Klyxum adii spec. nov. (Octocorallia: Alcyonacea) from Kenya

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Key words: Alcyoniidae; Cnidaria; Indian Ocean; new species.
A new species of *Klyxum* from Kenya, *K. adii*, is described and depicted. Its unique features include an encrusting growth form, short lobes, which are knob-shaped or flattened-laterally low crests and large branched spindles, thus making it different from the previously described *Klyxum* species.

Introduction

During the years 2000-2004 several field trips were carried out to the coral reefs of Kenya and a comprehensive octocoral survey was conducted there. A large number of specimens was collected, among which a new species of *Klyxum* Alderslade, 2000 was found. This species is described and depicted below.

Material and methods

During the survey collections were conducted in a large variety of reef sites in Kenya from Watamu (3°21'S, 40°1'E) in the north to Kitungamwe (40°42'S, 39°21'E) in the south (fig. 1). The reef sites were mostly reached by boat, a careful examination of a variety of niches was carried out by scuba diving to a maximal depth of 32 m. The collection sites of the currently described new species are presented in fig. 1. Prior collection the colonies were photographed *in situ*. Due to shortage in preservatives, samples were frozen to -18°C and then air-transported to Tel Aviv University (TAU), where they were transferred to 70% alcohol. Sclerites were obtained by dissolving the tissues in 10% sodium hypochlorite, and prepared for scanning electron microscopy as follows: the sclerites were carefully rinsed with double-distilled water, dried at room temperature, coated with gold, and then examined with a Jeol 840A electron microscope operated at 25 kV. The holotype is deposited in the Zoological Museum, Department of Zoology, Tel Aviv University, Israel (ZMTAU). The paratypes are deposited at ZMTAU and at the Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH).

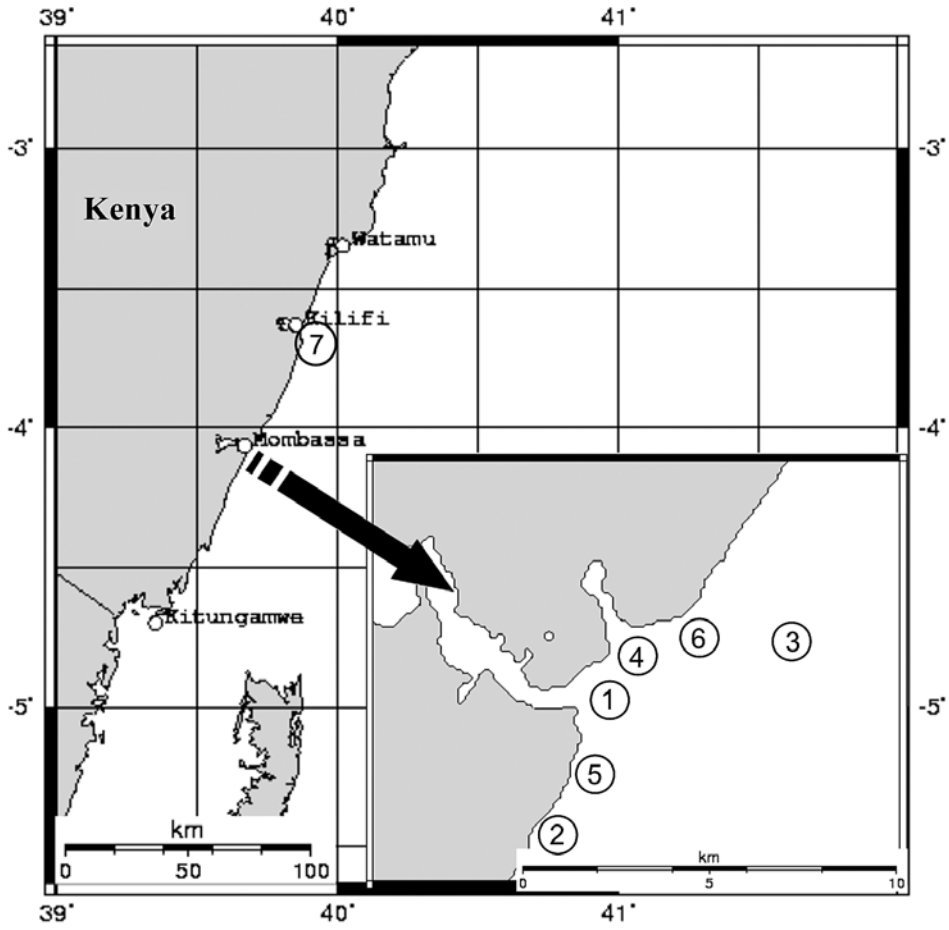


Fig. 1. Map of the collection sites of *Klyxum adii* spec. nov. in Kenya. 1. Mombasa, off Likoni, Shelly Beach (Turning Buoy); 2. Mombasa, off Likoni, Shelly Beach; 3. Off Mombasa, Nyali; 4. Mombasa, off Likoni (Wall reef); 5. Mombasa, Likoni, Shelly Beach; 6. Mombasa, off Likoni, (near Wall reef); 7. Kilifi mooring. Inset shows Mombasa area with six collection sites.

Systematic part

Family Alcyoniidae Lamouroux, 1812
Genus *Klyxum* Alderslade, 2000
Klyxum adii spec. nov.
(figs 2-6)

Material examined.— Holotype and two microscope slides, ZMTAU Co 30467, Kenya, Mombasa, off Likoni, Shelly Beach (Turning Buoy), 04°05'S, 39°41'E, 11-13 m, 28.i.2000; 14 paratypes: ZMTAU Co 30434 (two colonies), RMNH Coel. 39516, Kenya, Mombasa, off Likoni, Shelly Beach, 04°07'S, 39°40'E, 13-14 m, 26.i.2000; ZMTAU Co 30459 Kenya, Mombasa, off Likoni, Shelly Beach (Turning Buoy), 04°05'S,

39°41'E, 11-13 m, 28.i.2000; ZMTAU Co 31510, Kenya, off Mombasa, Nyali, 04°04'S, 39°43'E, 11-15 m, 1.iii.2002; ZMTAU Co 31528 (four colonies), Kenya, Mombasa, off Likoni (Wall reef), 04°06'S, 39°41'E, 16-17 m, 28.ii.2002; ZMTAU Co 32636 Kenya, Mombasa, off Likoni, Shelly Beach, 4°06'S, 39°41'E, 9 m, 8.ii.2003; ZMTAU Co 32637 (two colonies), Kenya, Kilifi mooring, 03°38'S, 39°52'E; 17 m, 9.ii.2003; ZMTAU Co 32645 (two colonies), Kenya, Mombasa, off Likoni, near Wall reef, 04°04'S, 39°42'E, 16-17 m, 28.ii.2002. All material was collected by Y. Benayahu and S. Perkol-Finkel.

Description.— The holotype is an encrusting colony with a maximum cross-section of 47 × 35 mm and a short stalk of 5-8 mm (fig. 2a). The polypary of the colony has short lobes, which are knob-shaped or flattened-laterally low crests. The preserved colony is rather flexible. The polyps appear to be retractile, but are noticeably deflated on the surface of the polypary. The surface of the polypary and the base has two types of sclerites, rod-like sclerites and spindles (fig. 3). The rods are 0.06-0.14 mm long (fig. 3a) with rugged surface and sparse tubercular sculpture (fig. 4). The tubercles are mostly truncate and few are cone-shaped. There are also some transitional forms between the long rod-like sclerites and the spindle-shaped ones, up to 0.20 mm long (fig. 3b). In addition, there are numerous spindles, up to 0.50 mm long, which are almost straight and feature sparse tubercular sculpture (fig. 3c). The interior of the polypary and the base contain similar spindles, but also larger ones, up to 14 mm long, with thorny sculpture (fig. 5); some possess short branches, arising from their end or along the sclerite (fig. 5b). These large spindles are mostly curved and occasionally posses narrow pointed ends.

Colour.— The preserved colony is beige. Zooxanthellae are found in the tissue, mainly in the polyps.

Living features.— The expanded polyps are medium to dark brown (fig. 6a), due to the abundant zooxanthellae, sometimes with a greenish tint, while the colony surface is light gray (fig. 6b-d). The colonies are usually roundish and quite small, mostly up to 50-80 mm in diameter. They were found growing in patches, and comprised a dozen or so colonies. When fully inflated they may touch each other and even overlap at their margins (fig. 6b-d).

Variation.— The paratypes differ only in size (fig. 2b-c) and possess the same sclerites as the holotype.

Etymology.— The species is named after the late Adi Zverdling who enthusiastically initiated the octocoral survey in Kenya and supplied tremendous help for its execution.

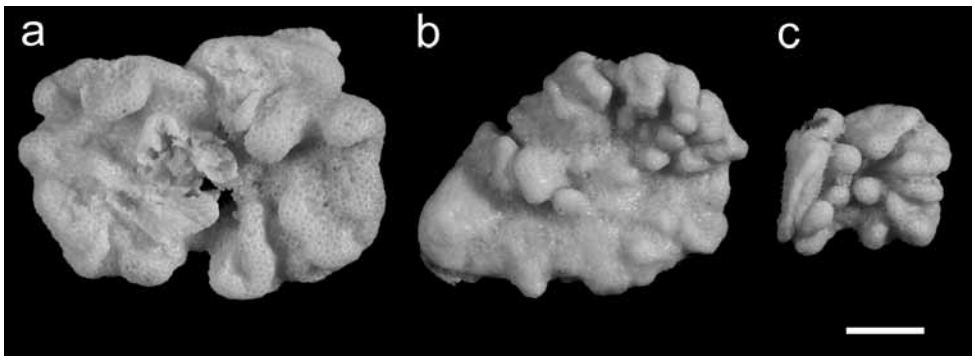


Fig. 2. *Klyxum adii* spec. nov., a, holotype ZMTAU Co 30467; paratypes b, c, ZMTAU Co 31528, scale 10 mm.

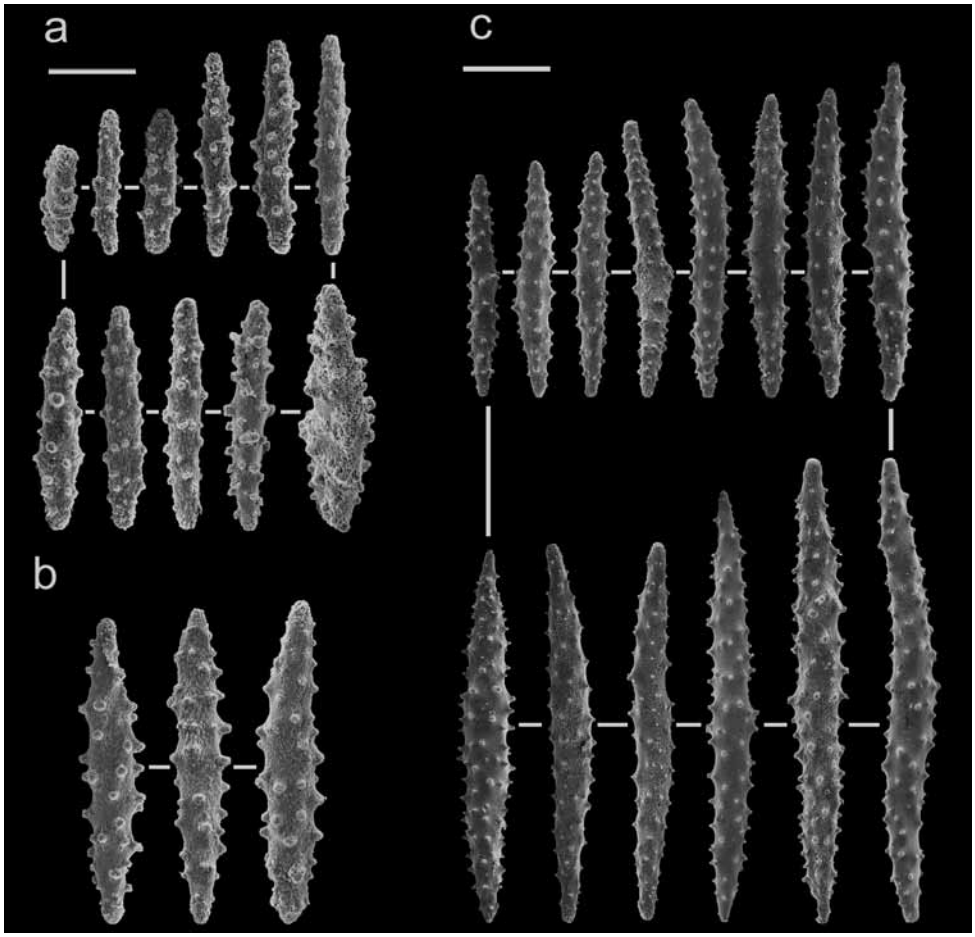
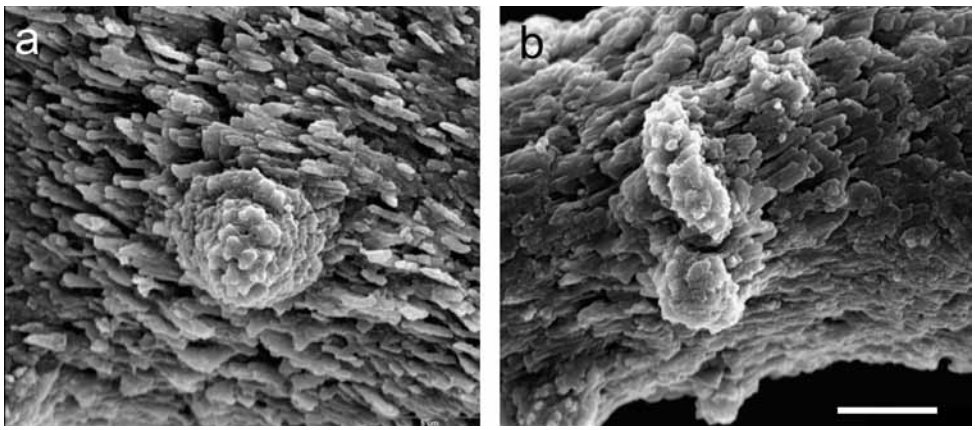


Fig. 3. *Klyxum adii* spec. nov., holotype ZMTAU Co 30467; sclerites of the surface layer of the polyparium; a, rods; b, transitional forms between rods and spindles, scale at a 0.05 mm, also applies to b; c, spindles, scale 0.10 mm.



Remarks.— The genus *Klyxum* was established by Alderslade (2000) to accommodate a number of species, previously wrongly assigned. *K. adii* spec. nov. demonstrates the major features of that genus, including non-retractile polyps, which according to Alderslade (2000) are considered as a diagnostic character. Furthermore, sequencing one of the paratypes (ZMTAU Co 32626) for both msh1 and COI genes revealed that both those genes are absolutely identical to other known *Klyxum* species, but clearly quite distinct from the related genus *Cladiella* Gray, 1869 (McFadden, pers. comm.).

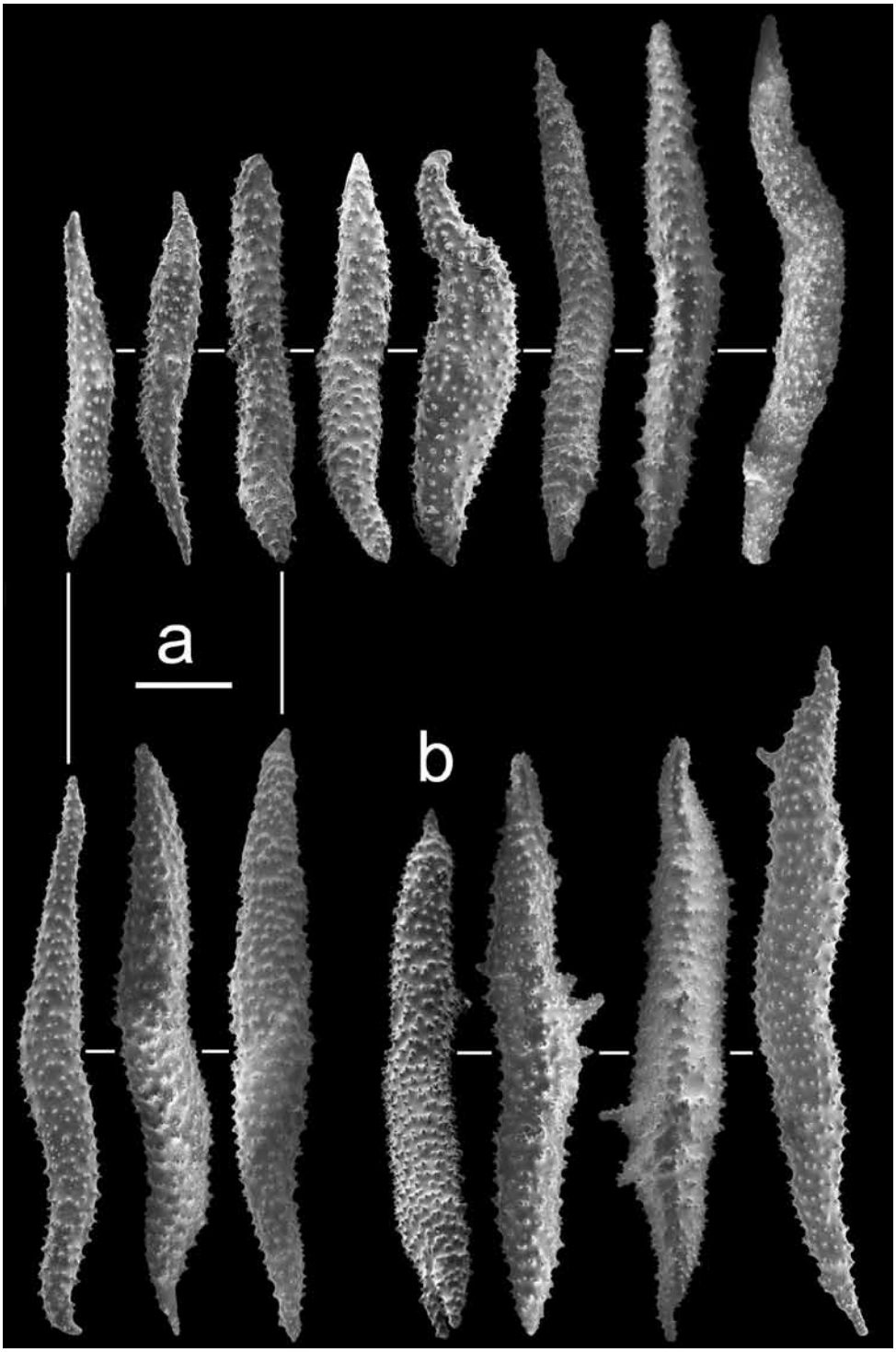
The living features of *K. adii* spec. nov. also resemble those mentioned by Fabricius & Alderslade (2001) for that genus. It should be indicated that living colonies of *K. adii* spec. nov. are not fleshy and soft as the congenerics (Alderslade, 2000; pers. obs.: *K. flaccidum* (Tixier-Durivault, 1966); *K. simplex* (Thomson & Dean, 1931) and *K. utinomii* (Verseveldt, 1971)). As opposed to the long and subdivided lobes commonly found in its congenerics, the knob-shaped and crest-like lobes of *K. adii* spec. nov. are very distinctive. *K. adii* spec. nov. features the typical sclerites of the genus, which include, mainly pointed spindles and rods (Alderslade, 2000). In addition, it has long and branched spindles (fig. 5), not depicted for any of the previously described *Klyxum* species.

In addition to the type species, *Lithophyton confertum* Kükenthal, 1903, that was designated to the genus *Klyxum*, another 12 species should be included in that genus (Alderslade 2000: 240). It should be noted that the diagnosis of *Klyxum* needs further consideration since not all species assigned to it by Alderslade (2000) were adequately examined. Thus, we do not exclude the possibility that future studies, including sequencing, will lead to change in the taxonomic status of some of these species. Nonetheless, our literature survey indicated that the unique suite of characters featured by *K. adii* spec. nov., which include its colony shape as well as the shape and size of sclerites, at present justify the establishment of a new species in the genus *Klyxum*.

Klyxum species, such as *K. flaccidum* (Tixier-Durivault, 1966), *K. legitimum* (Tixier-Durivault, 1970), *K. rotundum* (Thomson & Dean, 1931), *K. simplex* (Thomson & Dean, 1931) and *K. utinomii* (Verseveldt, 1971) were occasionally found on various Indo-Pacific reefs (*e.g.* Ambon: Ofwegen & Vennam, 1994; Bismarck Sea: Ofwegen, 1996; Guam: Benayahu, 1997; Tanzania: Ofwegen & Benayahu, 1992; Ryukyu Archipelago: Benayahu, 2002; Taiwan: Benayahu et al., 2004). During our octocoral survey on the Kenyan reefs we also found *K. flaccidum* (Tixier-Durivault, 1966) and *K. utinomii* (Verseveldt, 1971) (unpublished data Benayahu & Perkol-Finkel). Prior to the current study, *K. okinawanum* Utinomi, 1976 was the last described species for the genus, yet it is still doubtful if it indeed should be assigned to *Klyxum* (Alderslade, 2000).

Klyxum species inhabit the most extensively surveyed shallow reef habitats, similar to the common genera of the family Alcyoniidae. The rate of finding new species of that genus is low, especially when considering the other specious alcyoniid genera, such as *Sinularia* May, 1898 (*e.g.* Ofwegen, 2008), *Sarcophyton* Lesson, 1834 and *Lobophytum* von Marenzeller, 1886 (Benayahu & Ofwegen, 2009) which usually occupy reef-space in similar environments. In view of the above, describing *K. adii* spec. nov. is noteworthy.

◀ Fig. 4. *Klyxum adii* spec. nov., holotype ZMTAU Co 30467; a, b, rugged surface and tubercles of rods of the surface layer of the polyparium. Scale at b 0.005 mm, also applies to a.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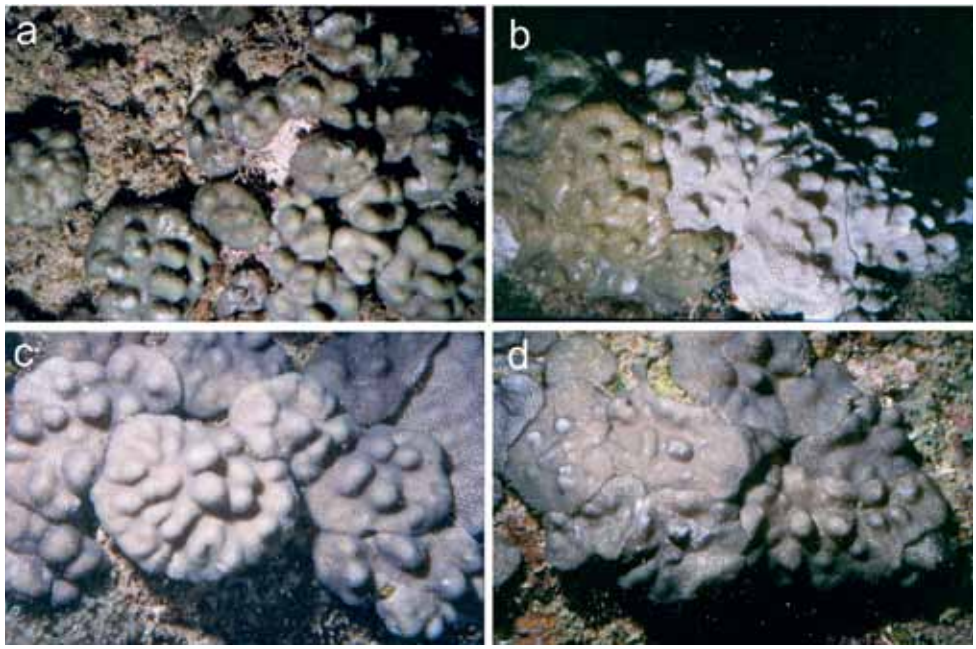

Fig. 6. Underwater photographs of *Klyxum adii* spec. nov.; a, colonies with expanded polyps; b, colonies with partially contracted polyps revealing lighter surface; c, d, patches of colonies.

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◀ Fig. 5. *Klyxum adii* spec. nov., holotype ZMTAU Co 30467; sclerites of the interior of the polyparium and the base; a, spindles; b, branched spindles. Scale at a 0.20 mm, also applies to b.

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