Neocucumis kilburni sp. nov. (Echinodermata : Holothuroidea : Cucumariidae) from the east coast of South Africa, with a key to the genus *Neocucumis*

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A new dendrochirotid holothuroid, *Neocucumis kilburni*, is described from waters 50 meters deep, off the southern coast of KwaZulu-Natal, South Africa. It appears quite close to *N. watasei* (Ohshima) and *N. sordidatus* (Sluiter), both from the West Pacific and to *N. atlanticus* (Ludwig & Heding) from the Atlantic Ocean and the Mediterranean Sea. It differs from the former in the nature of the calcareous ring and the disc and the spire of the body wall tables, from *N. sordidatus* in the completeness of its deposits and the number of polian vesicles and from *N. atlanticus* in the presence of handles to the quadrilocular table discs. The new species increases to ten the number of species now classified in the genus *Neocucumis*. A key to all the species is included.

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Introduction

A complete specimen of a cucumariid holothurian collected off Sheffield Beach, north of Durban, KwaZulu-Natal, is here described as a new species of *Neocucumis*, namely *Neocucumis kilburni*. The new species is the only known southern African species of the genus *Neocucumis* Deichmann, 1944. This genus, together with the genus *Cucumella* Ludwig & Heding, 1935 (represented in southern Africa by only *C. triplex* Ludwig and Heding, 1935), are the only two genera of the cucumariid subfamily Thyonidiinae Heding & Panning, 1954 currently known from southern Africa (south of tropic of Capricorn). Of the remaining two subfamilies of the Cucumariidae Ludwig, 1894, the Colochirinae Panning, 1949 is represented in southern Africa by approximately 13 nominal and one unnamed species while the Cucumariinae (Ludwig 1894) is represented by four nominal species. Hence only 19 nominal and one unnamed species of cucumariids are currently known from southern Africa. All species, excluding the new species here described, are listed by Thandar (1991). Of these *T ?parva* has recently been re-described as *Paracucumaria capense* Thandar, 1998.

To date nine species of *Neocucumis* have been described. Of these, *N. watasei* (Ohshima 1915), *N. sordidatus* (Sluiter 1901), *N. sagamensis* (Ohshima 1915) and *N. doelahensis* Heding & Panning, 1954 have been recorded from the West Pacific; *N. marioni* (Von Marenzeller 1877) from the Mediterranean Sea; *N. atlanticus* (Ludwig & Heding 1935) from the East Atlantic Ocean and the Mediterranean Sea; *N. veleronis* (Deichmann 1941) from the Caribbean; *N. panamensis* Heding & Panning, 1954 from the Panama Canal and, more recently, *N. cauda* (O'Loughlin & O'Hara 1992) from southern Australia. *Neocucumis proteus* (Bell 1884) has recently been referred to *Phyllophorus (Urodemella)* by Rowe (in Rowe & Gates 1995).

In the form of the calcareous ring, the new species comes closest to *N. sordidatus* (Sluiter 1901), differing from it in the completeness of the body wall deposits. However, Heding & Panning (1954), upon re-examination of Sluiter's specimen, did indicate that the calcareous deposits of the body wall of Sluiter's specimen could have deteriorated due to its storage in formalin. Despite this the authors are of the opinion that both the body wall and pedicel deposits of the southern African material are sufficiently distinct to warrant a new species.

Material and methods

The single, complete specimen (holotype, ?, XX 153) was dredged by the R.V. Meiring Naude deep sea cruise by Drs R. Kilburn and D. Herbert of the Natal Museum, from off Sheffield Beach, KwaZulu-Natal on 1 June 1990. It is deposited in the South African Museum, Cape Town, with SAM-A catalogue number.

The specimen was studied by conventional methods. The spicules were removed in household bleach, washed in distilled water, passed through a series of alcohols and illustrated with the camera lucida. For scanning electron microscopy the spicules were transferred together with a little alcohol onto a specimen stub, to which they normally adhere once the alcohol evaporates, sputter-coated with gold and photographed using a Philips SEM 500.

Order Dendrochirotida Grube, 1840

Family Cucumariidae Ludwig, 1894

Subfamily Thyonidiinae Heding & Panning, 1954

Genus *Neocucumis* Deichmann, 1944

Diagnosis: (after Heding & Panning, 1954: 75)

Dendrochirotid holothurians with 20 tentacles and simple calcareous ring. Podia arranged in double rows along the radii. Spicules of body wall composed of tables with two-pillared spires.

Type species: *Cucumaria marioni* Von Marenzeller 1877, by subsequent designation Heding & Panning (1954).

Neocucumis kilburni sp. nov. (Figures 1 & 2)

Diagnosis

Body distinctly U-shaped, colour off-white with rust-coloured markings, tentacles 20 (10 larger ones in outer circle and 10 smaller ones in inner circle). Podia restricted to ambulacra in single rows. Calcareous ring simple, radial and inter-radial plates united at their bases to form a ribbon-like structure, posterior processes absent. Polian vesicle and stone canal single. Deposits of body wall exclusively tables of two types: predominant type with regular oval discs with a high two-pillared spire tapering to a single point and an arched handle on the opposite side; other type less frequent, with somewhat quadrangular perforated discs with low, arched two-pillared spires. Podia with end plates, two-pillared tables and other elongated plates surrounding end plates. Tentacles with plates and rods of varying shapes and sizes. Introvert with tables of the same form as those of pedicels.

Type

South African Museum, Cape Town, SAM-A27726.

Type locality

Sheffield, KwaZulu-Natal, South Africa (29°32' S 31°20' E), 50 m.

Etymology

The new species is named after one of its collectors, Dr. Richard Kilburn of the Natal Museum.

Description

Specimen slender (Figures 1A & 2A), U-shaped with long tapered posterior end. Dorsal and ventral surfaces distinct due to shape of body and size of appendages. Ventral surface lighter than dorsal. Length along the ventral surface 45 mm, along dorsal 28 mm, width in the mid-body 6.5 mm, tapering to 2 mm and 1 mm anteriorly and posteriorly respectively. Colour, in alcohol, off white with rust-coloured markings in concavities between bases of podia. Body wall thin, rough to the touch. Podia well developed, non-retractile, located in single rows in ambulacra, denser and longer (ca 3 mm) midventrally, some twisted in a helical spiral, shorter (ca 1 mm) and less numerous dorsally. Suckers well developed, supported by end-plates. Inter-ambulacra naked. Tentacles 20, with 10 large in outer ring and 10 small in inner ring, alternating with each other in pairs. Anus surrounded by minute teeth and papillae.

Calcareous ring (Figure 1B) simple, delicate, 1.5 mm high without posterior processes. Radial and inter-radial plates weakly fused at their bases forming a delicate ribbon-like structure surrounded by the water vascular ring. Radial plates elongated, quadrangular, subdivided twice anteriorly with deep anterior concavity for attachment of retractor muscle. Inter-radial plates triangular with pointed anterior ends, often reaching beyond the limits off the radial plates, sometimes also with a median concavity. Posterior margins of both radial and inter-radial plates deeply notched. Calcareous ring situated 6 mm from the anterior end of the body. Polian vesicle single, mid-ventral, elongate, 4 mm long. Stone canal short, white, slightly coiled at the base, embedded in the dorsal mesentery, imperceptibly merging into the spherical madreporic body (Figure 1C). Respiratory trees well formed, reaching anterior end of body. Cloaca well developed, considerably elongate, about 14 mm long. Gonad mature, branched, white, filling almost the entire body cavity. Longitudinal muscles unpaired, thin but strong; retractor muscles short, arising from longitudinal bands as thick structures.

Spicules of body wall exclusively tables of two types: (a) predominant type (Figures 1D & 2B) with oval discs bearing 4–5 perforations and, on one side, a high two-pillared spire (with a single cross beam) tapering to a single point, and on the other side, a low, arched, smooth handle anchored by 4–(5) short supports; length of discs 60–80 μm (mean 66 μm), height of spire 85–120 μm (mean 100 μm); (b) other type (Figure 1E) less common, comprising quadrangular discs perforated by 5–10 holes and a low two-pillared, smooth, arched spire, sometimes reduced to a pair of knobs on the surface of the disc. Ventral podia supported by tables (Figures 1F & 2C) and well-developed end plates encircled by a series of elongated perforated plates (Figure 1G); tables with elongated discs, 40–90 μm (mean 68 μm), with four central perforations and a few more at one or both ends; a high, two-pillared spire, 50–90 μm (mean 72 μm), tapering to a single point.

Tentacles with smooth, curved, perforated rods and plates of varying shapes and sizes (Figures 1H & 2E). Introvert deposits exclusively tables of the same form as those of the podia (Figures 1I & 2D).

Distribution

Known only from type locality.

Remarks

Of the 10 species now classified in the genus *Neocucumis* the new species shows some affinity only with *N. watasei* (Ohshima) from the West Pacific in its spicules and with *N. sordidatus* (Sluiter) and *N. atlanticus* (Ludwig & Heding) in its calcareous ring. It resembles the former in possessing two-pillared tables provided with an arched handle on the opposite side. However, the tables of *N. watasei* have large, rounded, multilocular discs and a spire terminating in two clusters of teeth. Further, the two pillars in *N. watasei* appear to be derivatives of four original pillars as is indicated by the drawings of both Ohshima (1915) and Heding & Panning (1954). In *N. kilburni*, on the other hand, the tables have only two pillars converging to a single point. In addition there are few other tables with quadrangular, multilocular discs with an arched spire. Such tables have not been reported for *N. watasei*. The calcareous ring of *N. watasei* is shorter and very different from that of the new species. In fact, the ring of *N. kilburni* resembles that of *N. sordidatus* (Sluiter), also from the West Pacific, illustrated by Heding & Panning (1954) and *N. atlanticus* illustrated by Cherbonnier (1984). However, the body wall tables of *N. sordidatus* are reported to be sparse and incomplete (? dissolution in fluid), comprising only quadrilocular table discs with reduced spires and no handles whereas those of *N. atlanticus* are quadri- to multilocular and also devoid of handles. The podia deposits of Sluiter's (1901) species are also different, comprising tables with an arched spire bearing two clusters of teeth. Further, *N. sordidatus* has four polian vesicles as opposed to one in *N. kilburni*. The

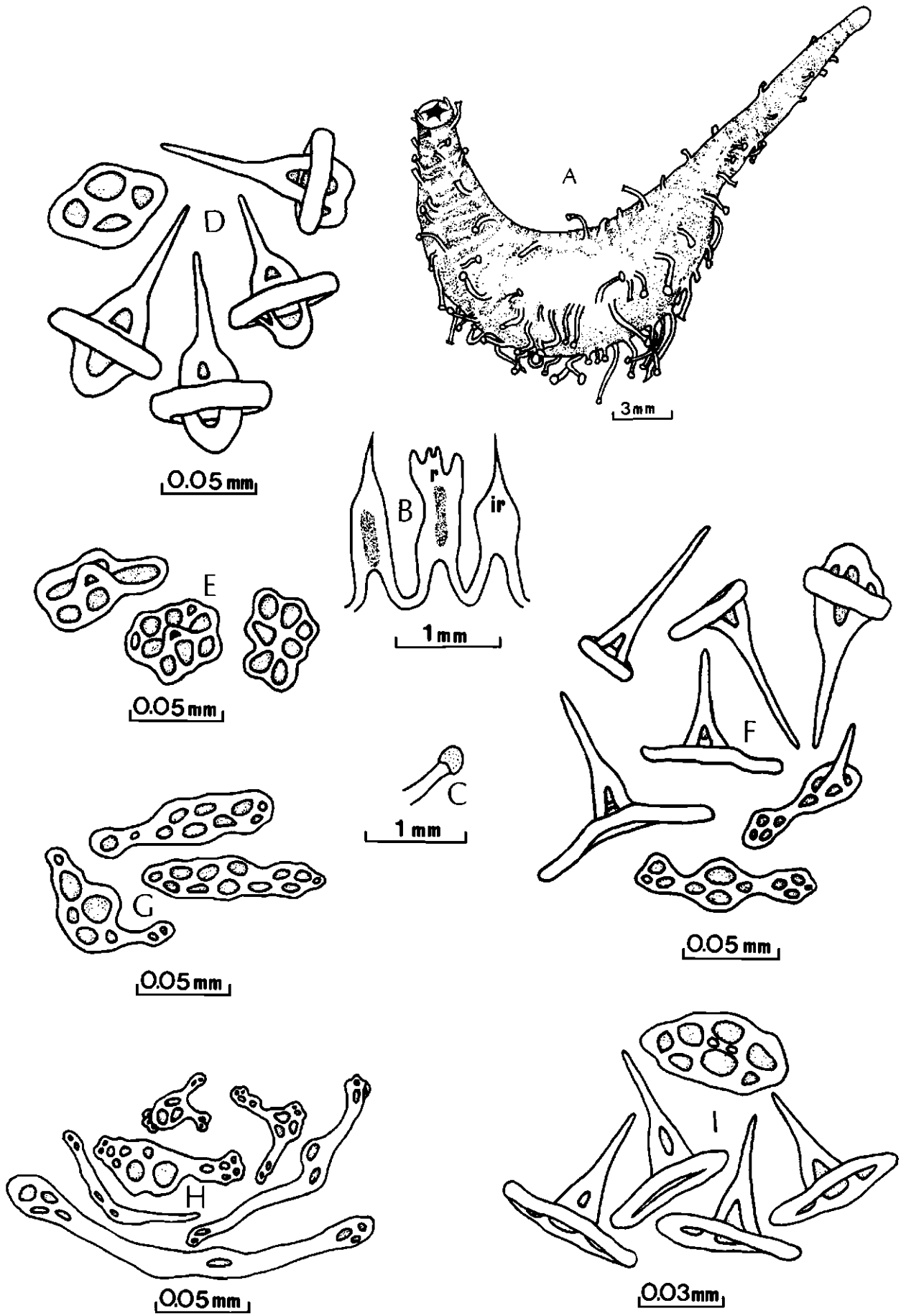

Figure 1 *Neocucumis kilburni* sp. nov. (A) entire; (B) single dorsal radial (r) and two dorsal interradial (ir) plates of the calcareous ring; (C) madreporic body; (D-I) spicules: (D) predominant tables from body wall; (E) rare tables from body wall; (F) pedicel tables; (G) pedicel plates; (H) tentacle deposits; (I) introvert tables.

Figure 2 *Neocucumis kilburni* sp. nov. (A) entire; (B-E) SEM micrographs; (B) tables from body wall; (C) pedicel tables; (D) introvert tables; (E) tentacle deposits.

following key, adapted from Heding & Panning (1954), excludes *N. proteus* (=*Phyllophorus [Urodemella] proteus*) but includes three more species (the new species, that included by Cherbonnier [1984] and that described by O'Loughlin & O'Hara [1992] from southern Australia), now classified in the genus *Neocucumis* and helps to differentiate the southern African form from the remaining species.

Key to the species of *Neocucumis*

1. Tables of body wall with a characteristic arched handle 2
   Tables of body wall without an arched handle 3
2. discs of tables with four (sometimes five) perforations and spire tapering to a single point ..... discs of tables with many perforations (>5) and spire terminating in two clusters of small, sharp teeth.. ..... *N. watasei* (Ohshima)
3. margin of table discs dentate.....4
   margin of table discs regular and smooth 5
4. tables with complete spire; introvert with branched rosettes, rods with terminal perforations and tables similar to those of body wall.....
   .....*N. panamensis* Heding & Panning
   tables with spire often reduced to knobs on surface of disc; introvert with only tables .....
   N. veleronis (Deichmann)
5. table discs with normally four large perforations, only exceptionally with smaller ones at one or both ends, spire reduced.....*N. sordidatus* (Sluiter)
   table discs often with many perforations (>4).....6
6. table discs of two forms and sizes: large, irregular, multilocular discs and smaller, circular to oval, quadrilocular discs-pillars of spire united proximally.....7
   table discs of one form and size, pillars of spire united distally.....8
7. spire of tables terminating in a single or double point, without any conspicuous teeth
   .....*N. doelahensis* Heding & Panning
   spire of tables terminating in two conspicuous clusters of teeth
   .....*N. atlanticus* (Ludwig & Heding)
8. spire of tables terminating in single cluster of teeth, table discs somewhat rhomboidal with many perforations
   .....*N. marioni* (Von Marenzeller)
   spire of tables terminating in two clusters of teeth 9
9. table discs almost round, usually with many perforations (>8); tentacles with fusiform rods with four large central holes and smaller ones at both ends.....
   .....*N. sagamensis* (Ohshima)
   table discs rectangular to oval, usually with eight perforations (4 large and 4 small);
   tentacles with elongate, curved plates with elongate perforations and very irregular mesh-like plates, partly denticulate .....*N. cauda* O'Loughlin & O'Hara.

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