

Affinities of the family Sollasellidae (Porifera, Demospongiae).

I. Morphological evidence

Rob W.M. van Soest¹, John N.A. Hooper², E. Beglinger¹, D. Erpenbeck^{2,3}

¹Zoologisch Museum, Universiteit van Amsterdam, P.O. Box, 94766, 1090 GT Amsterdam, Netherlands, e-mail: soest@science.uva.nl; ²Queensland Museum, P.O. Box 3300, South Brisbane, Qld. 4101, Australia; ³Dept. of Geobiology, Geoscience Centre Göttingen, 37077 Göttingen, Germany

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Abstract

Comparison of *Sollasella digitata* Lendenfeld, 1888, up until the present assigned to its own family Sollasellidae Lendenfeld, 1887 in the order Hadromerida, and *Raspailopsis cervicornis* Burton, 1959, assigned to Raspailiidae Nardo, 1833 in the order Poecilosclerida, leads to the conclusion that both should be considered congeneric and are best assigned to a single genus *Sollasella*. This conclusion is based on examination of habit and skeletal characters of the type material of *S. digitata* and both type and freshly collected material of *S. cervicornis*. The conclusion is strengthened by the discovery of a new species, *Sollasella moretonensis* n.sp. collected in North Australia (primarily in the northeastern coast, but also an isolated record from the northwestern Australian coast), which possesses in addition to the characteristic surface pattern and skeletal structure, genuine echinating acanthostyles. The re-defined genus *Sollasella* shares axial / extra-axial arrangement of the skeleton, special surface brushes of oxeas surrounding a single protruding style, and vestigial occurrence of acanthostyles with many *Raspailia* s.l. Nevertheless, it is retained as a separate genus, on account of its peculiar polygonal arrangement of surface pores. The distribution of the genus is disjunctive including both (southeast, northeast and northwest) Australian and Western Indian Ocean localities, but so far no intermediate records. Based on this morphological evidence, it is proposed – pending publication of corroborating molecular evidence to be presented in a follow-up study – to reassign *Sollasella* and the family Sollasellidae to the poecilosclerid family Raspailiidae.

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Introduction

The recent update of the sponge classification ‘Systema Porifera’ (Hooper and van Soest, 2002a) typified the family Sollasellidae and its sole representative the East Australian species *Sollasella digitata* Lendenfeld, 1888 as ‘incertae sedis’ and ‘poorly known’ (p. 170), and commented that ‘its true affinities remain to be established’ (p. 280). Nevertheless, it was assigned to the order Hadromerida on the grounds that it possessed a cortex and strongly radiating skeletal architecture. The species is only known from its original description and from an excellent re-description of the type material by Hallmann (1914). The species is arborescent and hispid. It has a strongly axial-radiate architecture, with a thick axial column made up of oxeas and styles, long protruding extra-axial styles and a dense ectosomal palisade of oxeas. Between this ‘cortical’ palisade and the axial column there is a region relatively lightly spiculated. The surface of *S. digitata* has a very characteristic polygonal pattern of ‘perforations’ visible to the naked eye. Previous authors attempting to classify this enigmatic species arrived at divergent conclusions: Axinellidae, order Halichondrida (cf. Hallmann, 1914), Coppatiidae, order Astrophorida, (cf. Hooper and Wiedenmayer, 1994), whereas Polymastiidae and Stylocordylidae, both order Hadromerida were named as closely related families by van Soest (2002).

Recently, we obtained freshly collected specimens of a branching hispid sponge from Oman waters showing the same characteristic surface perforation patterns and essentially a similar skeletal architecture and spiculation. This material was initially identified as *Raspailopsis cervicornis* Burton, 1959 - a species

that was previously described from Oman waters - based on the characters presented in the very brief description. Recent examination of type material in the Natural History Museum, London, confirmed that Burton's species was identical to our Oman material, but also that *R. cervicornis* is indeed very similar to *Sollasella digitata* from southeast Australia. These observations led to the discovery of a further similar species from subtropical Australia, which shared the surface perforations but possessed in addition abundant echinating acanthostyles, confirming the raspailiid affinity. This paper is intended to present morphological evidence for the close similarities of *Sollasella* and *Raspailia*, and to discuss the classification of the family Sollasellidae whose position in Hadromerida is proposed to be untenable. We will follow this up with further corroborating evidence from molecular sequence data (Erpenbeck *et al.* submitted).

Material and methods

Material was examined from the collections of the Natural History Museum, London (BMNH), the Australian Museum Sydney (AM), the Queensland Museum Brisbane (QM) and the Zoological Museum of the University of Amsterdam (ZMA). Details of the specimens are given below with the treatment of the species. Thick sections and spicule mounts for light and SEM microscopy were made following the usual methodology (cf. de Voogd and van Soest, 2002).

Results

Ordinal and familial affiliations of Sollasella digitata

Hadromerida are defined (cf. Hooper and van Soest, 2002b) as comprising sponges with peripherally radiating skeleton built from tylostyles, styles, or occasionally oxeas, usually with a smaller category in an ectosomal palisade. The radiating architecture becomes confused or plumose in the choanosome, where the larger spicule categories predominate. Microscleres (euasters, spirasters, amphiasters) occur in many families, usually as an ectosomal cover, but

are absent in several families. Family Sollasellidae and *Sollasella digitata* were hesitatingly assigned (cf. van Soest, 2002) to Hadromerida for want of a better placement. Shared characters with several Hadromerida are the arborescent shape, ectosomal palisade, confused choanosomal skeleton, robust oxeas and styles with faint tyle, but these features are widely distributed throughout the Demospongiae, not comprising clear synapomorphies with any particular order or family. The polygonally arranged surface pores are slightly reminiscent of the polygonal surface plates separated by grooves found in the family Placospongiidae, but they appear distinctly unique. Finally, the hispidity is shared with many Hadromerid genera, but can hardly be sufficient for ordinal identity.

Compared to Hadromerida, affinities of *Sollasella digitata* with the order Poecilosclerida also seem tenuous. This order is defined (Hooper and van Soest, 2002c) as possessing a skeleton of spicules and spongin, with distinct regionalization into ectosomal and choanosomal components. Among the spicules feature meniscoid microscleres (sigmas, chelae, toxas) and acanthose styles as characteristic. However, some families lack all or some of these. *Sollasella digitata* - in retrospect - shares several features with Poecilosclerid representatives, such as a distinct regionalization into ectosomal, extra-axial and axial skeletal arrangement, surface brushes of smaller megascleres surrounding single protruding long megascleres ('raspailid ectosome') and confused axial-longitudinal skeletal arrangement. Arborescent shapes with distinct hispidity like *Sollasella digitata* are very common features in microcionid Poecilosclerida.

The recent rediscovery of fresh material of South Arabian *Raspailopsis cervicornis* Burton, 1959 (see above and below), with its essentially similar surface pattern and structure, and an undescribed species from subtropical northeastern Australia 'Sp.1245' (see below) with the same surface pattern but in addition clear possession of acanthostyles, swung the balance definitely towards Poecilosclerida - Raspailiidae. Table 1 summarizes the different character states of *Sollasella* and representative families from Hadromerida and Poecilosclerida discussed above. Heuristic search with PAUP 3.1 (Swofford, 1993) using the characters unordered confirmed the morphological affinity of *Sollasella* with Raspailiidae

Table 1. Character states of *Sollasella* and representative families of Hadromerida (Suberitidae) and Poecilosclerida (Raspailiidae, Tedaniidae) (1= character(state) present, 0 = absent).

| Character(state) | <i>Sollasella</i> | Raspailiidae | Tedaniidae | Suberitidae |
|--------------------------------------|-------------------|--------------|------------|-------------|
| Arborescent | 1 | 1 | 0 | 1 |
| Polygonal surface pattern | 1 | 1 | 0 | 0 |
| Ectosomal palisade | 1 | 1 | 0 | 1 |
| Plumose choanosomal skeleton | 1 | 1 | 0 | 0 |
| Confused choanosomal skeleton | 1 | 0 | 0 | 1 |
| Plumoreticulate choanosomal skeleton | 0 | 1 | 1 | 0 |
| Ectosomal / choanosomal zonation | 1 | 1 | 1 | 0 |
| Axial/extraxial differentiation | 1 | 1 | 1 | 0 |
| Spongin optically present | 1 | 1 | 1 | 1 |
| Fusifiform short oxeas | 1 | 1 | 1 | 1 |
| Oxeas as main spicules | 0 | 0 | 1 | 1 |
| Auxiliary oxeas | 1 | 1 | 1 | 0 |
| Styles | 1 | 1 | 1 | 1 |
| Tylostyles | 1 | 0 | 0 | 1 |
| Echinating acanthostyles | 1 | 1 | 1 | 0 |

(11 shared characters in Table 1), rather than with Suberitidae (7 shared characters) (tree not shown). A full phylogenetic reconstruction will be provided in a second contribution on this topic, incorporating molecular evidence. In the molecular sequence analyses *Sollasella* clearly clusters inside the Raspailiidae clade, and distant from hadromerid taxa (Erpenbeck et al, submitted).

Systematic descriptions

The three species discussed here are assigned to a redefined genus *Sollasella*, provisionally assigned to Raspailiidae, pending further support from molecular studies. They will all be diagnosed below and morphological evidence for their congeneric status will be illustrated with habit and microscopical images.

Phylum Porifera

Class Demospongiae

Order Poecilosclerida

Family Raspailiidae Nardo, 1833

Subfamily Raspailiinae Nardo, 1833

Genus *Sollasella* Lendenfeld, 1887

Synonym. *Raspailopsis* Burton, 1959

Type species. *Sollasella digitata* Lendenfeld, 1888 (by monotypy)

Definition (emended). Raspailiidae with strong axial column of confusedly aligned oxeas and styles, and with extra-axial columns of short oxeas and long and short styles positioned at right angles to the axial column.. At the surface there is a characteristic ornamentation of polygonally arranged inhalant (?) pores and the oxeas form a continuous palisade of brushes of oxeas pierced by long styles. A low proportion of short acanthostyles may be present.

Sollasella digitata Lendenfeld, 1888

Figs 1A-F, 2A

Sollasella digitata Lendenfeld, 1888: 56; Hallmann, 1914: 287, pl. XV figs 1-2, text-fig. 1.

Material examined: Lectotype (per Hallmann, 1914): BMNH 1886.8.27.639 (spirit specimen), including 2 slides.

Paralectotype: AM G9107 – ‘syntype’ mentioned by Hooper and Wiedenmayer (1994: 144).

Description (mostly from Hallmann, 1914, summarized in van Soest, 2002).

Habit: Stalked ramose sponge (Figs. 1A, B, 2A) of up to 14 cm long, with rounded short branches. Consistency very firm, tough. Surface hispid due to protruding spicules, and provided with a characteristic polygonal pattern of round pores (Fig. 1A), presumed to be inhalant openings by Hallmann.

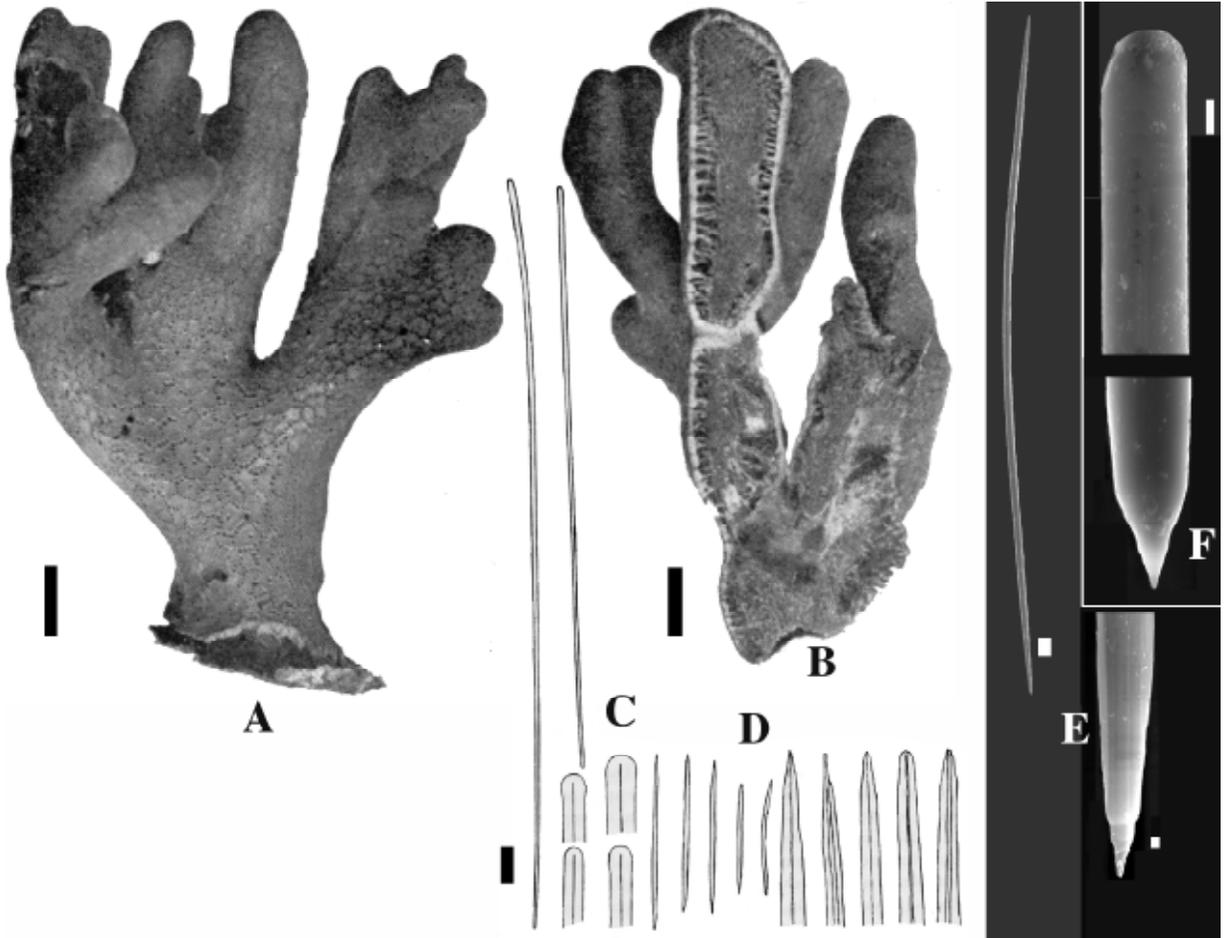


Fig. 1. *Sollasella digitata* Lendenfeld, 1888. A, habit of spirit specimen (scale 1 cm). B, BMNH lectotype (scale 1 cm). C, drawing of styles (scale 10 μm) and details of heads (same scale 1 μm). D, drawing of oxeas (scale 10 μm) and details of apices (scale 1 μm). E-F, SEM images of spicules (right scales 1 μm , left scale 10 μm). E, oxea and detail of apex. F, style. A-D, reproduced from Hallmann, 1914: pl. XV figs 1-2 and text-fig. 1. (the present figure entirely reproduced from van Soest, 2002).

Larger openings, presumably oscules up to 2 mm in diameter, few in number.

Skeleton: In cross section the branches (Fig. 1B) show three distinct regions: an axially condensed region, an open subcortical region of low spicular density, and an outer cortical region. The axial region consists of confusedly strewn spicules and anastomosing spicule bundles bound by considerable amount of spongin, the bundles consist of a mixture of styles and oxeas. The subcortical region is traversed by spicule bundles with orientation perpendicular to the axial core, and these consist of a single central style and a mass of surrounding oxeas. The styles protrude to some extent beyond the surface. The cortical skeleton is supported by the brushed

endings of the subcortical spicule bundles. Choanocyte chambers about 25 μm in diameter, confined to the axial core. Cortex densely fibrous.

Spicules (Fig. 1C-F), oxeas with sharp points, often annulated, $340\text{--}760 \times 10\text{--}16 \mu\text{m}$, some stylote modifications (we found about ten in the holotype spicule mount); long styles with often slightly swollen head and mucronate points (dubbed 'tylostrongyles' by Hallmann) $2000\text{--}4000 \times 10\text{--}35 \mu\text{m}$.

Distribution and ecology. Port Jackson, Manly Beach, E coast of Australia, no further data.

Remarks. The species has never been recorded since Hallmann (1914), and is apparently rare.



Fig. 2. A. *Sollasella digitata* Lendenfeld, 1888, photo of lectotype specimen, BMNH 1886.8.27.639 (photo R.W.M. van Soest, for size see scale in Fig. 2F). 2B-F. *Sollasella cervicornis* (Burton, 1959). B. habit of lectotype, BMNH 1936.3.4.604 (photo R.W.M. van Soest, for size see scale in Fig. 2F), C. on deck photo of habit of live specimens (photo R.G. Moolenbeek, reduced approx. 0.5 ×), D. detail of surface showing polygonal pore areas (photo J. van Arkel), E. cross section of branch showing three-tiered skeleton (photo J. van Arkel), F. habit of representative preserved specimen from the ZMA collection (ZMA Por. 17450, photo J. van Arkel).

Sollasella cervicornis (Burton, 1959)

Figs. 2B-F, 3A-E

Raspailopsis cervicornis Burton, 1959: 256, fig. 33
Raspailia (Parasyringella) cervicornis; Hooper, 2002: 478

Material examined: Holotype, BMNH 1936.3.4.604 (original designation): John Murray Exped. stat. 53, Oman, 19°22'36"N 57°53'E, 13.5 m, 02-11-1933.

BMNH 1936.3.4.521, John Murray Exped. stat. 27, Somalia, Gulf of Aden, 11°57'12"/11°56'24"N 50°35'E/50°39'12"E, 37 m, 12-10-1933.

BMNH 1936.3.4.523, John Murray Exped. stat. 27, Somalia, Gulf of Aden, 11°57'12"/11°56'24"N 50°35'E/50°39'12"E, 37 m, 12-10-1933.

BMNH 1936.3.4.522, John Murray Exped. stat. 45, Oman, 18°03'30"N 57°02'30"E, 38 m, 29-10-1933.

BMNH 1936.3.4.466, John Murray Exped. stat. 111, Tanzania, Zanzibar, 05°04'18"S 39°14'12"E, 73-165 m, 14-01-1934.

ZMA Por. 17450, Oman, Dhofar, Mirbat, Knobby Point, 16°57.026'N 54°49.109'E, 15-19 m, field number 02/IO/DEC11/RG/018, coll. Raquel Gomez, 02-12-2002.

Description

Habit (Figs. 2B-F): Thickly arborescent sponges, branching dichotomously. Branches have a tendency to coalesce and the Burton material contains one 'caliculate' specimen (from Zanzibar, BMNH 1936.3.4.466). Surface hispid through protruding spicules. Colour dark brown in life (Fig. 2C), paler grey in alcohol (Figs. 2B,F). Tough consistency, easily broken. Branch endings rounded and slightly swollen. Holdfast broader than stem, evenly rounded, spreading out equally. Height up to 12 cm, branch diameter 1-1.2 cm, specimens retained as ZMA 17450 are typically 5 or 6 cm high. A striking feature of all branches is the polygonal pattern of surface pores (Figs. 2B, D, F). Upon collection, when lifted out of the water and with slight pressure, these openings emitted tiny water jets, indicating they may be exhalant contrary to what is assumed here. Polygonal areas are elongate, on average 4×2 mm (Fig. 2D), and uniformly spread over the branches (Fig. 2F). No separate larger oscules have been observed.

Skeleton (Figs. 2E, 3A): In cross section the branches contain three distinct regions recognized by eye (Fig. 2E) and differently coloured in life: a thick axial column, reddish orange in life, pale orange when preserved, a relatively fibrous extra axial region, and a beige coloured cortical layer at the surface. Long single spicules protrude through the

cortex. The axial column is made up of a mixture of all spicules, but predominantly of small styles and oxeas. The extra-axial region (Fig. 3A) consists of thick cone-shaped columns of $2 \text{ mm} \times 1-3 \text{ mm}$ positioned at right angles to the axial region and fanning out to the surface region. In between these columns there are fibrous areas, 1-3 mm in size with low spicular density. The cortical region is approx. 1-1.5 mm thick and consists of a dense palisade of oxeas arranged in tight brushes. Burton described this cortex as typical *Raspailia*-like brushes surrounding a central long style, but this was not clearly observed by us. The cortical palisade is indeed pierced from the extra-axial region by long styles which protrude considerably beyond the surface at regular distances making the sponge quite hispid, but a clear association with brushes surrounding a single style is not evident.

Spicules (Table 2; Figs. 3B-E): Oxeas, (Fig. 3B, E) (dubbed pseudoxeas by Burton for no apparent reason) straight or occasionally curved or irregularly angulated, smooth, $710-850 \times 20-29 \mu\text{m}$; small styles (Figs. 3B, D), seemingly in the same size range as oxeas, $495-710 \times 18-25 \mu\text{m}$; in some of the BMNH specimens these styles were detected to possess spines. This was not noted by Burton, nor are they found in the ZMA material; long styles (Figs. 3B, C), with slight but distinct tyle, mostly broken in the slides, but measuring at least $2000 \times 45 \mu\text{m}$. Burton recorded a size range of 1600 -3000 \times 32-50 μm .

Distribution and ecology. Northwestern Indian Ocean: Gulf of Aden, South Arabian coast including Oman, and Zanzibar, 13.5-38m (Zanzibar area: 73-165m). The ZMA Oman specimens were growing on a sandy bottom, 15-19.1m deep, clear water (up to 20 m visibility), temperature 26°C.

Remarks. This species differs from *S. digitata* mainly in the abundant presence of short styles (which are very rare and probably oxea-derivates in *S. digitata*) next to long styles and oxeas. The short styles may have spines (rarely), which fits the family Raspailiidae. The oxeas are significantly thicker in *S. cervicornis* (up to 29 μm vs. only up to 16 μm in *S. digitata*).

The shared characters are more numerous:
 - polygonal arrangement of pores is a striking feature

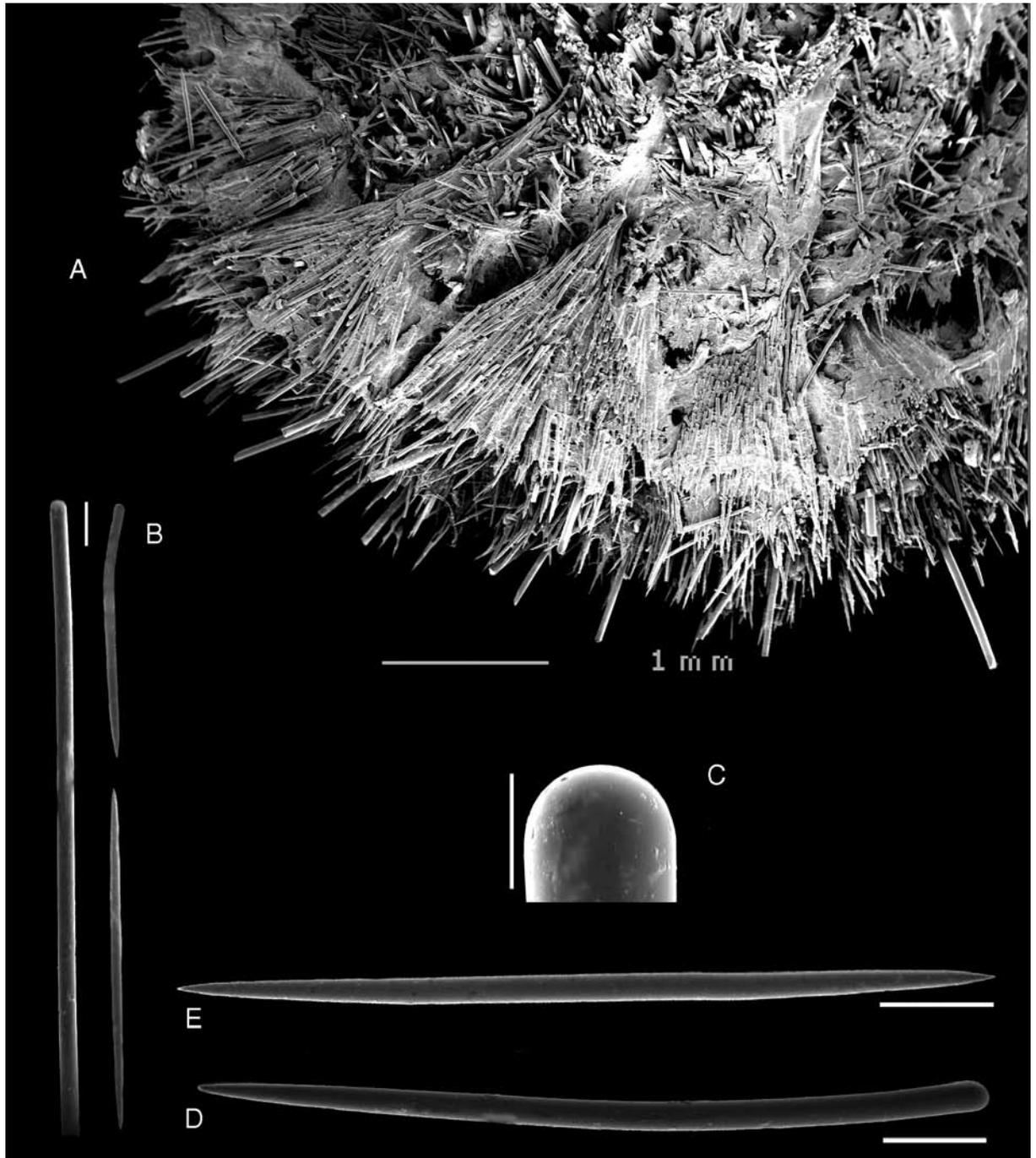


Fig. 3. *Sollasella cervicornis* (Burton, 1959), SEM photos of ZMA specimens (made by E. Beglinger). A. cross section of branch showing axial column and extra-axial palisade, B. overview of spicules (long and short styles, oxea) photographed at same scale (scale bar = 100 µm), C. head of long style (scale = 50 µm), D. short style (scale = 100 µm), E. oxea (scale = 100 µm).

of both and a strong synapomorphy. There are several other sponge genera showing a polygonal surface pattern (e.g. *Myrmekioderma* and *Didiscus*

in Halichondrida: Heteroxyidae, and *Tethya* and *Placospongia* in Hadromerida), but the similarities appear superficial because in these genera polygo-

nal areas are separated by grooves, rather than separate pores.

- branching habit and size are essentially similar
- live colour is unknown for *S. digitata*, but likely to be brown as is the colour in *S. cervicornis*
- skeletal architecture with the three regions visible to the naked eye is closely similar in both
- long styles are closely similar, including a slight tyle in most

***Sollasella moretonensis* sp. nov.**

(Figs. 4A-D, 5A-H)

Material examined: Holotype: QM G303227: Middle Reef, N of North Stradbroke Island, Queensland, Australia, 27.40083°S, 153.53°E, 30m, coll. Hooper, J.N.A. and Kennedy, J.A., scuba, 04-06-1993. Paratype: QM G321402: Inner Gneerings Shoals, Sunshine Coast, Queensland, Australia, 26.64512°S, 153.16111°E, 13m, coll. Cook, S., Crowther, A., Carini, G., Ekins, M. and Sutcliffe, T., scuba, 18-08-2004.

Specimens (Queensland, Australia): QM G303996: Mudjimba I., N side of island, off Mooloolabah, 26.60194°S, 153.1025°E, 11m, coll. Hooper J.N.A., Hobbs L.J., Kennedy J. and Cook S.D., scuba, 09-02-1994. QM G313599: Hutchinson Shoal, N. of Cape Moreton, 26.943516°S, 153.487426°E, 21.4m, coll. Hooper, J. N.A., Kennedy, J.A. and Cook, S.D., scuba, 01-12-1997. QM G315649: Sunshine Reef off Sunshine Coast, 26.412778°S, 153.13472°E, 27m, coll. Cook, S.D., Kennedy, J.A., List-Armitage, S.E., Adams, C.L. and Woerheide, G., scuba, 11-10-1999. QM G315759: North Halls off Sunshine Coast, 26.3461°S, 153.067°E, 21m, coll. Cook, S.D., Kennedy, J.A., List-Armitage, S.E., Adams, C.L. and Woerheide, G., scuba, 13-10-1999. QM G303205: Boat Rock, Point Lookout, N of North Stradbroke I., 27.41778°S, 153.55083°E, 25m, coll. Hooper, J.N.A. and Cook, S.D., scuba, 02-06-1993. QM G315719: Jew Shoal off Sunshine Coast, 26.37556°S, 153.12583°E, 18m, coll. Cook, S.D., Kennedy, J.A., List-Armitage, S.E., Adams, C.L. and Woerheide, G., scuba, 12-10-1999. QM G303059: NE Cape Grenville, Shelburne Bay, 11.61722°S, 143.06889°E, 31m, coll. Cook, S.D. on FV 'Clipper Bird', trawl, 26-03-1993.

Specimens (Western Australia): QM G306153: SW of Cape Jaubert, NW of Western Australia, 19.76667°S, 118.21667°E, 37m, coll. Cook, S.D. on CSIRO RV 'Southern Surveyor', beam trawl, 05-09-1995.

Description

Habit (Figs 4A-D): Vasiform, lobate, fan-shaped, cup-shaped or subvasiform habits, 11-28 cm high, 8-27 cm wide at apex, with thick lamellae 0.5-2 cm thick, bearing rounded 'lumpy' or convoluted margins. Specimens are usually attached to the substrate by a short cylindrical woody holdfast, ranging from 3-10 cm long, 1.5-3 cm diameter. Texture: Harsh (slightly hispid), firm, stiff but compressible in life,

more rigid when preserved. Surface: Dead specimens are covered with a polygonal plate-like pattern formed by shallow pits surrounding low conules, 3-5 mm in diameter, 1-2 mm high, with some (but not all) perforated by an oscule 2-5 mm in diameter sitting at the apex of the conule. When preserved most oscules and pits are collapsed, leaving only the polygonal pattern of conules reminiscent of typical *Polymastia* or massive *Cliona* surfaces (Fig. 4B-D), and conules appear to be distributed equally on both the inner and outer surfaces of the lamellae, extending across all lamellae to the upper part of the holdfast. In life, however, it is apparent (Fig. 4A) that oscules occur mostly on the inner surface of lamellae, less commonly on the upper margins of the outer surface, are about 4 mm in diameter, and are surrounded by a large raised membranous lip, pigmented darker brown than the surrounding area. The outer surface of living specimens is highly pitted and rendered convoluted by pointed conules surrounding large pits, interconnected by prominent ridges of flesh forming stellate patterns reminiscent of Dictyodendrillid sponges. This external sculpturing of pits and conules presumably represents the inhalant aquiferous system. Colour: In life the colour is bright orange to orange-brown, fading to darkish brown upon preservation.

Skeleton (Figs. 5A-E): In cross section the skeleton appears to be differentiated into three distinct regions: an open reticulate very fibrous core, a more plumo-reticulate extra-axial region, and a distinct radial ectosomal skeleton. There is no obvious axial compression, but in the core of the lamellae there are heavily collagenous fibres and multispicular bundles of large styles and oxeas, forming an open but highly reticulated skeleton. Fibres are moderately large, 180-260 µm in diameter, forming open meshes in some places over 1 mm in diameter. Bundles of oxeas and styles appear to run predominantly longitudinally through lamellae. At the core of the skeleton fibres are sparsely echinated by acanthostyles. In the extra-axial region the skeleton becomes more plumo-reticulate, with thicker, more densely compacted and heavy collagenous fibres together with radial bundles of large choanosomal styles oxeas, with the latter becoming more radial towards the periphery. The ectosomal skeleton has only occasional large oxeas or styles protruding from the subectosomal regions, with the remainder consisting of a nearly continuous, erect palisade of ectosomal oxeas. In some cases

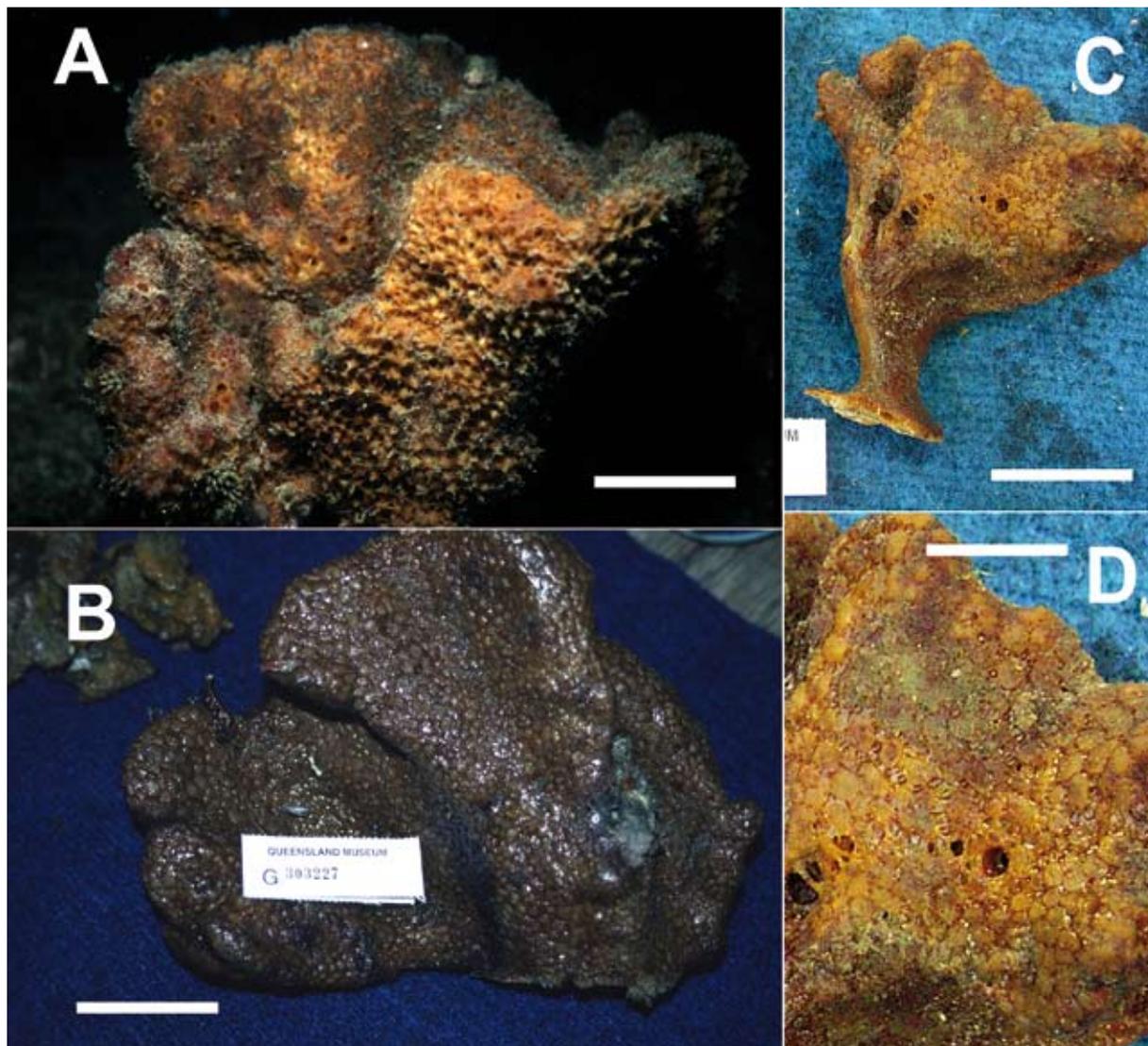


Fig. 4. *Sollasella moretonensis* n.sp.. A. Holotype QMG303227, alive (scale 6 cm), B. Holotype QMG303227, on deck after collection (scale 6 cm), C. Paratype QMG321402, on deck (scale 4 cm), D. Paratype QMG321402, close view of polygonal surface patterns around pores (scale 2 cm). (photos J.N.A. Hooper)

Table 2. Comparison of spicule sizes of *Sollasella* species.

| Spicule category | <i>S. digitata</i> | <i>S. cervicornis</i> | <i>S. moretonensis</i> n.sp. |
|--------------------------|--------------------------------|---|------------------------------|
| Long styles | 2000-4000 × 10-35 μm | 1600-3000 × 32-50 μm | 2500->4000 × 20-55 μm |
| Short styles | Modifications of oxeads smooth | 495-710 × 18-25 μm occasionally spined | Absent |
| Echinating acanthostyles | Absent | Not differentiated | 95-165 × 3-5 μm |
| Oxeads (1) | 340-760 × 10-16 μm | 710-850 × 20-29 μm | 660-940 × 14-20 μm |
| Oxeads (2) | Not differentiated | Not differentiated | 360-515 × 5-8 μm |

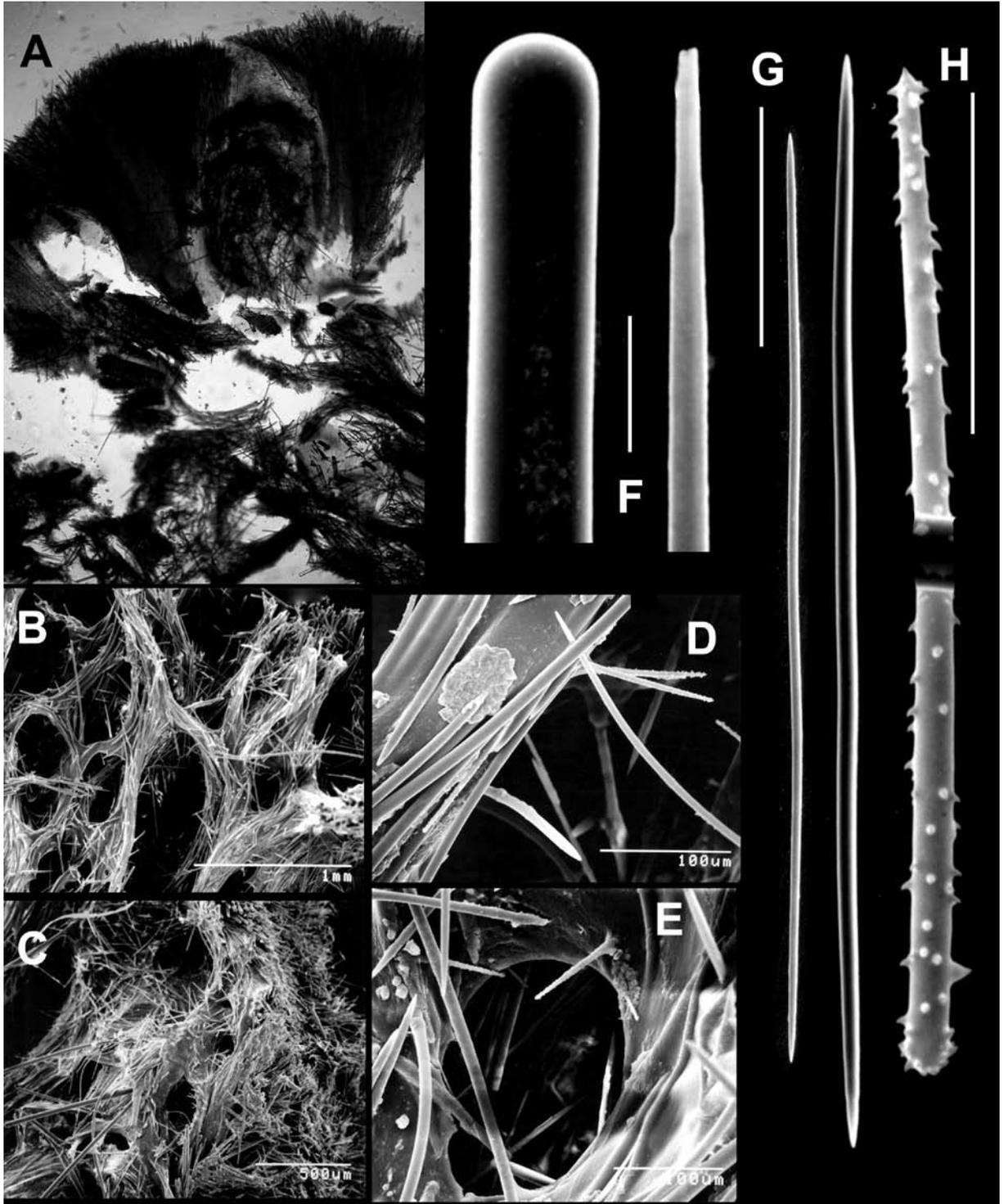


Fig 5. *Sollasella moretonensis* n.sp.. Holotype QMG303227. A. Light micrograph of skeleton (scale 1 cm), B. SEM of diffuse multi-compartmental axial skeleton (scale 1mm), C. SEM of slightly radial peripheral skeleton (to the bottom left) (scale 500 μ m), D. Acanthostyles echinating spongin fibres and associated bundles of choanosomal styles/ oxeas running parallel to fibres (scale 100 μ m), E. Echinating acanthostyles protruding into fibre mesh (scale 100 μ m), F. Base and point of long choanosomal style (scale 25 μ m), G. Ectosomal oxeas (scale 200 μ m), H. Echinating acanthostyle (scale 50 μ m).

these bundles of ectosomal oxeads appear to be surrounding the larger protruding subectosomal spicules, an apomorphy of the Raspailiidae, but this is rare. The mesohyl is sparse at the core of the skeleton but is more heavily invested in collagen towards the periphery.

Spicules (Table 2, Figs. 5F-H): The longer (subectosomal) spicules are predominantly styles, occasionally oxeads or anisoxeads, are not common, and appear to extend from the core of the skeleton to the surface, or close to it. They are completely smooth, more-or-less straight, and have either evenly rounded bases or abruptly pointed bases, and either sharp tapering points or taper to very fine slightly telescoped points, approximately $2500\text{--}4000 \times 20\text{--}55 \mu\text{m}$. The (choanosomal) oxeads are far more abundant and comprise most of the skeletal spiculation. They are usually slightly curved at the centre, sometimes straight, with sharp, tapering points, $660940 \times 1420 \mu\text{m}$. Ectosomal oxeads are straight, slightly curved at the centre or asymmetrically curved, with slightly tapering sharp points, $360515 \times 58 \mu\text{m}$. Echinating acanthostyles are straight or slightly curved at the centre, have slightly subtylote bases and are slightly rounded or blunt at the apex, and have a light, evenly distributed spination along the length of the spicule, slightly heavier spines at the tip, and spines are short and conical, $(95\text{--}165 \times 3\text{--}5 \mu\text{m})$.

Etymology. This species is named for its predominantly subtropical distribution in the vicinity of the Moreton Bay region, SE Queensland.

Distribution and ecology. Moderately prevalent in southern Queensland inshore waters (Brisbane and Sunshine Coast regions), associated with muddy substrata at the base of coral reefs. The two isolated records in Far North Queensland (Shelburne Bay) and NW of Western Australia (Cape Jaubert) were from commercial and scientific trawls made in deeper muddy substrates, and suggest that the species may have a wider distribution than presently known, or a discontinuous distribution in tropical Australia given that there has been intensive sampling of areas in between without trace of this species.

Remarks. The new species *S. moretonensis* shares the polygonal arrangement of surface pores, possession of three distinct skeletal regions and geometry

of spiculation with the other two species, but differs in possessing echinating acanthostyles, a differentiated category of ectosomal oxeads, a vasiform growth form, orange live colouration and specific dimensions of spicules. The discovery of this new species confirms the allocation of *Sollasella* to the Raspailiidae in possessing of the important raspailiid apomorphies – viz. echinating acanthostyles and bundles of ectosomal oxeads surrounding protruding subectosomal styles/oxeads (albeit rare), in conjunction with a continuous ectosomal palisade common to the other two species.

Discussion

In the latest revision of the Raspailiidae (Hooper, 2002), *Raspailopsis* was assigned to the synonymy of *Raspailia* (*Parasyringella*). Since three distinct species with disjunctive distributions share a number of unique features not shared with other *Raspailia* species, there is sufficient justification to abandon Hooper's synonymy decision and unite them in a separate genus. Accordingly we propose to retain *Sollasella* as a distinct genus in Raspailiidae, differing from all other genera in this family by the polygonally arranged surface pores and the continuous cortical palisade of long, robust oxeads.

The family Sollasellidae Lendenfeld, 1887 was erected a year before the description of the type species, *Sollasella digitata* Lendenfeld, 1888. Despite this slight deviation from the nomenclatural rules, it was accepted as a valid family name by subsequent revisors (Hallmann, 1914; de Laubenfels, 1936; van Soest, 2002). In view of the fact that the type species *Sollasella digitata* is now proposed to be assigned to Raspailiidae, the family name Sollasellidae falls into synonymy with that family name. The 'Systema Porifera' (Hooper and van Soest, 2002) gives Hentschel, 1923 as the author and date of Raspailiidae, which would potentially jeopardize the well-established name Raspailiidae. However, this authorship and date is predated by Nardo, 1833 who already employed a taxon name *Raspeliae* of the family group level (corrected to *Raspailiae* in Nardo, 1847). Thus, authorship of Raspailiidae should be attributed to Nardo, 1833 and this name remains the oldest available name. Sollasellidae Lendenfeld, 1887 is a junior synonym of Raspailiidae Nardo, 1833.

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