

The genus *Sinularia* (Octocorallia: Alcyonacea) from Bremer and West Woody islands (Gulf of Carpentaria, Australia)

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van Ofwegen, L.P. The genus *Sinularia* (Octocorallia: Alcyonacea) from Bremer and West Woody islands (Gulf of Carpentaria, Australia).

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A collection of *Sinularia* specimens from Bremer and West Woody islands (Gulf of Carpentaria, Australia) is presented; thirteen different species were recognized, six of which are new to science and are described and figured: *S. bremerensis*, *S. confusa*, *S. diffusa*, *S. linnei*, *S. papula* and *S. woodyensis*.

Introduction

Ongoing research on the phylogenetic relationships among species in *Sinularia* (McFadden et al., in prep.) resulted in the examination of a small collection of specimens from the Gulf of Carpentaria (Australia). Most of this material was collected at one site west of Bremer island, while only two species, *S. notanda* Tixier-Durivault, 1966, and one of the new species came from a site at West Woody island.

The identification of *S. leptoclados* (Ehrenberg, 1834) given below must be considered tentatively as molecular data and re-examination of museum material indicate specimens previously identified as *S. leptoclados* could belong to a complex of related species rather than one widespread species, as reported by Verseveldt (1980: 80). The re-examination of the Nationaal Natuurhistorisch Museum specimens identified as *S. leptoclados* will be the subject of a separate publication.

List of species

Genus *Sinularia* May, 1898

1. *S. bremerensis* spec. nov.: NTM C14488
2. *S. capitalis* (Pratt, 1903): NTM C14530
3. *S. confusa* spec. nov.: NTM C14456
4. *S. diffusa* spec. nov.: NTM C14457; NTM C14464
5. *S. hirta* (Pratt, 1903): NTM C14499
6. *S. leptoclados* (Ehrenberg, 1834): NTM C14492, NTM C14519-21
7. *S. linnei* spec. nov.: NTM C14480
8. *S. maxima* Verseveldt, 1971: NTM C14512
9. *S. notanda* Tixier-Durivault, 1966: NTM C14555
10. *S. papula* spec. nov.: NTM C14527
11. *S. ramosa* Tixier-Durivault, 1945: NTM C14475, NTM C14506

12. *S. robusta* Macfadyen, 1936: NTM C14518, NTM C14526

13. *S. woodyensis* spec. nov.: NTM C14557

Systematic part

Sinularia bremerensis spec. nov.

(figs 1a, 2-5)

Material.— NTM C14488, holotype, West of Bremer island, Gulf of Carpentaria, NT, Australia, 12°05.660'S 136°47.754'E, depth 1-3 m, coll. P. Alderslade & party, 17.xii.2003; RMNH Coel. 38661, three microscope slides of NTM C14488.

Description.— The holotype is an arborescent colony, 5 cm high and 7 cm wide (fig. 1a). The stalk is 3 cm high, it gives off a number of primary lobes, which branch once or twice; the lobules are only a few mm wide.

Surface layer of the lobules contains clubs, 0.08-0.20 mm long (figs 2-3a). The smallest are rod-like but most have a central wart; both this wart and the tubercles below it can be foliaceous. In the largest clubs the central wart is less obvious and a few clubs have bi-ramous heads. Furthermore, spindles are present, up to 0.30 mm long, with simple tubercles (fig. 3b-c). There are no sclerites in the polyps.

The clubs of the surface layer of the base resemble those of the lobules but are slightly shorter and have wider handles (fig. 4a). The small spindles of the base surface are also slightly shorter than those of the lobules (fig. 4b).

The interior of the colony has spindles (fig. 5a-b), mostly with complex tubercles but several have simple tubercles (fig. 5c-d). These spindles are up to 2 mm long in both top and base of the colony.

Colour.— The preserved colony is light brown.

Etymology.— The species is named after the type locality, Bremer island.

Remarks.— Colonies of *Sinularia cruciata* Tixier-Durivault, 1970, *S. hirta* (Pratt, 1903), *S. mollis* Kolonko, 1926, *S. lochmodes* Kolonko, 1926, *S. mira* Tixier-Durivault, 1970 and *S. variabilis* Tixier-Durivault, 1945 resemble the holotype of *S. bremerensis* spec. nov. *Sinularia cruciata* and *S. mira* also have clubs with a central wart, but in these species the clubs are shorter, mostly up to only 0.10 mm long and their heads are not as leafy as in *S. bremerensis*.

Some of the clubs of *S. bremerensis* resemble those of *S. brassica* May, 1898, and even the colony form can be similar (see figs 22, 24 in Benayahu et al., 1997). However, the clubs with very wide heads, present in *S. brassica*, are lacking in *S. bremerensis*.

Sinularia confusa spec. nov.

(figs 1b-c, 6-9)

Material.— NTM C14456, holotype, West of Bremer island, Gulf of Carpentaria, NT, Australia, 12°05.660'S 136°47.754'E, depth 1-3 m, coll. P. Alderslade & party, 17.xii.2003; RMNH Coel. 38662, three microscope slides of NTM C14456.

Description.— The holotype is a colony fragment, with a maximum cross-section of the polyparium being 7.5 × 5.5 cm (fig. 1b-c). The colony is 6 cm high; the stalk is about

2.5 cm in height. The polyparium consists of a number of densely placed primary lobes, many of which bear knob-like lobules.

Surface layer of the lobules contains clubs, 0.06–0.25 mm long (figs 6–7a). The smallest are rod-like (fig. 6b), but most have a central wart. Furthermore, spindles are present, up to 0.30 mm long, with simple tubercles (fig. 7b). There are no sclerites in the polyps.

Both clubs and small spindles of the surface layer of the base are shorter than those of the top of the colony, up to 0.20 mm long (fig. 8). The clubs have a less distinct central wart.

The interior of the colony has spindles (fig. 9), with simple or complex tubercles. These spindles are up to 2.5 mm long in both top and base of the colony.

Colour.— The preserved colony is cream-coloured.

Etymology.— The Latin “confusus”, to confuse, throw into disorder, trouble, disturb, upset, refers to the confusing small differences from *Sinularia nanolobata* Verseveldt, 1977.

Remarks.— The species can be assigned to Verseveldt’s group II, “clubs with a central wart” (Verseveldt, 1980: 7). In this group *S. gibberosa* Tixier-Durivault, 1970, and *S. nanolobata* Verseveldt, 1977, resemble the present material regarding clubs and colony shape. The colony form of *S. gibberosa*, with lobules arranged in rosettes, is like the colony shape of the holotype of *S. confusa*, but *S. gibberosa* has much smaller clubs. The clubs of *S. nanolobata* are very similar to those of the present material, but in *S. nanolobata* the lobes and lobules are smaller and the internal spindles are only up to 1.50 mm long. However, this latter character seems to vary considerably, as Benayahu (1998) reported when he described specimens identified as *S. nanolobata* and found longer internal spindles, up to 2 mm long.

Sinularia diffusa spec. nov.
(figs 1d, 10–13, 14a)

Material.— NTM C14457, holotype, West of Bremer island, Gulf of Carpentaria, NT, Australia, 12°05.660'S 136°47.754'E, depth 1–3 m, coll. P. Alderslade & party, 17.xii.2003; RMNH Coel. 38663, three microscope slides of NTM C14457; NTM C14464, paratype, same data as NTM C14457; RMNH Coel. 38664, two microscope slides of NTM C14464.

Description.— The holotype is a complete colony with the maximum cross-section of the polyparium being 9 × 6 cm (fig. 1d). The colony is 13 cm high, the stalk varies 7–12 cm in height. The polyparium consists of a number of densely placed primary lobes, several of which bear lobules; the latter vary in size and shape from tiny knobs to spherical or finger-shaped processes. Around the edge of the polyparium the lobes merge to form short ridges.

Surface layer of the lobules contains clubs, 0.08–0.30 mm long. The smallest are rod-like (fig. 11a) but most have a central wart (figs 10, 11b); both this wart and the tubercles below it can be foliaceous; in longer clubs the central wart is less obvious. Furthermore, a few spindles are present, also up to 0.30 mm long, with simple or complex tubercles (fig. 11c). There are no sclerites in the polyps.

The sclerites of the surface layer of the base are shorter, up to 0.20 mm long, and wider (fig. 12a).

The interior of the top of the colony has spindles, mostly with simple tubercles; many with side branches (fig. 13). In the interior of the base of the colony these spindles have larger tubercles and are less branched (fig. 12b). In both top and base the interior spindles are up to 2.5 mm long.

Colour.— The preserved colony is white.

Variability.— The paratype is also a complete colony, with a maximum cross-section of the polyparium being 10×6 cm (fig. 14a). This colony is 9 cm high, the stalk is shorter than in the holotype; it varies 3–6 cm in height. The lobes and lobules are more densely arranged than in the holotype.

Etymology.— The Latin “diffusus”, to pour in different directions, to spread out, diffuse, extend, refers to the branched spindles spreading out.

Remarks.— As the surface layer of the polyparium of both specimens has a mixture of two types of clubs, the smaller ones having a central wart, the larger ones not, we compared our material with the species Verseveldt put in his groups II–IV. In these groups, *Sinularia gravis* Tixier-Durivault, 1970, *S. peculiaris* Tixier-Durivault, 1970, *S. pedunculata* Tixier-Durivault, 1945, *S. prodigiosa* Verseveldt, 1977, and *S. vervoorti* Verseveldt, 1977, have similar colony form and branched spindles in the interior.

Sinularia peculiaris and *S. prodigiosa* clearly have differently shaped clubs (Verseveldt, 1980: 105; 1977: 183).

Sinularia gravis has clubs resembling those of the present material, but although that species has branched spindles in the interior, they are not so heavily branched (see Vennam & Ofwegen, 1996). Moreover, *S. gravis* seems to be an encrusting species having either a very short stalk or none at all.

Sinularia pedunculata has slightly less developed clubs in the surface layer of the lobes (Verseveldt, 1980: 106). Although little is known about the colony shape, only one colony was ever depicted, it shows less crowded and longer lobules (Verseveldt, 1980, pl 33 fig. 3).

Sinularia vervoorti lacks the longer clubs in the surface layer of the lobules. Besides, it has an encrusting colony shape, whereas the present species has a conspicuous stalk.

S. diffusa spec. nov. has clubs similar to those of *S. bremerensis* spec. nov., but the two species have completely different colony shape. *S. bremerensis* has no ridges or spherical lobules but solely slender, branch-like lobules (see figs 1a & 1d).

***Sinularia linnei* spec. nov.**
(figs 14b, 15–20)

Material.— NTM C14480, holotype, West of Bremer island, Gulf of Carpentaria, NT, Australia, 12°05.660'S 136°47.754'E, depth 1–3 m, coll. P. Alderslade & party, 17.xii.2003; RMNH Coel. 38665, three microscope slides of NTM C14480.

Description.— The holotype is a complete colony with a maximum cross-section of the polyparium being 7.5×4.5 cm (fig. 14b). The colony is 7 cm high, the stalk length varies, 3–5 cm in height. The polyparium consists of a number of densely placed primary lobes, several of which bear lobules; lobes and lobules vary in size and shape, from tiny knobs to small ridges.

Surface layer of the lobules contains clubs with a central wart (figs 15-18a), both this wart and the tubercles below it can be foliaceous; in longer clubs the central wart is less obvious. These clubs are 0.10-0.25 mm long. Furthermore, spindles are present, up to 0.30 mm long, with simple tubercles (fig. 18b). There are no sclerites in the polyps.

The clubs of the surface layer of the base resemble those of the lobules but are shorter, and have wider handles (fig. 19a). The small spindles of the base surface are also shorter than those of the lobules (fig. 19b).

The interior of the colony has spindles with simple or complex tubercles (fig. 20); several have a side branch. These spindles are up to 2.5 mm long in both top and base of the colony.

Colour.— The preserved colony is white.

Etymology.— Named after Carl von Linné, on the occasion of the 250th anniversary of zoological nomenclature.

Remarks.— The species resembles *Sinularia gravis* Tixier-Durivault, 1970, very much. The latter species differs in having only crest-like lobes and its clubs having more slender handles and simpler central warts.

The colony shape of *Sinularia linnei* resembles *S. diffusa* spec. nov., but its clubs have wider handles and the interior spindles are not branched.

Sinularia papula spec. nov.
(figs 14c-d, 21-24)

Material.— NTM C14527, holotype, West of Bremer island, Gulf of Carpentaria, NT, Australia, 12°05.660'S 136°47.754'E, depth 1-3 m, coll. P. Alderslade & party, 17.xii.2003; RMNH Coel. 38666, three microscope slides of NTM C14527.

Description.— The holotype (fig. 14c-d) is a colony fragment, 4 cm high and 3 × 7 cm in diameter. The polyparium consists of a number of densely placed primary lobes, several of which bear lobules; the latter vary in size and shape from knobs to ridge-like processes. Only a small part of the sterile stalk is present. The surface of the polyparium is strongly corrugated.

Surface layer of the lobules contains clubs, 0.05-0.25 mm long (figs 21-22a). The smallest are rod-like (fig. 21b), but most have a central wart; this wart can be foliaceous; in longer clubs the central wart is less obvious. Furthermore, a few sclerites are present, up to 0.30 mm long, which are intermediate between clubs and spindles (fig. 22b). There are no sclerites in the polyps.

The sclerites of the surface layer of the base are shorter, up to 0.15 mm long, and wider (fig. 23).

The interior of the colony has spindles with simple or complex tubercles (figs 22c, 24); a few have side branches. These spindles are up to 2.5 mm long in both top and base of the colony.

Colour.— The preserved colony is white.

Etymology.— The Latin “papula”, pimple, refers to the corrugated colony surface.

Remarks.— The species can be assigned to Verseveldt's group II, “clubs with a central wart”. In this group it is most similar to *S. confusa* spec. nov. However, that species has clubs with less developed heads (see figs 6-7a).

The colony form of *S. abhishiktae* Ofwegen & Vennam, 1991, is very similar to the present species, also with corrugated colony surface. However, that species has very variably shaped clubs (see Ofwegen & Vennam, 1991: 149-151).

The colony shape of *S. papula* is also similar to that of *S. crassa* Tixier-Durivault, 1945, but that species lacks the smaller clubs present in *S. papula*.

Sinularia woodyensis spec. nov.

(figs 14e, 25-28)

Material.— NTM C14557, holotype, West Woody island, Gulf of Carpentaria, NT, Australia, 12°11.10'S 136°40.288'E, depth 1-3 m, coll. P. Alderslade & party, 19.xii.2003; RMNH Coel. 38667, three microscope slides of NTM C14557.

Description.— The holotype is a colony fragment 6 cm long and 5 cm wide (fig. 14e). It consists of three erect lobes bearing small lobules.

Surface layer of the lobules contains clubs, 0.08-0.25 mm long (figs 25-26a). The smallest are rod-like (fig. 25b), but most have a central wart; in longer clubs the central wart is less obvious. Furthermore, spindles are present, also up to 0.25 mm long, with simple or complex tubercles (fig. 26b). There are no sclerites in the polyps.

The clubs of the surface layer of the base resemble those of the lobules but are shorter, and have wider handles (fig. 27). The small spindles of the base surface are also shorter than those of the lobules (fig. 28a).

The interior of the colony has spindles with complex tubercles; a few have simple tubercles, and several have a side branch or bifurcated at one end (fig. 26c, 28b-d). These spindles are up to 3 mm long in both top and base of the colony.

Colour.— The preserved colony is brown.

Etymology.— The species is named after the type locality, Woody island.

Remarks.— The colony form of the holotype resembles that of some colonies of *S. robusta* Macfadyen, 1936, but the latter species has *leptoclados*-type clubs. It also resembles *S. kotanianensis* Manuputty & Ofwegen, 2007, but that species has central wart clubs with more slender handles.

The sclerites of *S. woodyensis* resemble those of *S. confusa* spec. nov., but the latter species has a completely different colony shape (compare figs 1b-c with fig. 14e)

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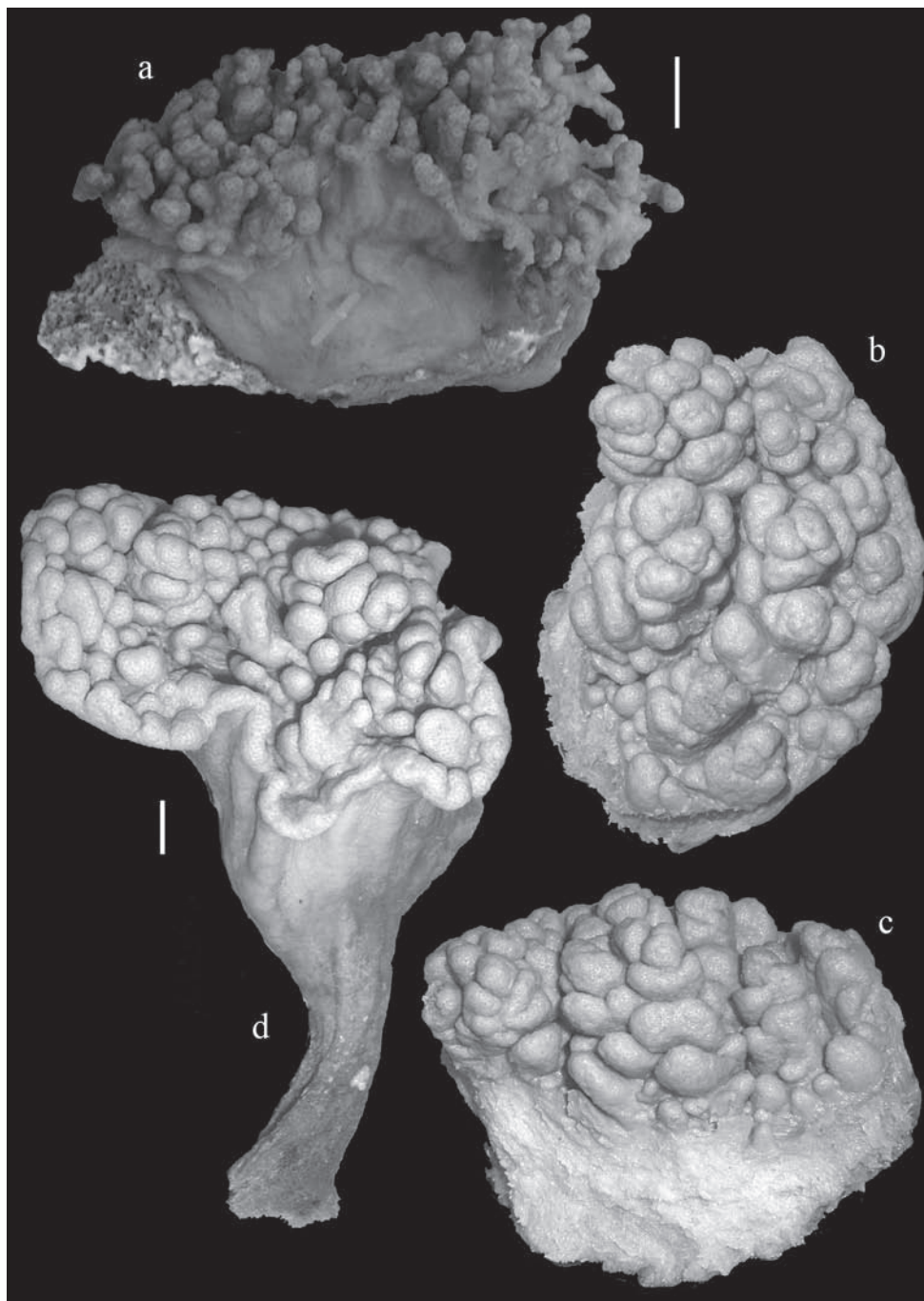


Fig. 1a. *Sinularia bremerensis* spec. nov., holotype NTM C14488, lateral view; 1b-c, *S. confusa* spec. nov., holotype NTM C14456, b, view from above, c, lateral view; d, *S. diffusa* spec. nov., holotype NTM C14457, lateral view. Scales 1 cm (that at a only applies to a).

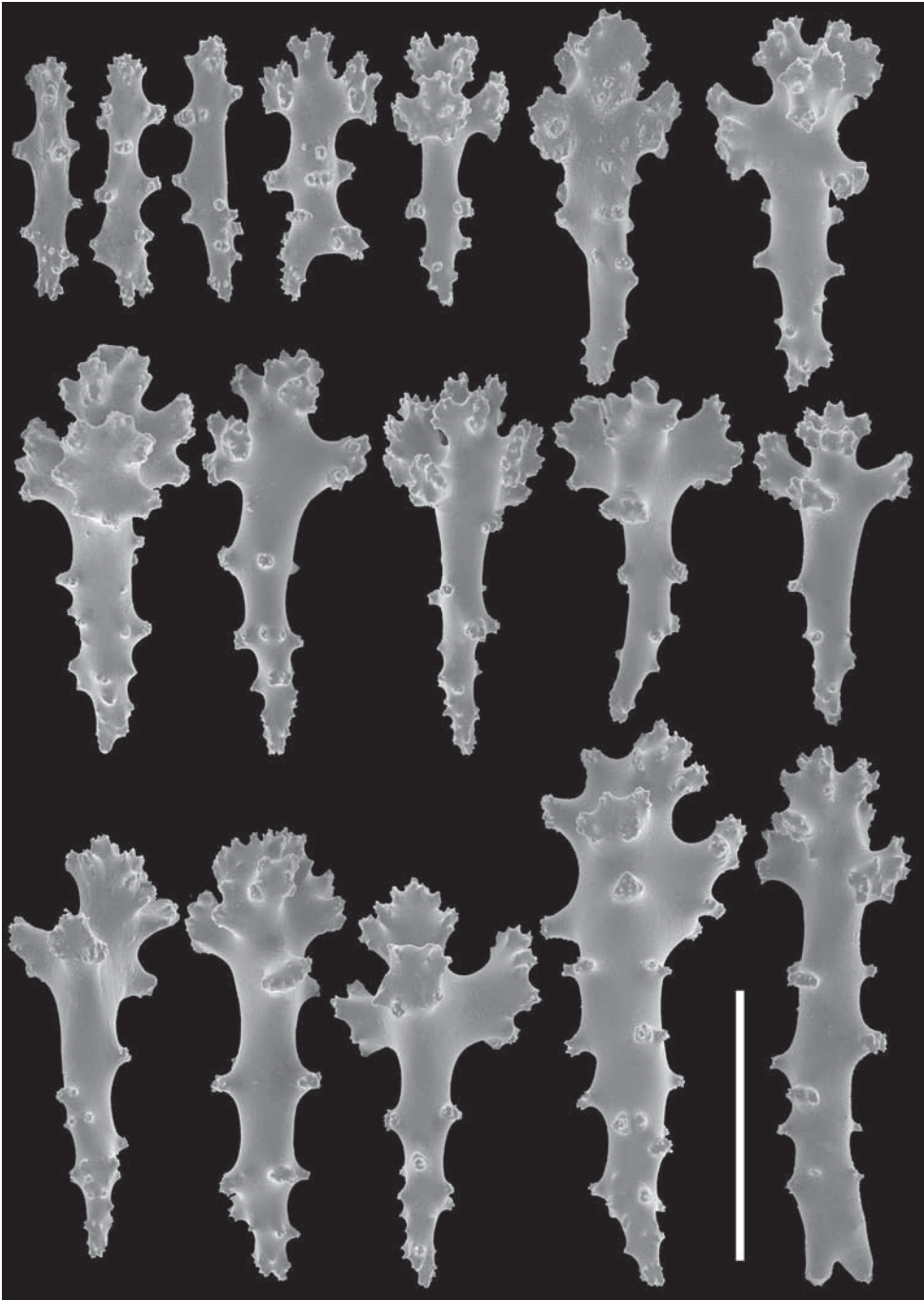


Fig. 2. *Sinularia bremerensis* spec. nov., holotype NTM C14488; clubs of surface layer of the top of the colony. Scale 0.10 mm.

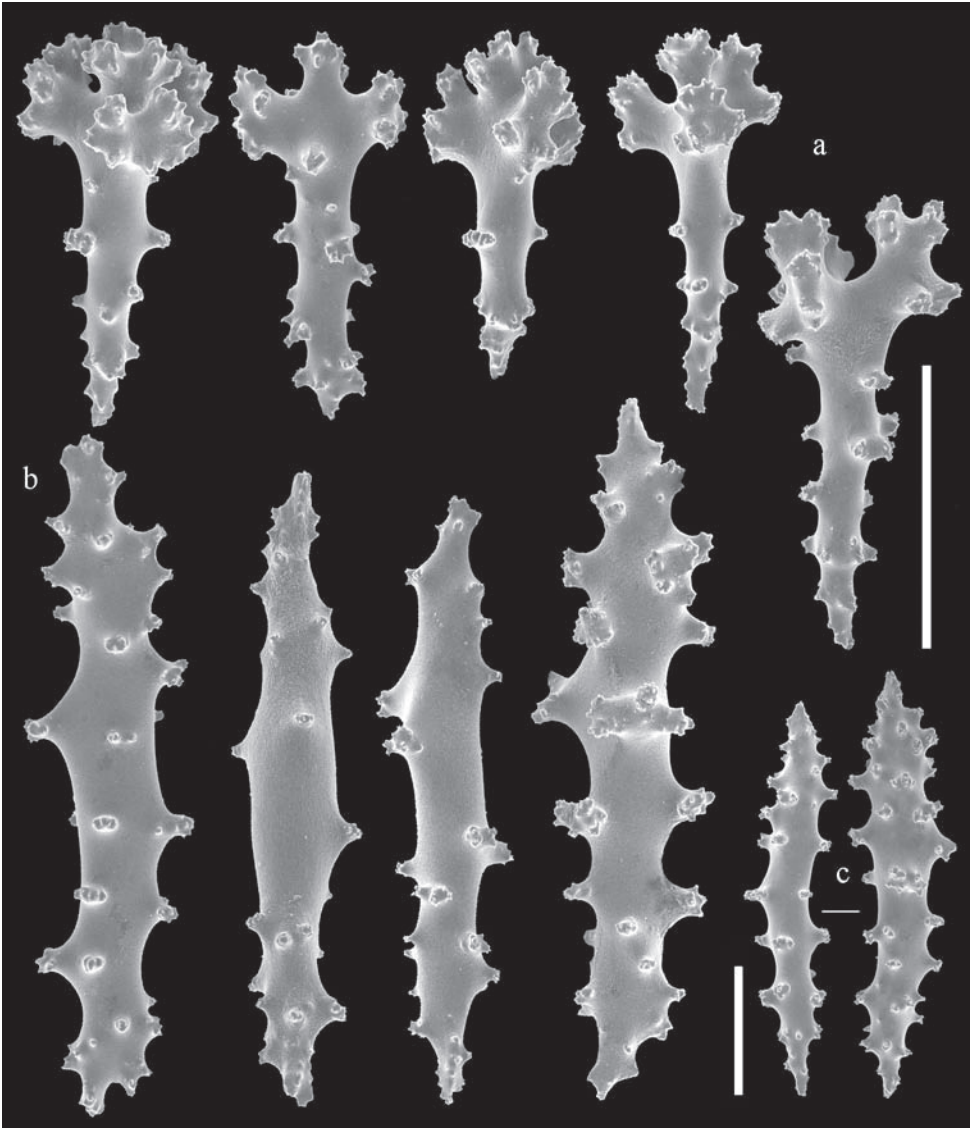


Fig. 3. *Sinularia bremerensis* spec. nov., holotype NTM C14488; sclerites of surface layer of the top of the colony; a, clubs; b-c, spindles. Scales 0.10 mm (that at c only applies to c).

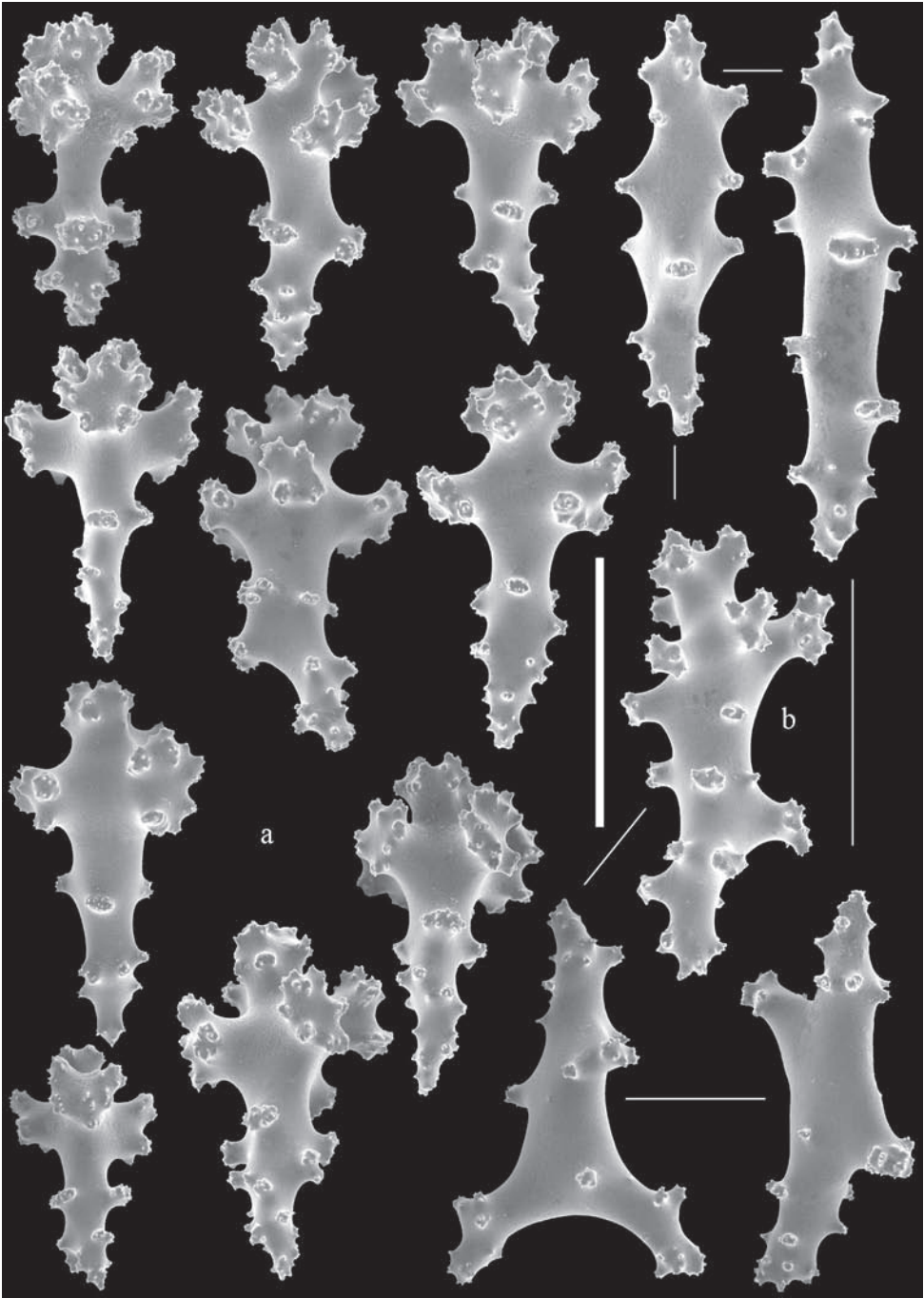


Fig. 4. *Sinularia bremerensis* spec. nov., holotype NTM C14488; sclerites of surface layer of the base of the colony; a, clubs; b, spindles. Scale 0.10 mm.

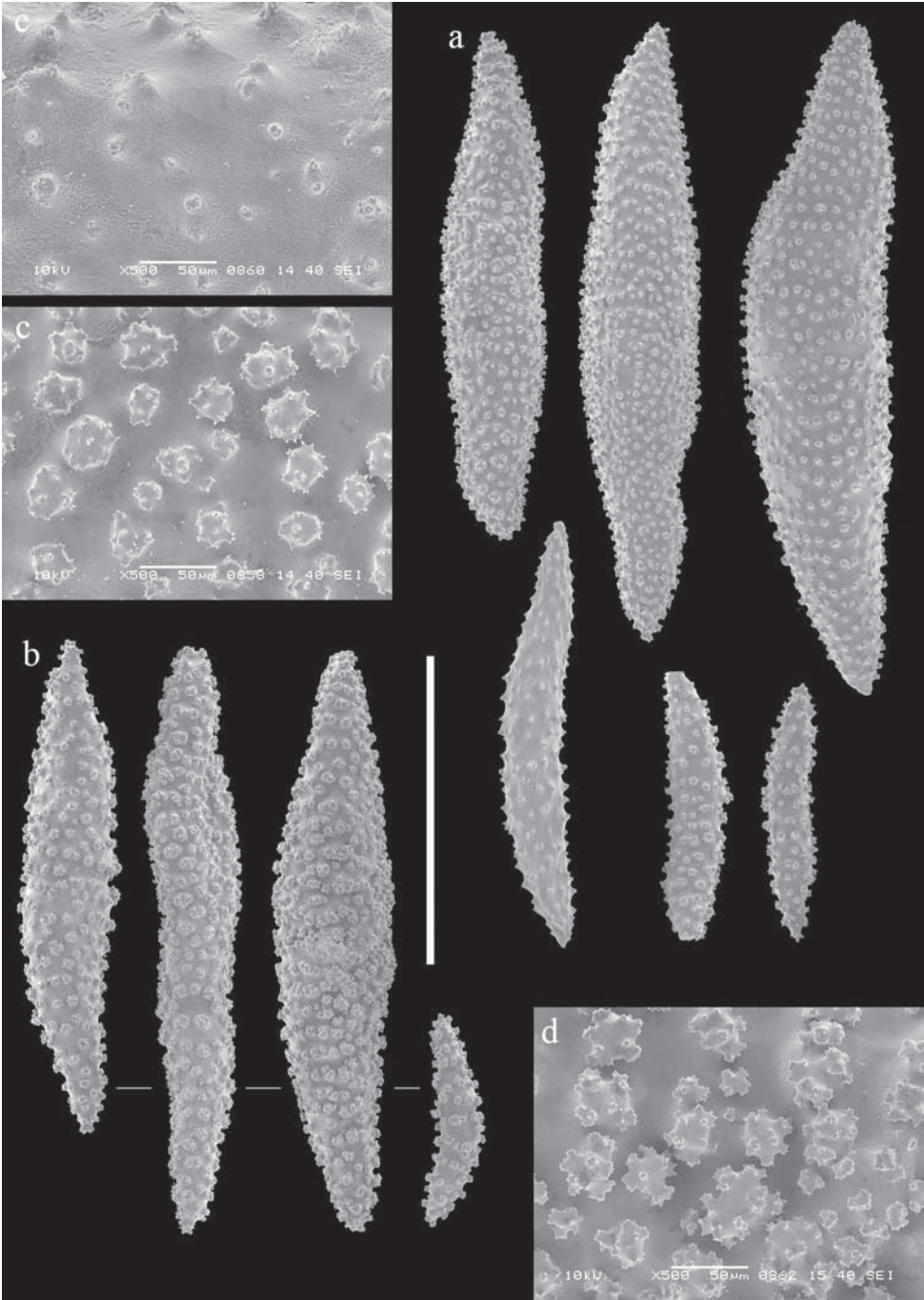


Fig. 5. *Sinularia bremerensis* spec. nov., holotype NTM C14488; a, spindles of interior of top of colony; b, spindles of interior of base; c-d, tubercles on spindles; c, of top of colony; d, of base of colony. Scale between a and b is 1 mm; it applies to a-b.



Fig. 6. *Sinularia confusa* spec. nov., holotype NTM C14456; sclerites of surface layer of the top of the colony; a, clubs; b, rod-like sclerites. Scale 0.10 mm.



Fig. 7. *Sinularia confusa* spec. nov., holotype NTM C14456; sclerites of surface layer of the top of the colony; a, clubs; b, spindles. Scale 0.10 mm.

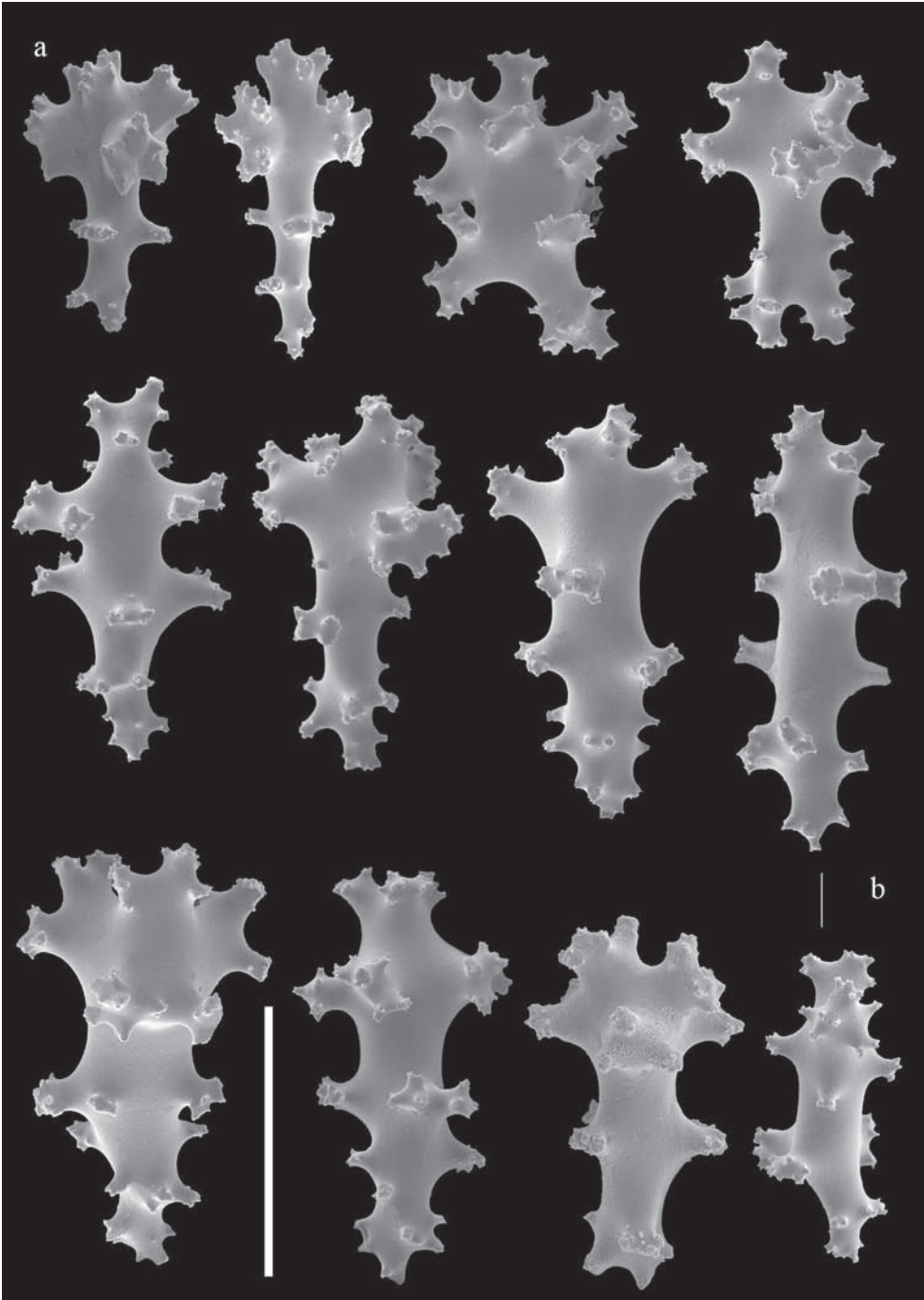


Fig. 8. *Sinularia confusa* spec. nov., holotype NTM C14456; sclerites of surface layer of the base of the colony; a, clubs; b, spindles. Scale 0.10 mm.

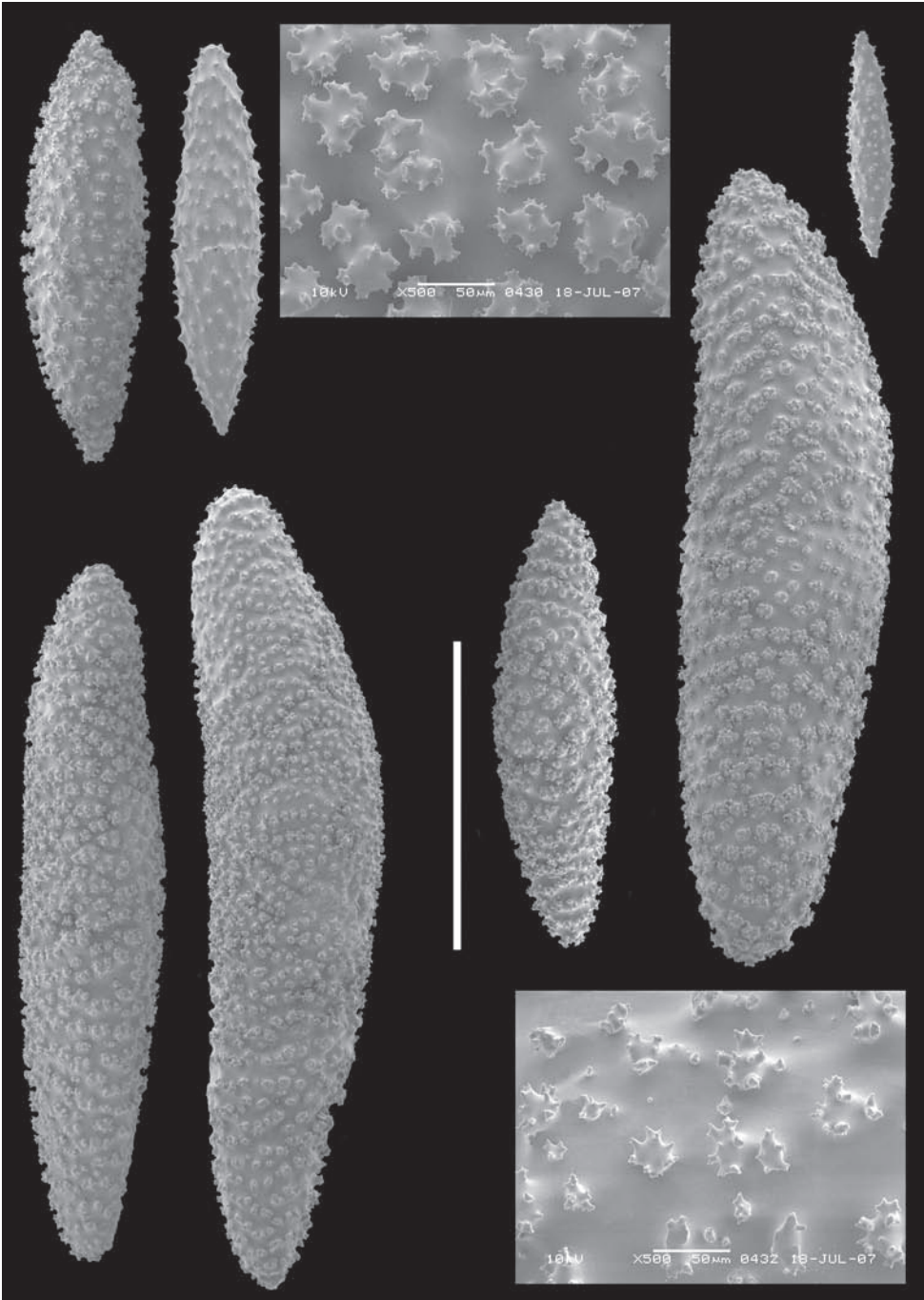


Fig. 9. *Sinularia confusa* spec. nov., holotype NTM C14456; spindles of interior of base of colony and tubercles on spindles. Scale of 1 mm only applies to the spindles.

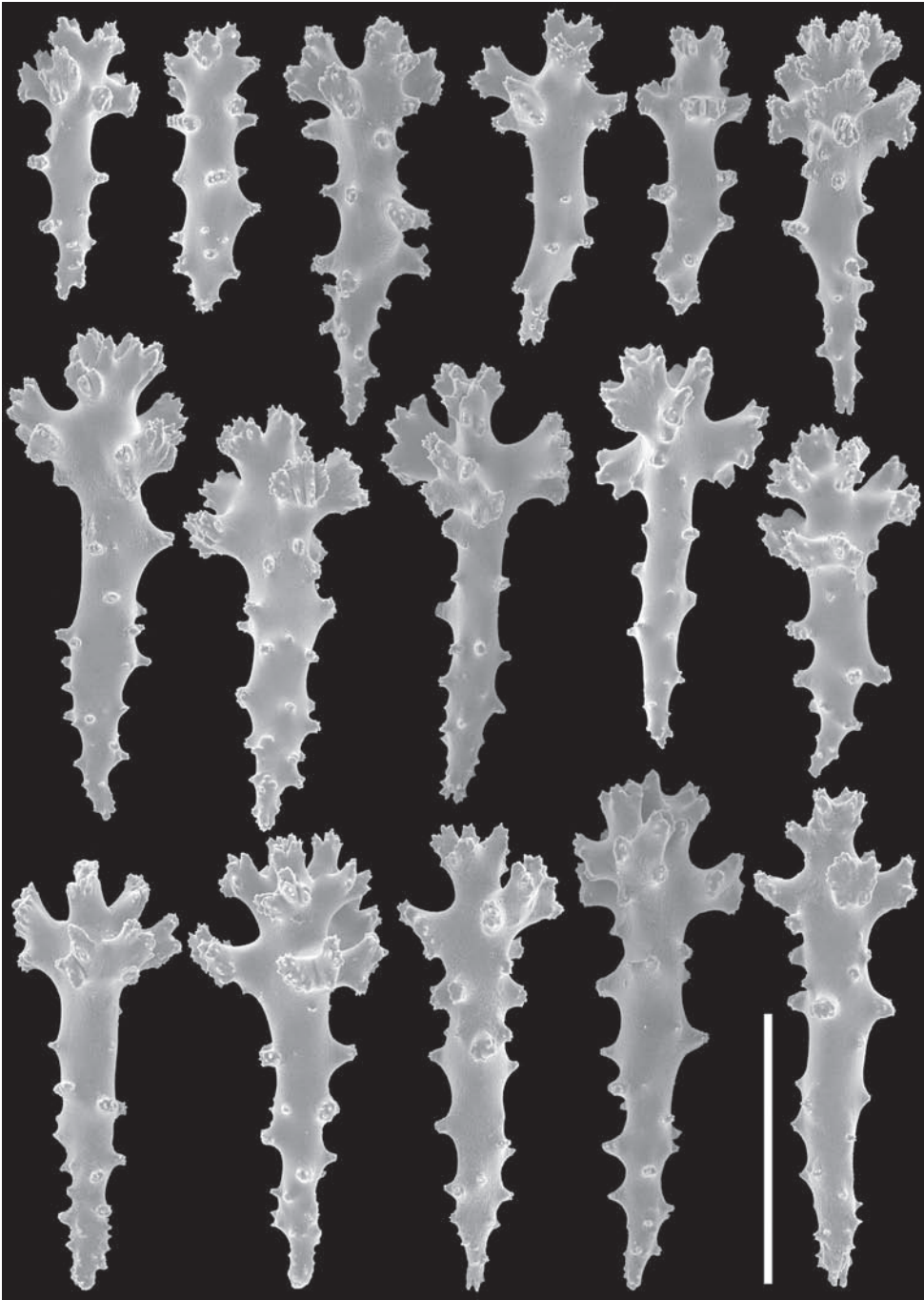


Fig. 10. *Sinularia diffusa* spec. nov., holotype NTM C14457; clubs of surface layer of the top of the colony. Scale 0.10 mm.

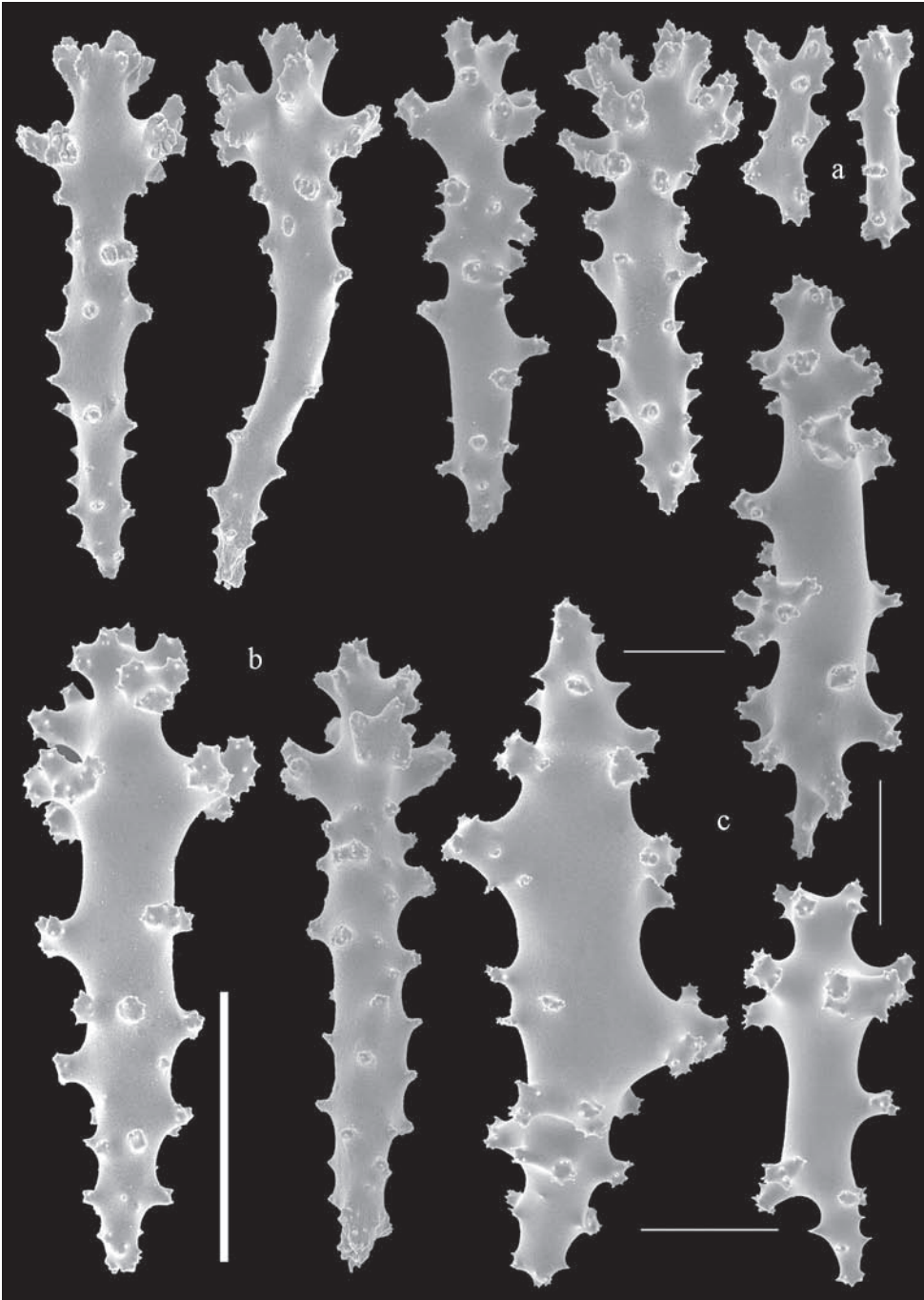


Fig. 11. *Sinularia diffusa* spec. nov., holotype NTM C14457; sclerites of surface layer of the top of the colony; a, rod-like sclerites; b, clubs; c, spindles. Scale 0.10 mm.

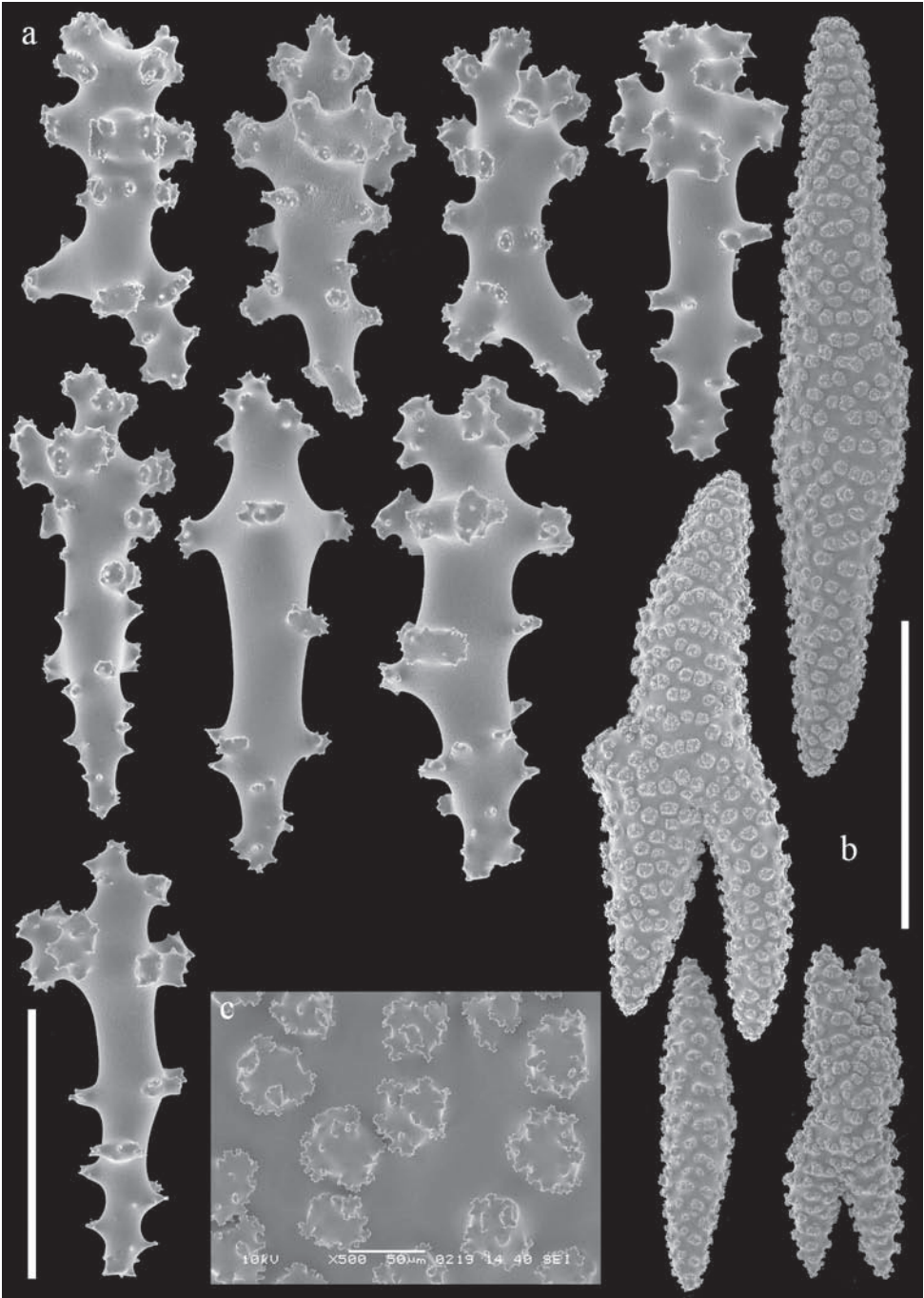


Fig. 12. *Sinularia diffusa* spec. nov., holotype NTM C14457; a, sclerites of surface layer of the base of the colony; b, spindles of interior of base of colony; c, tubercles on spindle. Scale at a 0.10 mm, at b 1 mm.



Fig. 13. *Sinularia diffusa* spec. nov., holotype NTM C14457; spindles of interior of top of colony. Scale 1 mm.

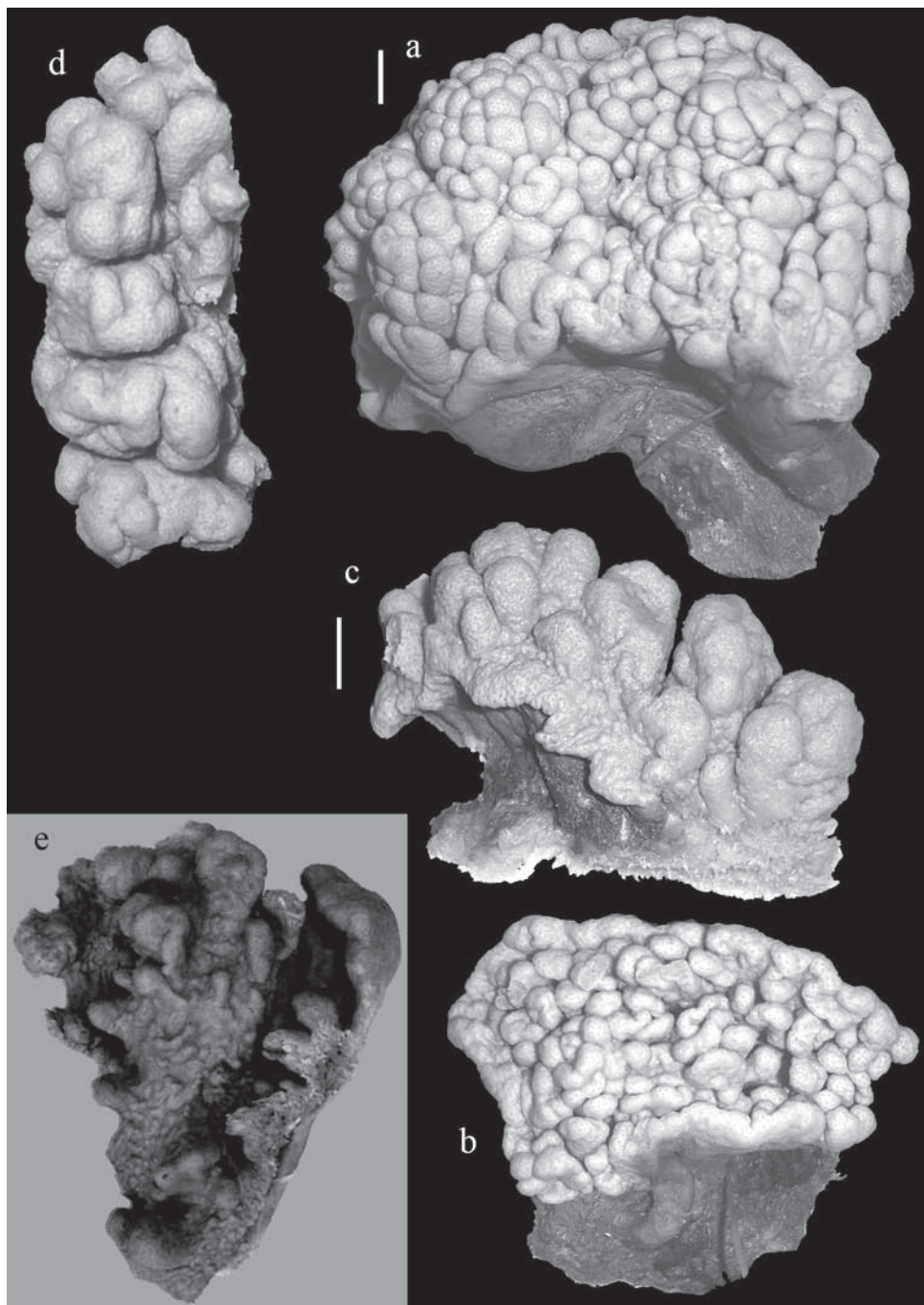


Fig. 14a. *Sinularia diffusa* spec. nov., paratype NTM C14464, lateral view; b, *S. linnei* spec. nov., holotype NTM C14480, view from above; c-d, *S. papula* spec. nov., holotype NTM C14527, c, lateral view, d, view from above; e, *S. woodyensis* spec. nov., holotype NTM C14557, lateral view. Scales 1 cm (that at a also applies to b).

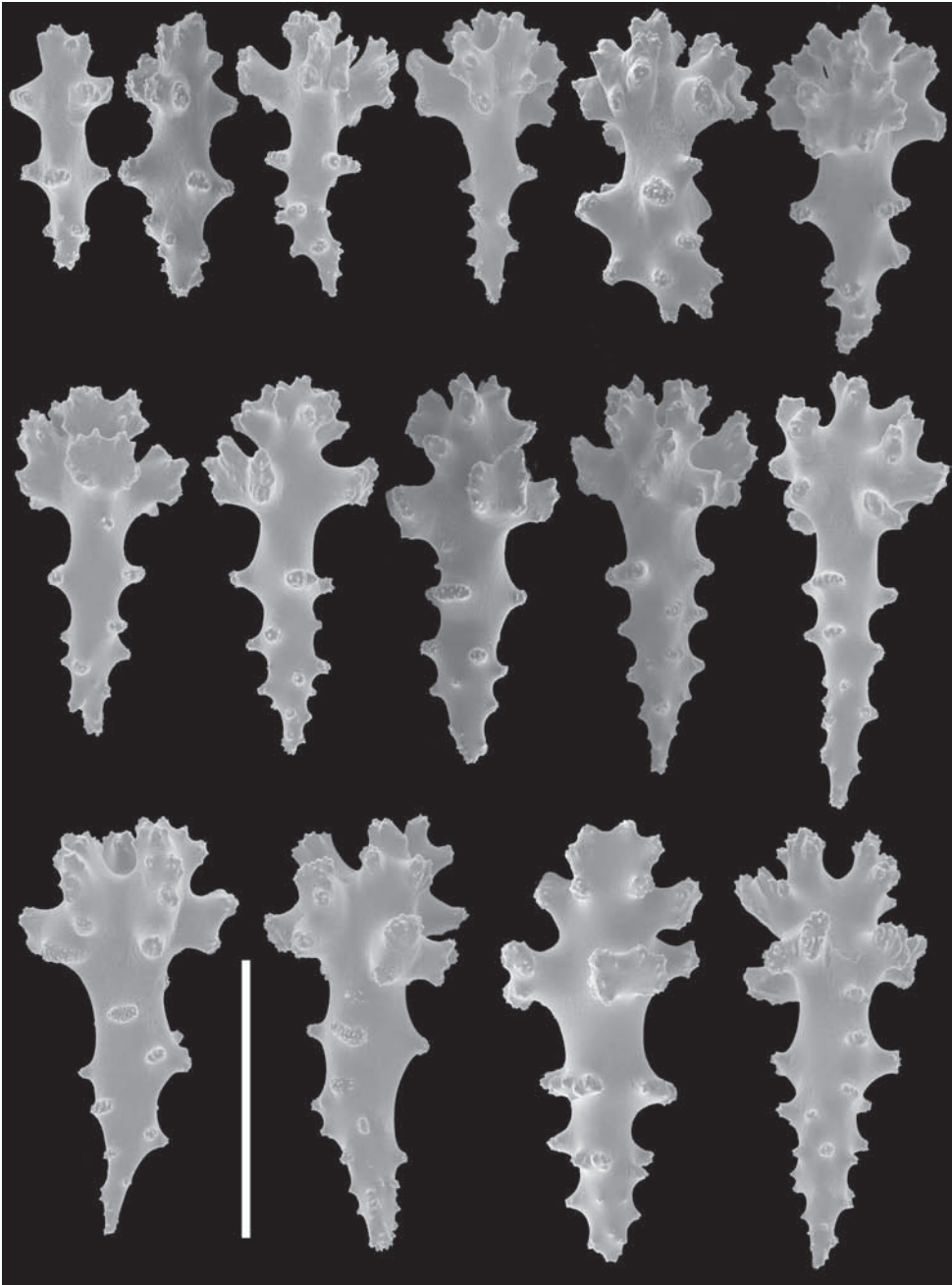


Fig. 15. *Sinularia linnei* spec. nov., holotype NTM C14480; clubs of surface layer of the top of the colony. Scale 0.10 mm.

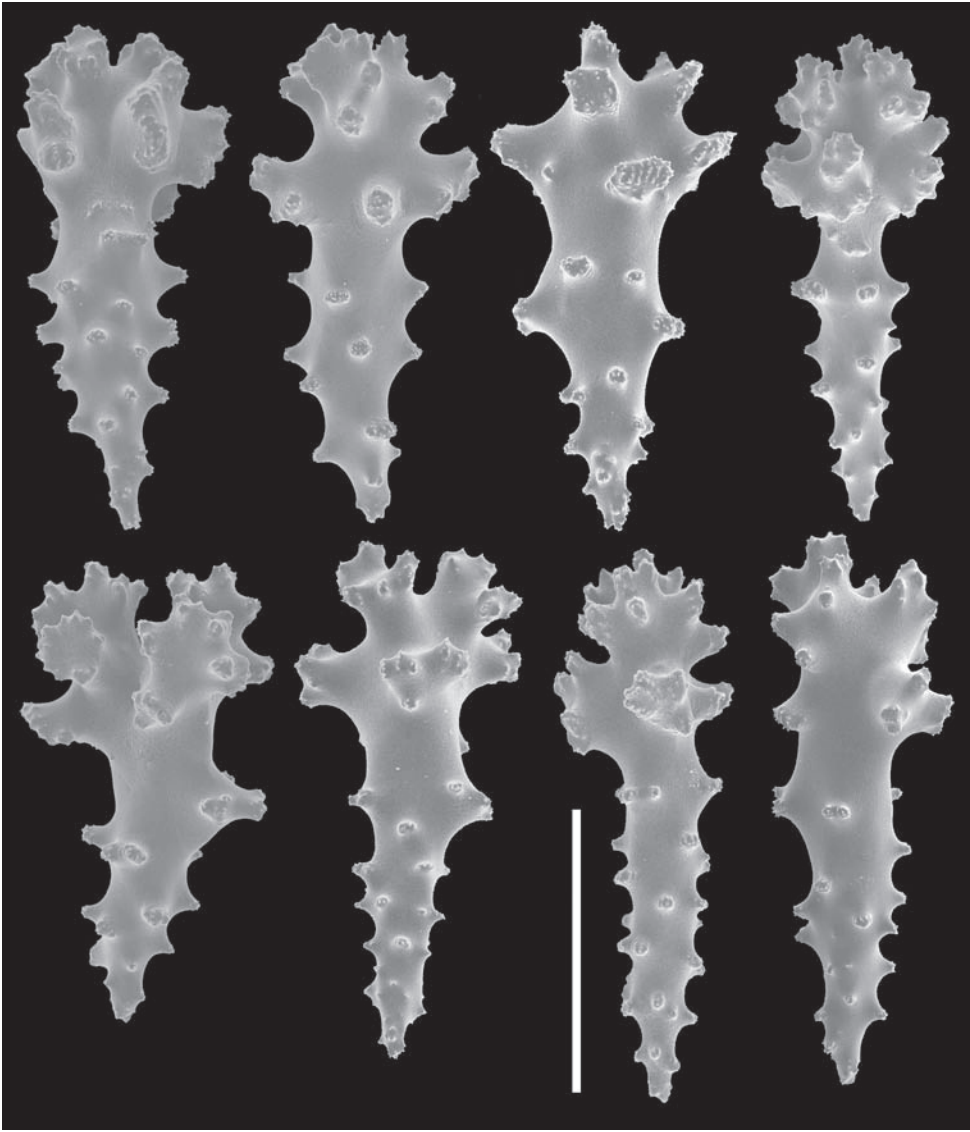


Fig. 16. *Sinularia linnei* spec. nov., holotype NTM C14480; clubs of surface layer of the top of the colony. Scale 0.10 mm.

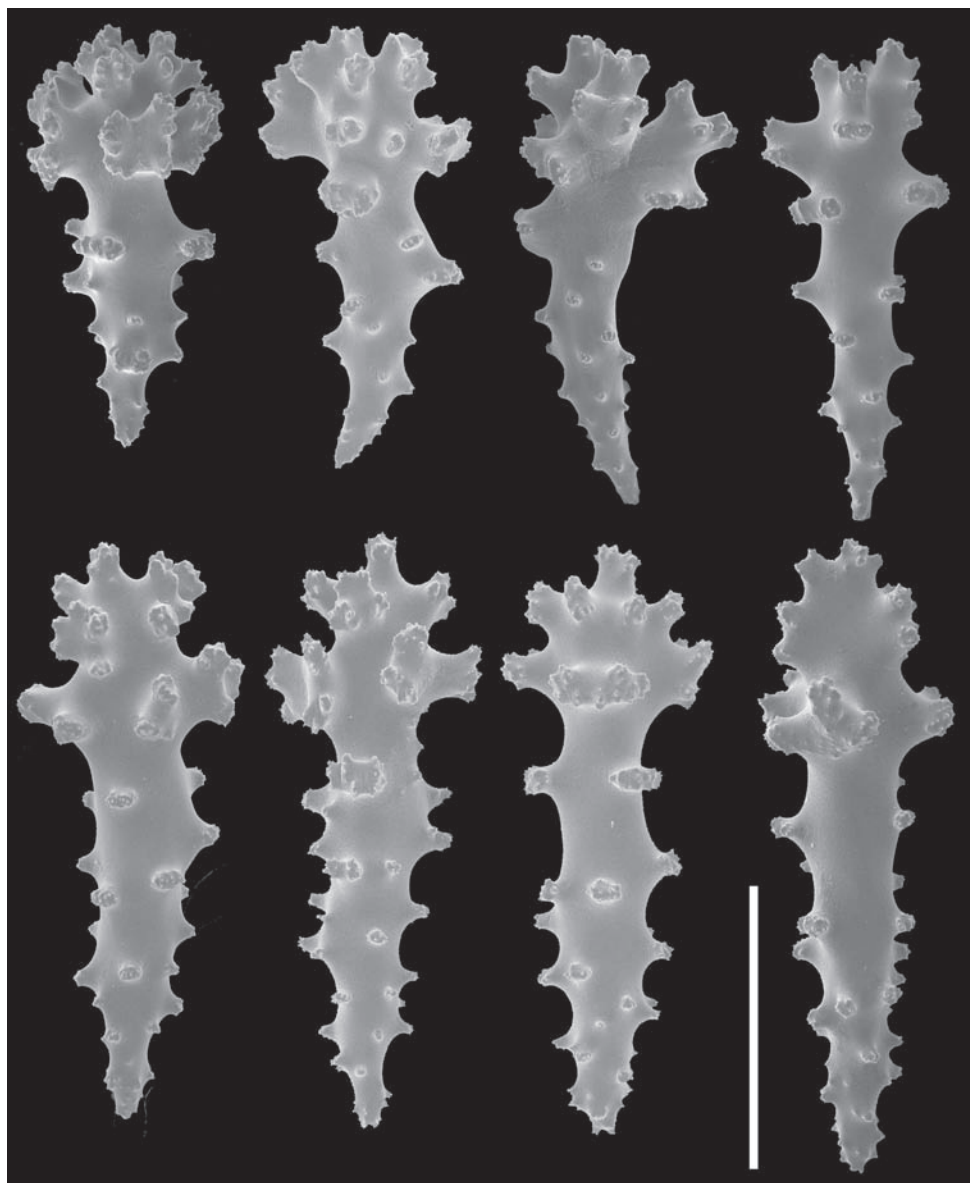


Fig. 17. *Sinularia linnei* spec. nov., holotype NTM C14480; clubs of surface layer of the top of the colony. Scale 0.10 mm.

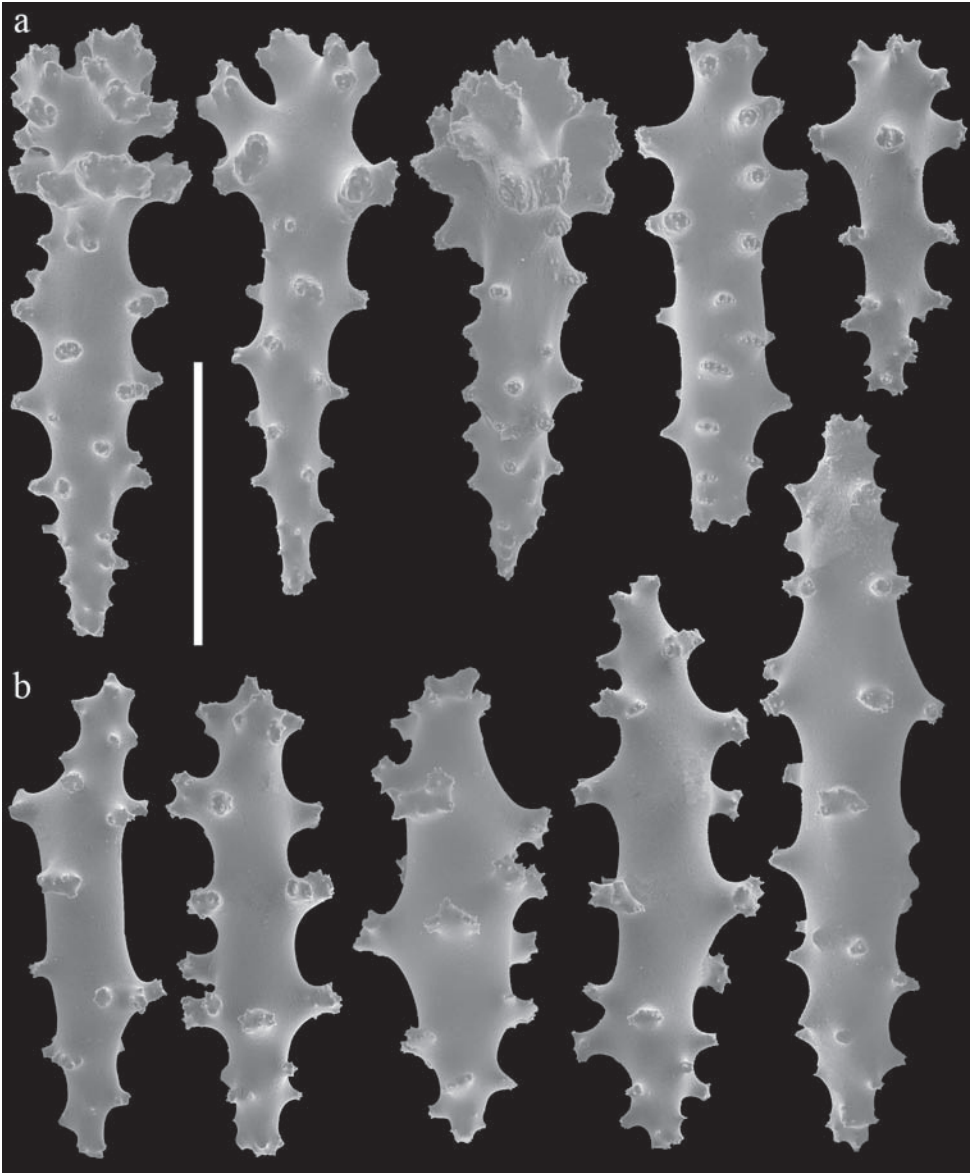


Fig. 18. *Sinularia linnei* spec. nov., holotype NTM C14480; sclerites of surface layer of the top of the colony; a, clubs; b, spindles. Scale 0.10 mm.

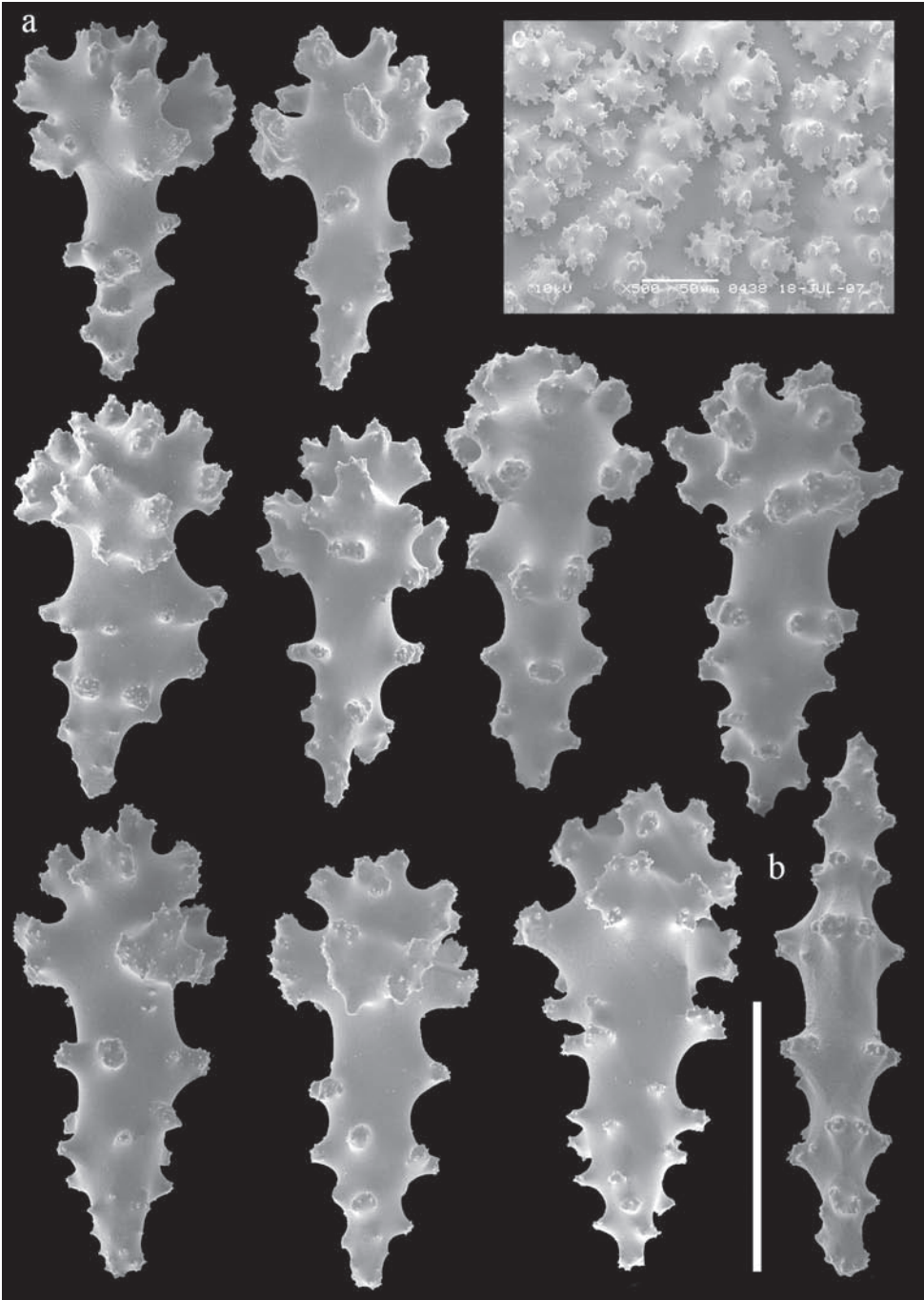


Fig. 19. *Sinularia linnei* spec. nov., holotype NTM C14480; a-b, sclerites of surface layer of the base of the colony; a, clubs; b, spindle; c, tubercles on spindle of interior. Scale 0.10 mm, applies to a-b.

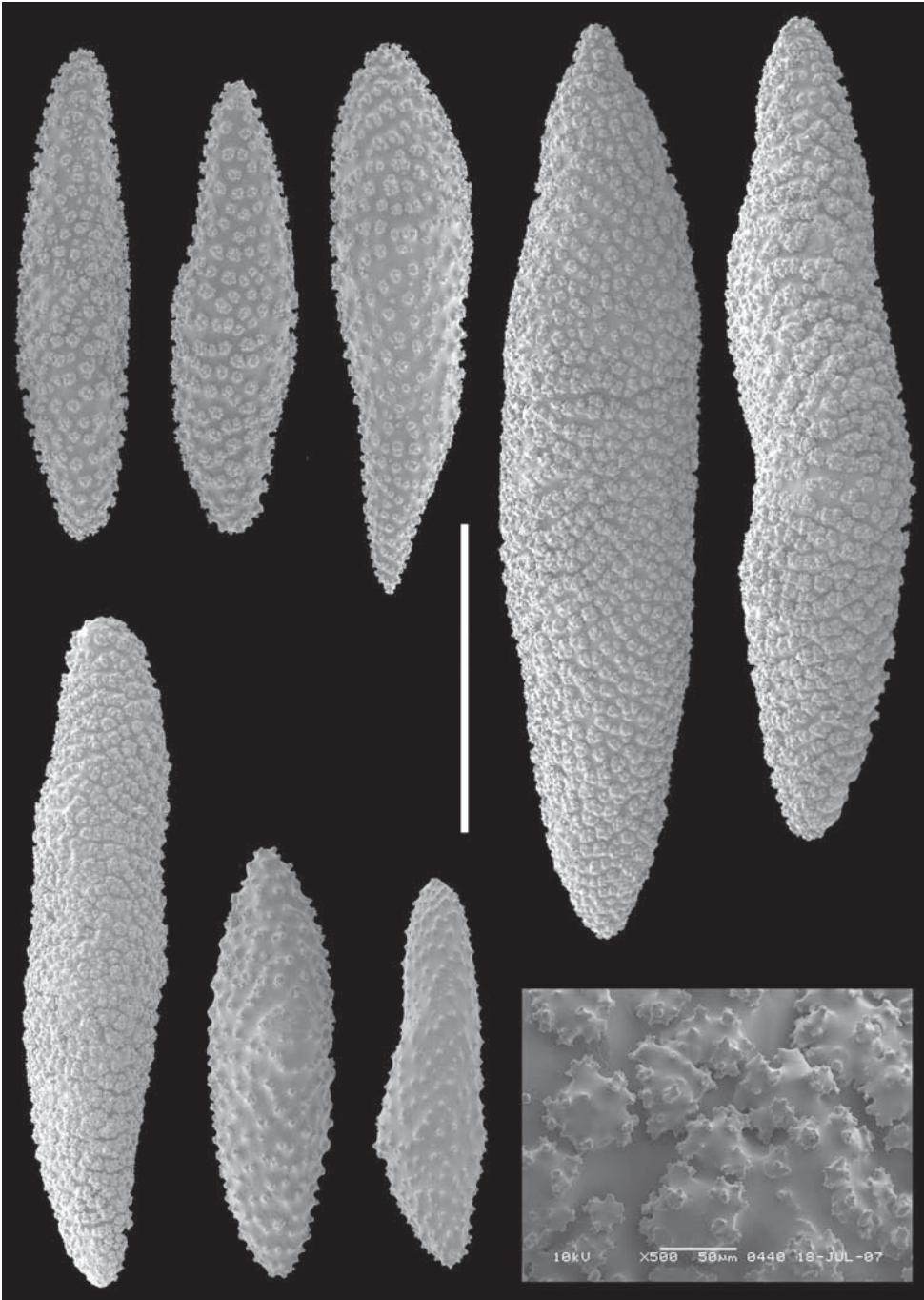


Fig. 20. *Sinularia linnei* spec. nov., holotype NTM C14480; spindles of interior of colony and tubercles on spindles. Scale 1 mm only applies to spindles.

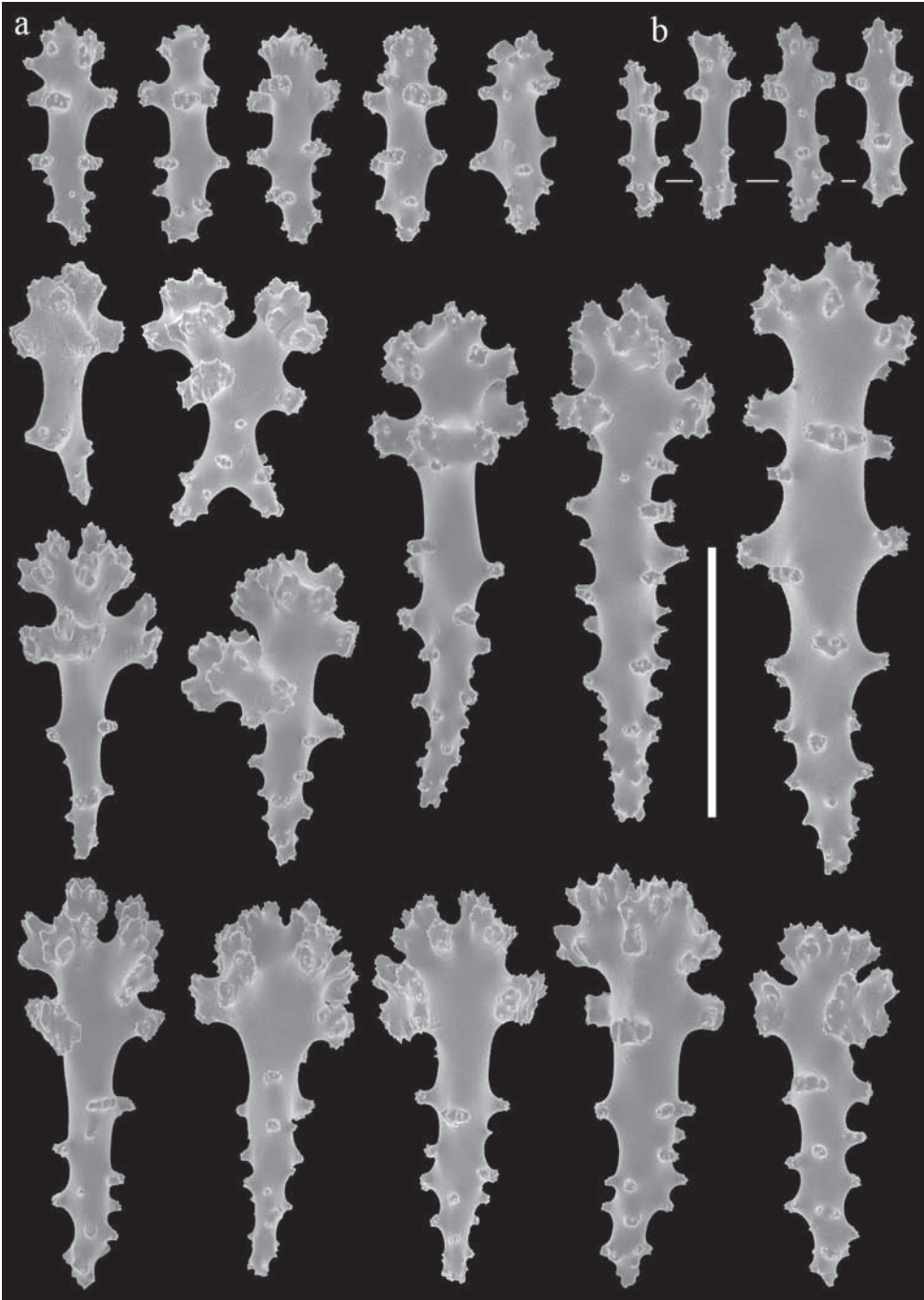


Fig. 21. *Sinularia papula* spec. nov., holotype NTM C14527; sclerites of surface layer of the top of the colony; a, clubs; b, rods. Scale 0.10 mm.

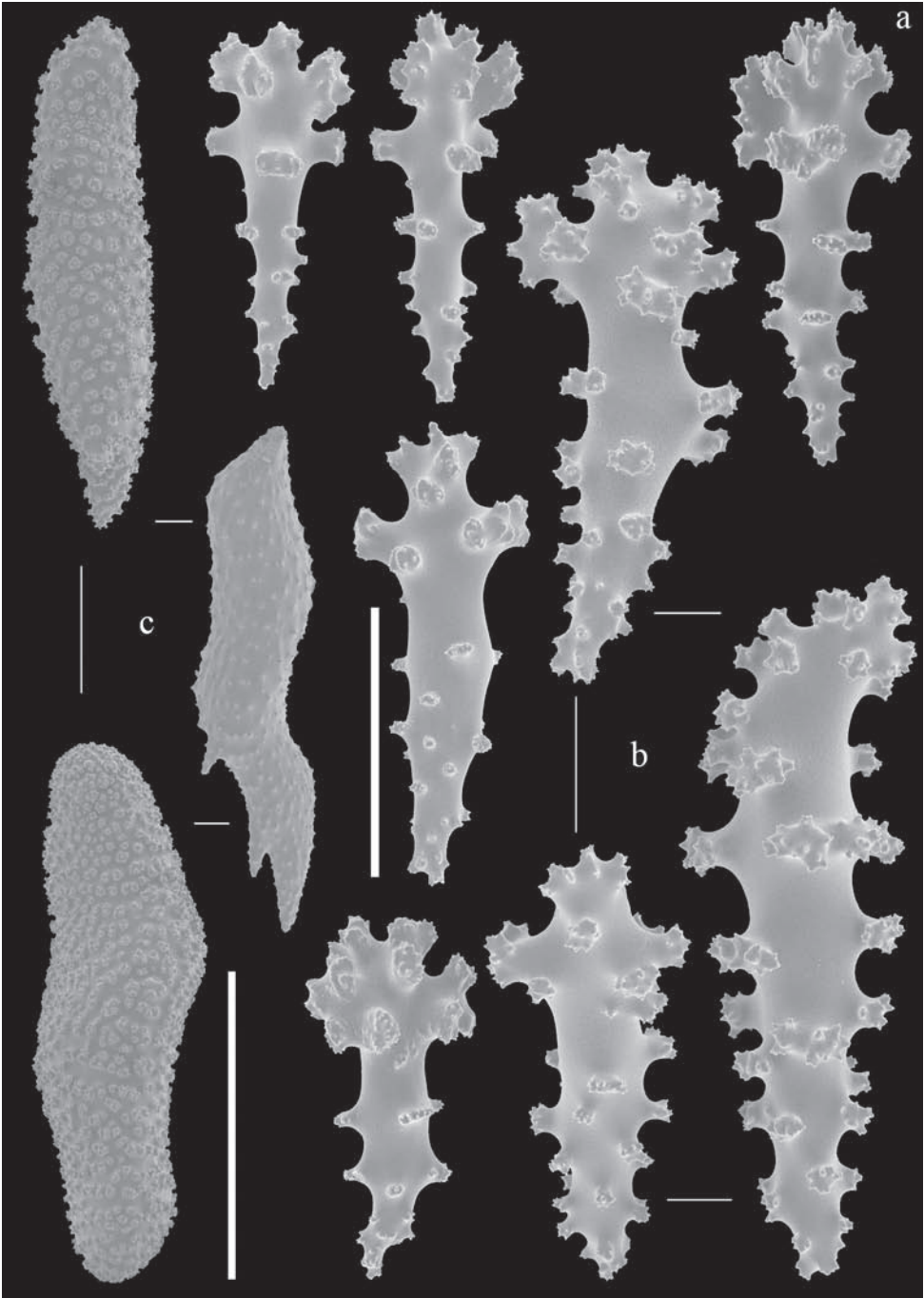


Fig. 22. *Sinularia papula* spec. nov., holotype NTM C14527; a-b, sclerites of surface layer of the top of the colony; a, clubs; b, intermediates between clubs and spindles; c, spindles of interior of top of colony. Scale at c 1 mm, that at a 0.10 mm, also applies to b.

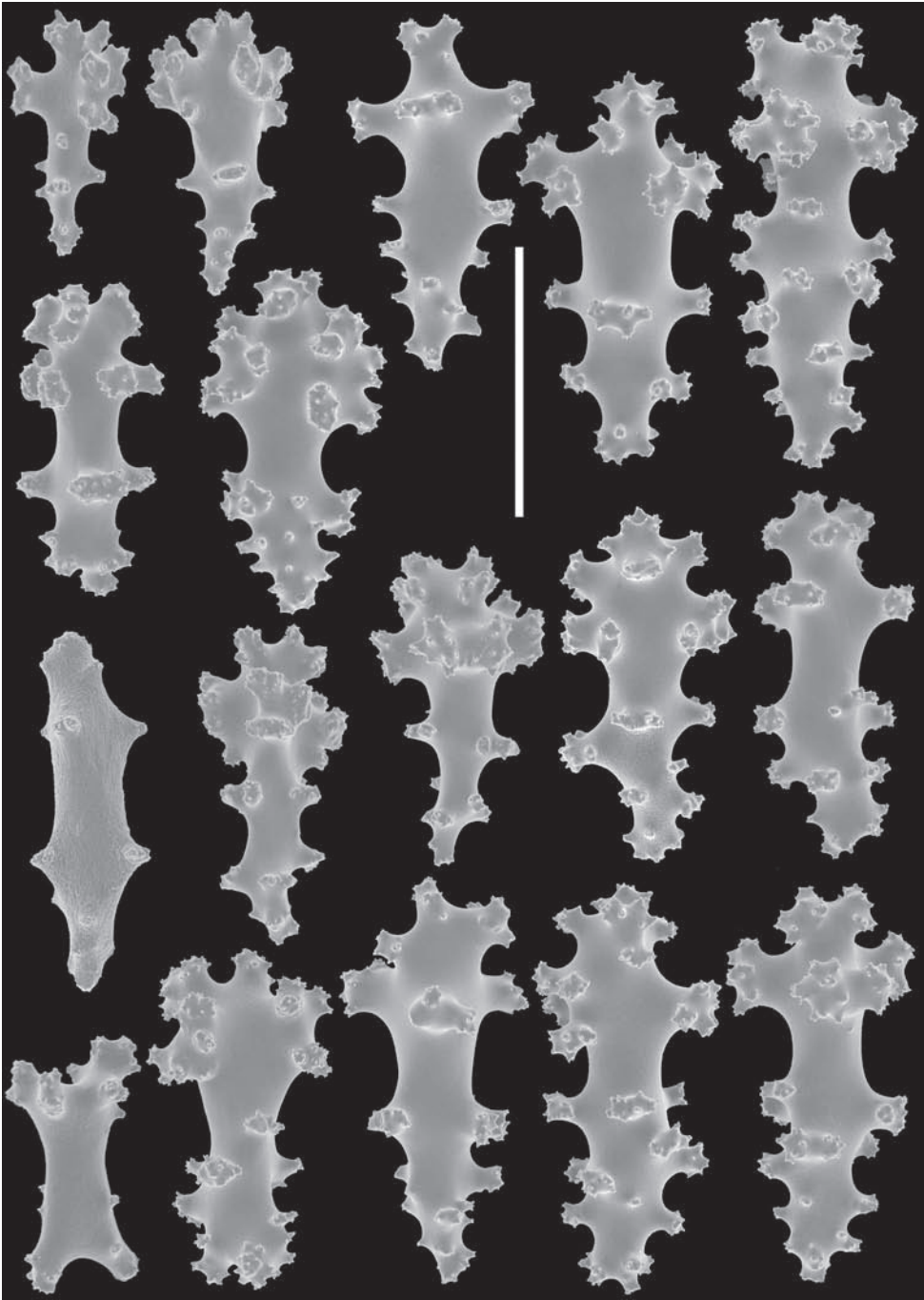


Fig. 23. *Sinularia papula* spec. nov., holotype NTM C14527; sclerites of surface layer of the base of the colony. Scale 0.10 mm.

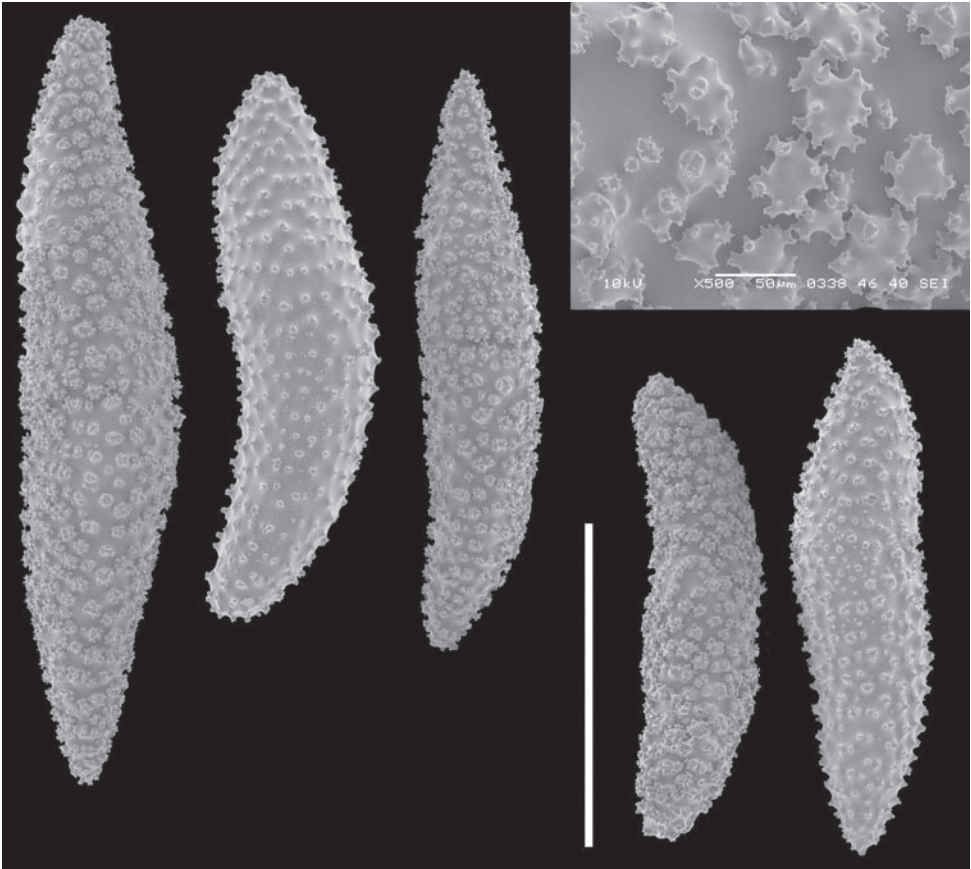


Fig. 24. *Sinularia papula* spec. nov., holotype NTM C14527; spindles of interior of colony and tubercles on spindle. Scale 1 mm only applies to spindles.

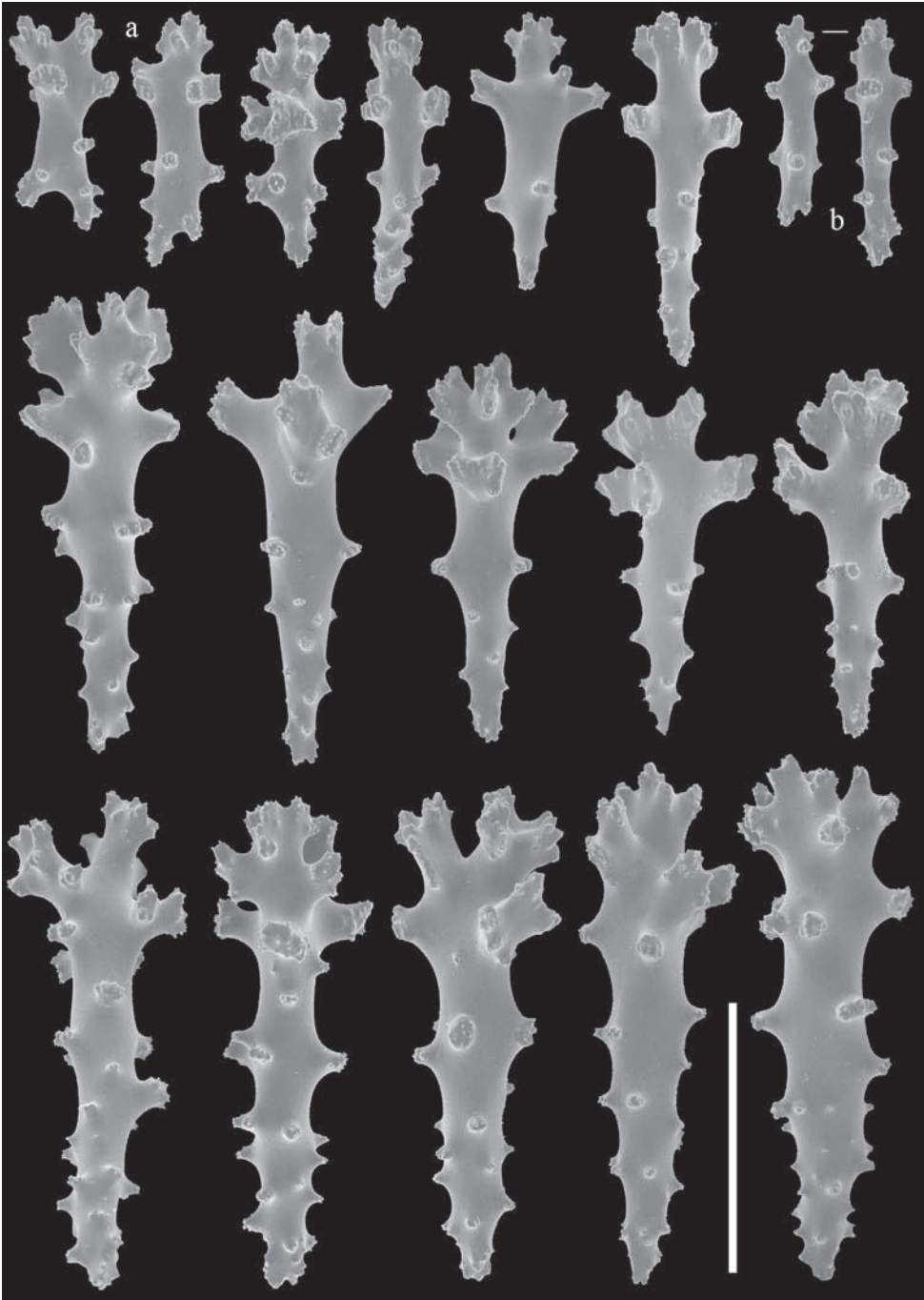


Fig. 25. *Sinularia wooddyensis* spec. nov., holotype NTM C14557; sclerites of surface layer of the top of the colony; a, clubs; b, rod-like sclerites. Scale 0.10 mm.

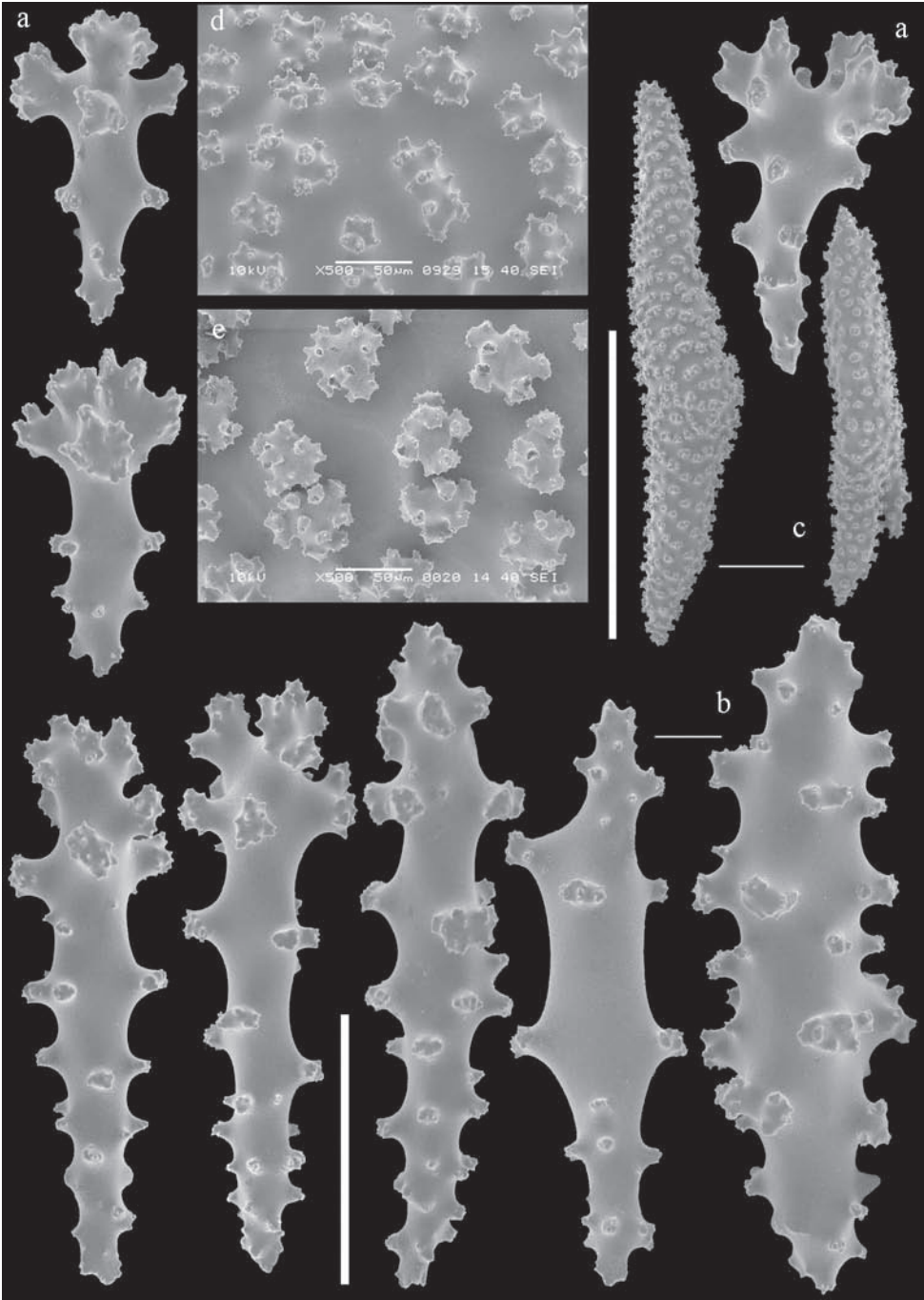


Fig. 26. *Sinularia woodyensis* spec. nov., holotype NTM C14557; a-b, sclerites of surface layer of the top of the colony; a, clubs; b, spindles; c, spindles of interior of top of colony; d, tubercles on spindle of interior of top of colony; e, tubercles on spindle of interior of base of colony. Scale at a 0.10 mm, also applies to b; scale at c 1 mm, only applies to c.

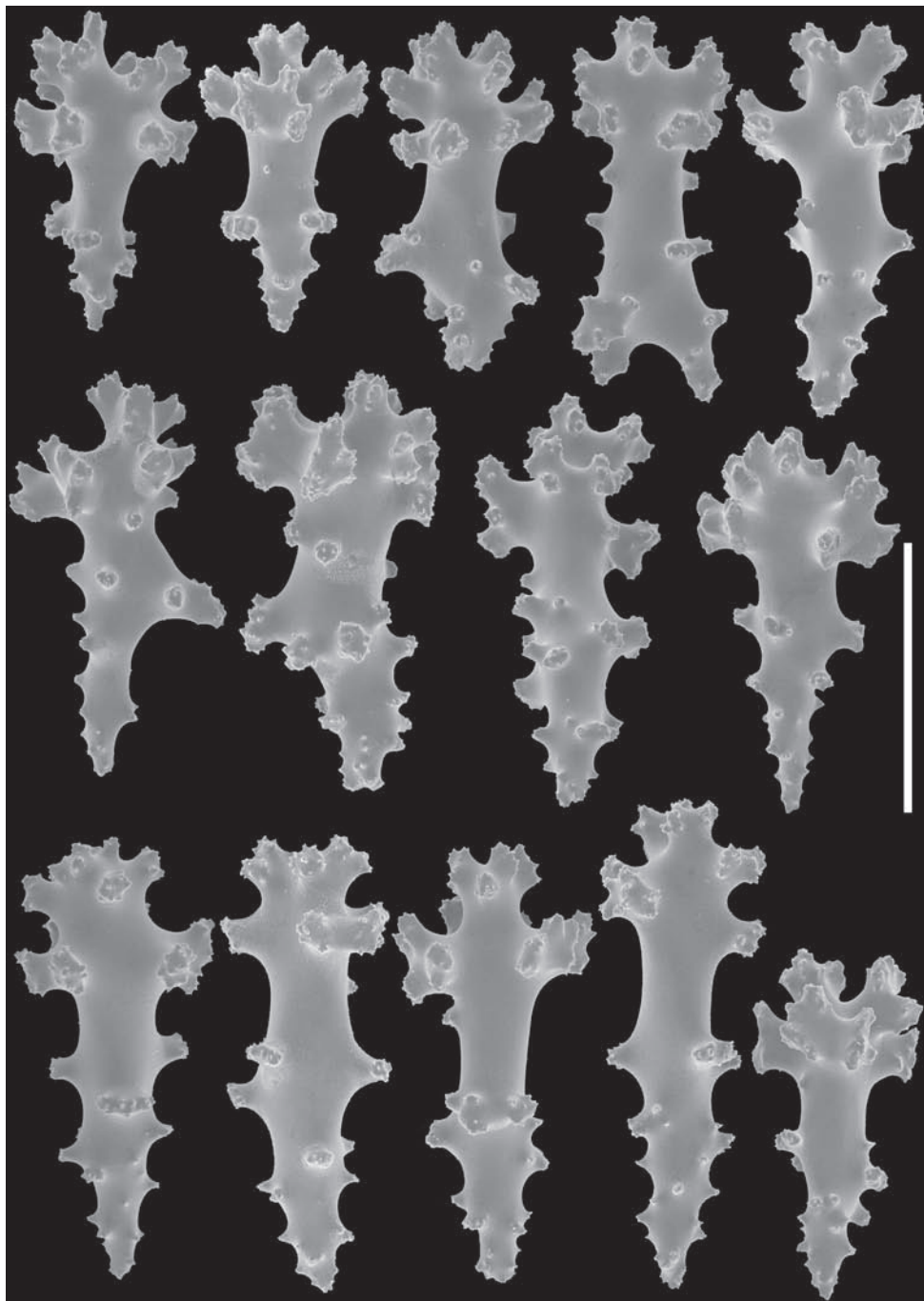


Fig. 27. *Sinularia woodyensis* spec. nov., holotype NTM C14557; clubs of surface layer of the base of the colony. Scale 0.10 mm.

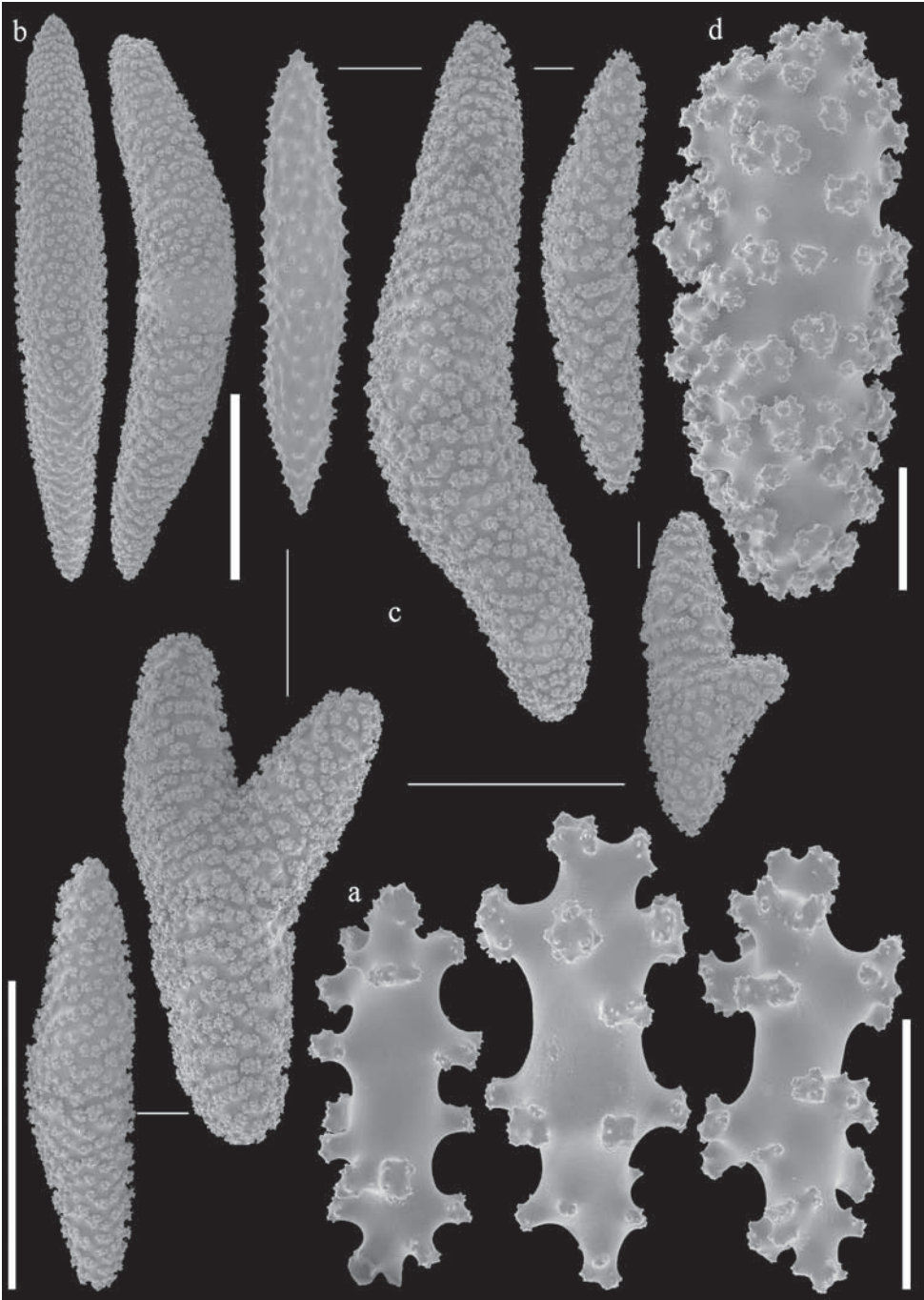


Fig. 28. *Sinularia woodyensis* spec. nov., holotype NTM C14557; a, spindles of surface layer of the base of the colony; b-d, spindles of interior of base of colony. Scales at a and d 0.10 mm, at b 1 mm, also applies to c.

