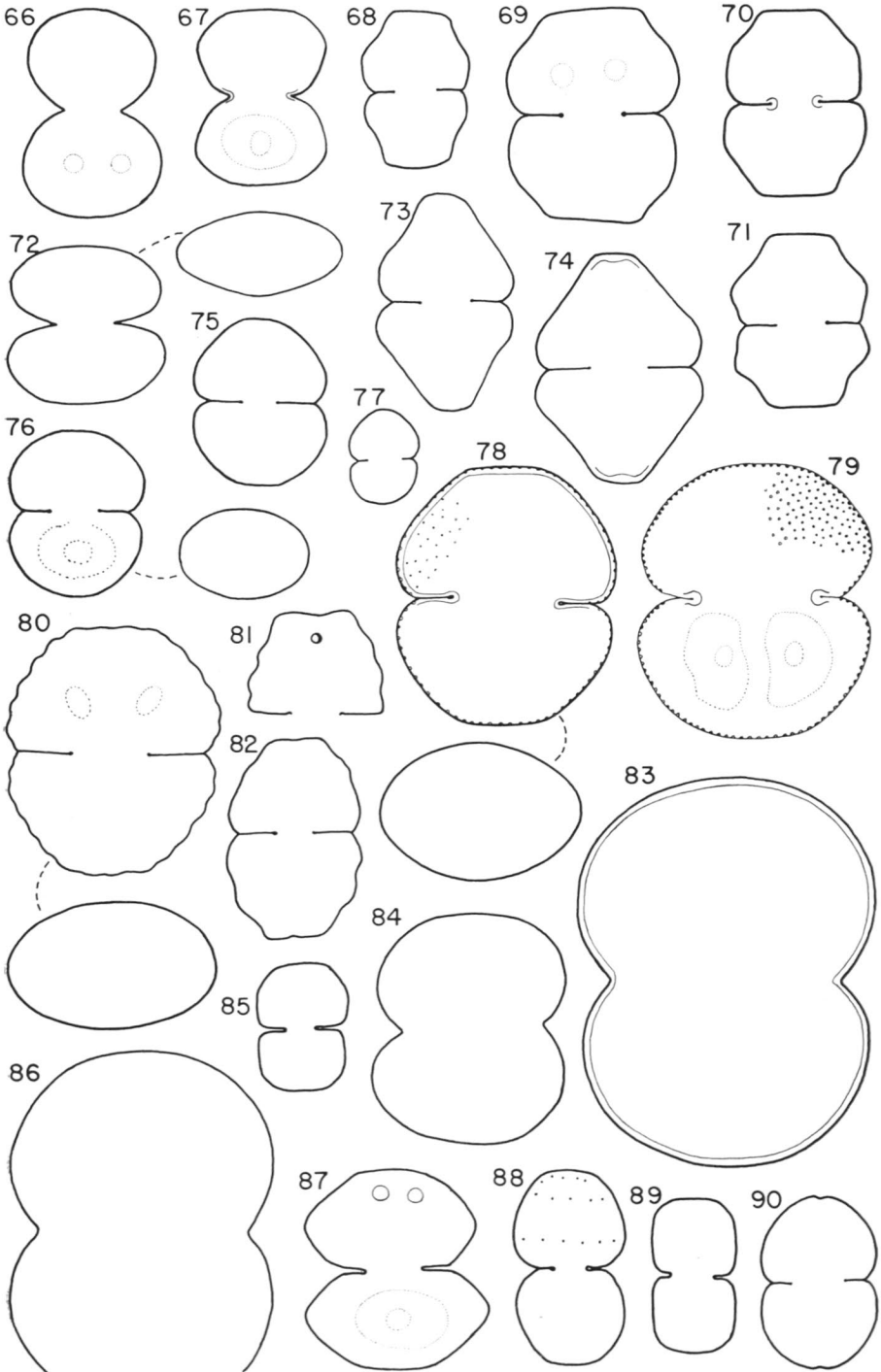


PLATE VI



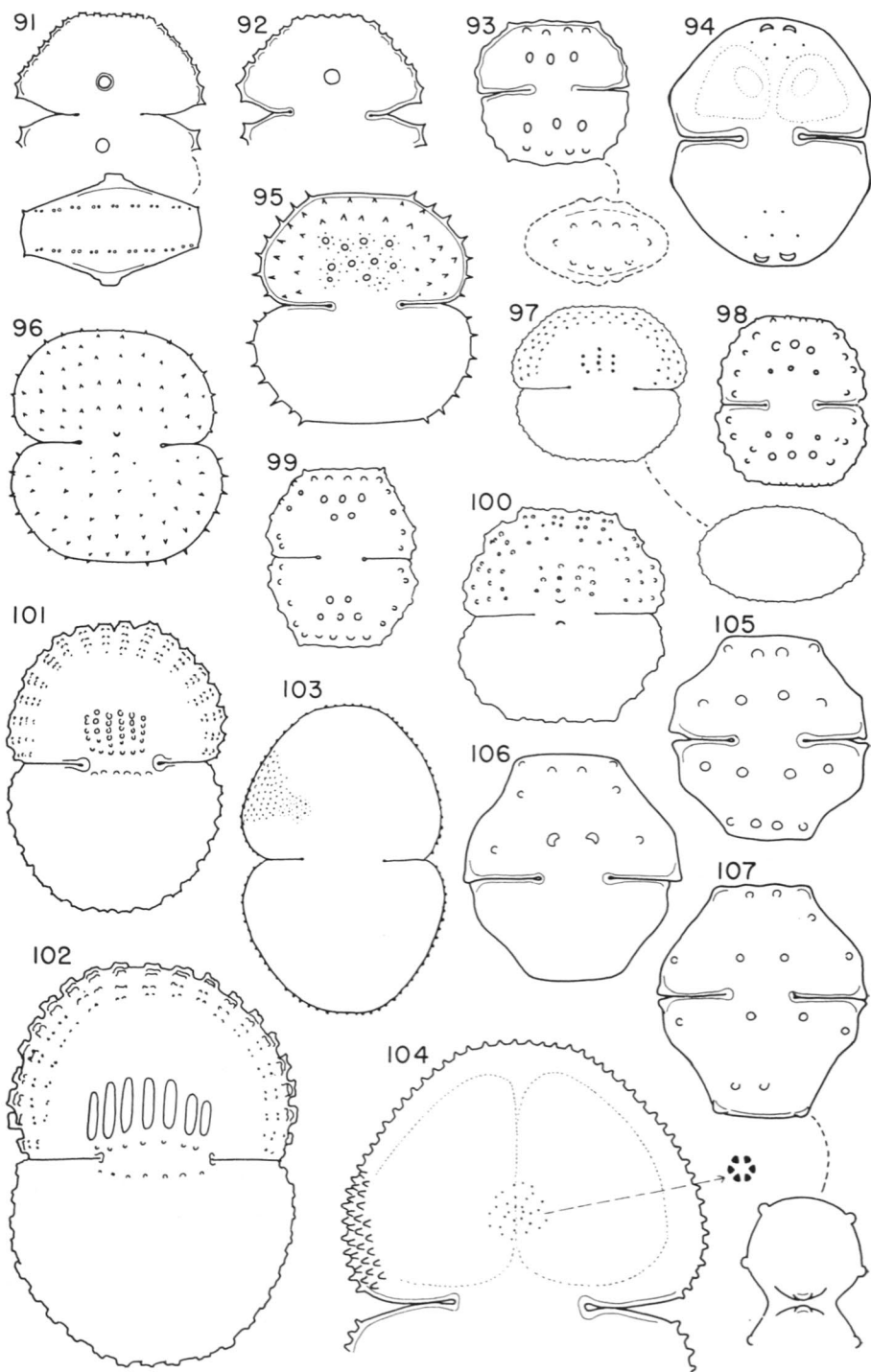
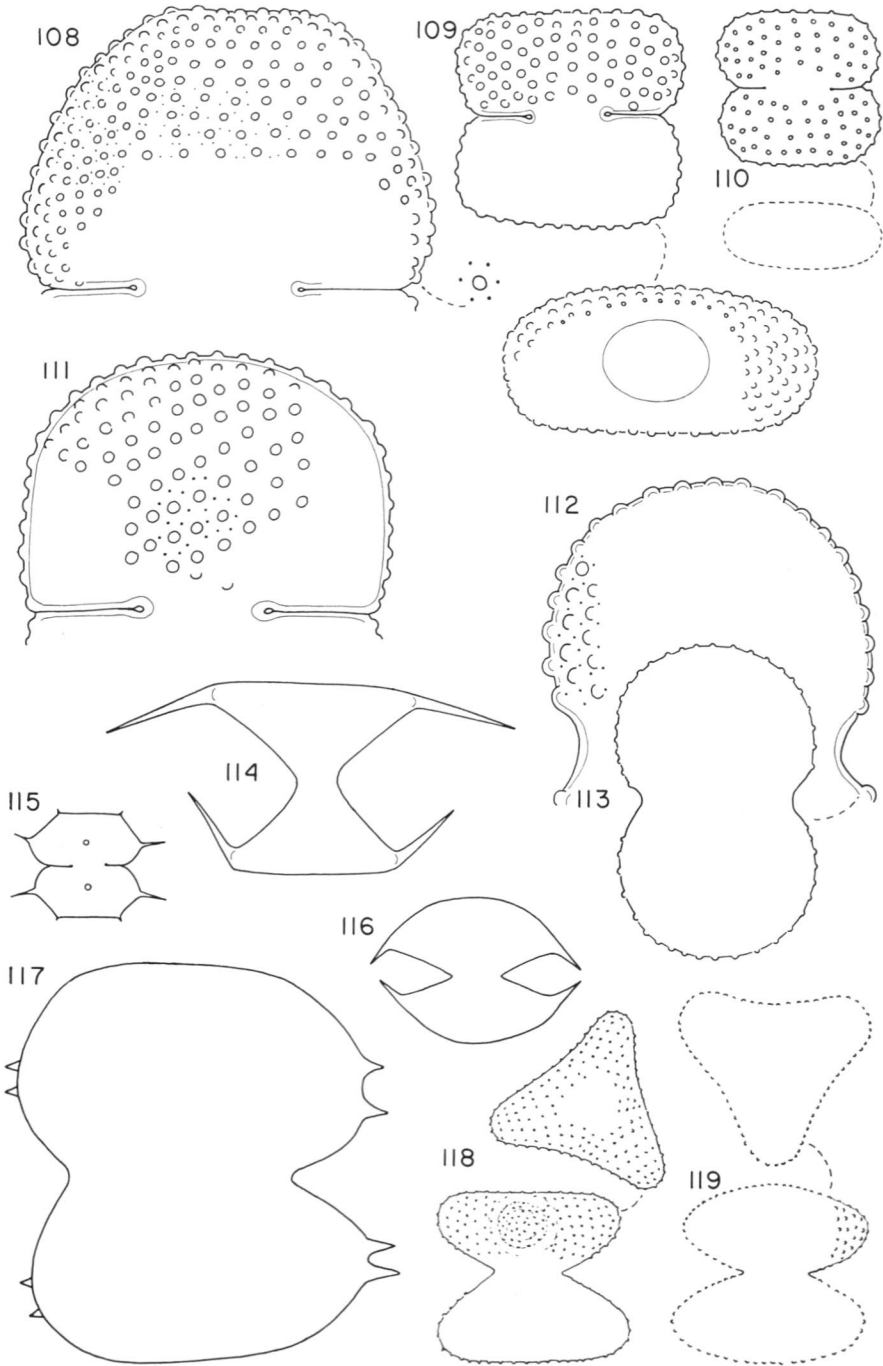


PLATE VIII



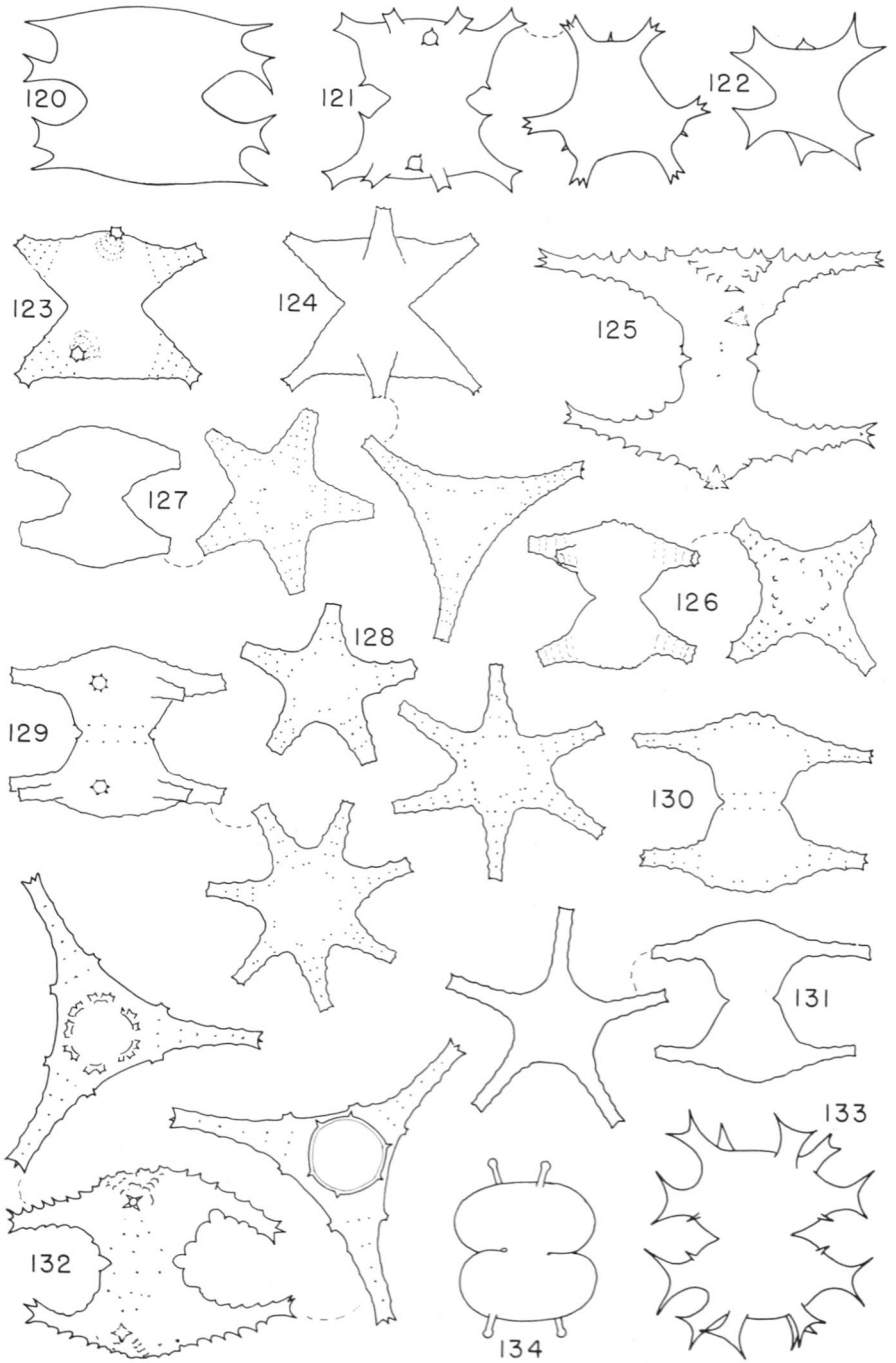
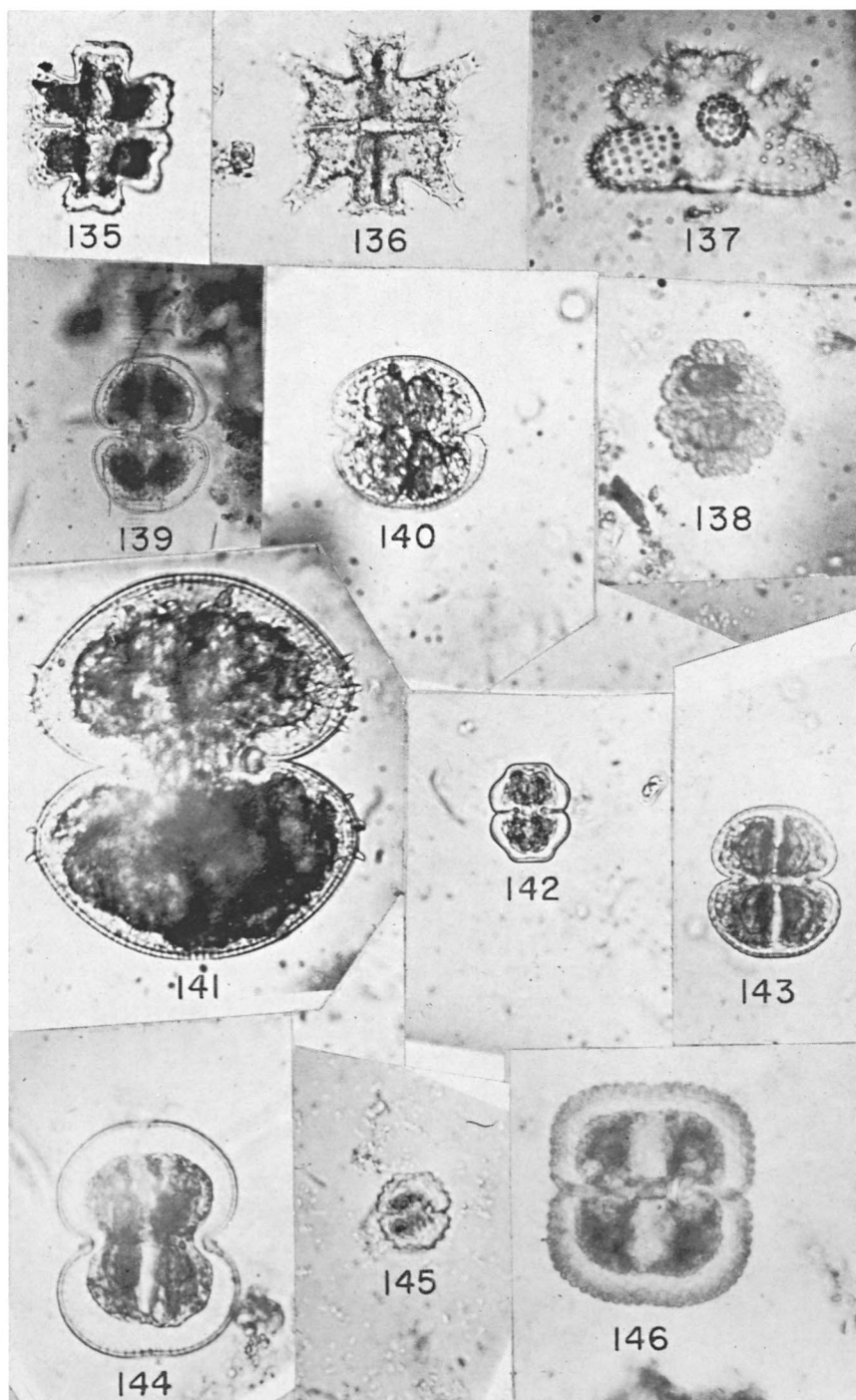


PLATE X



New name for a desmid described in Acta Bot. Fennica 69

This is a correction for the article: SCOTT, A. M., GRÖNBLAD, R., & CROASDALE, H., 1965: Desmids from the Amazon Basin, Brazil, collected by Dr. H. SIOLI. — Acta Bot. Fennica 69: 1—93.

It has been pointed out by Dr. Paul Silva (of the University of California at Berkeley, Cal., U.S.A.) that the name *Xanthidium multispinosum* Grönbl. & Croasd. (l.c., p. 47, fig. 143, 144) is preoccupied by *X. multispinosum* Möbius, Ber. Komm. Wiss. Unters. Deutsch. Meere Kiel 5: 124, 1887. Accordingly it is proposed to rename the junior homonym *Xanthidium echinatum* Croasd. sp. nov.

Holotypes

In the three manuscripts completed by H. Croasdale from the notes of Dr. R. Grönblad and Mr. A. M. Scott the junior author failed to indicate the holotypes of the novelties. These are now given below: In the cases where only one specimen was drawn the figure is the holotype. In the case where more than one specimen was figured the holotype is as follows:

GRÖNBLAD, R., SCOTT, A. M., & CROASDALE, H. 1964: Desmids from Uganda and Lake Victoria, collected by Dr. Edna M. Lind. — Acta Bot. Fennica 66: 1—57, 12 pl.

Cosmarium sinostegos Schaarschm. var. *granulatum* Croasd. Fig. 72, 73.

Arthrodesmus mucronulatus Nordst. f. *depauperatus* Grönbl. Fig. 108.

SCOTT, A. M., GRÖNBLAD, R. & CROASDALE, H. 1965: Desmids from the Amazon Basin, Brazil, collected by Dr. H. Sioli. — Acta Bot. Fennica 69: 1—93, 19 pl.

Pleurotaenium tridentulum (Wolle) W. West var. *tenuissimum* Grönbl. & Croasd. Fig. 34.

Euastrum Foersteri Scott & Croasd. Fig. 70.

» *Siolii* Scott & Croasd. Fig. 72.

Micrasterias Ledouxii Scott & Croasd. Fig. 92.

» *Siolii* Scott & Croasd. f. *simplicior* Croasd. Fig. 88.

Xanthidium echinatum Grönbl. & Croasd. (corrected from *X. multispinosum* Grönbl. & Croasd., see p. 40 of the present paper) Fig. 144.

» *Siolii* Grönbl. & Croasd. Fig. 138.

Arthrodesmus aperiens Scott & Croasd. Fig. 145.

» *aperiens* Scott & Croasd. f. *latior* Scott & Croasd. Fig. 148.

Staurastrum Donnellii Wolle var. *simplex* Croasd. & Scott Fig. 185.

» *quadrangulare* Bréb. var. *prolificum* Croasd. Fig. 176.

» *trifidum* Nordst. var. *porrectum* Croasd. & Scott Fig. 174.

GRÖNBLAD, R., SCOTT, A. M. & CROASDALE, H. 1968: Desmids from Sierra Leone, Tropical West Africa. — Acta Bot. Fennica 78: 1—41, 10 pl.

Micrasterias mahabuleshwariensis Hobs. var. *semireducta* Scott & Croasd. Fig. 60.

Actinotaenium Wollei (Grönbl.) Teil. var. *latius* Croasd. Fig. 70, 71.

Cosmarium Wenmanae Croasd. Fig. 75.

76. Pentti Alhonen: Palaeolimnological investigations of three inland lakes in South-western Finland. 59 pp. (1967).
77. Carl-Johan Widén, Jaakko Sarvela and Teuvo Ahti: The *Dryopteris spinulosa* complex in Finland. 24 pp. (1967).
78. Rolf Grönblad, Arthur M. Scott and Hannah Croasdale: Desmids from Sierra Leone, tropical West Africa. 41 pp. (1968).
79. Orvokki Ravanko: Macroscopic green, brown, and red algae in the southwestern archipelago of Finland. 50 pp. (1968).
80. Yrjö Vasari and Annikki Vasari: Late- and Post-glacial macrophytic vegetation in the lochs of Northern Scotland. 120 pp. (1968).
81. Liisa Kaarina Simola: Comparative studies on the amino acid pools of three *Lathyrus* species. 62 pp. (1968).
82. Gábor Uherkovich: Zur Chlorococcalen-Flora Finnlands. I. Ekenäs-Tvärminne-Geogend. 1. 26 S. (1968).
83. Åke Niemi: On the railway vegetation and flora between Esbo and Ingå, S. Finland. 28 pp. (1969).
84. Åke Niemi: Influence of the Soviet tenancy on the flora of the Porkkala area. 52 pp. (1969).
85. Liisa Kaarina Simola: Comparative studies on the sugar pools of three *Lathyrus* species. 16 pp. (1969).
86. Liisa Kaarina Simola: Effect of different sucrose concentrations and gibberellic acid on anatomy of *Bidens radiata* Thuill. and *B. pilosa* L. 26 pp. (1969).
87. Irmeli Vuorela: The indication of farming in pollen diagrams from southern Finland. 40 pp. (1970).
88. Marjatta Aalto: Potamogetonaceae fruits. I. Recent and subfossil endocarps of the Fennoscandian species. 85 pp. (1970).
89. Pekka Isoviita: Dillenius's 'Historia muscorum' as the basis of hepatic nomenclature, and S. O. Lindberg's collection of Dillenian bryophytes. 28 pp. (1970).
90. Esa Kukkonen und Risto Tynni: Die Entwicklung des Sees Pyhäjärvi in Süd-finnland im Lichte von Sediment- und Diatomeenuntersuchungen. 30 S. (1970).
91. Carl-Johan Widén, Veikko Sorsa and Jaakko Sarvela: *Dryopteris dilatata* s.lat. in Europe and the Island of Madeira. A chromatographic and cytological study. 30 pp. (1970).
92. Pentti Alhonen: The stages of the Baltic Sea as indicated by the diatom stratigraphy. 18 pp. (1971).
93. Rolf Grönblad and Hannah Croasdale: Desmids from Namibia (SW Africa). 40 pp. (1971).

Exchange — Austausch — Echange
SOCIETAS PRO FAUNA ET FLORA FENNICA
Snellmaninkatu 9—11 — Snellmansgatan 9—11
Helsinki 17 — Helsingfors 17

For sale — Verkauf — En vent

HY VIIKIN KAMPUSKIRJASTO



1150385504