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Psammocinian sponges (Demospongiae: Dictyoceratida: Irciniidae) from Korea

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Four psammocinian species (Demospongiae: Dictyoceratida: Irciniidae) are described from Gageodo and Jejudo Islands, Korea. Among them, three are new species, *Psammocinia rana*, *P. massa* and *P. vermins*, which are very different from other recorded species. Secondary fibres of *Psammocinia rana* are mostly wide plate-like shape with large perforation. Primary and secondary fibres of *Psammocinia massa* are lumped together in a thick mass through numerous areas. *Psammocinia vemis* is similar to *P. mosulpia* in skeletal structure, but differs in size of cored sands in primary fibres. The fourth species, we reclassify from *Ircinia chupoensis* to *Psammocinia chupoensis* based on more detailed observation of the skeletal structure. *Ircinia* only has sand cored primary fibres, while the observed species, has sand cored primary and secondary fibres.

Keywords: Dictyoceratida, Korea, new species, *Psammocinia*

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Introduction

The genus *Psammocinia* in family Irciniidae is characterized by sand armored surface and skeletal morphology, comprising of a regular and reticulate fibre skeleton. Many species of the genus *Psammocinia* incorporate a large quantity of sand in fibres, matrix, and also as a thick superficial cortex. Primary fibres are cored but secondary fibres range from uncored to fully cored. Many of the sand grains in fibres are very large, coated individually with spongin, and linked to the weakly fasciculate, and are often almost obscured by the accumulation of sand (Cook and Bergquist, 1998). To date 33 species of *Psammocinia* have been reported worldwide (Poléjaeff, 1884; Lendenfeld, 1888; Bergquist, 1995; Cook and Bergquist, 1996; 1998; Sim, 1998; Sim and Lee, 1998; 2001, 2002; Lee and Sim, 2004; Sim *et al*., 2017; Calcinai *et al*., 2017). Among them, 17 species are described from Korean waters. This study describes three new *Psammocinia* species and reclassify an additional species, *P. chupoensis* which was previously identified as *Ircinia chupoensis* (Sim *et al*., 2017).

Materials and Methods

Sponge collections were made from Jejudo and Gageodo Islands, Korea. Individuals were collected from depths of 15-20 m using SCUBA diving during 2002-2009. Collected specimens were preserved in 95% ethyl alcohol, and identified based on their morphological characteristics. The external features of sponges were observed with a stereo microscope (Stemi DV4, Carl Zeiss, Göttingen, Germany). The skeletal fibres were studied under a light microscope (Primo Star, Carl Zeiss, Göttingen, Germany with Nikon Digital Camera D5000). Terminal knobs and emerging holes on fibres were observed with Scanning Electron Microscope (JSM-6390LV, Jeol, Japan). The type specimens were deposited in the National Institute of Biological Reources (NIBR), Incheon, Korea.

Systematic Accounts

Phylum Porifera Grant, 1836
Class Demospongiae Sollas, 1885
Order Dictyoceratida Minchin, 1900
Family Irciniidae Gray, 1867
Genus *Psammocinia* Lendenfeld, 1889

1. *Psammocinia rana* n. sp. (Figs. 1, 2)
개구리모래해면(신칭)

Type specimen. Holotype (NIBRIV0000828223), Korea:

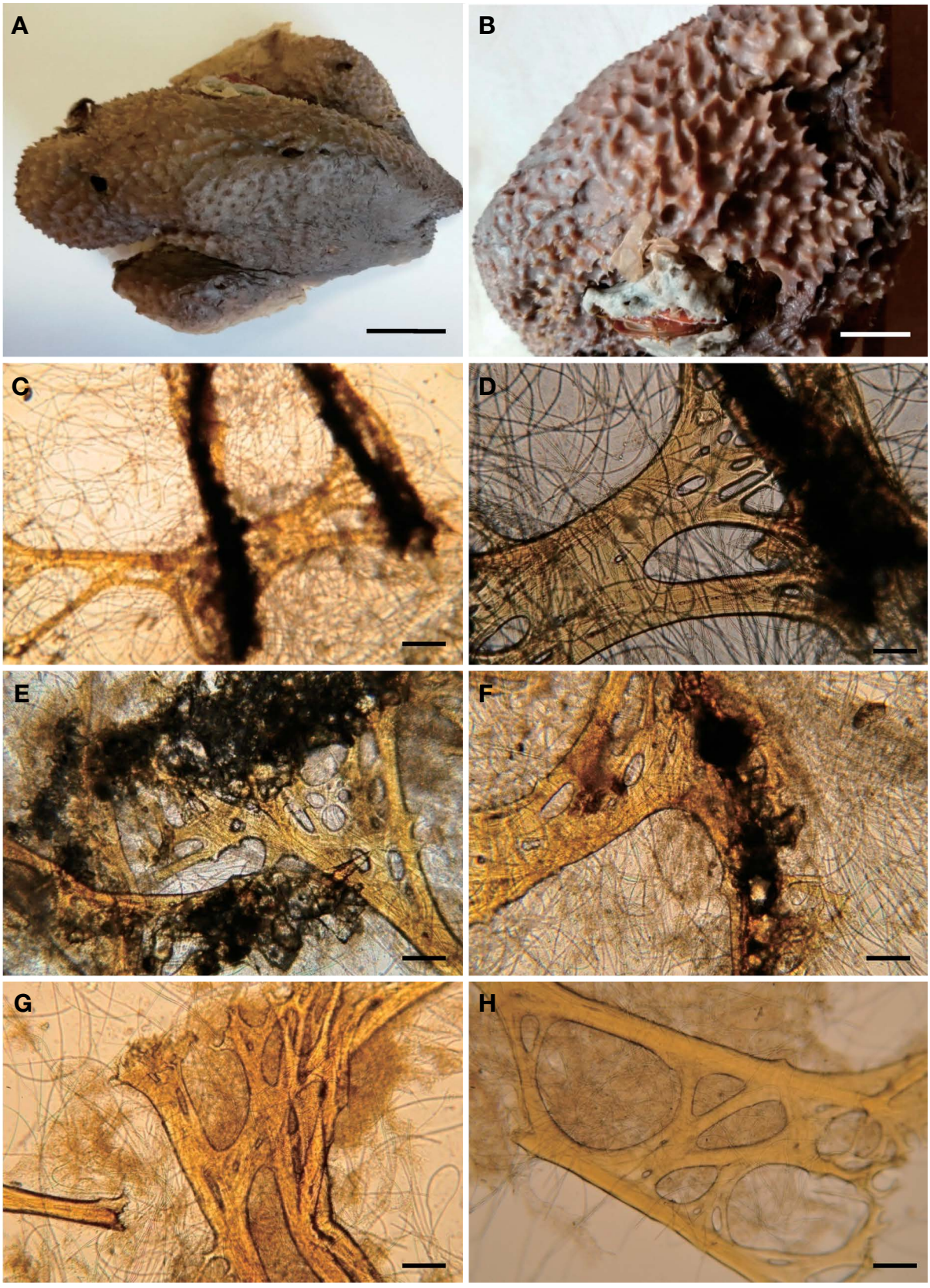


Fig. 1. *Psammocinia rana* n. sp. A, entire animal; B, closed surface; C, skeletal structure; D, wide secondary fibres; E, F, cored primary and secondary web; G, bridged secondary fibres; H, large perforated secondary fibres. Scale bars: A = 2 cm, B = 1 cm, C = 200 μm, D-H = 100 μm.

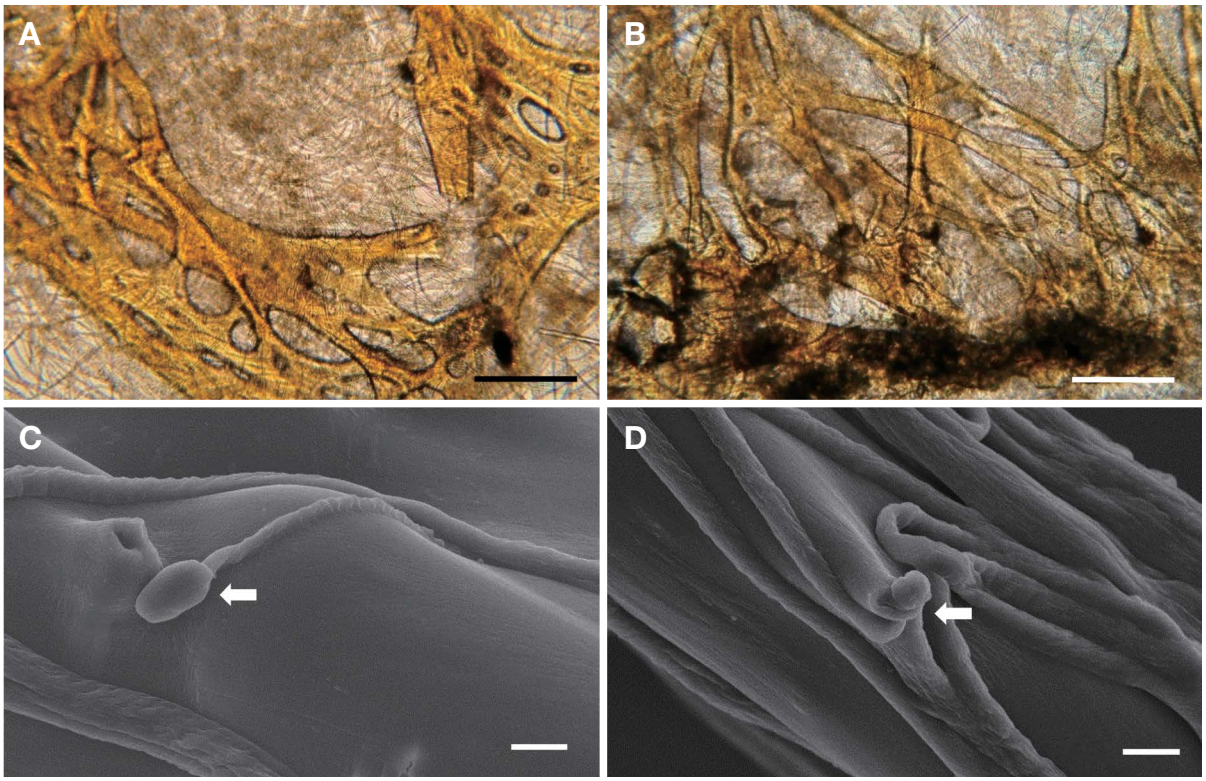


Fig. 2. *Psammocinia rana* n. sp. A, clear secondary fibres; B, skeletal structure; C, terminal knob (arrow); D, filament emerging from the hole on fibre (arrow). Scale bars: A, B = 100 μm, C, D = 10 μm.

Jagenganyeo, Gageodo, Heuksan-myeon, Shinan-gun, Jeollanam-do, 19 Jul 2007, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.

Description. Thick mass sponge, size up to 10 × 7 cm (width) and 4.5 cm (height). Surface with low and sharp conules partly. Strong collagen filamentous membrane mixed with sands and spicules rarely. Oscules, 1-5 mm in diameter, open on top of sponge. Colour in life, black surface and beige inside. Texture very firm.

Skeleton: Primary fibres, 300-700 μm in diameter, cored sands. Secondary fibres, various type, wide fibres like plate with small and large perforation (Fig. 1H). Some secondary fibres, 100 μm in diameter in middle part, branch type, or root shape which connected to primary fibres (Fig. 1G). All secondary fibres clear (Fig. 2A). Filaments, 5-7 μm in diameter, and its terminal knobs, 15 μm in diameter.

Etymology. This new species is named, *rana*, for resemblance of its shape to a frog.

Remarks. *Psammocinia rana* is similar to *P. bergquistia* in wide secondary fibres like plate, but secondary fibres of the new species are mostly wide plate-like shape with large perforation (Fig. 1H).

2. *Psammocinia massa* n. sp. (Figs. 3, 4)
덩어리모래해면(신칭)

Type specimen. Holotype (NIBRIV0000828224), Korea: Jagenganyeo, Gageodo, Heuksan-myeon, Shinan-gun, Jeollanam-do, 19 Jul 2007, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.

Description. Large mass shape with several low mamillate protruding, size up to 11 × 9 cm (width) and 4.5 cm (height). Surface with low conules, but somewhat not distinct. Thick sand crust mixed with collagen. Oscules, 2-7 mm in diameter, opened on top of protruding mamillate. Colour in life, grayish black. Texture firm and compressible.

Skeleton: Primary fibres, 300-600 μm in diameter, with rarely cored sands partly and it made of thick lump. Wide secondary fibres like plate, 100-400 μm in diameter. Primary fibres, 400 μm in diameter, in choanosome thick but easily breakable. Secondary fibres very clear, with no cored sand. Filaments, 5-7 μm in diameter, and its terminal knobs, 15 μm in diameter.

Etymology. This new species is named, *massa*, after the lumpy skeletal structure of the sponge.

Remarks. *Psammocinia massa* is similar to *P. gageoensis* in thick skeletal structure, but there is a big difference in the shape of the sponge. Primary and secondary fibres of this new species are lumped together in a thick mass through numerous areas. Branched secondary fibres in *P. gageoensis* have a very complicated fasciculate shape in

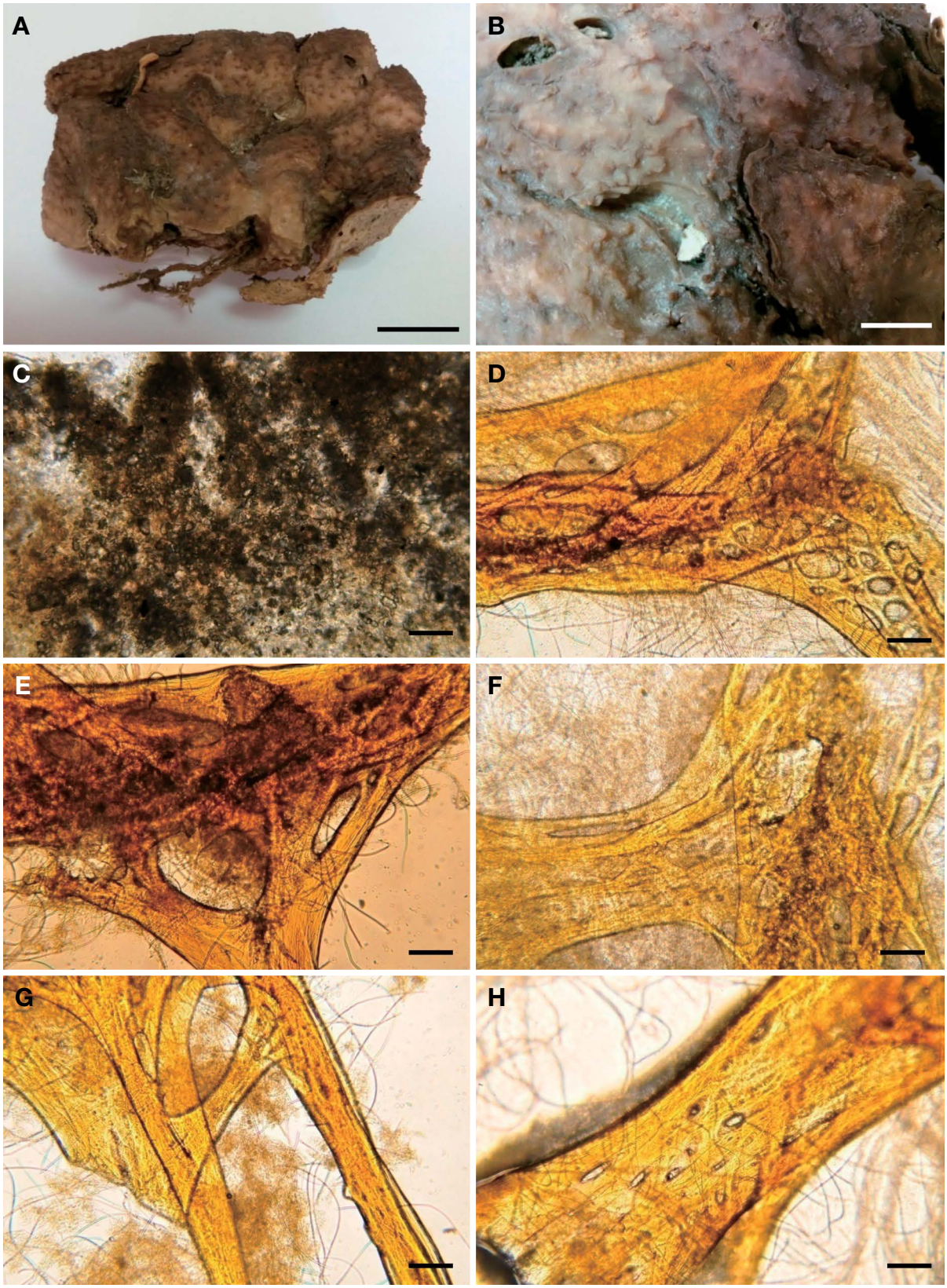


Fig. 3. *Psammocinia massa* n. sp. A, entire animal; B, closed surface; C, sand crust; D, E, subdermal skeletal structure; F, wide secondary fibres and primary fibres; G, narrow bridged secondary fibres; H, wide bridged secondary fibres. Scale bars: A = 2 cm, B = 1 cm, C-H = 100 μm.

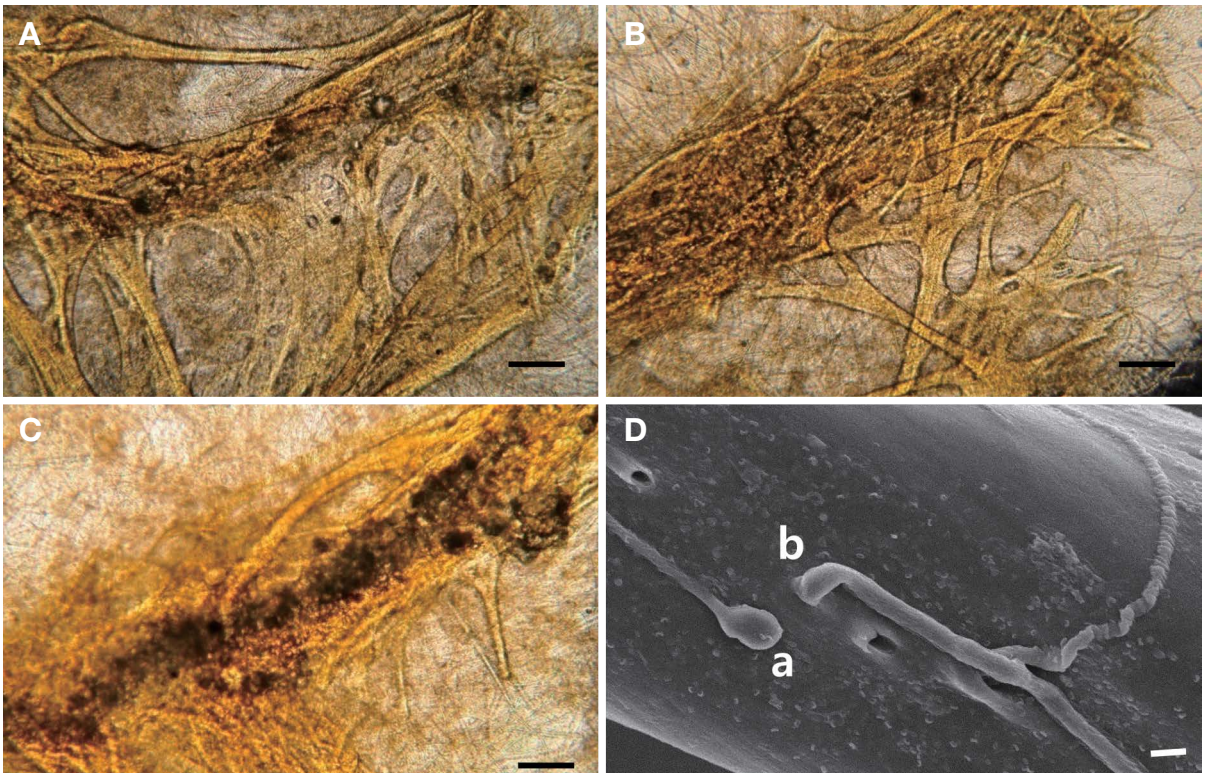


Fig. 4. *Psammocinia massa* n. sp. A, B, choanosome skeletal structure; C, fibres near surface membrane; D, terminal knob (a) and filament emerging from the hole on fibres (b). Scale bars: A-C = 100 μm, D = 10 μm.

skeletal structure.

3. *Psammocinia vermis* n. sp. (Fig. 5)
지렁이모래해면(신칭)

Type specimen. Holotype (NIBRIV0000828225), Korea: Chuja-do, Chuja-myeon, Jeju-si, Jeju-do, 5 Nov 2009, Kim, H.S., by SCUBA, depth 15 m, deposited in the NIBR.

Description. Thickly incrusting and massive sponge, size up to 10 × 7 × 4 cm, with many round projections. Surface has sand crust with thick filamentous membrane and low conules. Oscules, 1-4 mm in diameter, opened on surface. Colour in life, grayish black at surface, brown inside. Texture rubbery and compressible.

Skeleton: Primary fibres, 100-250 μm in diameter, dense and cored with small sands near surface. Cored or clear secondary fibres, 50-100 μm in diameter. Filaments, 5-8 μm in diameter, and its terminal knobs, 10 μm in diameter.

Etymology. This new species is named, *vermis*, after the earthworm shape of the cored primary fibres near the surface.

Remarks. *Psammocinia vemis* is similar to *P. mosulpia* in skeletal structure, but differs in size of cored sands in primary fibres.

4. *Psammocinia chupoensis* (Sim, Lee and Kim, 2017) (Fig. 6) 추포모래해면(개칭)

Ircinia chupoensis, Sim *et al*., 2017, pp. 101, 106, 107, Fig. 10.

Material examined. Chupodo, Yecho-ri, Chuja-myeon, Jeju-si, Jeju-do.

Remarks. *Psammocinia chupoensis* has been previously recorded in the genus *Ircinia* (Sim *et al*., 2017) based on its skeletal structure, but *P. chupoensis* has cored primary and secondary fibres with sands throughout the sponge (Fig. 6D, G), whereas secondary fibres in genus *Ircinia* are not cored with sand. Therefore we reclassify *Ircinia chupoensis* to *Psammocinia*.

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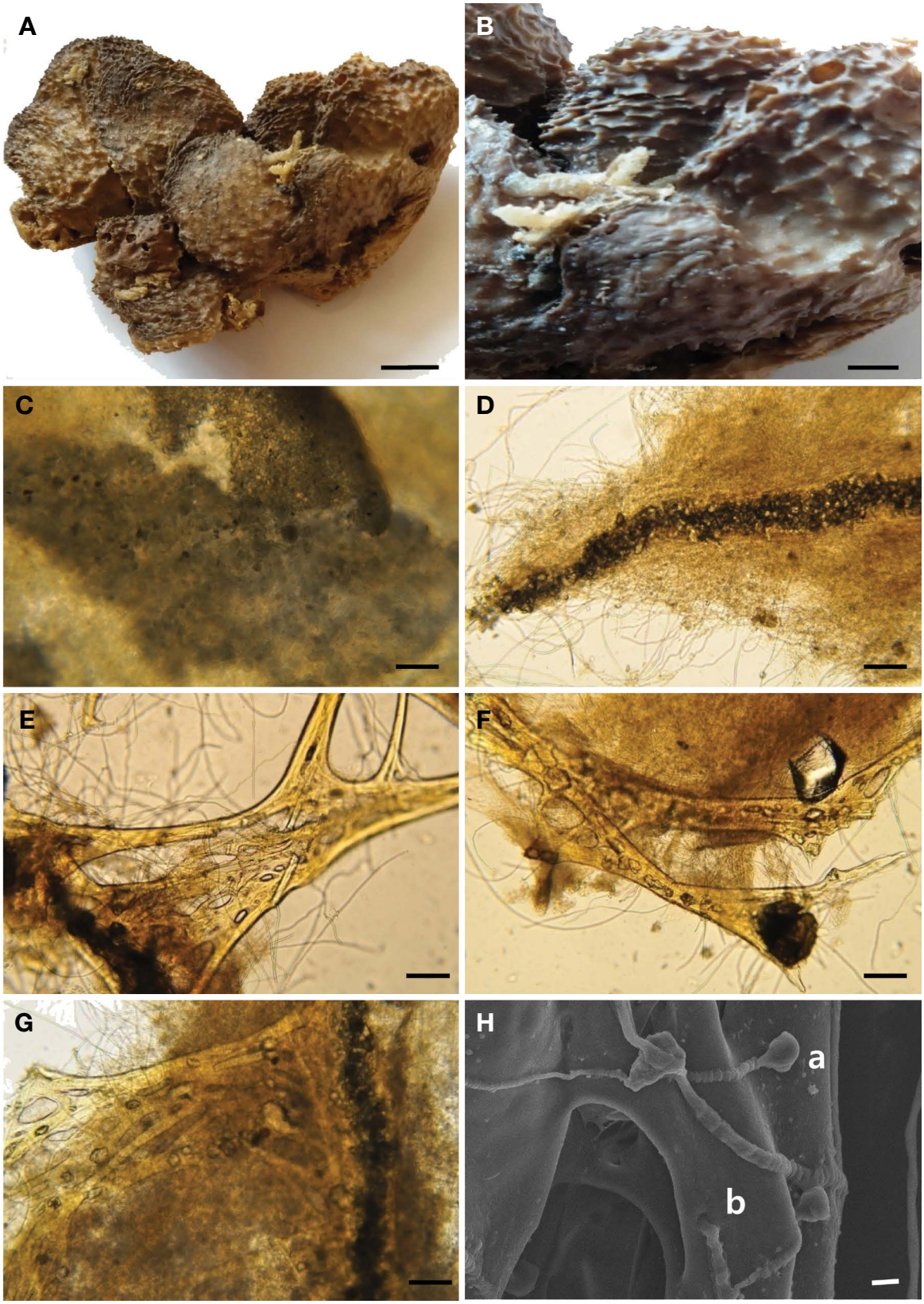


Fig. 5. *Psammocinia vermis* n. sp. A, entire animal; B, closed surface; C, sand crust; D, cored primary fibres; E, secondary web; F, cored secondary fibres; G, cored primary and secondary web; H, terminal knob (a) and filament emerging from the hole on fibre (b). Scale bars: A = 3 cm, B = 1 cm, C-G = 100 μm, H = 10 μm.

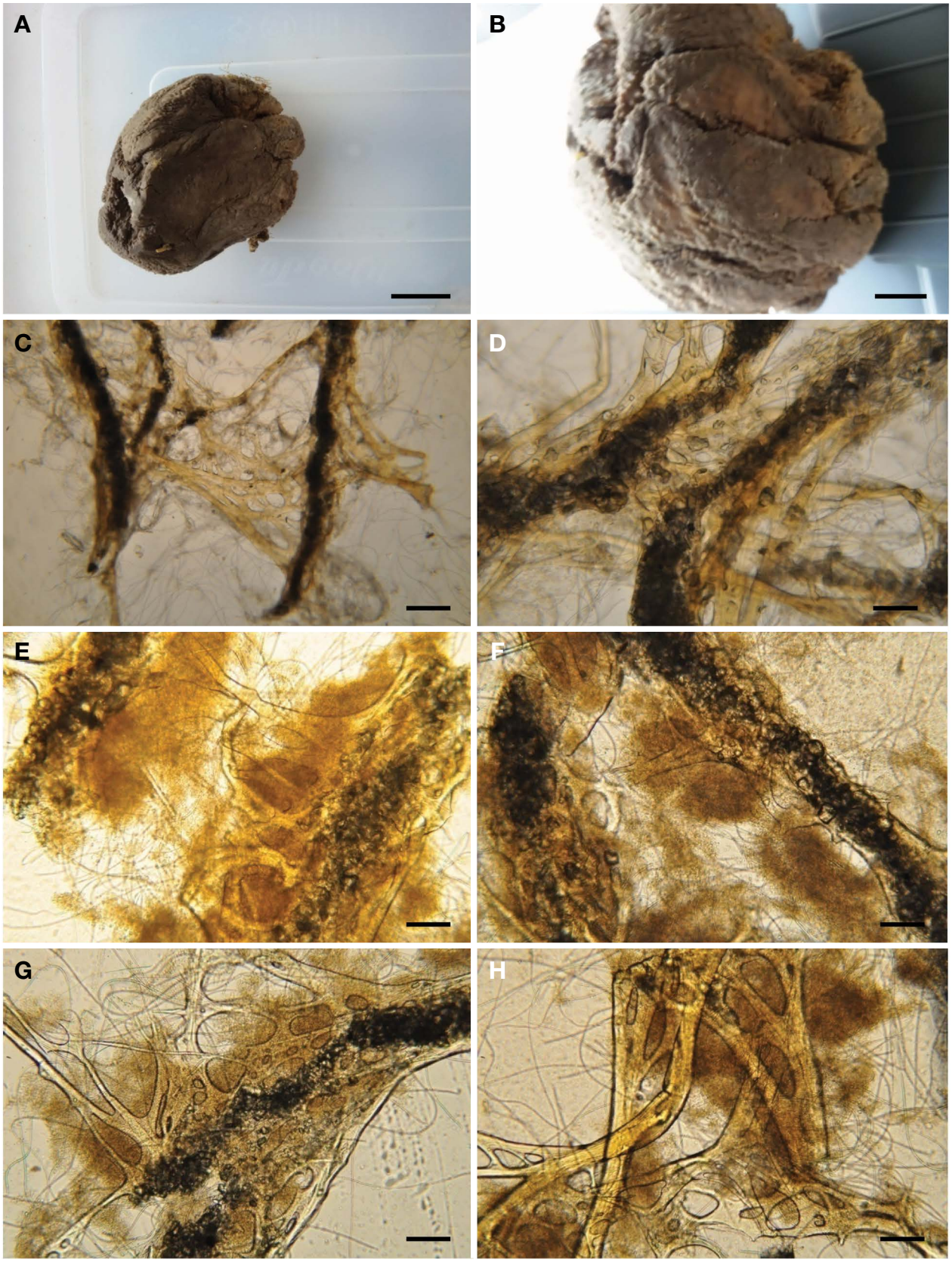


Fig. 6. *Psammocinia chupoensis* A, entire animal; B, closed surface; C, skeletal structure; D, cored primary and secondary fibres; E, F, skeletal structure; G, cored secondary web; H, clear secondary fibres. Scale bars: A = 3 cm, B = 2 cm, C = 200 μm, D-H = 100 μm.

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