Bothalia 12, 2: 239–245 (1977)

Freshwater algae of Southern Africa. IV. Some Micrasteriae from Rhodesia, including a new species

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ABSTRACT

Micrasterias ambadiensis (Grönblad & Scott) Thomasson, *M. crux-melitensis* (Ehrenberg) Hassall forma *minor* Turner, *M. decemdentata* (Nägeli) Archer, *M. pinnatifida* (Kützing) Ralfs var. *incudiformis* West & West, *M. radiata* Hassall var. *brasiliensis* Grönblad sensu lato, and *M. tropica* Nordstedt var. *tropica* are discussed. A new species, *M.* **schweickerdtii** Claassen, is described.

RESUME

ALGUES DULCICOLES D'AFRIQUE AUSTRALE. IV. QUELQUES MICRASTERIAE DE RHODESIE, INCLUANT UNE NOUVELLE ESPECE

On discute Micrasterias ambadiensis *(Grönblad & Scott) Thomasson,* M. crux-melitensis *(Ehrenberg) Hassall forma* minor *Turner,* M. decemdentata *(Nägeli) Archer,* M. pinnatifida *(Kützing) Ralfs var.* incudiformis *West & West,* M. radiata *Hassall var.* brasiliensis *Grönblad sensu lato, et* M. tropica *Nordstedt var.* tropica. *Une nouvelle espèce est décrite:* M. **schweickerdtii** *Claassen.*

INTRODUCTION

A sample containing a rich assemblage of desmids was given to me by Prof. Dr H. G. W. J. Schweickerdt, formerly head of the Department of General Botany, University of Pretoria. He collected the material during July 1957 from a small pool on dolomite rocks near Rusape, Rhodesia, but provided no physical or chemical data.

The sample contained seven different *Micrasterias* taxa amongst a number of other desmids. Although this sample was poorer in taxa, the taxon-composition showed a remarkable resemblance to that of Lake Ambadi, Sudan (Grönblad, Prowse & Scott, 1958).

METHODS

The material was preserved in 4% formalin.

Slides were made by mounting a sample droplet in a drop of glycerine.

Drawings were made with a Zeiss binocular bright field/phase contrast microscope using a Leitz micrometer-net-ocular and specially printed squared paper, the squares being 2×2 cm. The lenses used were a 12,5× eye-piece and a 40× objective.

Photomicrographs were taken on Adox KB14 film using a 35 mm Willd microscope camera on a Zeiss Nomarski contrast microscope. A 6× eye-piece and a 40× objective were used.

All dimensions are given in micrometres (μm).

OBSERVATIONS AND DISCUSSION

The following taxa were identified in the sample collected by Schweickerdt:

1. **Micrasterias ambadiensis** (*Grönblad & Scott*) *Thomasson* (1960, p. 22, Figs 4: 10 & 10: 4; Lind, 1971, p. 542, Pl. 2, Fig. 3).

Syn.: *M. radians* Turner var. *ambadiensis* Grönblad & Scott (Grönblad, Prowse & Scott, 1958, p.21, Pl. 11, Fig. 119 & Pl. 26, Fig. 363; Grönblad, 1962, p.7, Pl. 1, Fig. 9).

Some variation with regard to the delineation of the lateral lobes occurred in the Rusape specimens (Figs 11–14 and 26–29). In the type figures by Grönblad & Scott (1958, Figs 119 and 363) as well as Thomasson's figure (1960, Fig. 4: 10) the inferior lateral lobes have three spines each and the superior lateral lobes either three or four. In the specimen depicted in Grönblad's Fig. 9 (1962) both inferior and superior lateral lobes have four spines each and in Lind's specimen (1971, Pl. 2, Fig. 3) both inferior and superior lateral lobes have three spines each. In the Rusape specimens the number of spines in both inferior and superior lateral lobes varies from two to four. In a single specimen one inferior lateral lobe was completely absent and another consisted of a single spine (Fig. 12, bottom semicell). An abnormal coalescence of the cell wall in the inner portion of the sinus was observed in another specimen (Fig. 26). This specimen also showed abnormal cell wall thickenings at the base of each incision between the inferior and superior lateral lobes and between the superior lateral lobes and the polar lobe (upper semicell) as well as a large granule in the centre of the apical margin of the polar lobe. Length without spines 114–136, with spines 140–168; width without spines 98–113, with spines 112–131; width of isthmus 23–24; maximum width of polar lobe without spines 44–48, with spines 60–72. Very common.

2. **Micrasterias crux-melitensis** (*Ehrenberg*) *Hassall* forma **minor** *Turner* (1892, p. 92, Pl. 5, Fig. 4c; Grönblad, Prowse & Scott, 1958, p. 19, Pl. 11, Fig. 124 & Pl. 25, Fig. 358; Hinode, 1969, p. 199, Fig. 7: 11; Krieger, 1939, p. 65, Pl. 115, Fig. 1).

In some of the Rusape specimens the basal portion of the polar lobe is noticeably broader than in the typical form (Fig. 15). Length without spines 74–76, with spines 87–89; width without spines 80–82, with spines 86–89; width of isthmus 15–17; maximum width of polar lobe 42–44. Rare.

3. **Micrasterias decemdentata** (*Nägeli*) *Archer* (Borge, 1918, p. 66, Pl. 5, Fig. 23; Grönbald & Croasdale, 1971, p. 11, Pl. 4, Fig. 47; Grönblad, Scott & Croasdale, 1964, p. 15, Pl. 9, Fig. 219; Krieger, 1939, p. 34, Pl. 104, Figs 9–11; Lind, 1971, p. 542, Pl. 1, Fig. 29).

Syn.: *M. decemdentata* (Näg.) Arch. var. *galpinii* Claassen, 1961, p. 585, Pl. 17, Figs 4–7.

Specimens with 10 spines per semicell were rather rare; more common were specimens with 6 (Figs 16 and 17, upper semicells) or 9 (Fig. 17, lower semicell) spines per semicell. Fig. 16 represents a specimen in which one of the polar lobes is undeveloped (lower semicell). Length 47,5–50; width without spines 46–50, with spines 56,5–62; width of isthmus 10–12; maximum width of polar lobe without spines 30–31, with spines 36–40,6. Rare.

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4. **Micrasterias pinnatifida** (*Kützing*) *Ralfs* var. **incudiformis** *West & West* (1895, p. 48, Pl. 6, Fig. 5; Grönblad & Croasdale, 1971, p. 11, Pl. 4, Fig. 49; Krieger, 1939, p. 19, Pl. 100, Fig. 3).

These specimens (Figs 18–21) more closely resemble the plant represented in Grönblad & Croasdale's Fig. 49 than the type specimen but their dimensions agree better with that of the type. Length 56–60; width without spines 57–62, with spines 61–67; width of isthmus 11–12; maximum width of polar lobe without spines 38–46,8, with spines 44–52. Very common.

5. **Micrasterias radiata** *Hassall* var. **brasiliensis** *Grönblad* sensu lato, 1945, p. 15, Pl. 4, Figs 82 & 83; Förster, 1969, p. 41, Pl. 11, Fig. 5 & Pl. 12, Fig. 1; Thomasson, 1960, p. 24, Figs 4: 8 & 6: 12.

Syn.: *M. radiata* Hassall pro parte, in Krieger, 1939, p. 68, Pl. 117, Fig. 4 (non Pl. 116, Figs 4–6 & Pl. 117, Figs 1–3); *M. radiata* Hassall forma Nordstedt (1869, in Borge, 1925, p. 29, Pl. 2, Fig. 7) in Förster, 1974, p. 156; *M. radiata* Hassall var. *groenbladii* sensu Förster, 1974, p. 156, Pl. 7, Fig. 1 (non Pl. 5, Fig. 80 in Scott, Grönblad & Croasdale, 1965); *M. radians* Turner var. *brasiliensis* (Grönblad) Krieger in Förster, 1964, p. 380, Pl. 18, Figs 1 & 2; Krieger & Scott (1957, p. 135) in Förster, 1974, p. 156.

The plant referred to here and all the cited figures seen by the present author more closely resemble Grönblad's Fig. 83 than his Fig. 82. A broad interpretation of *M. radiata* var. *brasiliensis* has been adopted because, as the following discussion reveals, there is no name available for the plant illustrated in Fig. 83, and it is felt that, in view of the rather confused nomenclature, it would be unwise to describe a new taxon at this stage.

When Grönblad (1945) created *M. radiata* var. *brasiliensis* he illustrated it with two figures. In his Explanation of Plates he said "Fig. 82 is the most frequent form, Fig. 83 is a larger form with more slender processes" (Scott, Grönblad & Croasdale, 1965, p. 40). Croasdale (Scott, Grönblad & Croasdale, 1965) felt that the plant represented in Grönblad's Fig. 83 should be distinguished from the plant represented in Fig. 82. She included this plant (Fig. 83) in the new variety *M. radiata* var. *groenbladii* Croasdale (Scott, Grönblad & Croasdale, 1965, p. 39, Pl. 5, Fig. 80) and thereby it could possibly be construed that she indirectly made Grönblad's Fig. 82 the lectotype of *M. radiata* var. *brasiliensis*. As Croasdale failed to indicate a type, the name *M. radiata* var. *groenbladii* was not validly published (Stafleu, 1972, p. 41, Art. 37). Förster (1969, p. 41) decided that the plants depicted in Grönblad's Fig. 83 and Croasdale's Fig. 80 represented different varieties. He transferred the plant represented in Grönblad's Fig. 83 back to *M. radiata* var. *brasiliensis* and incorporated the plant represented in Croasdale's Fig. 80 in his new variety *M. radiata* var. *croasdaleae* Förster (1969, p. 41, Pl. 12, Fig. 2) as a synonym. The name *M. radiata* var. *croasdaleae* was also not validly published as no type was indicated, although Förster mentioned on the first page of his paper where slides containing new described taxa are preserved.

When Förster (1969, p. 41) discussed *M. radiata* var. *brasiliensis* he cited only Grönblad's Fig. 83 and not Fig. 82 and it is not clear whether he meant that his plant was *M. radiata* var. *brasiliensis* Grönblad, pro parte, quoad Fig. 83.

Later Croasdale (Grönblad & Croasdale, 1971, p. 40) indicated her Fig. 80 in Scott, Grönblad & Croasdale, 1965, as the type for *M. radiata* var. *groenbladii* Croasdale. This validated the publication of the variety and means that the name *M. radiata* var. *croasdaleae* Förster is superfluous and illegitimate and Förster's concept of *M. radiata* var. *groenbladii* Croasdale in Förster, 1974, p. 156, is incorrect. When Förster (1974, p. 156) recognized Croasdale's variety *groenbladii*, he excluded Fig. 80 and cited Grönblad's var. *brasiliensis*, pro parte, quoad Fig. 83 as one of the synonyms. Thomasson (1960, p. 24, Figs. 4: 8 and 6: 12) recorded *M. radiata* var. *brasiliensis* Grönblad, 1945, cf. Fig. 83 for Lake Bangweulu and although this paper appears in Förster's list of references (1974, p. 195) Thomasson's figures were not cited amongst the above-mentioned synonyms.

Fig. 24 of the Rusape specimens resembles Thomasson's Fig. 4: 8 (1960, p. 15) and Fig. 9 resembles Thomasson's Fig. 6: 12 (1960, p. 19) and Förster's Pl. 7, Fig. 1 (1974, p. 213).

In the Rusape specimens there is a noticeable variation in the width of the basal portions of the polar lobes of mature semicells (Figs 9, 10, 24 and 25). An abnormal coalescence of the cell wall was observed in the inner portion of the sinus (Fig. 24) between the superior lateral and polar lobes (Fig. 24) and between the lobules of the inferior and superior lateral lobes (Fig. 25, mature semicell). The latter also showed abnormal cell wall thickenings in the diverging processes of the polar lobe. Length with spines 180–208; width with spines 138–150; width of isthmus 20–22; maximum width of polar lobe 80–100. Common.

6. **Micrasterias schweickerdtii** *Claassen,* sp. nov. (Figs. 1–8).

DIAGNOSIS

Inter species descriptas nulla affinitas obvia. Cellulae amplae circiter 1,2–1,3-plo longiores quam latiores, ellipticae, penitus constrictae, sinus apertus; semicellulae trilobae. Lobus polaris magnus, subcuneatus, anguli laterales deorsum curvati, apex incisura mediana signatus, margini apicis spinae sunt plerumque curvatae, 6 vel 7 utrimque ab incisura mediana. Lobi laterales incisuris non profundis in lobulos quattuor inaequales divisi; lobulus superior sursum curvatus, tribus vel quattuor spinis marginalibus ac curvatis instructus; quarum ima maxima, vel in formam lobuli parvi et bidenticulati delineata; lobuli mediani aut binis spinis marginalibus instricti, aut in binos lobulos minores et bidenticulatos subdivisi, aut ex singula spina magna et lobulo parvo et bidenticulatu constant; lobulus inferior deorsum curvatus, tribus, spinis marginalibus instructus. Cellulae paries porosus, plurimis instructus spinis quae in series subradiatas in lobis polaribus et lateralibus sunt dispositae; modo aliquot spinae in semicellula media admodum supra isthmum inveniuntur, modo nullae. Longitudo sine spinis 256–307 μm, cum spinis 284–337 μm; latitudo sine spinis 201–234 μm, cum spinis 227–262 μm; isthmi latitudo 41–45,5 μm; lobi polaris latitudo maxima sine spinis 124–146 μm, cum spinis 139–161 μm. Iconotypus: fig. mihi 5.

This species does not correspond to any other *Micrasterias* in literature available to the author.

Cells large, about 1,2–1,3 times longer than broad, elliptic, deeply constricted, sinus open; semicells 3-lobed. Polar lobe large, subcuneate, lateral angles curved downwards, apex with a median notch, apical margin with 6–7, generally curved, spines on each side of the median notch. Lateral lobes divided into 4 unequal lobules by shallow incisions; superior lobule curved upwards, furnished with 3–4 marginal curved spines, lowermost spine largest or delineated as a small 2-denticulate lobule; median lobules furnished with 2 marginal spines each or subdivided into 2 smaller 2-denticulate lobules or consists of one large spine and a small 2-denticulate lobule; inferior lobule curved downwards, furnished with 3 marginal curved spines. Cell wall porose, furnished with numerous spines arranged in subradiate rows within the polar and lateral lobes, with or without a few spines in die middle of each semicell just above the isthmus. Length without spines 256–307, with spines 284–337; width without spines 201–234, with spines 227–262; width of isthmus 41–45,5; maximum width of polar lobe without spines 124–146, with spines 139–161. Very rare.

Several unsuccessful attempts were made to turn the cells over, so that they could be studied in lateral or apical views.

The specimen depicted in Figs 3, 4 and 8 was slightly anomalous in that one side of the sinus was linear and not open.

7. **Micrasterias tropica** *Nordstedt* var. **tropica** (Krieger, 1939, p. 56, Pl. 112, Fig. 4).

In the polar lobes of the Rusape specimens (Figs 22, 23, 30 and 31) the diverging processes are longer than in the type. These specimens fall rather in between the plants represented in Krieger's Fig. 4 (1939, Pl. 112) and his Fig. 7 (1939, Pl. 113) for *M. tropica* var. *elegans* West & West as the lateral and polar lobes are more slender than in the typical variety and less slender than in var. *elegans*. The semicell depicted in Fig. 23 could be compared with var. *elegans* but for the shorter polar lobe. Length 92-104; width 80–106; width of isthmus 14–17,7; maximum width of polar lobe 58–63,5. Rare.

ACKNOWLEDGEMENTS

I am indebted to the University of Pretoria for research facilities, to Prof. Dr H. G. W. J. Schweickerdt for the sample provided and to Prof. Dr H. L. Gonin, who kindly prepared the Latin diagnosis.

UITTREKSEL

Micrasterias ambadiensis (*Grönblad & Scott*) *Thomasson*, M. crux-melitensis (*Ehrenberg*) *Hassal forma* minor *Turner, M.* decemdentata (*Nägeli*) *Archer*, M. pinnatifida (*Kützing*) *Ralfs var.* incudiformis *West & West*, M. radiata *Hassall var.* brasiliensis *Grönblad sensu lato, en* M. tropica *Nordstedt var.* tropica *word bespreek. 'n Nuwe spesie,* M. **schweickerdtii** *Claassen*, word beskryf.

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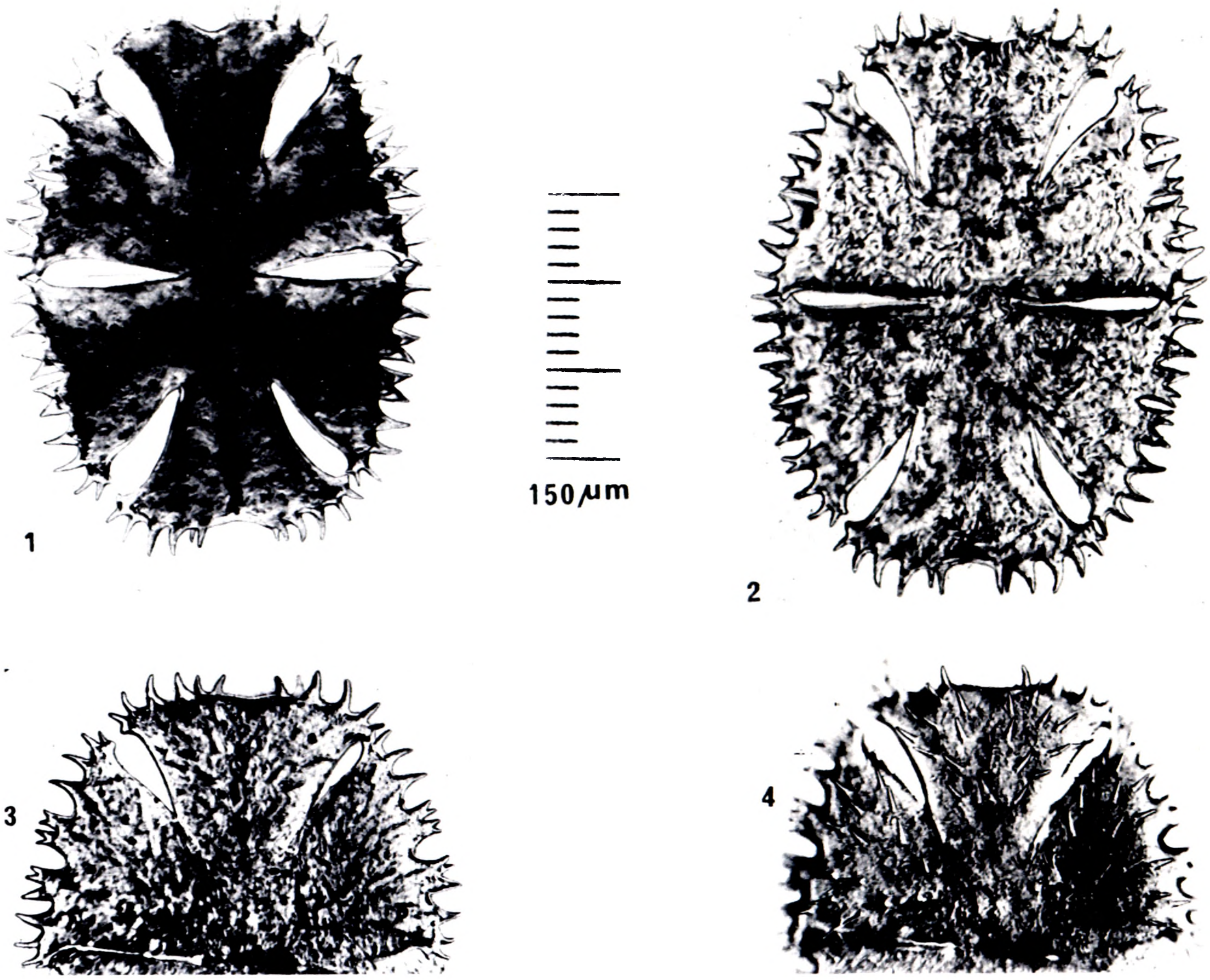
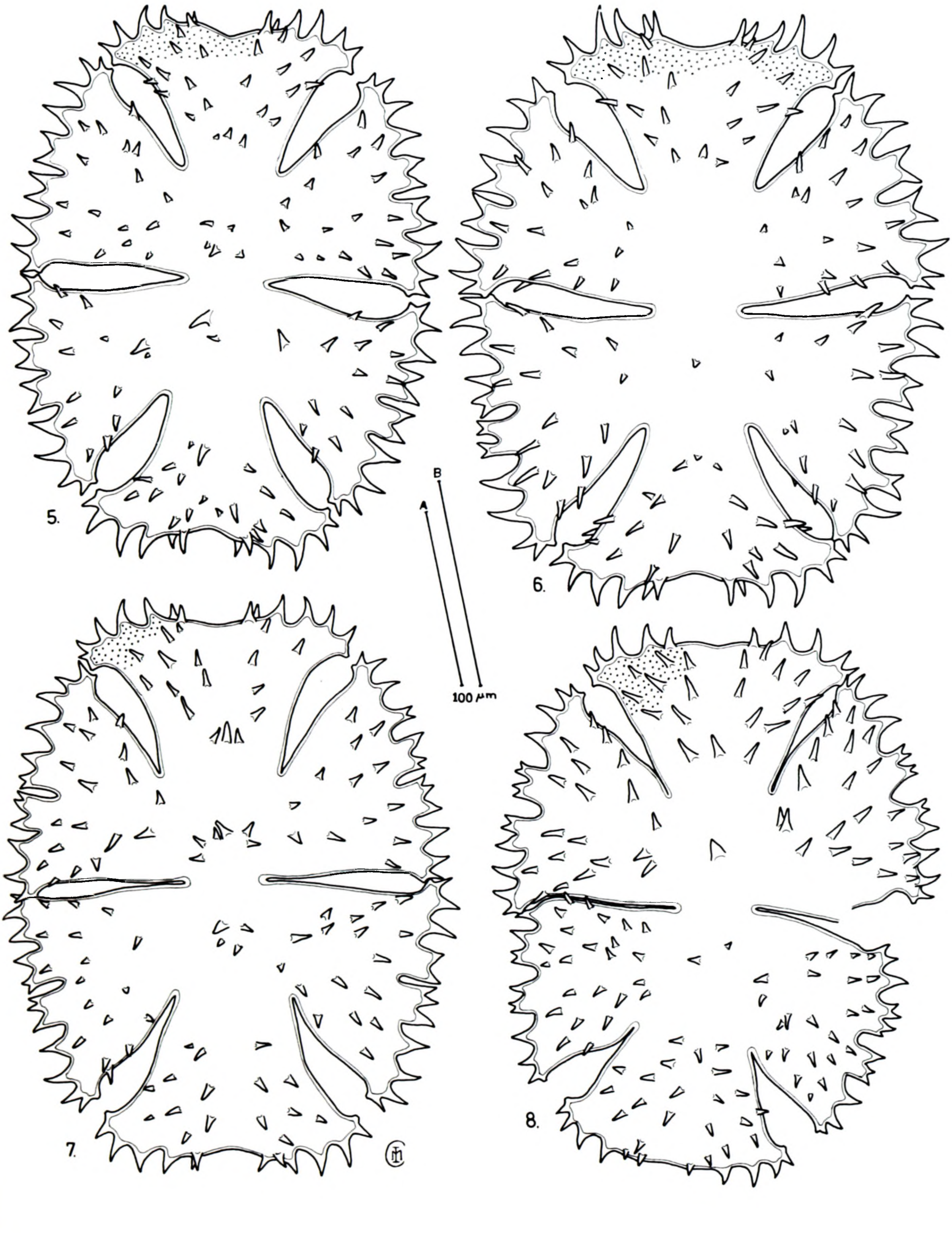
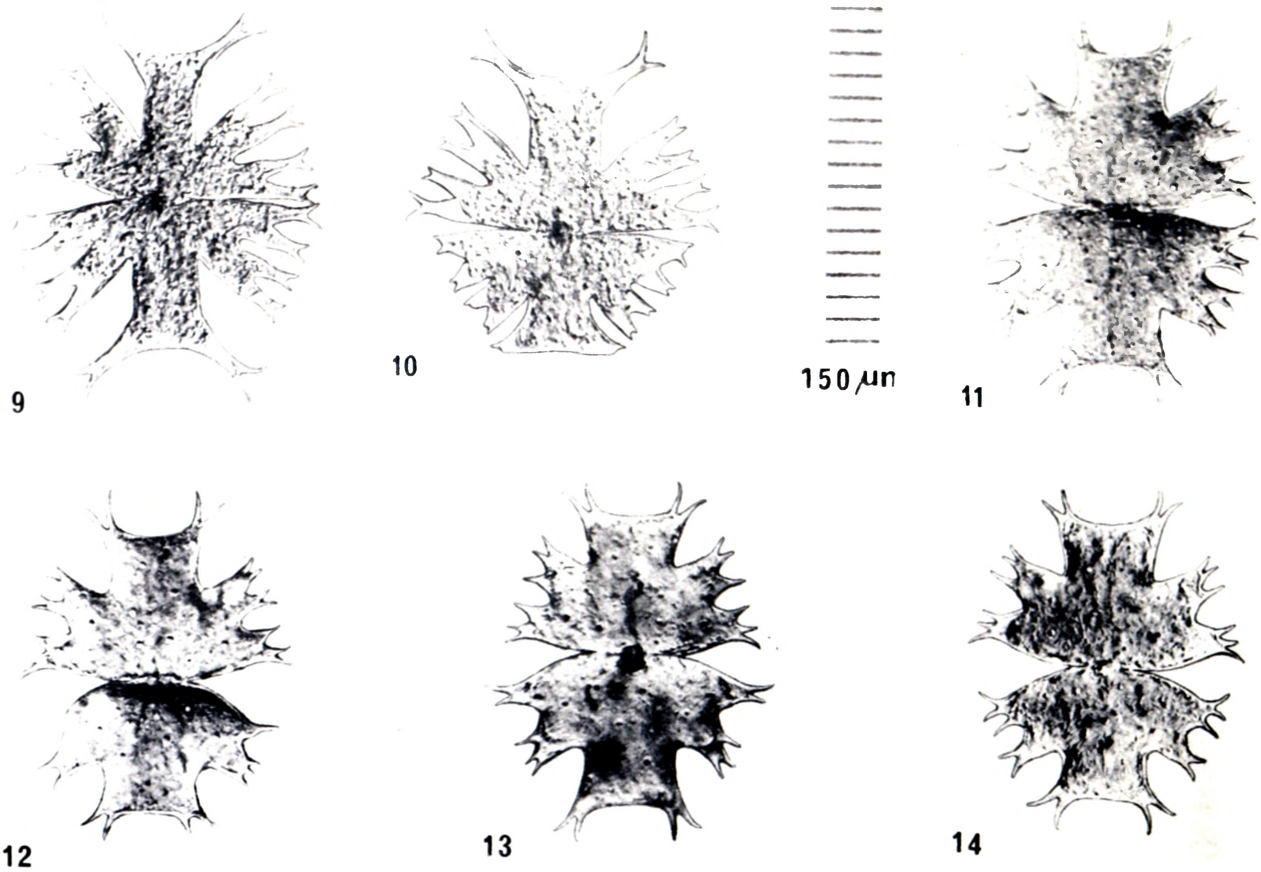


FIGS 1–4.—*Micrasterias schweickerdtii*; 4, semicell showing spines in surface view.



FIGS 5–8.—*Micrasterias schweickerdtii.*



FIGS 9, 10.—*Micrasterias radiata* var. *brasiliensis*; 9, mature cell; 10, cell in divisional stage. 11–14, *M. ambadiensis*, various specimens showing variation of lateral lobes.

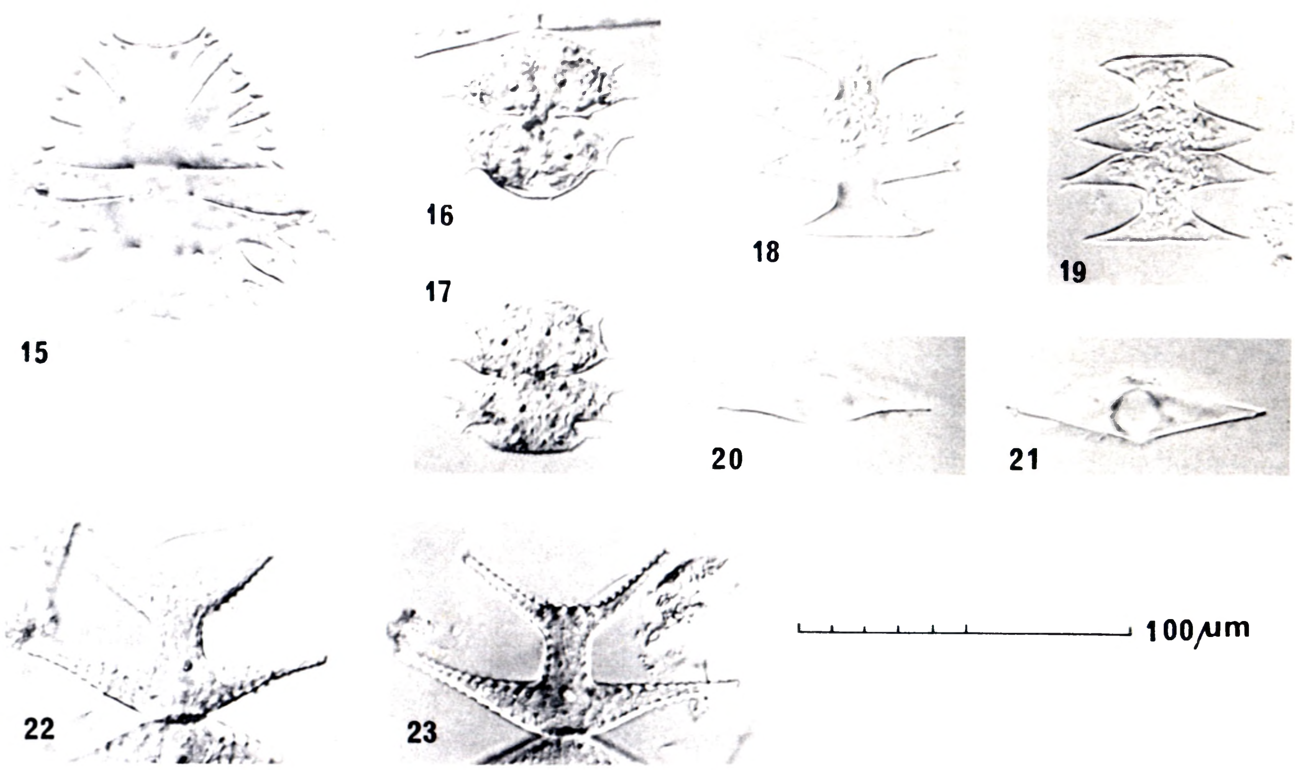
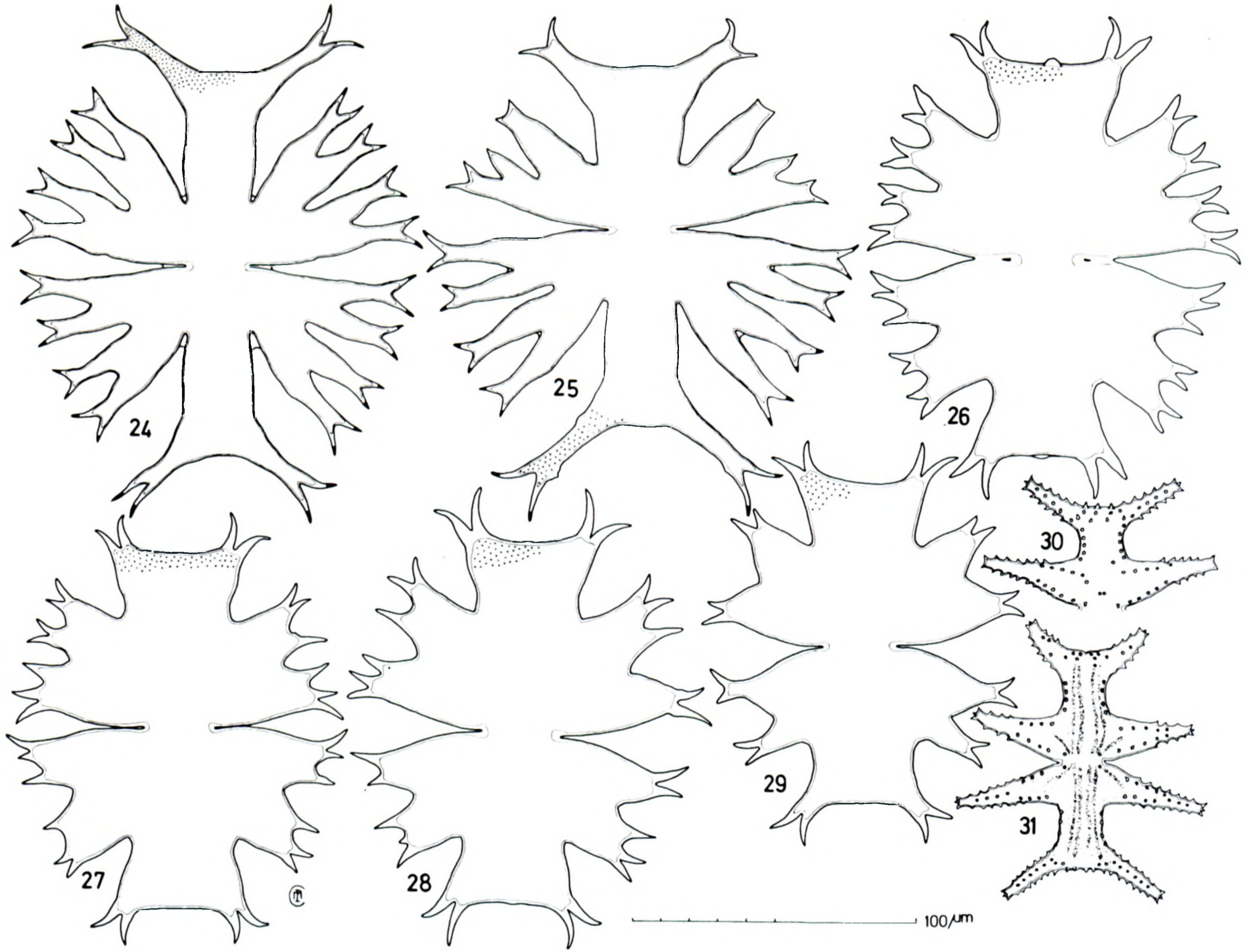


FIG. 15.—*Micrasterias crux-melitensis* forma *minor*. 16, 17, *M. decemdentata*. 18–21, *M. pinnatifida* var. *incudiformis*; 18, 19, front view of cell; 20. apical view of semicell; 21, basal view of semicell. 22, 23, *M. tropica* var. *tropica*.



FIGS 24, 25.—*Micrasterias radiata* var *brasiliensis*; 24, mature cell; 25, cell after division with anomalous upper semicell. 26–29, *M. ambadiensis*, various specimens showing variation of lateral lobes. 30, 31, *M. tropica* var. *tropica*.