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Eight new species of two genera *Dysidea* and *Euryspongia* (Demospongiae: Dictyoceratida: Dysideidae) from Korea

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Eight new species of two genera *Dysidea* and *Euryspongia* (Demospongiae: Dictyoceratida: Dysideidae) are described from Gageodo, Ulleungdo, Geomundo, and Jejudo Islands, Korea. Four new species of the genus *Dysidea* are differentiated by the fibre structure, cored detritus, and fibre arrangement. *Dysidea mureungensis* n. sp. is characterized by the honeycomb shape of surface and no distinction between primary and secondary fibres. *Dysidea glavea* n. sp. differs by large sands cored in fibres and that the membrane easily separates from fibres. *Dysidea geomunensis* n. sp. has fibres that are thinner than those of *D. glavea* n. sp.. *Dysidea corallina* n. sp. is characterized by folded fan shape and the arrangement of secondary fibres. Four new species of the genus *Euryspongia* are differentiated by the fibre structure, cored detritus, shape of sponge, and fibre arrangement. *Euryspongia radicula* n. sp. is very different from other species by having regularly arranged fibres. *Euryspongia spina* n. sp. has a fence-like skeletal structure. Bridged type secondary fibres are arranged near the surface and web types are at the base of fibres. *Euryspongia flabellum* n. sp. has a very unique wide, thin leaf-like shape. String-like primary fibres of *E. linea* n. sp. are very unique and cored with large sized sands.

Keywords: *Dysidea*, Dysideidae, *Euryspongia*, Korea, new species

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Introduction

Dysideids are characterized within the Dictyoceratida by the presence of eurypylous choanocyte chambers. They also have concentrically laminated and pithed skeletal fibres, cored fibres, and some species have a sand armoured surface (Bergquist, 1980; Cook and Bergquist, 2000).

The genus *Dysidea* is characterized by the primary and secondary fibres that are all cored with detritus. Sixty eight species were reported worldwide (Lendenfeld, 1886; 1889; De Laubenfels, 1936; Bergquist, 1965; 1995; Hoshino, 1985; Lehnert and Van Soest, 1999; Lee and Sim, 2007b; Van Soest *et al*., 2019). Among them, one species was reported from Korea (Lee and Sim, 2007b). The genus *Euryspongia* is characterized by cored primary fibres and secondary fibres that are clear of debris. Thirteen species were reported worldwide (De Laubenfels, 1936; 1954; Bergquist, 1961; 1965; 1995; Pulitzer-Finali, 1982; Lebnert and Van Soest, 1999; Lee and Sim, 2007a; Vacelet *et al*., 2007; Van Soest *et al*., 2019). Among them, two species were reported from Korea (Lee and Sim, 2007a). To date, both genera are poorly described in Korea.

Materials and Methods

Sponge collections were made from Gageodo, Ulleungdo, and Jejudo Islands, Korea. They were collected from a depth of 5−30 m using SCUBA diving during 2001−2012. Additionally two preserved specimens from Geomundo Island were collected by hand from the intertidal zone in 1977. Collected specimens were preserved in 95% ethyl alcohol and were identified based on their morphological characteristics. The external feature of sponges was observed with stereo microscope (Stemi SV. 6, Carl Zeiss, Germany). The skeletal fibres were studied under a light microscope (Axioscope II, Carl Zeiss, Germany). The type specimens were deposited in the National Institute of

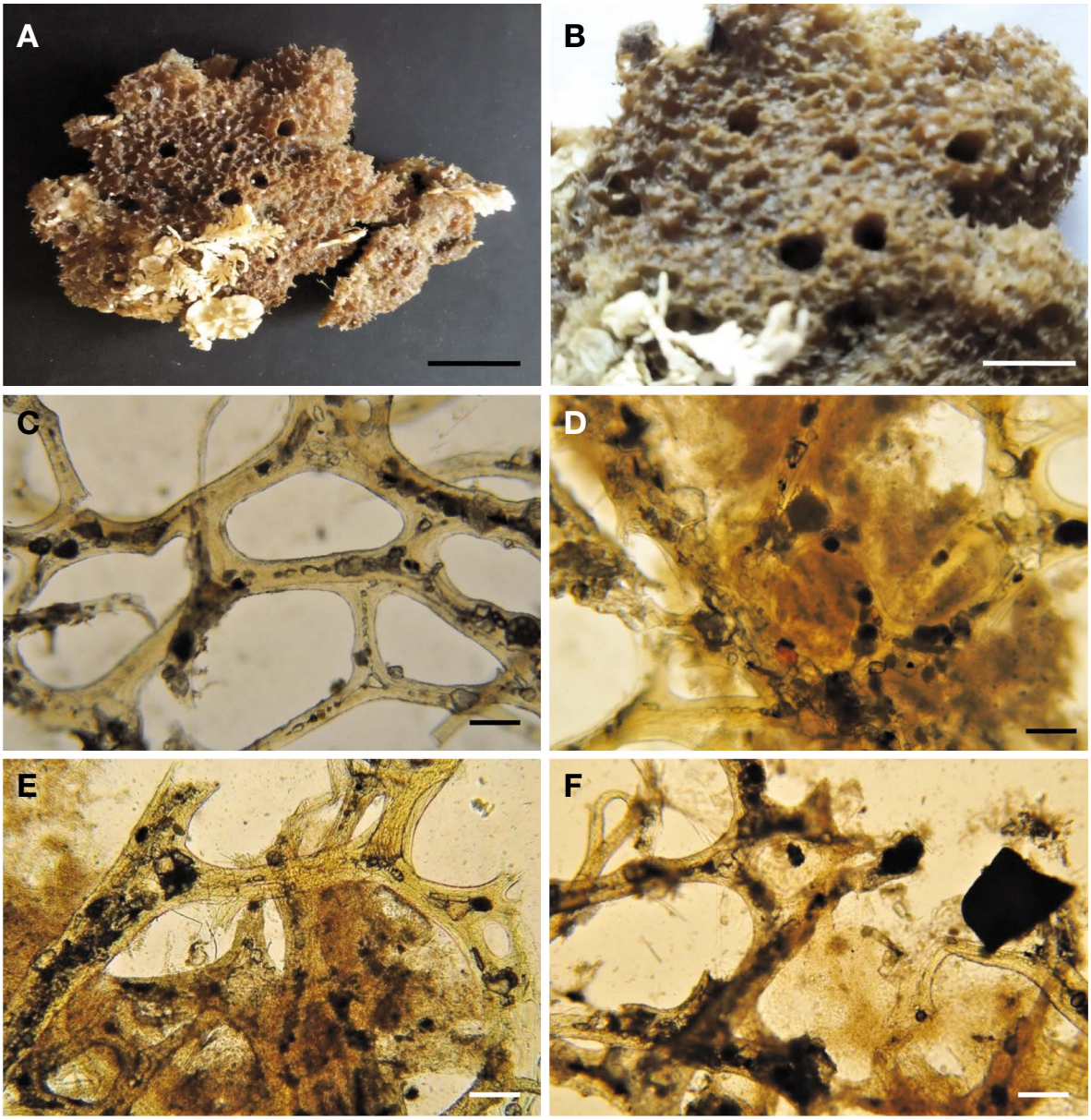


Fig. 1. *Dysidea mureungensis* n. sp. A, external morphology; B, surface close up; C, skeletal structure; D, skeletal structure with membrane near conules; E, all cored fibres; F, attached large sands near surface. Scale bars: A = 1 cm, B = 0.5 cm, C–F = 100 μm.

Biological Resources (NIBR), Incheon, Korea.

Systematic Accounts

Phylum Porifera Grant, 1836
Class Demospongiae Sollas, 1885
Order Dictyoceratida Minchin, 1900
Family Dysideidae Gray, 1867
Genus *Dysidea* Johnston, 1842

1. *Dysidea mureungensis* n. sp. (Fig. 1)
무릉디시디해면(신칭)

Type specimen. Holotype (NIBRIV0000854516), Korea: Mureungarch, Deajeong-eup, Seogwipo-si, Jeju-do, 20 Sep 2012, Moon, S.E., by SCUBA, depth 5 m, deposited in the NIBR.

Description. Thick encrusting, small mass sponge, size up to 6 × 5 × 1 cm, surface, rough honeycomb shape, covered with membrane mixed sands and spicules lightly and attached large sands. Several oscules open on surface,

2–4 mm in diameter. Color in life, grayish beige. Texture firm and compressible.

Skeleton: Primary fibres, 100–200 μm in diameter with cored sands and spicules. Secondary fibres, rarely cored with detritus, have web type mesh in some areas, 60–100 μm in diameter. There is no distinction between primary and secondary fibres because network is rectangular mesh on near surface.

Etymology. The specific name, *mureungensis*, is named after a locality, Mureungarch, Korea.

Remarks. This species is characterized by the honeycomb shape of surface. There is no distinction between primary and secondary fibres.

2. *Dysidea glavea* n. sp. (Fig. 2)
자갈디시디해면(신칭)

Type specimen. Holotype (NIBRIV0000854517), Korea: Geomun-ri, Samsan-myeon, Yeosu-si, Jeollanam-do, 18 Jul 1977, Yoon, S.J., by hand, intertidal zone, deposited in the NIBR.

Description. Thick encrusting sponge, size up to 12 × 13 × 8 cm. Surface smooth with attached large sands. Several protruding open oscules, 2–4 mm in diameter. Numerous fibres appear on surface without membrane. Membrane easily separates from fibres. Large sands cored in fibres (Fig. 2C). Color in life dirty brown. Texture soft and compressible.

Skeleton: Primary and secondary fibres are densely cored with debris. Primary fibres, 150–200 μm in diameter near conules. Secondary fibres, 40–150 μm in diameter.

Etymology. The species name, *glavea* is named after the shape of the fibres that are cored with gravel.

Remarks. This species is similar to *Dysidea geomunensis* n. sp. but differs by large sand cored in between fibres and in matrix. The membrane easily separates from fibres.

3. *Dysidea geomunensis* n. sp. (Fig. 3)
거문디시디해면(신칭)

Type specimen. Holotype (NIBRIV0000854518), Korea: Geomun-ri, Samsan-myeon, Yeosu-si, Jeollanam-do, 18 Jul 1977, Yoon, S.J., by hand, intertidal zone, deposited in the NIBR.

Description. Thick encrusting sponge, size up to 9 × 4 cm wide and 1.5 cm thick. Surface smooth with short conules. Several oscules open on surface, 1–3 mm in diameter. Color in life beige. Texture soft and compressible.

Skeleton: Fibres not easily separated from sponge. Primary fibres, 80–150 μm in diameter near conules, densely cored but without large sands. Secondary fibres, 30–100 μm in diameter, rarely cored in some areas and make thin bridged or wide web type.

Etymology. The species name, *geomunensis*, is named after a locality, Geomundo Island, Korea.

Remarks. This species is similar to *Dysidea mureungensis* n. sp. in skeletal structure but differs by size of skeletal fibres, which are thinner than *D. mureungensis* n. sp.. Fibres not easily separated from sponge. Fibres are not cored with large sands and also no large sand in the matrix.

4. *Dysidea corallina* n. sp. (Figs. 4, 5)
산호디시디해면(신칭)

Type specimen. Holotype (NIBRIV0000854519), Korea: Jakeunganyeo, Gageo-ri, Heuksan-myeon, Shinan-gun, Jeollanam-do, 22 Sep 2008, Lee, K.J., by SCUBA, depth 15 m, deposited in the NIBR.

Description. Upright sponge, lobate digitate form, flatten lobate projection arising from base, like coral shape, size up to 10 × 7 × 1.5 cm. Surface rough with distinct sharp conules, and covered with thin membrane. Several oscules open on surface, 1–1.5 mm in diameter. Color in life purple, beige inside. Texture firm and compressible.

Skeleton: Primary fibres, 200–250 μm in diameter, dense cored with sands and large spicules. Secondary fibres, 70–220 μm in diameter, with irregular web type or various sized mesh, mostly clear but rarely with cored debris.

Etymology. The species name, *corallina* is named after the coral shape of sponge.

Remarks. This species is characterized by folded fan shape and arrangement of secondary fibres. The species is similar to coral in external features.

Genus *Euryspongia* Row, 1911

5. *Euryspongia radicula* n. sp. (Fig. 6)
뿌리진해면(신칭)

Type specimen. Holotype (NIBRIV0000854520), Korea: Dueokyeo, Gageo-ri, Heuksan-myeon, Shinan-gun, Jeollanam-do, 20 Jul 2007, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.

Description. Thin, small mass, leaf like sponge, size up to 5.5 × 2.5 × 1 cm. Surface smooth with thick primary fibres, not distinct conules, but have sharp conules at side and no oscules. Color in life pale-brown, brown clay in alcohol. Texture soft and compressible.

Skeleton: Skeletal structures very simple. Primary fibres, 80–200 μm in diameter, root-like form at base (Fig. 6C). Secondary fibres, rarely branched (Fig. 6B), 60–100 μm in diameter. Fibres easily broken.

Etymology. This species name, *radicula* is named after the root-like shape of primary fibres at base.

Remarks. This new species is very different from other

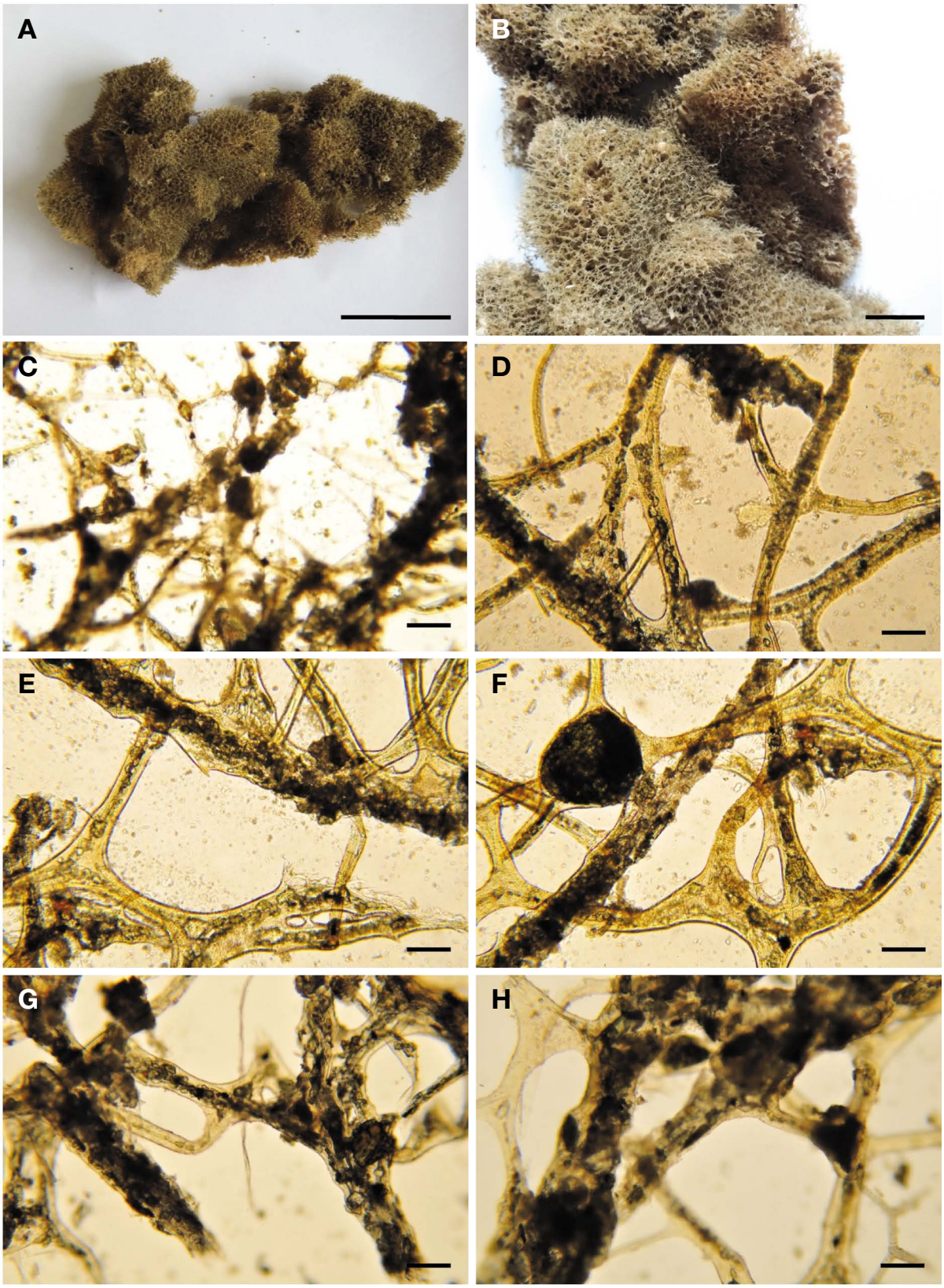


Fig. 2. *Dysidea glavea* n. sp. A, external morphology; B, surface close up; C, skeletal structure cored with large sands; D, E, cored primary and secondary fibres; F, secondary fibres cored with large sands; G, primary fibres near conules; H, thick primary fibres and thin secondary fibres. Scale bars: A = 1 cm, B = 0.3 cm, C = 200 μm, D–H = 100 μm.

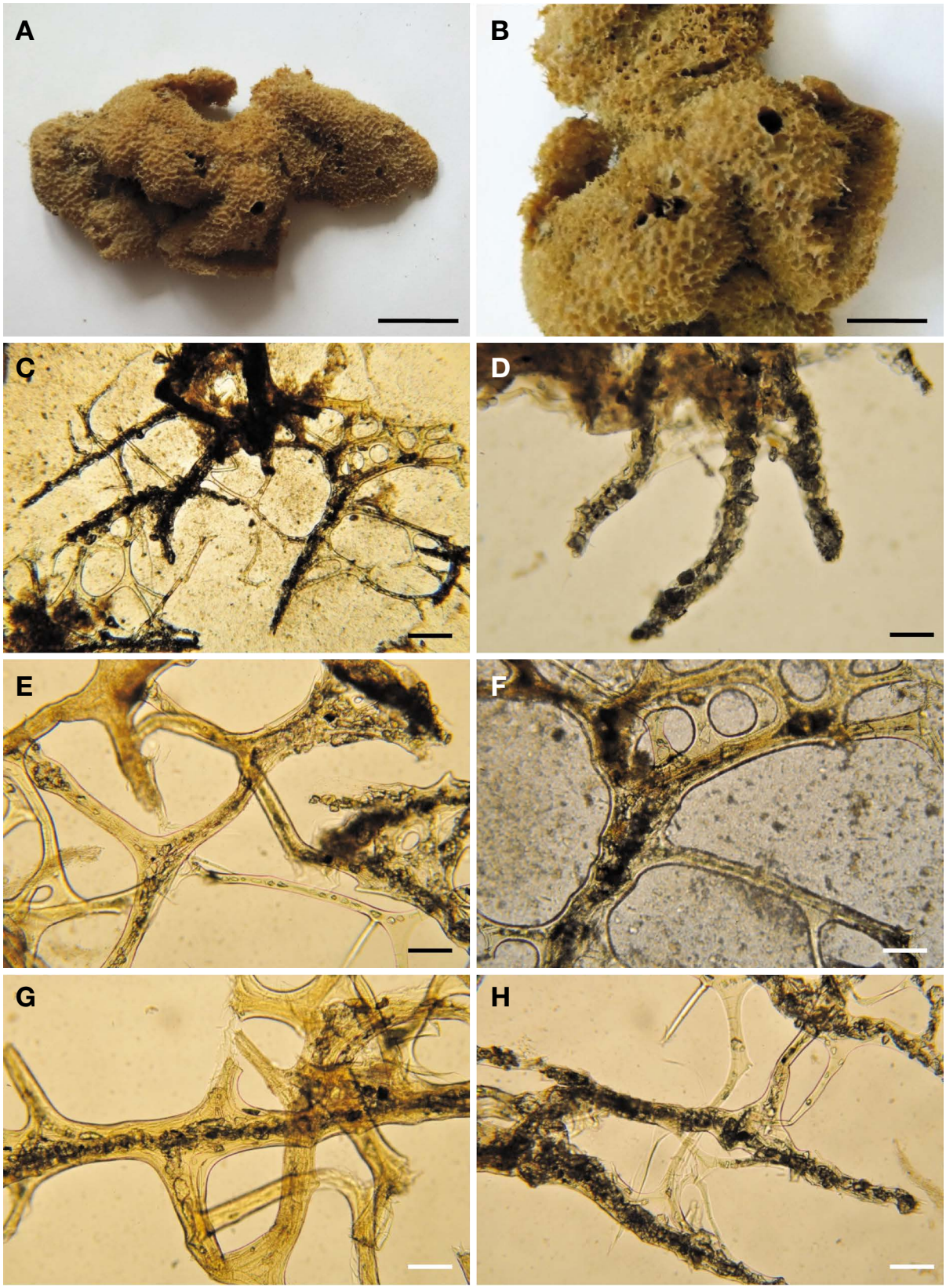


Fig. 3. *Dysidea geomunensis* n. sp. A, external morphology; B, surface close up; C, skeletal structure; D, primary fibres near conules; E, F, bridged and web type of cored secondary fibres; G, choanosome primary fibres; H, primary fibres at the surface. Scale bars: A = 2 cm, B = 1 cm, C = 200 μm, D–H = 100 μm.

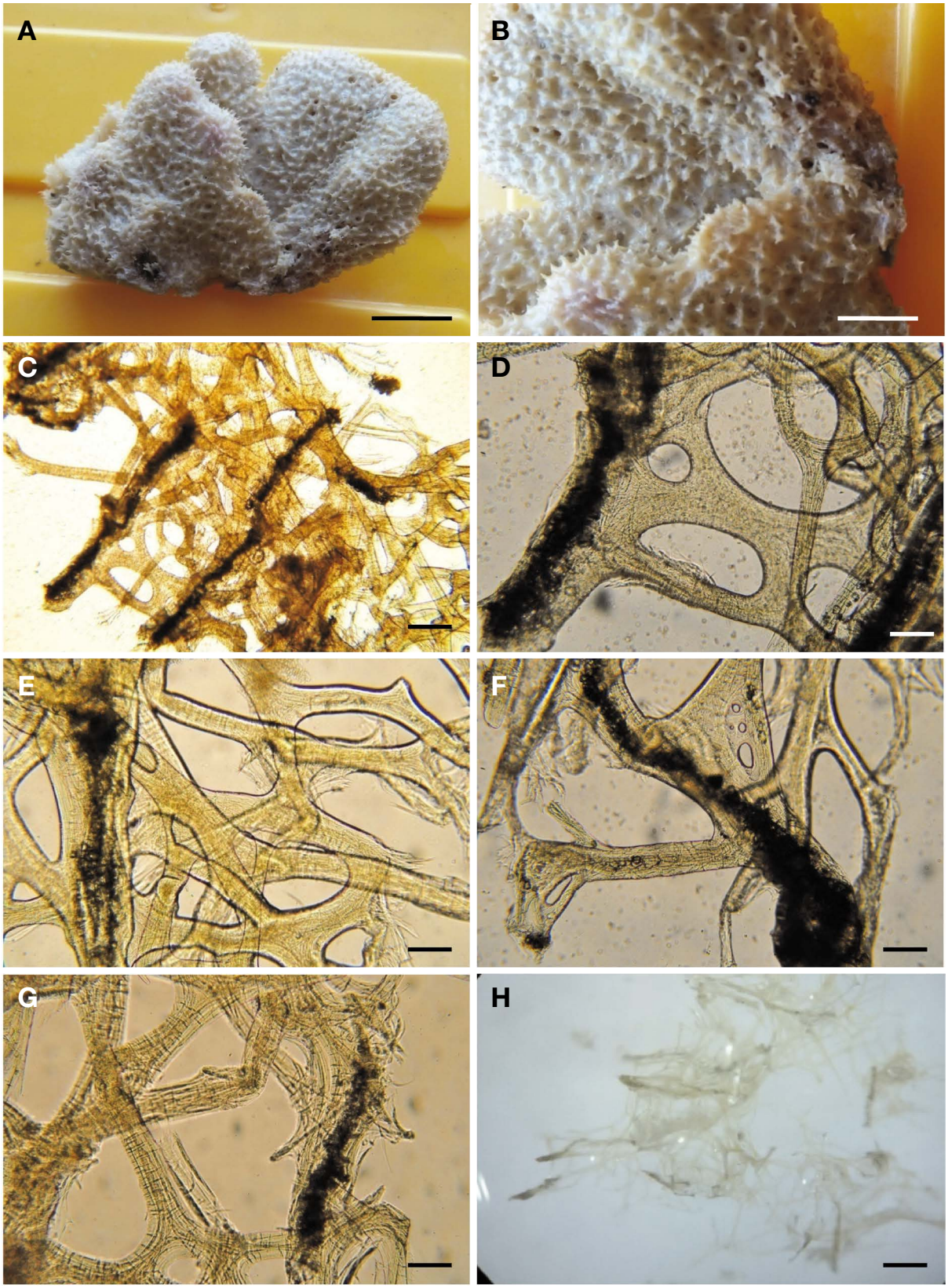


Fig. 4. *Dysidea corallina* n. sp. A, external morphology; B, surface close up; C, D, skeletal structure; E, uncored secondary fibres; F, rare cored secondary fibres; G, bark-like secondary fibres; H, skeletal structure under a dissecting microscope. Scale bars: A = 2 cm, B = 1 cm, C = 200 μm, D–H = 100 μm.

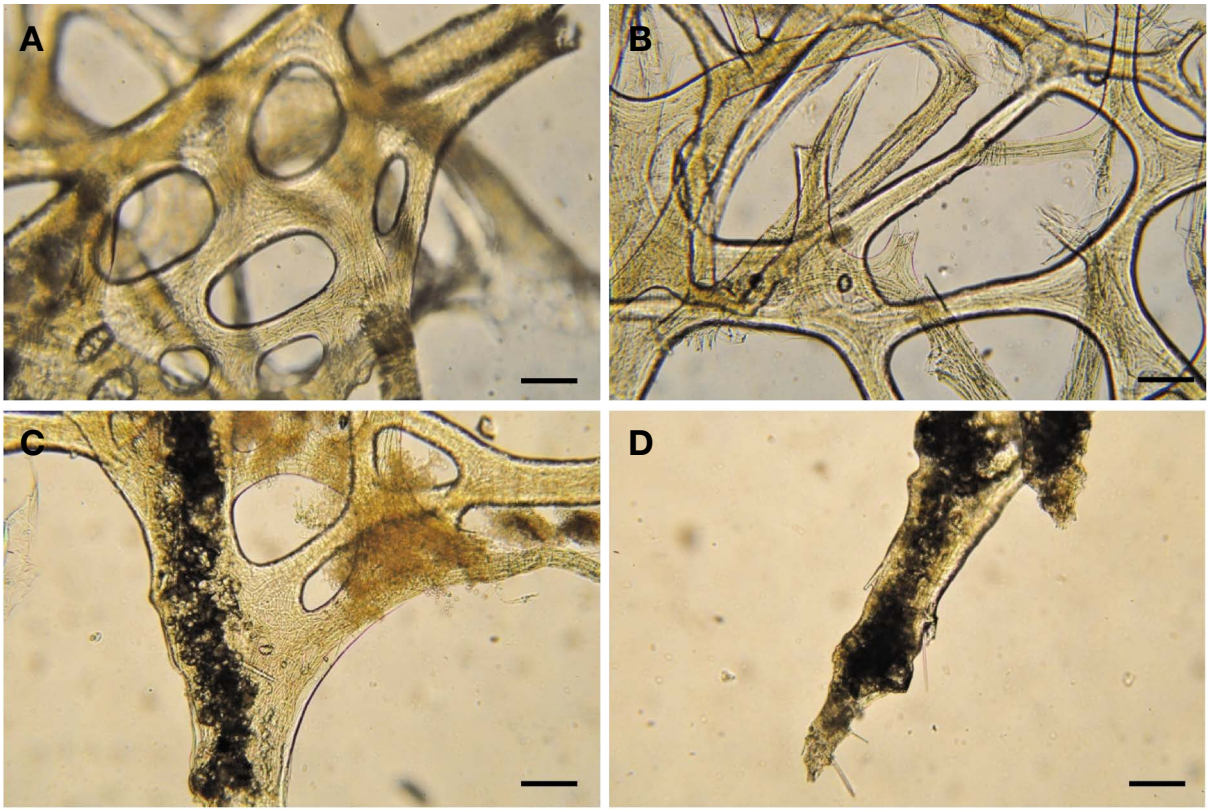


Fig. 5. *Dysidea corallina* n. sp. A, B, secondary web; C, cored primary and secondary web; D, primary fibres near conules. Scale bars: A–D = 100 μm.

species in *Euryspongia* by regularly arranged primary and secondary fibres. Primary fibres are very simple, root-like shape at the base. Secondary fibres are very rare. All fibres are easily broken.

6. *Euryspongia spina* n. sp. (Fig. 7)
가시진해면(신칭)

Type specimen. Holotype (NIBRIV0000854521), Korea: Dueokyeo, Gageo-ri, Heuksan-myeon, Shinan-gun, Jeollanam-do, 20 Jul 2007, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.
Description. Mass sponge, size up to 7 × 5.5 × 3 cm. Surface, smooth with protruding primary fibres, and indistinct conules, but have sharp conules at side. Oscules not open. Color in life beige-brown, brown clay in alcohol. Texture soft and compressible.

Skeleton: Skeletal fibres fence-like and especially secondary fibres complex web type at base. Primary fibres, 200–350 μm in diameter, with numerous spines at the end of fibre. Secondary fibres, 30–130 μm in diameter, rarely occur on surface.
Etymology. This species name, *spina*, is named after its primary fibres with spines near the surface.
Remarks. Skeletal structure is fence-like. Bridged type secondary fibres are between primary fibres near the surface, 1800–2000 μm long and 80–130 μm in diameter. Web type secondary fibres are usually arranged at the base of fibres.

7. *Euryspongia flabellum* n. sp. (Fig. 8)
부채진해면(신칭)

Type specimen. Holotype (NIBRIV0000854522), Korea: Dueokyeo, Gageo-ri, Heuksan-myeon, Shinan-gun, Jeollanam-do, 20 Jul 2007, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.
Description. Wide thin folded leaf-like shape sponge, size up to 16 × 10 × 0.3–0.4 mm. Surface smooth with thick primary fibres, not distinct conules. Oscules rare 1–2 mm in diameter. Color in life beige-brown, brown clay in alcohol. Texture soft and compressible.

Skeleton: Numerous primary fibres, arranged side by side, 150–250 μm in diameter. Secondary fibres, 30–100 μm in diameter with diverse-sized openings near primary fibres (Fig. 8D, 8E).
Etymology. This species name, *flabellum*, is named after its fan shape form.

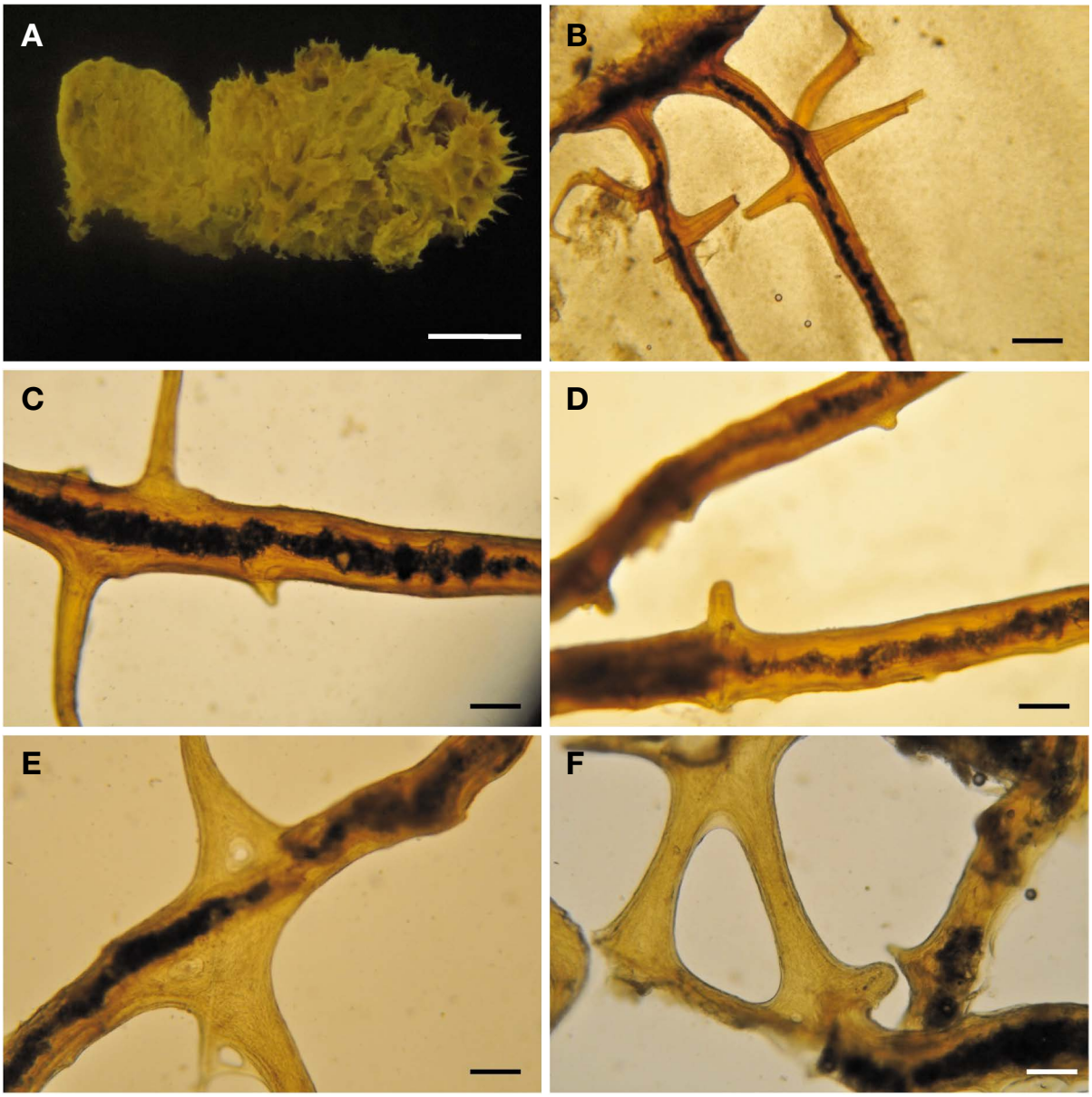


Fig. 6. *Euryspongia radicula* n. sp. A, external morphology; B, skeletal structure near base; C, D, cored primary fibres; E, branched secondary fibres; F, bridged secondary fibres. Scale bars: A = 2 cm, B = 200 μm, C–F = 100 μm.

Remarks. Primary fibres are like a bundle (Fig. 8C), and thin secondary fibres are between primary fibres. The wide thin leaf-like shape in this sponge is very unique.

8. *Euryspongia linea* n. sp. (Fig. 9)
긴끈진해면(신칭)

Type specimen. Holotype (NIBRIV0000854523), Korea: Neunggeol, Ulleung-gun, Gyeongsangbuk-do, 2 Oct 2001, Kim, H.S., by SCUBA, depth 20 m, deposited in the NIBR.

Description. Thick encrusting sponge, size up to 7 × 3 × 2 cm. Surface smooth with long rope-like primary fibres occur, no oscules. Color in life beige, brown clay in alcohol. Texture soft and compressible.

Skeleton: Primary fibres, 150–300 μm in diameter. Long rope-like primary fibres emerging from surface. Secondary fibres, very rare, 40–100 μm in diameter.

Etymology. This species name, *linea*, is named after its long string-like primary fibres.

Remarks. String-like primary fibres are very unique and cored with large sized sands.

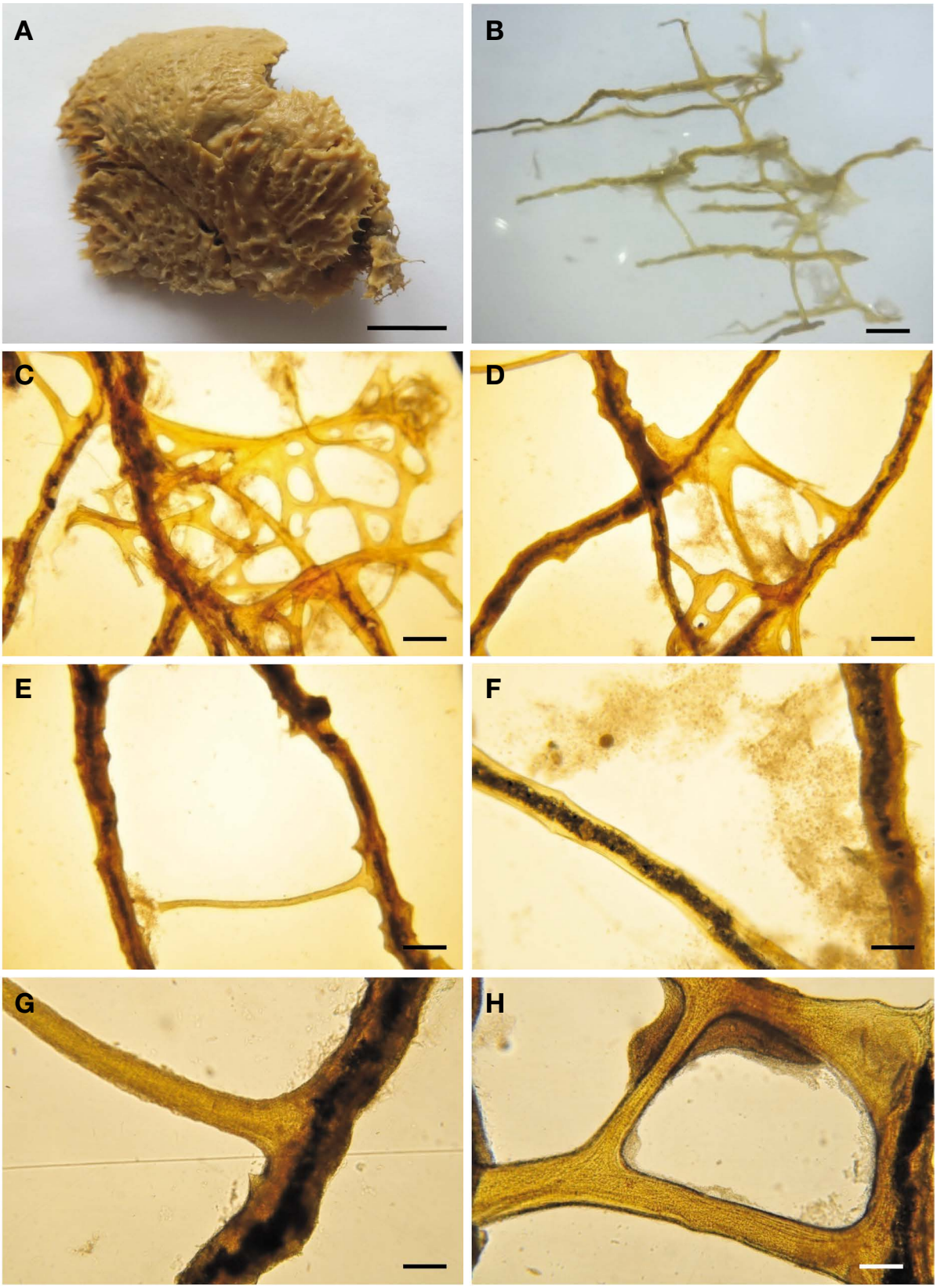


Fig. 7. *Eurispongia spina* n. sp. A, external morphology; B, skeletal structure under a dissecting microscope; C, skeletal structure at base; D, skeletal structure at mid-section; E, F, primary fibres near surface; G, primary fibres near conules; H, primary and secondary fibres. Scale bars: A = 2 cm, B = 1 cm, C, D = 200 μm, E–H = 100 μm.

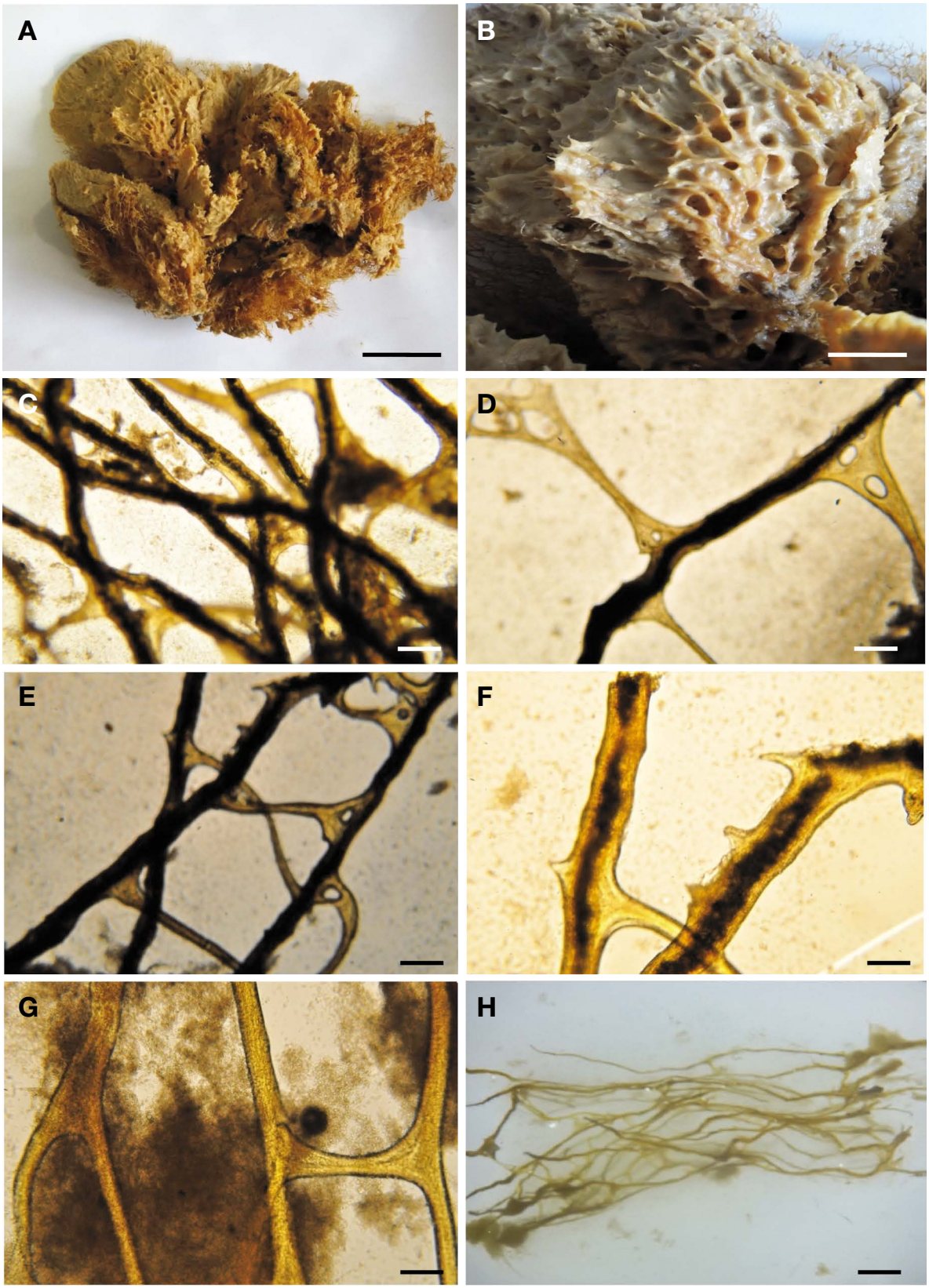


Fig. 8. *Euryspongia flabellum* n. sp. A, external morphology; B, surface close up; C–E, skeletal structure; F, primary fibres with spine; G, secondary fibres; H, skeletal structure under a dissecting microscope. Scale bars: A = 2 cm, B = 1 cm, C–E = 200 μm, F, G = 100 μm, H = 1 cm.

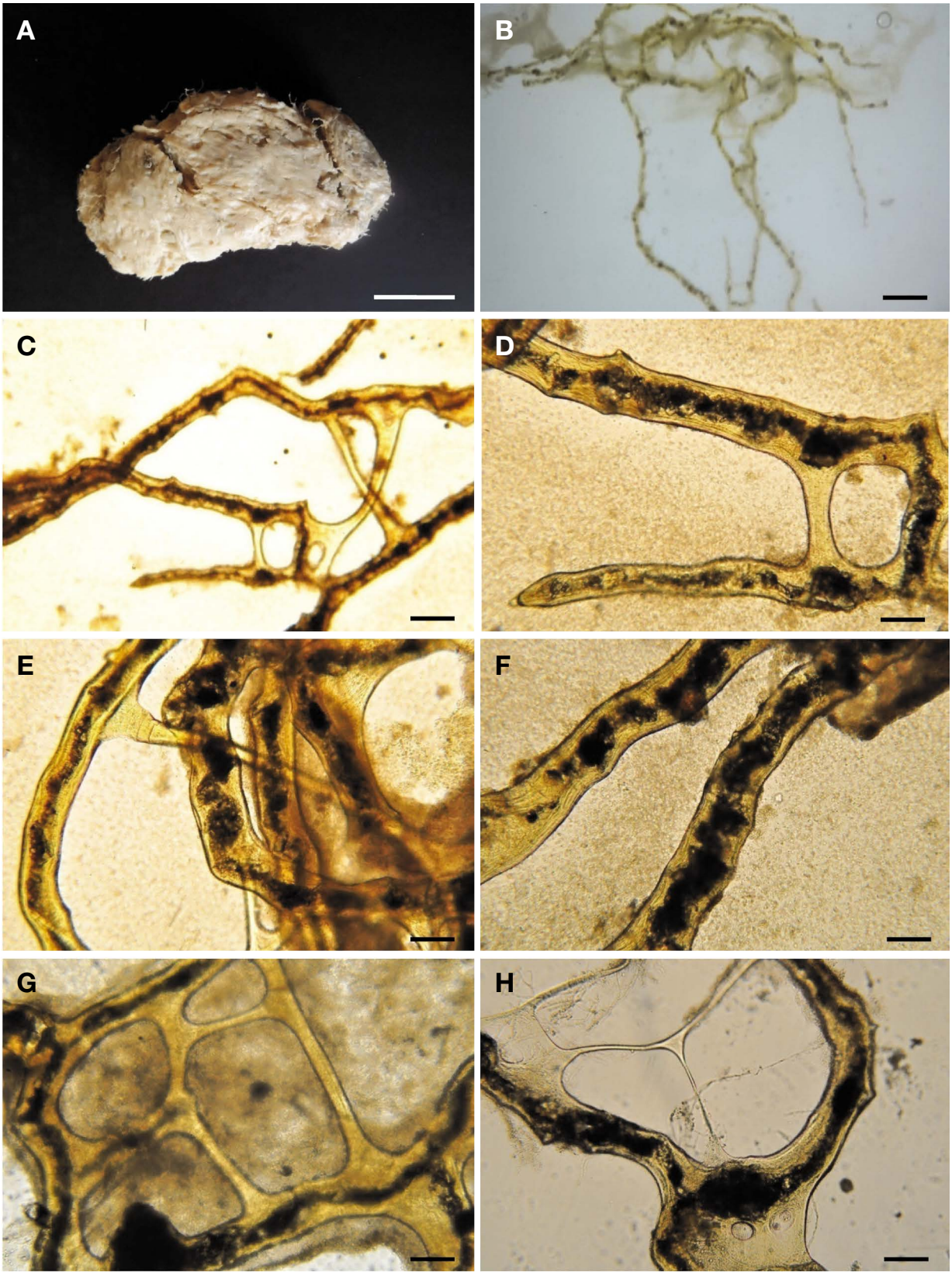


Fig. 9. *Euryspongia linea* n. sp. A, external morphology; B, skeletal structure under a dissecting microscope; C, D, skeletal structure; E, F, cored primary fibres; G, skeletal structure with membrane; H, primary fibres near conules. Scale bars: A = 2 cm, B = 1 cm, C = 200 μm, D−H = 100 μm.

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