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Two new species of *Chondrocladia* (Demospongiae: Cladorhizidae) with a new spicule type from the deep south Pacific, and a discussion of the genus *Meliiderma*

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Abstract

Two new species of *Chondrocladia* are described from the deep Pacific, off New Zealand and South Australia. These presumably carnivorous sponges are characterized by the presence of a sheath of special spicules along the stalk, for which the new term 'trochirhabd' is coined. Similar spicules were known from fossil strata of the Early Jurassic, suggesting that Cladorhizidae were already present in the Mesozoic. The arrangement of the trochirhabds along the stalk is similar to that described in the genus *Meliiderma*, which has been synonymized with *Chondrocladia*. We propose here the revival of *Meliiderma* as a subgenus of *Chondrocladia*, for *Chondrocladia stipitata* Ridley & Dendy, 1887, from the subantarctic Indian Ocean, *C. occulta* (Lehnert et al., 2006), described from the North Pacific as a species of *Latrunculia*, and for *C. turbiformis* **sp.nov.** and *C. tasmaniensis* **sp.nov.** from New Zealand's Chatham Rise and several Tasmanian seamounts, respectively, described herein.

Key words: Porifera; carnivorous sponges; seamounts; New Zealand, Tasmania; Cladorhizidae; *Chondrocladia*; *Meliiderma*; new species

Introduction

The genus *Chondrocladia* is rather special among carnivorous sponges in that species have a modified aquiferous system absent in other Cladorhizidae and allied families of carnivorous sponges. The genus presently includes 31 described species and is well characterised by a pedunculate body bearing diverse appendages, and the presence of anchorate unguiferous isochelae. Evidence of an aquiferous system with choanocyte chambers has only been fully documented in one species (Kübler & Barthel 1999) belonging to a group of species bearing lateral appendages that terminate in turgescent spheres, inflated when alive, at the top of their stalk-like bodies. Many species do not display such a morphology, and it is possible that other types of organization are present.

Here we describe two new species which present a special arrangement of the skeleton, with a type of spicule (trochirhabd) that was previously known only from Early Jurassic and Miocene sediments, with a reduced form in *Chondrocladia stipitata* (Ridley & Dendy, 1887). This type of skeleton is present in four species of Recent *Chondrocladia*, for which we propose to revive *Meliiderma* Ridley & Dendy, 1887 as a subgenus.

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Materials and methods

Material was collected from the Chatham Rise extending east from the South Island of New Zealand, and from several seamounts south of Tasmania (Figure 1) by sled and dredge onboard the R.V. *Tangaroa* and R.V. *Southern Surveyor.* Upon collection, specimens were preserved in 70% ethanol, and prepared for histological examination. The skeletal architecture was studied using thick polished sections obtained by embedding a fragment of the specimen in Araldite®, and sectioning with a low speed saw using a diamond wafering blade and wet-ground on polishing discs. Spicules were prepared for both light and scanning electron microscopy (SEM) by boiling a small piece of sponge in nitric acid on a microscopic glass slide (Vacelet 2006). They were observed under a Hitachi S570 SEM. Spicule measurements generally made on 25 spicules are presented either as 'range (mean ± st. dev.)' or as 'range'. Primary and secondary type material have been registered and deposited in the NIWA Invertebrate Collection, Wellington, New Zealand (prefix NIWA—) and in the Queensland Museum, Brisbane, Australia (Prefix QM G—).

Abbreviations: Australian Commonwealth Scientific and Research Organisation (CSIRO), National Institute of Water & Atmospheric Research (NIWA). Queensland Museum (QM).

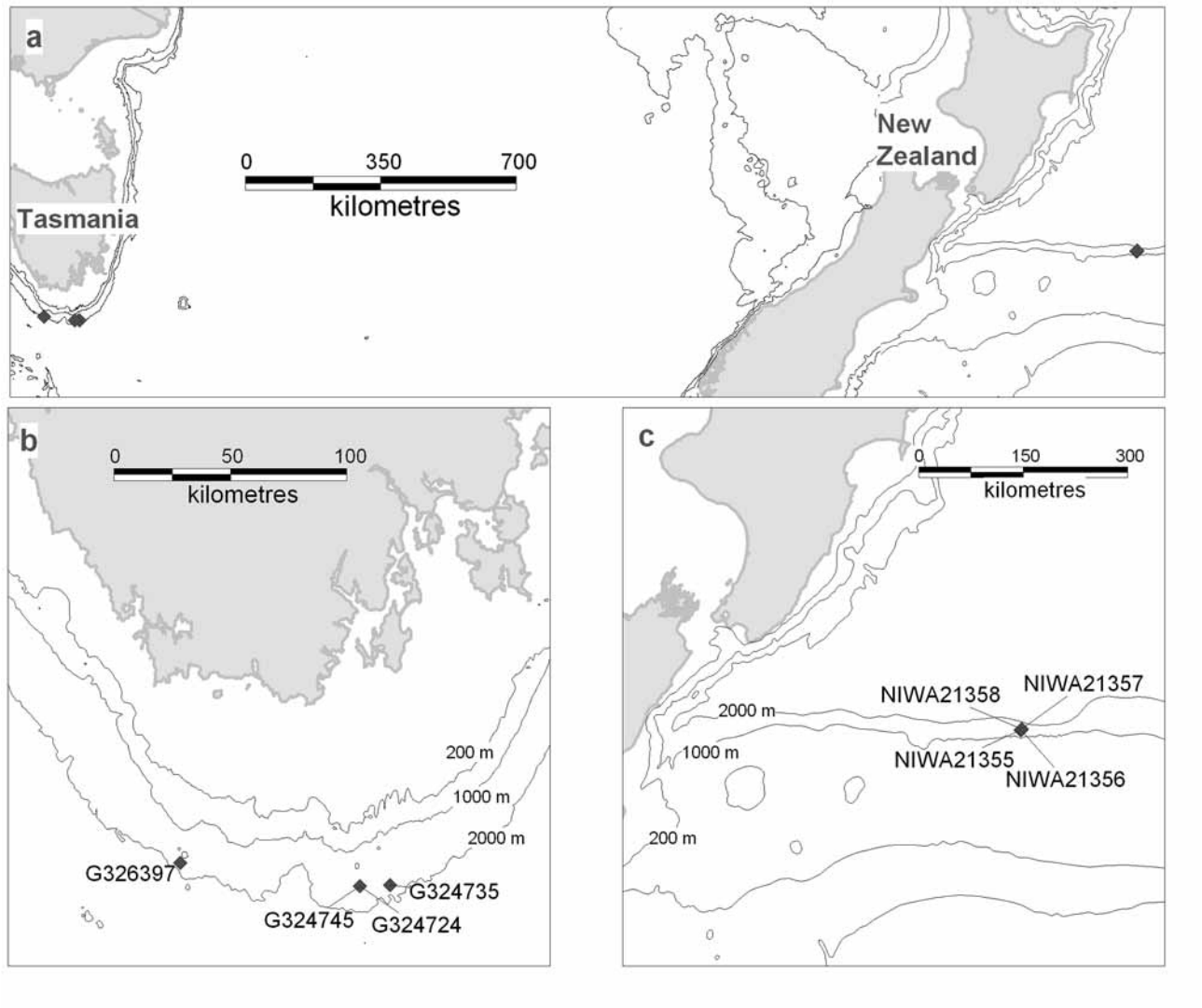

FIGURE 1. Maps showing the collecting areas.

Systematic descriptions

Family Cladorhizidae Dendy, 1922

Diagnosis. Sponges usually small, symmetrical, mostly in deep water, with diagonal, radiating supporting processes and basal root adaptations for living in soft sediments. Axial skeleton composed of monactinal or diactinal megascleres, from which radiating extra-axial tracts diverge to lateral processes. Microscleres include (an)isochelae, sigmas, forceps or micro(subtylo)styles (microspined, spear-shaped in a few cases). Considerable reduction to complete loss of the choanocyte layer is known for some species, being associated with an adaptation to carnivory, preying on relatively large food items. (modified from Hajdu & Vacelet 2002).

Genus *Chondrocladia* Thomson, 1873

Chondrocladia Thomson, 1873: 188; *Crinorhiza* Schmidt, 1880: 83; *Meliiderma* Ridley & Dendy, 1887: 102; Not *Neocladia* Koltun, 1970: 193 (amended from Hajdu & Vacelet 2002).

Diagnosis. Cladorhizidae with a slender stalk and spherical body with filamentous processes that may be inflated and turgid in life. The base of attachment may be root-like or solid. Axial skeleton composed of monactinal megascleres (mycalostyles), from which radiating extra-axial tracts diverge to lateral processes. Microscleres include unguiferous anchorate isochelae (modified from Hajdu & Vacelet 2002).

Subgenus *Chondrocladia* n. sg.

Diagnosis. As above

Type species. *Chondrocladia virgata* Thomson, 1873 (by monotypy).

Subgenus *Meliiderma* Ridley & Dendy, 1887

Meliiderma Ridley & Dendy, 1887: 102.

Diagnosis. *Chondrocladia* bearing a dense encrustation of special spicules (spear-like tylostyles or trochirhabds) packed in a single layer around the stalk and projecting vertically outwards.

Type species. *Meliiderma stipitata* Ridley & Dendy, 1887 (by monotypy).

Chondrocladia (*Meliiderma*) *turbiformis* sp.nov. (Fig. 2–3)

Material examined. **Type material**. Holotype NIWA21357: NIWA Stn TAN0104/333, Pyre Seamount, Chatham Rise, -42.7183342°, 179.9095001°, 1075–1008 m, R. V. *Tangaroa*, 20 April 2001.

Paratypes NIWA21355: NIWA Stn TAN0104/152, Gothic Seamount, Graveyard seamount complex, Chatham Rise, -42.7298317°, 179.8903351°, 1130–1000 m, R. V. *Tangaroa*, 18 April 2001; NIWA21356: NIWA Stn TAN0104/153, Gothic Seamount, Graveyard seamount complex, Chatham Rise, -42.7324982°, 179.8984985°, 1076–990 m, R. V. *Tangaroa*, 18 April 2001; NIWA21358: NIWA Stn TAN0104/333, Pyre Seamount, Graveyard seamount complex, Chatham Rise, -42.7183342°, 179.9095001°, 1008–1075 m, R. V. *Tangaroa*, 20 April 2001; NIWA21359: NIWA Stn TAN0104/397. Pyre Seamount, Graveyard seamount complex, Chatham Rise, -42.7163315°, 179.9114990°, 1050–1000 m, R. V. *Tangaroa*, 21 April 2001.

Type Locality. Pyre Seamount, Chatham Rise, New Zealand.

Distribution. Pyre and Gothic seamounts in the Graveyard seamount complex, Chatham Rise, southeastern New Zealand.

Habitat. Attached to fragments of coral dredged from seamount, depth range 990 to 1130 m.

Description. Six fragmentary stipitate specimens, consisting of a roughly spherical body supported by a broken cylindrical stalk. Fixation base or rhizoids absent. Body 14 mm in diameter in the holotype, varying from 10 to 19 mm in the paratypes, fragmentary stalk 25 x 2 mm in the holotype, 10–30 x 1.2–1.9 mm in the paratypes. Body irregular in shape, covered with long, irregular thick expansions at the surface, up to 8 mm long. Stalk curved in most specimens, smooth, with some irregular swellings in NIWA21358. Color clear brown, more translucent in the stalk. Numerous whitish oval bodies, probably embryos, in the body of most specimens. In NIWA21357, putative embryos in various stages of development irregularly ovoid, 450–600 x 250–300 µm, some devoid of spicules, others containing immature stages of isochelae 2 or mature isochelae 2 irregularly arranged, without megasclere. No visible aquiferous system; living tissue poorly preserved.

Skeleton. Stalk made of tightly packed longitudinal slightly sinuous mycalostyles and substrongyles, including a few isochelae and sigmas, and a variable number of trochirhabds. Trochirhabds present uniquely along the shaft, dispersed or grouped in rosettes attached by the narrower end. In specimenNIWA21358, trochirhabds form an incomplete, poorly preserved sheath along the stalk, spicules tightly apposed on a single layer, perpendicular to the axis. Skeleton of the body made of radiating fascicles of mycalostyles, extending as an axis in the filaments. Irregular swellings of the stalk of NIWA21358 with a skeleton of irregularly arranged mycalostyles 1, substrongyles, isochelae 1 and trochirhabds.

Spicules. Megascleres (Table 1, Fig. 2). Mycalostyles 1 of the stalk and of the spicular axis of the body, most generally straight, non or feebly fusiform except in specimen NIWA21358 (for instance for a mycalostyle 1600 µm long, diameter 25 µm in head, 40 µm in middle), with a short point, 1000–1700 x 15–40 µm, up to 45 µm thick in NIWA21356; Mycalostyles 2, always rare, long and thin, often with a slightly inflated head, generally straight although sometimes curved near the point, possibly juvenile or ill-formed mycalostyles 1, 340–1400 x 4–15 µm; Substrongyles and subtylostrongyles of the basal part of the stalk, not found in specimen NIWA21357, irregularly curved or faintly flexuous, the larger sometimes slightly curved and inflated, with intermediaries with mycalostyles 1, 260–1288 x 12–30 µm, some short and thick (260 x 30 µm in NIWA21355). **Microscleres (Fig. 2, 3).** Anchorate isochelae 1, rare in the stalk, very abundant in the body, with narrow fimbriae and five or six teeth. Teeth short, rather thin and acerate (13–15 x 3–3.2 µm). Size 68–95 µm, shaft 5 µm in diameter; Anchorate isochelae 2, less numerous and apparently localized in embryos, with fimbriae larger than in isochelae 1 and five thin teeth oval or lanceolate (9 x 2 µm). Size 32–50.5 µm, shaft 2 µm in diameter; Sigmas, present in all specimens although rare in NIWA21355, C or S-shaped, with a 90° torsion, 30–50 µm; Trochirhabds, present in the stalk and inside the living tissue in the basal part of the body of all specimens, absent in the upper part of the body, sometimes with a rosette-like arrangement or in a single layered sheath along the stalk. Spicule made of a straight, slightly conical rhabd ending in a large, hemispherical bulge at the apex and in a smaller bulge at the thinner end. Rhabd bearing three, rarely two thick rings. Hemispherical upper surface of the two bulges covered with short, irregular spines or small buttons. Under surface of the bulges, surface of the rings and shaft nearly smooth, bearing only a few, irregularly dispersed small granules. Rings sometimes incomplete, with the margin irregularly crenulated or slightly verrucose. Very young developing spicules in shape of a rhabd with an inflated head, a long, narrow neck progressively inflating in a cylindrical shaft 5 µm in diameter, ending in a mucronate, round point. Rings appearing later as swellings of the shaft. Nearly mature spicules with rather smooth surfaces and a poorly developed third ring. Size: 30–50 µm, rings in the mature spicules 7–20 µm in diameter.

Etymology: Named for the spindle or whirl-shaped form of the characteristic trochirhabds (Latin, *turbo*, spinning top, disc)**.**

Remarks: This species differs from the two other species of *Chondrocladia* with trochirhabds by having three annuli on the trochirhabds, instead of two in *C. occulta* (Lehnert et al., 2006) and one in *C. tasmaniensis* **sp.nov.** (this paper). Unlike the two other species, the cover of trochirhabds is discontinuous on the stalk,

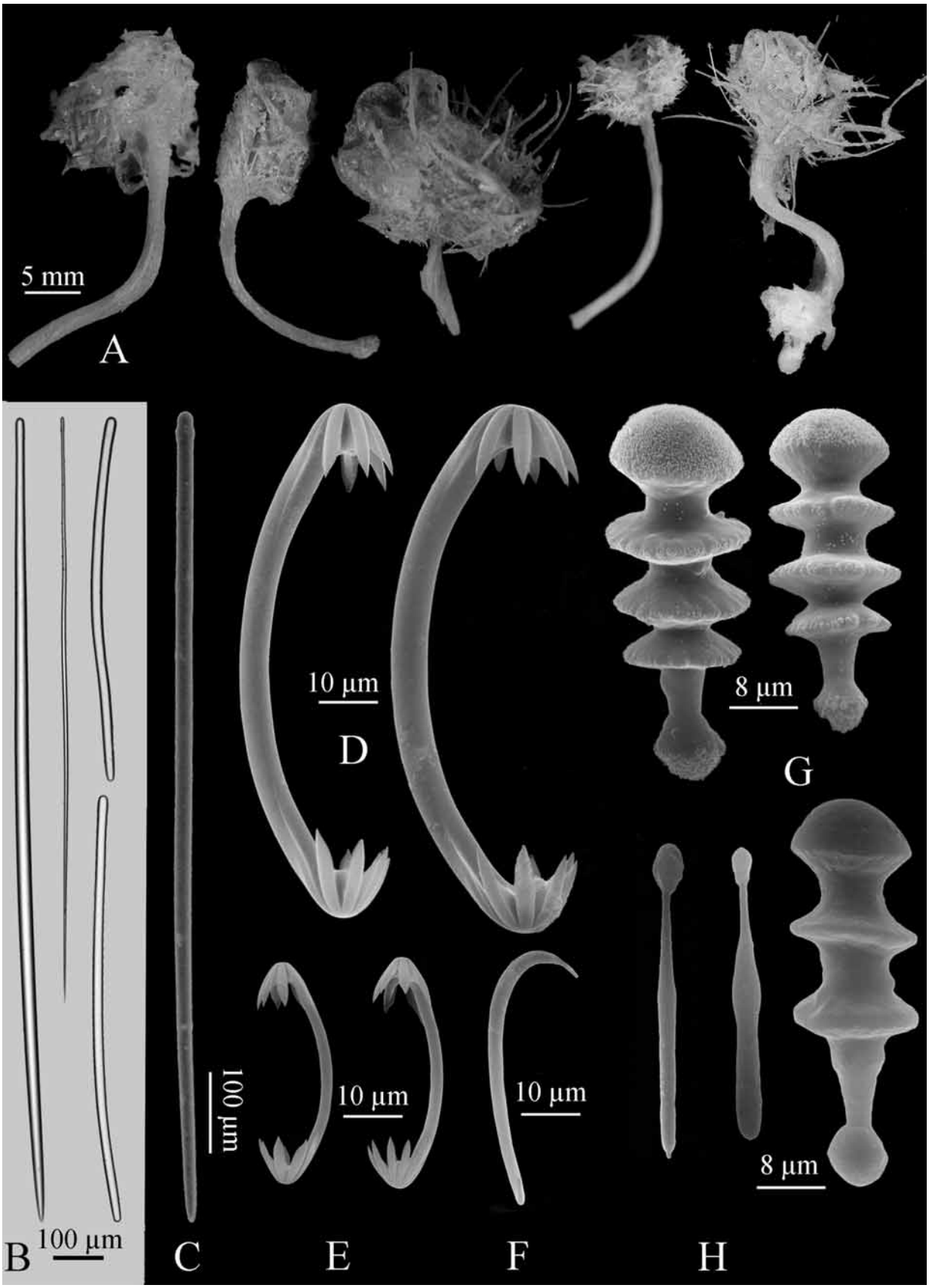

FIGURE 2. *Chondrocladia (Meliiderma) turbiformis* **sp.nov.** A: Holotype (left) and paratypes NIWA21356 (two specimens), NIWA21355 and NIWA21358. B. Megascleres; from left to right, mycalostyle 1, mycalostyle 2, two strongyles. C. Mycalostyle 1. D. Isochelae 1. E. Isochelae 2 from embryos. F: Sigma. G. Trochirhabds. H. Development stages of trochirhabds.

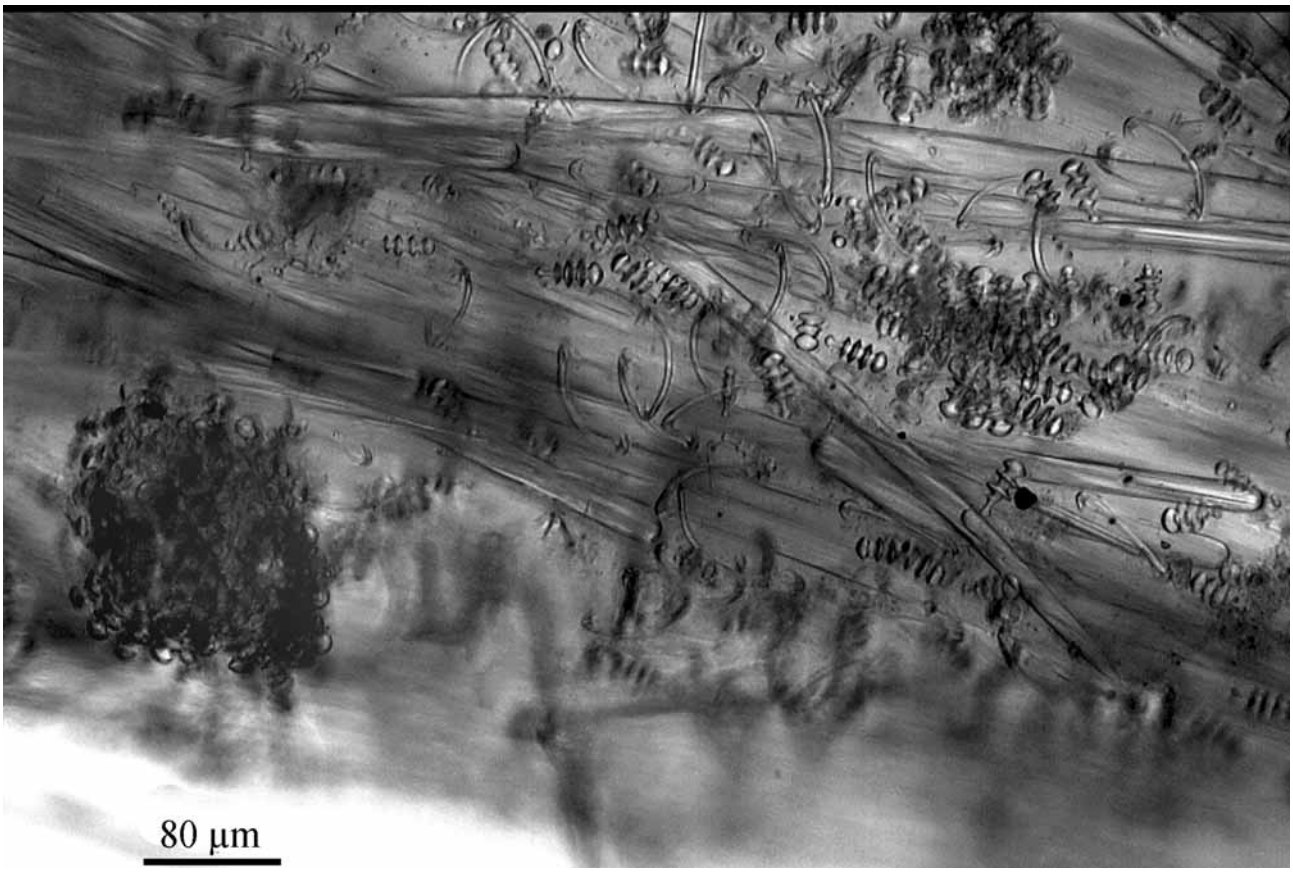

FIGURE 3. *Chondrocladia (Meliiderma) turbiformis* **sp.nov.** Longitudinal section through the stalk of specimen NIWA21359, showing the axis of mycalostyles and substrongyles, trochirhabds isolated or grouped in vague rosettes.

forming a sheath only in places. This could be due to poor preservation, as this thin sheath is easily removed in places. The trochirhabds are also sometimes grouped in rosettes, and some of them are located inside the axis of the stalk. The fixation base is missing in all specimens, suggesting that the specimens were fixed on hard substrate by an enlarged base, and subsequently broken off. If the specimens were anchored in mud we could expect a rhizoid system to have survived on the base of the stalk. It is likely that shorter and thicker substrongyles would be present in the base in complete specimens, as it is frequently the case in cladorhizids attached to solid substratum.

TABLE 1. Spicule dimensions (µm) of *Chondrocladia* (*Meliiderma*) *turbiformis* **sp.nov**.

	Mycalostyles 1	Mycalostyles 2	Substrongyles	Isochelae 1	Isochelae 2	Sigmas	Trochirhabds
NIWA21357 Holotype	1000–1675 x 20.5–40	498–1188 x 8–10	Absent	78–93	36–45	35–50	42–43
NIWA21355	1055–1750 x 17.5–34	340–1200 x 4–8	260–1000 x 12–30	80–91	32–50	30–48	30–44
NIWA21356	1220–1650 x 15–45	450–1200 x 3–10	400–860 x 13–20	81–95.5	35–45	33.5–46	38–46
NIWA21358	1060–1632 x 20–40	535–979 x 5–14	450–900 x 20–25	68–93.5	37.5–50.5	35–47.5	32.5–44
NIWA21359	1030–1700 x 15–38	690–1400 x 5–15	330–1288 x 12–30	70–92	32–42.5	30–43	35–50

***Chondrocladia* (*Meliiderma*) *tasmaniensis* sp.nov. (Fig. 4)**

Material examined. **Type material**. Holotype QM G326397: CSIRO Cruise-Station-Shot SS0207 Stn 33, Mini Matt seamount transect, SSW of Tasmania, -44.24473°, 146.16427°, 1120–1360 m, CSIRO, sled, 5 April 2007.

Paratypes QM G324724: T. Koslov Stn 47, Dory Hill seamount transect, S of Tasmania, -44.33333°, 147.11°, 1360–1656 m, demersal rock sled, 29 January 1997. QM G324735: T. Koslov Stn 62, Hill A1 Reserve seamount/ transect, S of Tasmania, -44.32833°, 147.26833°, 1399–2253 m, demersal rock sled, 30 Jan 1997; QM G 324745:T. Koslov Stn 47, Dory Hill seamount transect, S of Tasmania, -44.33333°, 147.11°, 1360–1656 m, demersal rock sled, 29 January 1997.

Type Locality. Mini Matt seamount transect, SSW of Tasmania, Australia.

Distribution. Mini Matt seamount south-southwest of Tasmania, and Dory Hill and Hill A1 Reserve seamount, south of Tasmania, Australia

Habitat. Attached to fragments of a scleractinian coral *Solenosmilia variabilis* rubble dredged from depth range of 1120–2253 m.

Description. Four stipitate specimens, consisting of a subspherical body supported by a cylindrical stalk. Stalk broken in specimens G 324724 and G 324735, attached by an enlarged base to a fragment of *Solenosmilia variabilis* in holotype and in paratype G 324745. Body 7.2 mm in diameter in the holotype, varying from 3.5 to 9 mm in the paratypes, stalk 12 x 1 mm in the holotype, 12–30 x 0.9–1.5 mm in the paratypes. Body more or less regular in shape, surface uneven with numerous foreign bodies included. Stalk generally curved, smooth, slightly thicker near the base. Color cream to clear brown in alcohol. No visible aquiferous system; living tissue poorly preserved.

Skeleton. Stalk made of an axis of tightly packed longitudinal mycalostyles and substrongyles, including a few isochelae and isolated trochirhabds. Stalk axis covered by a dense sheath of closely packed trochirhabds, individual spicules sitting perpendicular to the axis with the larger swelling upwardly directed. Body with a skeleton of radiating fascicles of mycalostyles, and numerous anchorate isochelae. Foreign spicules of hexactinellid and of an *Asbestopluma* sp. present in several specimens.

Spicules. Megascleres (Table 2, Fig. 4). Mycalostyles 1 of the stalk and spicular axis of the body, slightly flexuous or a little bent in the third near the head, feebly fusiform, often with a slight swelling near the head, with a short acerate point. Size in holotype: 350–950 x 10–27.5 µm. Mean size smaller in the fixation base: 350–660 (481 ± 77) x 10–21 (15.4 ± 2.7) µm, larger in the body: 740–950 (872.4 ± 53.6) x 15–27.5 (21.6 ± 2.9) µm, intermediate in the stalk: 470–950 (745.2 ± 148.5) x 11.5–26 (19.2 ± 3.7) µm (from measurements in the holotype). Size slightly larger in specimen QM G 324735. **Microscleres (Table 2, Fig. 4).** Anchorate isochelae, rare in the stalk, very abundant in the body, with narrow fimbriae and five lanceolate teeth measuring 4–18 x 3.6–3.7 µm. Size 67.5–90 µm, shaft approximately 5.5–5.6 µm thick; Trochirhabds, very abundant as a sheath on the stalk, arranged perpendicularly in a dense cover with the large cap outwardly directed. Rhabd straight, bearing on each end respectively a cap and a subspherical bulge, and a disc in the middle. Cap large, resembling a mushroom pileus, convex and bearing small blunt spines giving it a rugose aspect on the upper surface, flat and smooth on the underside. Subspherical bulge, rugose on the surface. Disc without indentation, with a few blunt small spines on the edge. Rhabd smooth, sometimes with a faint swelling between the cap and the disc. Size 32.5–50 µm.

Etymology: Named from the type locality, Tasmania

Remarks: This species differs from the two other species of *Chondrocladia* that have trochirhabds by the shape of these microscleres, which have a single ring, instead of two in *C. occulta* and three in *C. turbiformis* **sp.nov.** The trochirhabds are also peculiar in that they have an enlarged end resembling a convex mushroom pileus rather than a hemisphere as in the two other species. *C. tasmaniensis* **sp.nov.** also differs from *C. turbiformis* **sp.nov.** by the absence of substrongyles (although the fixation base, in which these spicules are generally localized in Cladorhizidae is present in two specimens), by the possible absence of small isochelae (which are localized in the embryos in *C. turbiformis* **sp.nov.**), and by the absence of sigma.

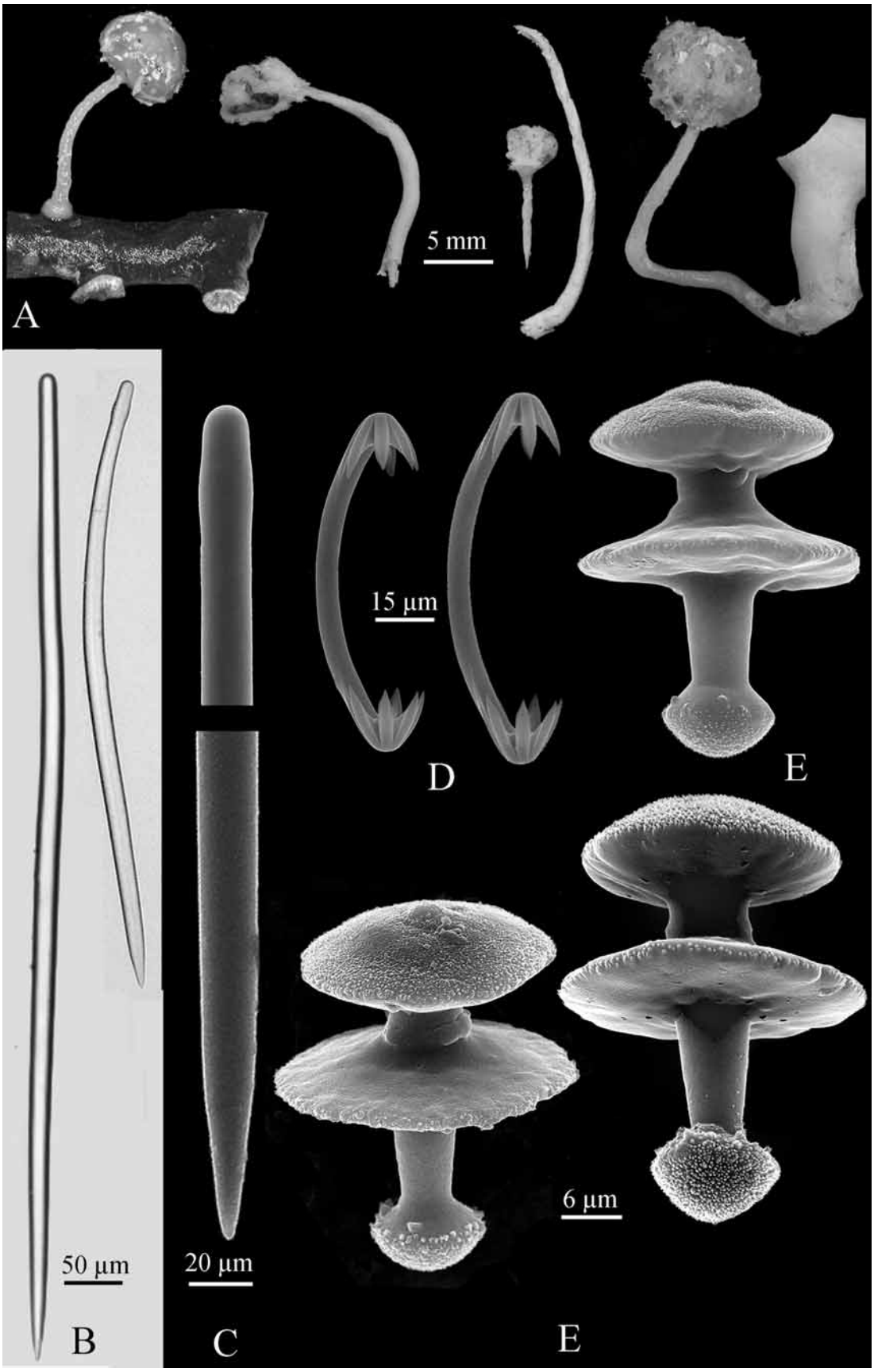

FIGURE 4. *Chondrocladia (Meliiderma) tasmaniensis* **sp.nov.** A. View of the type specimens; from left to right, holotype QM G326397, paratypes 1, 2 and 3. B–E. Spicules of the holotype. B. Mycalostyles. C Head and tip of a mycalostyle. D. Anchorate isochelae. E. Trochirhabds.

The large isochelae are remarkably similar, although with slightly longer and larger alae in *C. tasmaniensis* **sp.nov.** Two specimens are preserved with a fixation base attached to a fragment of scleractinian coral, showing that they were living on small hard substrates rather than anchored in mud by a rhizoid system as many other *Chondrocladia* spp.

TABLE 2. dimensions (µm) of *Chondrocladia* (*Meliiderma*) *tasmaniensis* **sp.nov.**

	Mycalostyles	Isochelae	Trochirhabds
QM G 326397	350–950 (699.5 ± 192.3) x 10–27.5 (18.5 ± 4.1)	72.5–90 (80 ± 4.6)	32.5–40 (37.1 ± 2.26)
QM G 324724	330–910 (567 ± 160) x 12.5–30 (19.5 ± 5.8)	75–90 (82 ± 4.6)	35–45 (38.5 ± 2.95)
QM G 324735	340–1062 (847.2 ± 215.3) x 15–50 (31.2 ± 11.26)	67.5–90 (80.8 ± 4.6)	35–50 (38.7 ± 3.13)
QM G 324745	343–985 (505 ± 195) x 11–27.5 (18 ± 4.76)	74–89 (80.8 ± 3.6)	35–45.5 (39.5 ± 2.42)

Discussion

The two new sponges display the typical morphology of *Chondrocladia*, which may be rather diverse, but most frequently consists of a subspherical body perched on a stalk with various lateral appendages. The spicule complement of mycalostyles and anchorate isochelae, with or without sigmas or sigmancistras, is also typical of the genus, although it does not allow their identification to a known species of *Chondrocladia*. The new species are separated from other *Chondrocladia* by the presence on the stalk of a sheath of special spicules that we here propose to name "trochirhabds", a name derived from the ancient Greek *troch* or *trochal*, meaning disc-shaped. The spicules strongly resemble spinning-top toys, which bear a disc or discs on a shaft. These trochirhabds are similar to the 'discorhabds' described in *Latrunculia occulta* Lehnert et al., 2006, a sponge which has been interpreted as an elusive epizoan on the stalk of *Chondrocladia concrescens* (Schmidt, 1880) (Lehnert et al. 2006). Our interpretation of these spicules as proper to some *Chondrocladia* species radically differs from that given by these authors, and we propose to correct the name of this sponge to *Chondrocladia occulta* (Lehnert et al., 2006). This interpretation rests on several points:

(1) Although the trochirhabds resemble the discate microrhabds called acanthodiscorhabds that are diagnostic of the Latrunculiidae (Samaai & Kelly 2002; Samaai et al. 2003), the resemblance is mostly due to the presence of two or three discs along a rhabd and does not indicate that they are homologous. In trochirhabds the rings derive from swellings of the shaft of the spicule rather than from coalescing spines as in Latrunculiidae, as evidenced by our observation of incompletely developed spicules, which we have also observed on the slides of "*Latrunculia occulta*". Similarly, the terminal bulges have a different structure and origin than the apex and manubrium of discorhabds. Lehnert et al (2006) also pointed out these differences and admitted that the terminology of discorhabds does not apply to these spicules. Trochirhabds appear in fact to be another example of discorhabd-like microscleres that have been described in several groups of sponges taxonomically different from Latrunculiidae, such as *Didiscus* or *Barbozia* (Samaai & Kelly 2002).

(2) The body of the presumed epizoic *Latrunculia* was not seen by the authors. Lehnert et al recorded only '*a very thin encrustation with a thickness of only a unispicular layer*' of spicules. Similarly, the stalk of our specimens does not display an encrustation which could correspond to an epizoic sponge, neither in macroscopic observations nor on sections, but only a thin unispicular layer of trochirhabds arranged perpendicularly to the surface of the axis in the best preserved individuals. In some specimens of *C. turbiformis* **sp.nov.**, specimen NIWA21359 for instance, some trochirhabds are intimately mixed with the spicules of the stalk axis, or display at the surface a rosette-like arrangement which is unknown in

Latrunculiidae. Furthermore, there are no other spicules which could be proper to a *Latrunculia*, such as straight styles or strongyles arranged in wispy tracts. This would mean that the *Latrunculia* has lost the megascleres in relation with its epizoic mode of life, which is unlikely. The substrongyles that are found in the basal part of the stalk in the two new species are rather unusual in *Chondrocladia*, although quite common in the basal part of the stalk of many Cladorhizidae. We have checked that they are well integrated in the spicular axis of the stalk, with some intermediaries with the normal styles. They are thus proper to the *Chondrocladia*, and cannot belong to an elusive *Latrunculia*.

(3) The characters of the three *Chondrocladia* spp. in which trochirhabds have been observed are consistent. The trochirhabds are distinctive between the three species, and these characters are well correlated with the specific characters of the normal spicules of *Chondrocladia.*

These special, non-meniscoid microscleres are very unusual in *Chondrocladia* and more generally in Cladorhizidae, which have a large variety of microscleres derived from sigmas (Vacelet 2007). Their protorhabds appears to be straight, contrary to that of the spinorhabds of Podospongiidae, which originate from a sigmoid spicule. However, the juvenile trochirhabds closely resemble in shape, size and arrangement the "spear-like spicules" described by Ridley and Dendy, 1887 in *Meliiderma stipitata*, transferred to *Chondrocladia* by Hajdu & Vacelet, 2002. In this species, the fully grown spear-like spicules have only faintly marked swellings. They are '*densely packed in a single layer around the stalk*' (Ridley and Dendy, 1887). Remarkably, Ridley & Dendy first thought that these spicules belong to an epizoic sponge, an interpretation similar to that of Lehnert et al.(2006), but that they discarded on closer examination. A special skeleton occurring at the base of the shaft is rather frequent in carnivorous sponges. It could be a feltwork of spinose microstyles in *Asbestopluma*, a sheath of granulose tylostyles in some *Chondrocladia* (Lundbeck 1905; Topsent 1930), or short and thick substrongyles sometimes evolving in desmas. It seems that in a small group of *Chondrocladia* these spicules are more specialized, and in the form of trochirhabds.

The *Chondrocladia* considered here, with such a spicule lining of the stalk, clearly differ by the characters of these spicules. They are subtrochirhabds, spear-like spicules showing only annular swellings in *C. stipitata* (Ridley & Dendy, 1886) from the subantarctic Indian Ocean (between Prince Edward and Crozet Islands). They are fully formed trochirhabds in the three other species, with three discs in *C. turbiformis* **sp.nov.** from New Zealand, two discs in *C. occulta* from the North Pacific, and a single disc with a bulge enlarged in a cap in *C. tasmaniensis* **sp.nov.** from South Australia. The four species have a rather similar shape and other spicule complement, with anchorate isochelae bearing five teeth similar in size. We have examined the slides of *L. occulta* mixed with a *Chondrocladia* identified as *C. concrescens* by Lehnert et al (2006). This *Chondrocladia* has, in addition to trochirhabds 42–54 µm long and bearing only two rings, a spiculation rather similar to that of the two new species, indicating that they are near relatives (Table 3). The styles are feebly fusiform, with a short acerate point, sometimes a little flexuous, 1200–2100 x 30–38 µm. The anchorate isochelae, 75–98 µm, bear five teeth, with rather large fimbriae. The trochirhabds form a very coherent layer on the base of the sponge, similar to the feltwork of granulose styles frequently found in cladorhizids, but here very regularly arranged. This spiculation, however, differs from that of the two new species not only by the characters of the trochirhabds, but also by the absence of sigmas. The absence of the small size of isochelae, which could be localized in embryos, and of substrongyles, which are localized at the base of the stalk, are less significant. The characters of the "normal" spicules, without taking into account the trochirhabds, clearly differ from those of the Caribbean *C. concrescens*, which according to Schmidt's description checked by Topsent (Schmidt 1880; Topsent 1920) has large isochelae with 6 or 7 teeth measuring 71–120 µm or 110–130 µm, small isochelae 28–31 or 27–40 µm long displaying a distinctive shape with long teeth nearly in contact by their tip, and sigmancistras 69–97 µm long.

The similarity in shape and in spicule complement of these four *Chondrocladia* spp. with a spicule lining on the stalk indicates a close relationship, which could justify the distinction as a subgenus of *Chondrocladia.* We propose here to revive *Meliiderma* (Ridley & Dendy 1887) as a subgenus of *Chondrocladia* for these species, with the diagnosis given above. The four known species have anchorate isochelae with five teeth, and substrongyles may be present in the basal part of the stalk in the species where the fixation base is known.

Another *Chondrocladia* (*Meliiderma*) species, with similar characters and probably new to science, has been discovered in 2005 during the ANDEEP III-Expedition in the deep Antarctic Weddel Sea, and is in the process of description (D. Janussen, personal communication).

TABLE 3. Characters of *Chondrocladia* spp. subgenus *Meliiderma*, spicule sizes in µm.

	Shape	Mycalostyles	Substrongyles	Isochelae	Sigmas	Trochirhabds
C. turbiformis **sp.nov.**	Subglobular, stipitate	1000–1700 x 15–45 & 340–1400 x 4–15	260–1288 x 12–30	68–95 & 32–50.5 with 5 alae	30–50	30–50, three rings
C. tasmaniensis **sp.nov.**	Subglobular, stipitate	330–1062 x 10–50		67.5–90, with 5 alae		32.5–50, one ring
C. occulta Lehnert *et al.*	Subglobular, stipitate	1200–2100 x 30–38		75–98, with 5 alae		42–54, two rings
C. stipitata Ridley & Dendy	Subglobular, stipitate	Up to 2200 x 38		85, with 5 alae	55	Spear-like styles 62–100

With the exception of a superficial resemblance to the discorhabds of Latrunculiidae, the trochirhabds have no known equivalent in Recent sponge spicules. However, and interestingly, they closely resemble the fossil spicules described by Möstler (1990) from sediment of the Early Jurassic of the Northern Calcareous Alps. The fossil spicules generally have two rings, as those of *C. (M.) occulta*, and exactly the same shape. Similar spicules, with three rings, have also been recorded from strata of deep-sea sediments dating back to the Miocene from the NE Atlantic near Iceland (Bukry 1979). These spicules were termed ‘cricorhabds’ or ‘microcricorhabds’ by Möstler (1990), followed by Wiedenmayer (1994), a rather general term used by Rauff (1893) for monaxons provided with annular swellings. We prefer here to coin the new, more specific term ‘trochirhabd’ for these spicules. The fossil records suggest that *Chondrocladia* (*Meliiderma*) spp. with trochirhabds are very ancient, dating back at least from the Early Jurassic. The presence of *Chondrocladia* sp. at this period has been already suggested by Möstler (1990), based on the presence of anchorate isochelae, but these microscleres are more ubiquitous and less significant.

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