Zootaxa 725: 1–18 (2004)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

725

Cyclacanthia n.g. (Demospongiae: Poecilosclerida: Latrunculiidae *incertea sedis*), a new genus of marine sponges from South African waters, and description of two new species

TOUFIEK SAMAAI [1], VASHA GOVENDER[1] & MICHELLE KELLY[2]

[1]*School of Biological and Conservation Sciences, University of KwaZulu-Natal, Westville Campus, P.O Box X54001, Durban, 4000 (samaait@ukzn.ac.za)*

[2]*National Centre for Aquatic Biodiversity & Biosecurity, National Institute of Water & Atmospheric Research Ltd, Private Bag 109-695, Newmarket, Auckland (m.kelly@niwa.co.nz)*

**Corresponding author: Toufiek Samaai*

Abstract

The new genus *Cyclacanthia* n.g. is erected in the poecilosclerid Family Latrunculiidae for the type species *Latrunculia bellae* Samaai & Kelly, 2003, and two further species, *Cyclacanthia cloverlyae* sp. nov., and *Cyclacanthia mzimayiensis* sp. nov.. The latter species are from the subtropical east coast of South Africa, whereas *C. bellae* has only been found further south in warm temperate Algoa Bay. *Cyclacanthia* n.g. differs from other Latrunculiidae genera in the ontogeny, morphology and structure of the mature microsclere, the isospinodiscorhabd, which has only three major whorls of projections as opposed to the four in species of *Latrunculia* du Bocage. Additional diagnostic characters include the presence of broad swathes of megascleres that diverge from the base of the sponge towards the upper choanosome, where they form loose brushes and the typical whispy reticulation of most Latrunculiidae. The ectosome is composed of a dense tangential layer of megascleres, an irregular palisade of microscleres at the surface, and a permanently encrusting habit. *Cyclacanthia* n.g. is the second new latrunculid genus recently described from shallow subtidal South African waters, following major revision of the family. The presence of species in four of the five known genera in the family, on South African coastlines, suggests a diversity hot-spot for the family in this region.

Key words: Poecilosclerida; Latrunculiidae; isospinodiscorhabd; *Cyclacanthia*; new genus; new species; ontogeny; South Africa

Introduction

Latrunculia bellae Samaai & Kelly, 2003 was first described from the warm temperate

Accepted by J.N.A. Hopper: 28 Oct. 2004; published: 15 Nov. 2004

waters of Rhi Bank, Algoa Bay, South Africa. Samaai *et al*. (2003) considered this species to be unique amongst South African Latrunculiidae, and indeed worldwide, as it is thinly encrusting, with reduced microscleres and no subsidiary whorl on the shaft. Moreover, the apical whorl and manubrium are discretely spinose in overall morphology and ornamentation. This microsclere morphology was not like anything described in *Latrunculia* du Bocage, but reminiscent of the three-whorled morphology of microscleres in *Tsitsikamma* Samaai & Kelly.

The discovery of three additional sponges, referable to two new species, with this characteristically three-whorled microsclere morphology, from two subtropical locations on the South African east coast, clearly indicates a diverging taxonomic lineage within the Latrunculiidae. The two new species like *L. bellae*, are thinly encrusting, and all possess microscleres with a unique ontogenetic developmental pathway, remarkably different from that found in *Latrunculia*, *Tsitsikamma* and *Sceptrella* Schmidt (see later). In this paper we describe the two new species and erect the genus *Cyclacanthia* n.g. to accommodate it and *L. bellae* Samaai and Kelly (2003), emphasising key diagnostic characters such as microsclere ontogeny, overall morphology and ornamentation, spicule dimensions, choanosomal architecture, gross morphology and life colouration.

Materials and Methods

Material was collected from the east coast of South Africa by SCUBA during a large-scale survey and inventory of sponges and reefal biotopes on the east coast of South Africa, undertaken in collaboration with Emzimvelo KwaZulu-Natal Wildlife (EKZN), for the purpose of conservation and management (Fig. 1). Upon collection, specimens were preserved in 70% ethanol, and prepared for histological examination as in Hooper (1996). Spicules were measured using a calibrated stage micrometer. Spicule dimensions are given as the mean length (range of length measurements) x mean width (range of width measurements) of 20 spicule measurements, unless otherwise stated. Primary type material and some paratypes have been deposited in The Natural History Museum (BMNH), London, and in the South Africa Museum (SAM), Cape Town. Fragments of both the holotypes and paratypes have also been retained at the University of KwaZulu-Natal, Durban. TS & MK are the primary taxonomic authors; the authority for each new species described herein will be referred to in future as *Genus species* Samaai & Kelly, 2004.

Microsclere terminology

Terminology for the microsclere morphology and ornamentation follow Samaai & Kelly (2002) and Samaai *et al*. (2003).

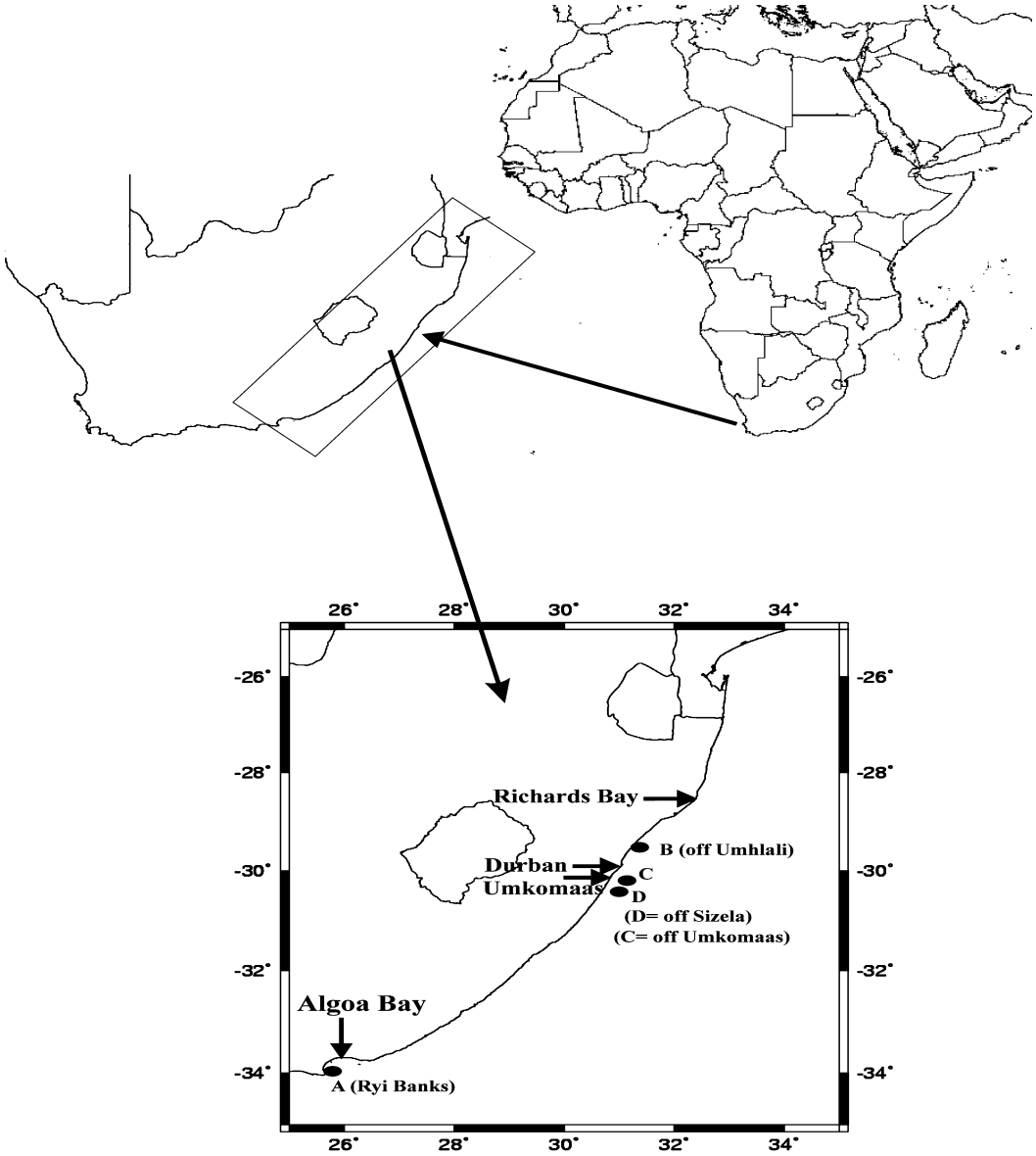

FIGURE 1. Collection localities for *Cyclacanthia* n.g. spp. on the east and south coasts of South Africa: A. *C. bellae* (Samaai & Kelly); B. *C. mzimayiensis* sp. nov.; C. *C. cloverlyae* sp. nov.

List of species described

Class Demospongiae Sollas, 1885
Order Poecilosclerida Topsent, 1928
Family Latrunculiidae Topsent, 1922
Genus *Cyclacanthia* n.g.
Cyclacanthia bellae (Samaai & Kelly, 2003)

Cyclacanthia cloverlyae sp. nov
Cyclacanthia mzimayiensis sp. nov.

Systematic descriptions

Family Latrunculiidae Topsent, 1922

Diagnosis. Massive semispherical, pedunculate, or thinly encrusting sponges, with areolate porefields and raised fistular oscules; texture in life soft, slightly elastic, compressible, leathery in preservative. Colour in life typically liquorice brown, dark green, olive, brown or khaki, often tinged with forest-green or blue, or rarely pale beige to white. Structural megascleres are styles or anisostrongyles, rarely oxeas, these are frequently slightly irregular, sinuous, forming a compact tangential layer under the ectosome, and a wide-meshed reticulation in the choanosome that, in some genera, is bounded by broad dense ascending (*Cyclacanthia* n.g.), or chamber-forming tracts (*Tsitsikamma* Samaai & Kelly). Microscleres are typically acanthose anisodiscorhabds, or "chessman" spicules, or isospinodiscorhabds (*Cyclacanthia* n.g.), bearing various apical and basal whorls (manubrium) of discrete spines that merge to various degrees to form crenulate discs; the subsidiary and median whorls (in the upper half and midway along the shaft, respectively) are variously present, and form crenulate to spinose discs. Microscleres are typically arranged in a compact or irregular palisade of spicules orientated perpendicular to the ectosome, their bases buried in the ectosomal membrane. Viviparous. Shallow sublittoral to abyssal, polar to warm temperate (modified from Samaai & Kelly, 2002).

Genus *Cyclacanthia* n.g

Type species. *Latrunculia bellae* Samaai & Kelly, 2003: 14, Fig. 3C, 4D, 5D.

Diagnosis. Thinly encrusting sponges with long cylindrical to tapering volcano-shaped oscular fistules and truncate areolate porefields, surface even, non hispid but felt-like to the touch, texture in life soft, compressible, only slightly compressible in preservative. Colour in life, emerald green to olive green and in preservative dark green to dark brownish green. Choanosomal architecture consists of broad swathes or defined tracts of megascleres (styles) that diverge and radiate from the base of the sponge towards the upper choanosome, where they form loose brushes and the typical whispy reticulation of other Latrunculiidae, with megascleres scattered interstitially; ectosome composed of a dense tangential layer of megascleres with an irregular palisade of microscleres at the surface that are oriented in many directions. Microscleres are acanthose isospinodiscorhabds with

a straight stout shaft bearing identical apical whorl and basal manubrium with a reduced numbers of discrete conical spines that may be unevenly distributed around the shaft, i.e. grouped in bunches. The median whorl is equidistant from the apical whorl and manubrium, and bears several discrete conical spines; all spines are secondarily spinose. A single spike protrudes from the manubrium and apical whorls in the plane of the shaft. Microscleres are disposed in a palisade with their basal whorls buried in the outer ectosome.

Etymology. The name is derived from the Greek words *cyclo* meaning ring and *acanthus* meaning spine/thorn. *Cyclacanthia* refers to the arrangements of the spines around the shaft of the discorhabd (forming a ring of spines as oppose to a whorl).

Remarks. The microscleres in *Cyclacanthia* n.g. are acanthose **isospino(acantho)discorhabd** with a stout straight shaft bearing an apical whorl with a reduced number of spines, and a reduced spinose manubrium that are undifferentiated in the size and form of the constituent spines. The apical whorl and manubrium do not form a rosette structure where the spines merge to form a disc or crown-like structure, as in the anisodiscorhabds of *Latrunculia* or *Sceptrella* (see Fig. 2 in Samaai and Kelly, 2002), but the number of spines in the whorl is reduced considerably and they remain discrete and grouped. These microscleres superficially resemble the spinorhabds of *Diacarnus* Burton and *Sigmosceptrella* Dendy (Kelly & Samaai 2002), but differ from them in being secondarily spinose, and in their uneven (grouped) distribution around the shaft. A single spike protrudes from the manubrium and apical whorls. The median whorl is equidistant from the apical whorl and manubrium, and bears several discrete conical spines that may be acanthose.

***Cyclacanthia bellae* (Samaai & Kelly, 2003)**
(Figs. 2F, 3A, E–F, 4A)

Latrunculia bellae Samaai & Kelly, 2003: 14, Fig. 3C, 4D, 5D.

Holotype. BMNH 2003.1.10.1: Ryi Banks, Algoa Bay, South east South Africa.

Paratype. SAM H-4963: Ryi Banks, Algoa Bay, South east South Africa.

Description (modified from Samaai *et al*., 2003). Thinly encrusting sponge, 5 mm thick in life, surface crowded with very small conical oscules and numerous thin-lipped crater-like areolate porefields (Fig. 3A). Compressible in life, slightly felty to the touch, emerald green in life, dark chocolate brown internally and in preservative. The sponges were collected from a moderately rugged rocky bottom with patches of sand between rocks, on Ryi Banks, Algoa Bay, southeastern South Africa, at 10–22 m. **Spicules. Megascleres—**Styles: Smooth, hastate, centrally thickened straight or slightly sinuous styles, 364 (319–400) long x 12 μm wide (Fig 4A). **Microscleres—**Acanthose isospinodiscorhabds: The median whorl is composed of four groups of discrete spines distributed evenly around the shaft, the spines of the manubrium and apical whorl are slanted obliquely from the

median whorl and the spines are orientated at different angles within each whorl. A single spike protrudes from the apex and base of the spicule, all spines are markedly acanthose, 46 (44–51) μm long (Fig. 2F).

Skeleton. Large dense swathes of megascleres, 230–250 μm wide, emerge from the base of the sponge towards the upper choanosome, where they diverge to form loose brushes and a whispy polygonal reticulation of tracts c. 60–180 μm wide, forming a mesh c. 230 μm wide (Fig. 3F). Interstitial megascleres and microscleres are abundant. The ectosome of tangentially arranged styles is c. 320 μm thick, and is aligned by an irregular palisade of densely packed isospinodiscorhabds (Fig. 3E).

Remarks. While Samaai *et al.* (2003) considered *C. bellae* (Samaai & Kelly) to be unique amongst South African Latrunculiidae, they did not consider the combination of characters that this species displayed to be sufficient evidence for the erection of a new genus until further species were discovered. The discovery of two additional species has now justified this action.

The isospinodiscorhabds of *C. bellae* (Samaai & Kelly) (Fig. 2F) are superficially similar to the isoconicodiscorhabds of the North Atlantic latrunculid genus *Sceptrella* (Fig. 2C) in that they both have whorls of discrete spines grouped in an irregular distribution around the shaft ('furcate spines' of Samaai & Kelly, 2002), and these microscleres are both secondarily spinose. The key difference is that in the isospinodiscorhabds of *Cyclacanthia* sp. nov., the subsidiary whorl is absent in all three known species. The morphology of the isospinodiscorhabds is in fact more similar to the isochiadiscorhabds of *Tsitsikamma*. While the mature microscleres differ considerably in their overall morphology (the microscleres of *Tsitsikamma* bear three regular whorls of apically spined tubercules (Fig. 2B), the subsidiary whorl in both types of microscleres is absent, and the ontogenetic pathways of both are similar. Moreover, species in both genera have thick tracts or swathes of megascleres in addition to the typically whispy polygonal reticulation of other Latrunculiidae (Samaai & Kelly 2002; Samaai *et al*., 2003). The phylogenetic implications of the similarities between *Cyclacanthia* sp. nov. and *Tsitsikamma* will be considered in the final discussion of this work.

The primary character of *C. bellae* (Samaai & Kelly), that is diagnostic at the species level, is the overall morphology of the microsclere, the design and geometry of the spines in the various whorls on the microsclere, the degree and nature of ornamentation of the spines, and the basal choanosomal architecture (Table 1).

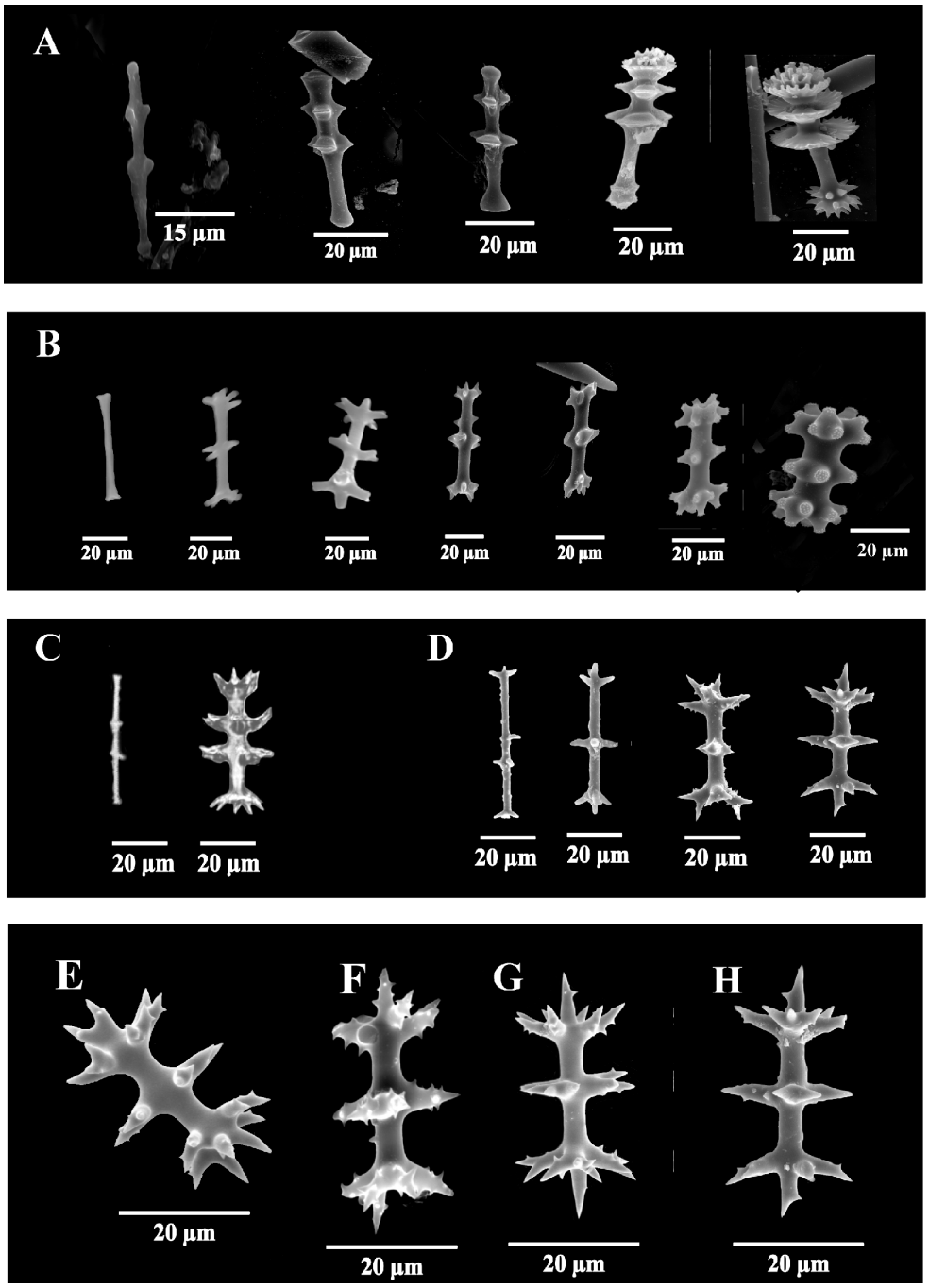

FIGURE 2. Morphology and ontogenetic development of microscleres of Latrunculiidae: A. Ontogeny of *Latrunculia* [BMNH 1887.5.2.237, *Latrunculia bocagei* Ridley and Dendy, 1886 (from Samaai and Kelly, 2002)] B. Ontogeny of *Tsitsikamma* [BMNH 1997.7.3.2, *Tsitsikamma favus* Samaai and Kelly, 2002]. C. Ontogeny of *Sceptrella* [BMNH 1870.5.3.22 *Sceptrella regalis* Schmidt, 1870 (from Samaai & Kelly 2002)]; D. Ontogeny of *Cyclacanthia* [SAM-H 5082, *Cyclacanthia mzimayensis* sp. nov.]; E. Isospinodiscorhabd of *C. cloverlyae* sp. nov. [SAM H-5080]; F. Isospinodiscorhabd of *C. bellae* Samaai & Kelly [BMNH 2003.1.10.1]; G–H, Isospinodiscorhabd of *C. mzimayiensis* sp. nov. [SAM H-5082 and SAM H-5081].

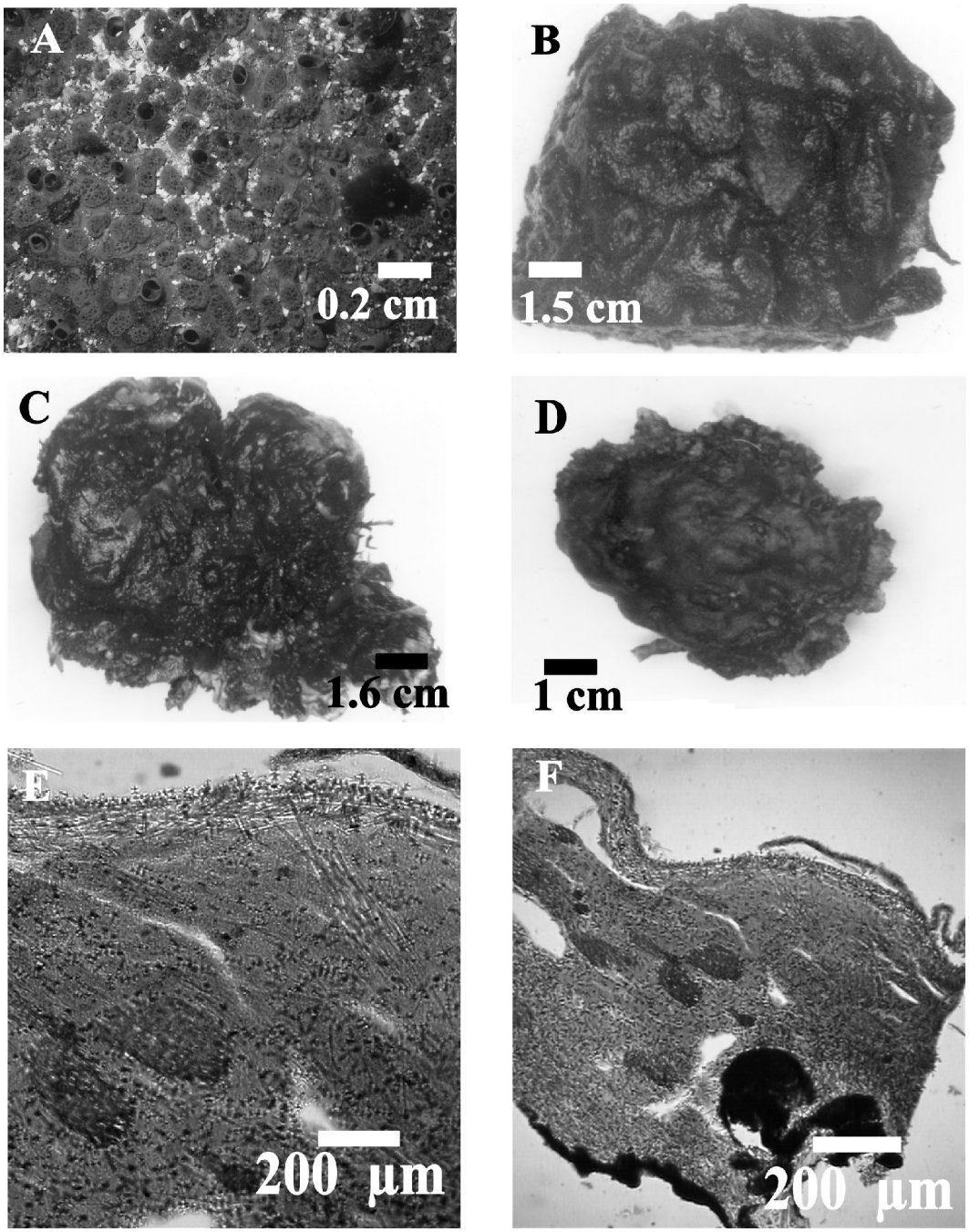

FIGURE 3. A. Gross morphology of genus holotype *Cyclacanthia bellae* Samaai & Kelly [BMNH 2003.1.10.1]; B. Gross morphology of *C. cloverlyae* sp. nov. [SAM-H 5080]; C–D. Gross morphology of *C. mzimayiensis* sp. nov. [SAM-H 5082 and SAM H-5081]; E–F. Gross skeletal architecture of the holotype, *C. bellae*, showing several large tracts in cross section, tangential ectosomal skeleton, and the abundant interstitial microscleres.

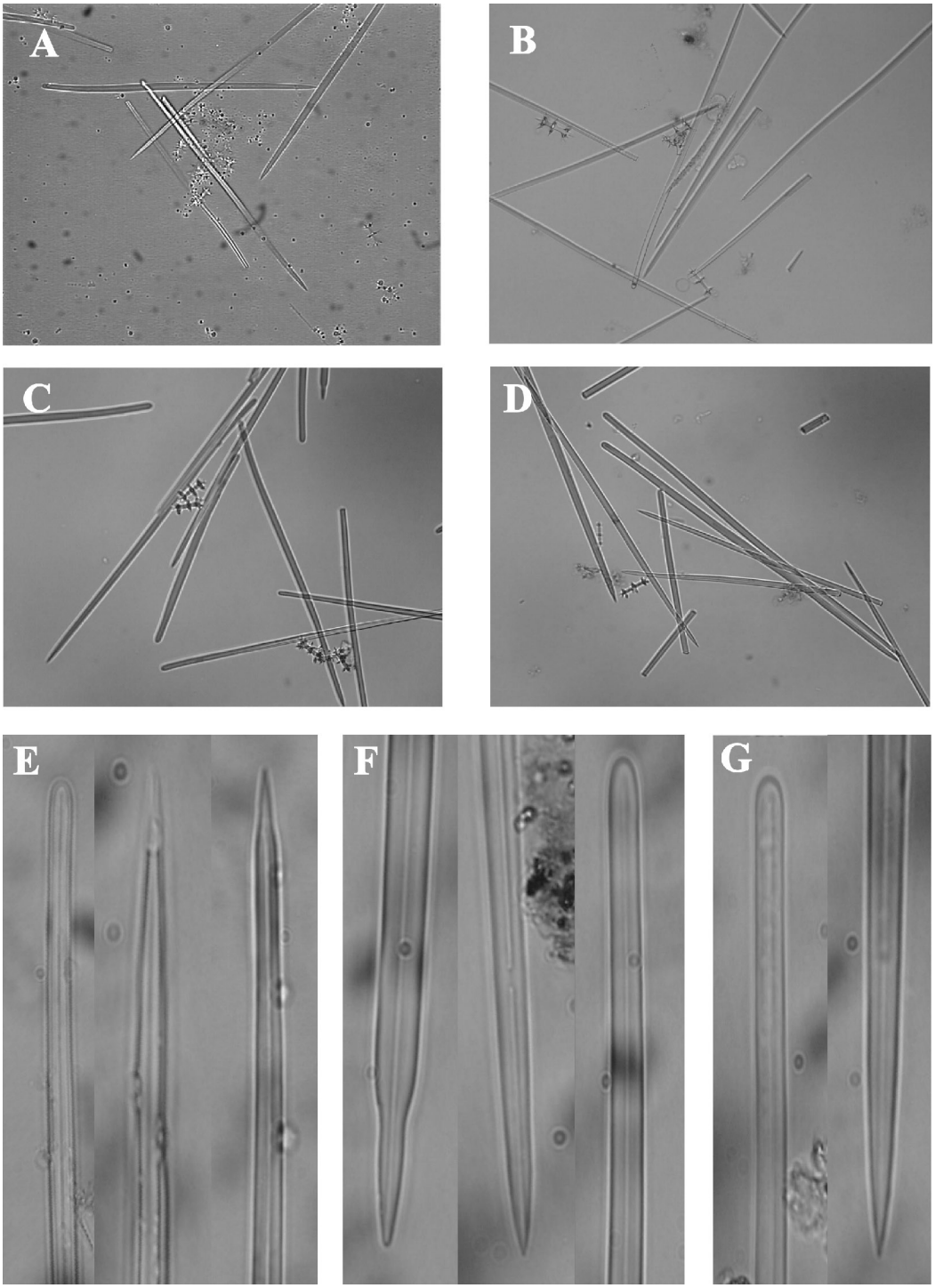

FIGURE 4. A. Styles of *C. bellae* Samaai & Kelly [BMNH 2003.1.10.1]; B. Styles of *C. cloverlyae* sp. nov. [SAM-H 5080]; C, D. Styles of *U. mzimayiensis* sp. nov. [SAM-H 5082 and SAM-H 5081]; E. Close up view of the proximal and distal ends of the style as found in *C. cloverlyae* sp. nov.; F, G. Close up view of the proximal and distal ends of the style as found in *C.. mzimayiensis* sp. nov..

TABLE 1. Comparison of morphological characters and details of microscleres of *Cyclacanthia bellae* (Samaai & Kelly), *C. cloverlyae* sp. nov., and *C. mzimayiensis* sp. nov.

Diagnostic characters	*C. bellae*	*C. cloverlyae*	*C. mzimayiensis*
Microsclere morphology	Acantho isospinorhabds	Smooth isospinorhabd	Smooth isospinorhabds
Shape of apical spine	Slanted at different angles from shaft, with single acanthose spike protruding from apex	Radiating obliquely away from shaft, with single smooth spike protruding from apex	Radiating obliquely away from shaft, with furcated spike protruding from apex
Arrangement of spines on apical whorl	3 groups of 2 spines	3 groups of 4 spines	3 groups of 3 spines
Arrangement of spines on median whorl	4 groups of 3 spines	3 groups of 4 spines	4 groups of 2 spines
Arrangement of spines on manubrium	3 groups of 2 spines	4 groups of 3 spines	3 groups of 3 spines
Shape of basal spine	single acanthose spike protruding from base	single smooth spike protruding from base	furcated spike protruding from base
Overall degree of ornamentation	All spines are acanthose (Fig 2F)	Single spine on shaftward side of each apical spine and manubrium spine (Fig. 2E)	Irregular occasional spination with no discernible pattern (Fig. 2G,H)
Microsclere dimensions	46 (44–51) µm	32 (25–44) µm	39 (30–48) µm
Megasclere dimensions	364 (319–400) x 12 µm	321 (273–370) x 5µm	268 (182–363) x 5 µm
Areolate porefields	With poral membrane	Without poral membrane	With poral membrane
Colour in life	Emerald green	Olive green	Lime green
Thickness	5 mm	5 mm	2–3 mm, growing on pebbles, incorporating sand & barnacles

***Cyclacanthia cloverlyae* sp. nov.**
(Figs. 2E, 3B, 4B, E, 5A, B)

Holotype material. SAM H-5080: Christmas reef, Umhlali, Tugela Banks region, Durban, East coast of South Africa, 29° 47 395'S, 31° 27 373 'E, 17 m, collected by C. Lawrence, EKZN, 24 July 2003.

Description. Thinly encrusting sponge forming a circular patch 9 cm long, 6 cm wide and 3 mm thick (Fig. 3B). Surface smooth, velvety to the touch, with volcano-shaped oscules, 5 mm high x 3 mm wide at base, 1 mm at apex being closely packed (5mm apart), and a few nodular truncate areolate porefields, 3 mm high x 3 mm wide, with no poral

membrane covering the opening. Texture compressible, soft and fleshy. Colour in life olive green; in preservative dark green.

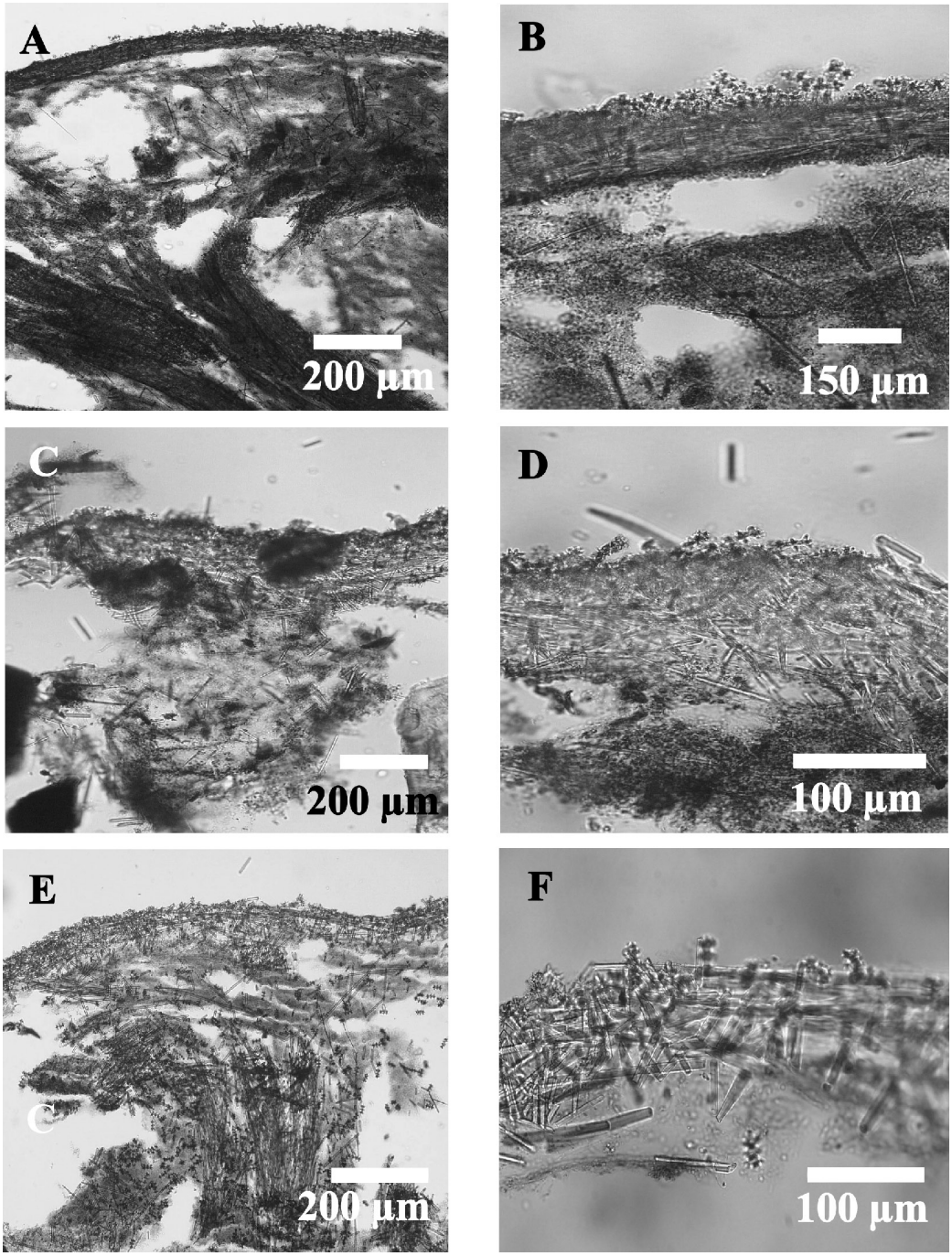

FIGURE 5. Skeletal architecture showing massive choanosomal tracts and tangential ectosome, and irregular palisade of microscleres: A–B. *C. cloverlyae* sp. nov. [SAM-H 5080]; C–D. *C. mzimayiensis* sp. nov. [SAM-H 5082]; E–F. *C. mzimayiensis* sp. nov. [SAM H-5081];

Spicules. **Megascleres—**Styles: Smooth, straight, occasionally wavy, some centrally thickened, fusiform; 321 (273–370) x 5 (4–7) µm (Fig. 4B, E). **Microscleres—**isospinodiscorhabds: The apical whorl has 3 groups of 4 spines radiating obliquely from the shaft away from the median whorl, each with one spine facing towards the spicule shaft. The apex is armoured with a double spike with a single additional spine on each primary spine. The manubrium is identical to the apical whorl, with 4 groups of 3 spines that emanate obliquely from the shaft, and one or more double spikes at the apex. The median whorl is equidistant from both apical whorl and manubrium; 3 groups of 4 spines are directed horizontally from the shaft: 32 (25–44) µm (Fig. 2E).

Skeleton. Thick tracts 166–274 µm emanate from the deep choanosome and diverge towards the surface forming plumose tracts c. 225 µm wide. The upper choanosome has an irregular polygonal-meshed reticulation formed by wispy tracts of smooth styles (Fig. 5A). Interstitial megascleres and microscleres are abundant. The ectosome is a thin paratangential layer of megascleres, c. 147 µm thick, and is aligned with an irregular palisade of isospinodiscorhabds (Fig. 5B).

Ecology. The sponges were found on a rocky reef at 17 m depth in the Tugela Banks area of Umhlali, which is very turbid with visibility often less than 2 m distance. This species is rare; only a single specimen was found.

Etymology. Named for Miss Cloverley Lawrence, the co-ordinator of the EKZN reef project, who collected the specimen described here.

Remarks. *Cyclacanthia cloverlyae* sp. nov. is distinguished from the type species *C. bellae* (Samaai & Kelly) by features of external morphology and colouration; *C. cloverlyae* has thick nodular truncate areolate porefields, with no poral membrane, and is olive green in colour, whilst the surface of *C. bellae* (Samaai & Kelly) is covered with numerous tiny thin-lipped truncate areolate porefields, and is emerald green with touches of brown. *C. cloverlyae* sp. nov. and *C. bellae* (Samaai & Kelly) are further separated on the dimensions of their megascleres, those of *C. cloverlyae* sp. nov. being slightly smaller (Table 1), and on the smaller size and morphology of the microscleres (Table 1). The microscleres of *C. cloverlyae* sp. nov. are more regular and considerably less ornamented (acanthose) than those in *C. bellae* (Samaai & Kelly).

***Cyclacanthia mzimayiensis* sp. nov.**
(Figs. 2G, H, 3C, D, 4C, F, 4D, G, 5C, D, E, F)

Holotype material. SAM H-5082: Mzimayi reef, Sizela, south of Durban, east coast of South Africa, 30° 37 137 'S, 31° 16 112 'E, 29 m, collected by T. Samaai and C. Lawrence, EKZN, 16 October 2003.

Paratype material. SAM H-5081: Umkomaas, Aliwal Shoal, east coast of South Africa, 30° 26 202 'S, 32° 02 558 'E, 18 m, collected by T. Samaai, 4 September 2003.

Description. Thinly encrusting sponge, 2–3 mm thick, forming a patch c. 28 mm x 35

mm diameter, incorporating sand, pebbles, barnacles, and other foreign material (Fig. 3C, D). Surface smooth, with low volcano shape oscules, 3 mm high x 2 mm wide at base, 1 mm at apex, and a few nodular truncate areolate porefields, 2 mm high x 2 mm wide. Texture is incompressible and crumbly due to incorporation of substrate. Ectosome readily separable from the underlying choanosome. Colour in life lime green, in preservative dark green.

Spicules. Megascleres—Styles: Smooth, straight, occasionally wavy, occasionally centrally thickened, narrow proximal region, fusiform: 268 (182–363) x 5 µm (Fig. 4D, G). Paratype (SAM H-5081) style length; 276 (315–200) x 5 µm (Fig 4C, F). **Microscleres—**isospinodiscorhabds: The apical whorl has 3 groups of 3 spines radiating obliquely from the shaft away from the median whorl, each with several additional spines. The apex is armoured with a single irregular spike that may be irregularly spined. The manubrium is identical to the apical whorl, the apex is also armoured with a single irregular spike that may be irregularly spined. The median whorl is equidistant from both apical whorl and manubrium; 4 groups of 2 spines are directed horizontally from the shaft: 39 (30–48) µm (Holotype) (Fig. 2G), 35 (30–44) µm (Paratype) (Fig. 2H).

Skeleton. Thick tracts 196–245 µm emanate from the deep choanosome and diverge towards the surface forming plumose tracts 274–392 µm wide The upper choanosome has an irregular polygonal-meshed reticulation formed by wispy tracts of smooth styles (Fig. 5E, C). Interstitial megascleres and microscleres are abundant, as are sand particles and other foreign materials. The ectosome is a thin paratangential layer of megascleres, c. 98 µm thick, and is aligned with an irregular palisade of isospinodiscorhabds (Fig. 5F, D).

Ecology. The holotype was collected at Mzimayi reef, on a flat rocky ledge at the edge of the vertical section of the reef, at 29 m depth. This species is cryptic, accounting for its apparent rarity, and appears to grow where there is strong current flow. The paratype was found at Aliwal Shoal, on the southern edge of the reef complex, in a small crevice on a boulder, at 17 m depth. The sponge was barely visible, being covered with sand, and only the areolate porefields were visible.

Etymology. Named after the type locality, Mzimayi Reef, south of Durban

Remarks. *C. mzimayiensis* sp. nov. is clearly differentiated from *C. bellae* (Samaai & Kelly) and *C. cloverlyae* sp. nov. in habit; the sponge is very thinly encrusting over sandy pebbles, and it incorporates much foreign material. *C. mzimayiensis* sp. nov. is also lime green, as unusual colour for any latrunculiid sponge, and it is hard, and incompressible, while *C. cloverlyae* sp. nov. is relatively fleshy. The morphology of the microscleres further differentiates these species; the microscleres of *C. mzimayiensis* sp. nov. are more irregularly ornamented, compared to those of *C. cloverlyae* sp. nov., in particular, and they are medium in overall dimensions compared to those of both species (Table 1). *C. cloverlyae* sp. nov and *C. mzimayiensis* sp. nov. are separated by habitat, the former is found in a turbid, sandy reef environment and the latter in deeper waters on a rocky platforms associated with hard coral and algae.

Discussion

With the exception of perhaps *Tsitsikamma favus* Samaai & Kelly (Samaai and Kelly, 2002), and *T. pedunculata* Samaai & Kelly (Samaai *et al*. 2003), species of *Cyclacanthia* n.g. are reasonably difficult to differentiate from other Latrunculiidae in the field, as they share the similar colouration (olive green through oak browns to very dark browns) and surface aquiferous structures (areolate porefields and conical oscular fistules) of all Latrunculiidae. Field characteristics that have been identified as weak synapomorphies for the genus, through the discovery of two new species since the initial description of *C. bellae* Samaai & Kelly, are the thinly encrusting habit, and the nodulose tuberculate areolate porefields. *Latrunculia procumbens* Alvarez *et al*., 2002, from New Zealand, and *Sceptrella regalis* Schmidt, 1870, are also encrusting, but they lack the isospinodiscorhabds of *Cyclacanthia* n.g. spp., and *Sceptrella* spp. are only known from northern Atlantic and Boreal locations including Florida, Iceland, and Norway.

As for most Latrunculiidae, the morphology and ontogeny of the microscleres and the general skeletal architecture provide key diagnostic characters that more clearly differentiate the genera and species within this family (Samaai and Kelly, 2002; Samaai *et al*., 2003). Certainly, in terms of skeletal architecture and spicule geometry, *Cyclacanthia* n.g. is relatively homogenous, and it is only through small, but significant differences in a number of skeletal and spicule features that the constituent species can be reliably differentiated (see Table 1). Diagnostic characters of the inorganic skeleton include megasclere dimensions and the shape of the proximal ends of these spicules, microsclere dimensions and the degree of, and nature of, microspination of the isospinodiscorhabds, and finally, the number of spines and their arrangement in relation to each other, on the manubrium, apical and median whorls (Table 1).

Apart from the clear differences in the geometry and overall morphology of the mature isospinodiscorhabd, the developmental pattern (ontogeny) of these spicules in *Cyclacanthia* n.g., is quite different from that of *Latrunculia*. The anisodiscoprotorhabds of *Latrunculia* are a straight uniform shaft bearing two acentric crenulated discs, and develop from a straight protorhabd (see Fig. 2A), as defined by Dendy (1917) and illustrated for various other species (du Bocage 1869; Ridley and Dendy, 1886, 1887; Dendy 1917; Hentschel 1914; Dendy 1921; Carter 1879; Samaai & Kelly 2002; Samaai *et al*., 2003).

In *Cyclacanthia* n.g., the microscleres arise from a straight protorhabd as in *Latrunculia*, but the post-whorl development differs. The spinose protorhabd projections develop simultaneously in *Cyclacanthia* n.g. (Fig. 2D), as they do also in *Tsitsikamma* (Fig. 2B), rather than asynchronously in *Latrunculia* (Fig. 2A), and the spines develop directly from the shaft and are smooth or entirely microspined. The protospines of *Cyclacanthia* n.g. clearly develop as discrete spines and do not transform into circular plates with serrated margins, as in *Latrunculia*. These characters are important in delineating the generic boundaries between *Cyclacanthia* and the other acanthodiscorhabd bearing latrunculids, because the choanosomal, ectosomal characters, gross morphology are relatively homogenous between these genera (Samaai and Kelly, 2002, Samaai *et al*., 2003).

In a hypothesis put forward by Samaai (2002), presently to be expanded in a full phylogenetic study, *Latrunculia* du Bocage and *Strongylodesma* Lévi are considered to be most closely related as sister taxa, with *Sceptrella* and *Tsitsikamma* being successively less derived. The shared presence of thick tracts in addition to the whispy polygonal skeleton, and of isodiscorhabds rather than anisodiscorhabds, in *Cyclacanthia* n.g. and *Tsitsikamma* seem to indicate a sister taxon relationship between these two taxa (Fig. 6).

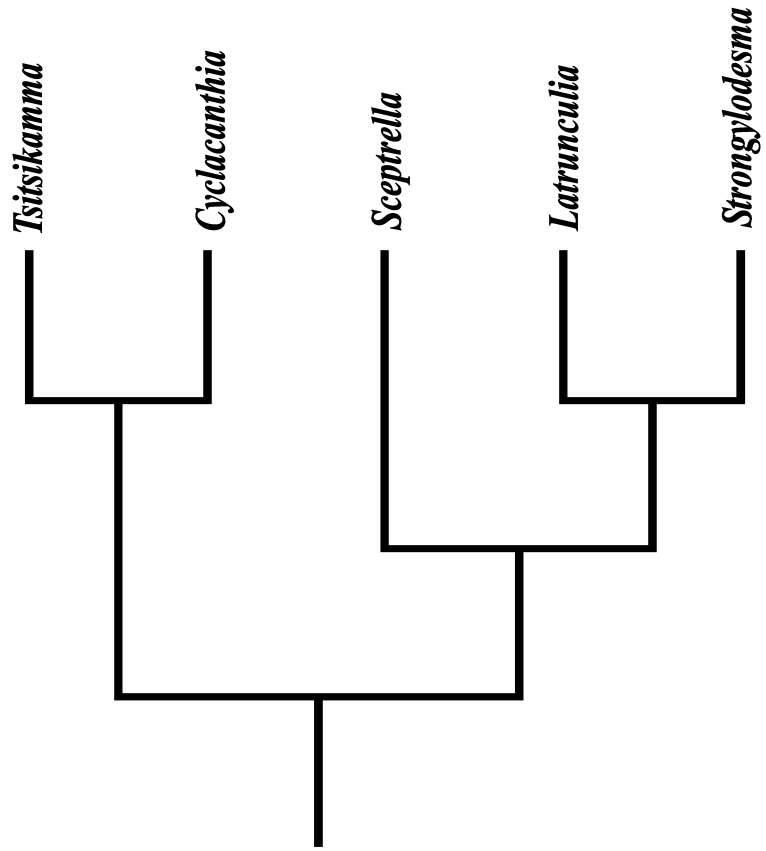

FIGURE 6. Hypothesised phylogenetic relationships of Family Latrunculiidae following Samaai (2002).

The inclusion of this new taxon within the Latrunculiidae is strongly supported by a suite of synapomorphies including the presence of styles, that are arranged in a whispy polygonal reticulation as in *Latrunculia*, *Strongylodesma*, and *Sceptrella* in particular, but which also includes thick swathes of megascleres such as are found in *Tsitsikamma*. *Cyclacanthia* n.g. spp. also have a thick tangential ectosome which is lined apically by an irregular palisade of isoconicodiscorhabds, as is present in all Latrunculiidae with the exception

of *Strongylodesma* which lack these microscleres. All species of *Cyclacanthia* n.g. spp also have typically latrunculid areolate porefields and conical oscular fistules.

Although it is possible that more extensive sampling along the South African coastline will reveal additional species, *Cyclacanthia* g, nov. as it is presently known, is a predominantly shallow water genus occurring in warm temperate to subtropical waters, and is usually associated with rocky reef substrata, especially in areas that has cold upwelling cells and extreme current flow. That *Cyclacanthia* g, nov. is endemic to South Africa, as is *Tsitsikamma*, is certain because no species have been described with similar microscleres on a world-wide basis in the extensive literature dealing with regional faunas (e.g. Bergquist, 1968; Bergquist and Warne, 1980; Bergquist and Fromont 1988; Boury-Esnault & Lopez, 1985; Hartman, 1982; Wiedenmayer 1977; Wiedenmayer, 1989 or on Latrunculiidae (Alvarez *et al*., 2002; Dendy, 1921; Hooper, 1986; Kelly-Borges and Vacelet, 1995; Samaai and Kelly, 2002) from particularly the southern Ocean region, or are known from either the extensive private or commercial collections of sponges from the southern African and Indo-Pacific regions, available to these authors (Samaai and Kelly, 2002; Samaai, 2002).

Acknowledgements

The authors thank Cloverley Lawrence and members of the Ezemvelo KwaZulu-Natal Wildlife (EKZN) for allowing TS to participate in their reef surveys. We also thank Professor Vic Peddemors, University of KwaZulu-Natal, for assisting in collections. We are grateful to Fiona Graham (UKZN-Edgewood Campus) Electron Microscopy Unit, for allowing TS access to their Scanning Electron Microscope. TS thanks Marine and Coastal Management (M & CM) of the Dept. of Environmental Affairs and Tourism, South Africa for permits to undertake these collections. The outline maps (Africa, South Africa and the east coast coastline) were created with Coastline Extractor (http://www.ngdc.noaa.gov/mgg/shorelines/shorelines.html). Part of this work was supported by the National Research Foundation, South Africa, by a research grant to TS. MK thanks NIWA for support under their Biodiversity & Biosecurity Programme.

References

Alvarez, B., Bergquist P. R. & Battershill C. N. (2002) Taxonomic revision of the genus *Latrunculia* du Bocage (Porifera: Demospongiae: Latrunculiidae) in New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 36, 151–184.

Bergquist, P.R. (1968) The marine fauna of New Zealand: Porifera, Demospongiae, Part 1 (Tetractinomorpha and Lithistida). *New Zealand Department of Scientific and Industrial Research Bulletin* 188 (*New Zealand Oceanographic Institute Memoir* 37, 1–105 pp., 15 pls. (+ fsp. in colour).

Bergquist, P.R. & Warne, K.P. (1980). The marine fauna of New Zealand: Porifera, Demospongiae, Part 3 (Haplosclerida and Nepheliospongida *New Zealand Department of Scientific and Industrial Research Bulletin New Zealand Oceanographic Institute Memoir,* 87, 1–77, 17 pls. + figs 4.

Bergquist, P.R. & Fromont , J.P. (1988) The marine Fauna of new Zealand: Porifera, Demospongiae. Part 4 (Poecilosclerida). *New Zealand Department of Scientific and Industrial Research Bulletin New Zealand Oceanographic Institute Memoir,* 96, 1–197.

Boury-Esnault, N. & Lopez, M.T. (1985) Les Démosponges littoralis de lÁrchipel des Azores. *Annales de l'Institt océanographique,* 61 (2), 149–225.

Bocage, J.V. Barboza du. (1869). Éponges siliceuses nouvelles de Portugal et de l'île de Saint-Iago (archipel du Cap-vert). *Jornal de sciencias mathematicas, physicas e naturaes,* 2, 159–162, pls X–XI.

Carter, H.J. (1879) Contributions to our knowledge of the Spongida. *Annals and Magazines of Natural History,* (5)3, 284–304, 343–360.

Dendy, A. (1917) The chessman spicule of the genus *Latrunculia*; a study in the origin of specific characters. *Journal of the Quekett Microscopical club,* XIII, 1–18.

Dendy, A. (1921) The tetraxonid sponge spicule:— a study in evolution. *Acta Zoologica,* 2, 95–152.

Hartman, W.D. (1982) Porifera. *In:* Parker, S.P. (ed.) *Synopsis and Classification of Living Organisms*. McGraw-Hill, New York, Vol. 1. pp. 640–666.

Hentschel, E. (1914) Monaxone Kieselschwämme und Hornshwämme der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition 1901–1903,* 15(Zool. 7), 35–141 pls 4–8.

Hooper. J.N.A. (1986) Revision of the marine sponge genus *Axos* Gray (Demospongiae: Axinellida) from Northwestern Australia. *The Beagle, Occasional Papers of the Northern Territory Museum of Arts and Science,* 3(1), 167–189, pl. 1.

Hooper, J.N.A. (1996) Revision of the Microcionidae (Porifera: Poecilosclerida: Demospongiae), with description of Australian species. *Memoirs of the Queensland Museum,* 40, 1–626.

Kelly-Borges & Vacelet, J. (1995) A revision of *Diacarnus* Burton and *Negombata* de Laubenfels (Demospongiae: Latrunculiidae) with descriptions of new species from the west central Pacific and the Red sea. *Memoirs of the Queensland Museum,* 38(2), 477–503.

Ridley, R.S. & Dendy. O. (1886) Preliminary report on the Monaxonida collected by H.M.S. 'Challenger.' Part II. *Annals and Magazines of Natural History,* series 5 18, 119–121.

Ridley, S.O. & Dendy, A. (1887) Report on the Monaxonida collected by *H.M.S. Challenger* during the years 1873–6. *Report on the Scientific Results of the Voyage of H.M.S. 'Challenger', 1873-1876, Zoology,* 20(59), i–lxviii, 1–275, 51 pls, 1 map.

Samaai, T. (2002) *Systematics of the Family Latrunculiidae Topsent (Porifera:* Demospongiae) and consideration of the diversity and biogeography of shallow-*water sponges of western South Africa*. Volume 2. Ph.D Thesis.. University of the Western Cape, unpublished.

Samaai, T. & Kelly, M. (2002) Family Latrunculiidae. *In*: Hooper, J.N.A., & Van Soest, R.W.M. (eds). *Systema Porifera. A Guide to the supraspecific classification of sponges and spongiomorphs (Porifera)*. Kluwer Academic/Plenum Published, New York, pp. 708–719.

Samaai, T., Gibbons, M.J., Kelly, M & Davies-Coleman, M. (2003) South African Latrunculiidae (Porifera: Demospongiae: Poecilosclerida): descriptions of new species of *Latrunculia* du Bocage, *Strongylodesma* Lévi, and *Tsitsikamma* Samaai & Kelly. *Zootaxa,* 371, 1–26.

Schmidt, E.O. (1870) *Grundzüge einer Spongien-Fauna des atlantischen Gebietes.* Engelmann, Leipzig, vi + 88 pp., 6 pls.

Sollas, W. J. (1885) A classification of sponges. *Annals and Magazine of Natural History,* (5) 16, (95), 395.

Topsent, E. (1922). Les mégasclères polytylote des Monaxonides er la parenté des Latrunculiines.

Bulletin de l'Institut Océanographique, Monaco, 415, 1–8.

Topsent, E. (1928) Spongiaires de l'Atlantique et de la Méditeranée provenant de croisières du Prince Albert ler de Monaco. *Résultats des campagnes scientifique accomplies par le Prince Albert 1, Monaco,* 74, 1–376 pp., 11 pls.

Wiedenmayer, F. (1977) Shallow-water sponges of the western Bahamas. Birkhäuser: Basal. *Experientia* suppl. 28, 1–287, 43 pls.

Wiedenmayer, F. (1989) Demospongiae (Porifera) from northern Bass Strait (Shelf of Southern Australia). *Memoirs of the Museum of Victoria,* 50(1), 1–242.

