

# Four New Species of Genus *Scalarispongia* (Demospongiae: Dictyoceratida: Thorectidae) from Jeju Island, Korea

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## ABSTRACT

Four new species of genus *Scalarispongia* (Demospongiae: Dictyoceratida: Thorectidae) are described from Jeju Island, Korea. These new species of *Scalarispongia* are compared with 14 reported species of the genus by the skeletal structure. *Scalarispongia songakensis* n. sp. is similar to *S. lenis* in sponge shape but differs in skeletal structure and meshes are not divided into two sections. The length of secondary fibres between primary fibres of this new species is much longer than *S. lenis*. *Scalarispongia radícula* n. sp. resembles *S. songakensis* in sponge shape, but this new species has pseudo-tertiary fibres at the sponge base. *Scalarispongia maraensis* n. sp. is very similar to *S. subjiensis* in sponge shape but primary fibres of this new species are not simple because fibres have wide webbing. *Scalarispongia massa* n. sp. is characterized by the large mass sponge shape and numerous open oscules form a long line on the ridge of the sponge.

**Keywords:** new species, *Scalarispongia*, Thorectidae, Korea

## INTRODUCTION

Genus *Scalarispongia* is characterized by ladder-like pattern of skeletal fibres. The meshes in skeletal reticulum are often tough, precisely rectangular with secondary fibres forming almost perfect right-angles to primary fibres (Cook and Bergquist, 2000). The primary fibres of this genus are very simple, mostly show traces of coring with broken spicules and their diameter is usually below 100 µm (Kim et al., 2020). Fourteen species of *Scalarispongia* were reported worldwide (Schmidt, 1862; Thiele, 1905; Pulitzer-Finali and Pronzato, 1981; Desqueyroux-Faúndez and Van Soest, 1997; Helmy et al., 2004; Lee and Sim, 2007), among them seven species are from Korea (Lee and Sim, 2007; Kim et al., 2020).

## MATERIALS AND METHODS

Sponge collections were made from Jeju Island Korea. They were collected from intertidal zone to depth of 5–20 m in 1984, 1991, and 2004. Collected specimens preserved

in 95% ethyl alcohol 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). The type specimens were deposited in National Institute of Biological Resources (NIBR), Incheon, Korea.

## SYSTEMATIC ACCOUNTS

Phylum Porifera Grant, 1836  
Class Demospongiae Sollas, 1885  
Order Dictyoceratida Minchin, 1900  
Family Thorectidae Bergquist, 1978  
Genus *Scalarispongia* Cook and Bergquist, 2000

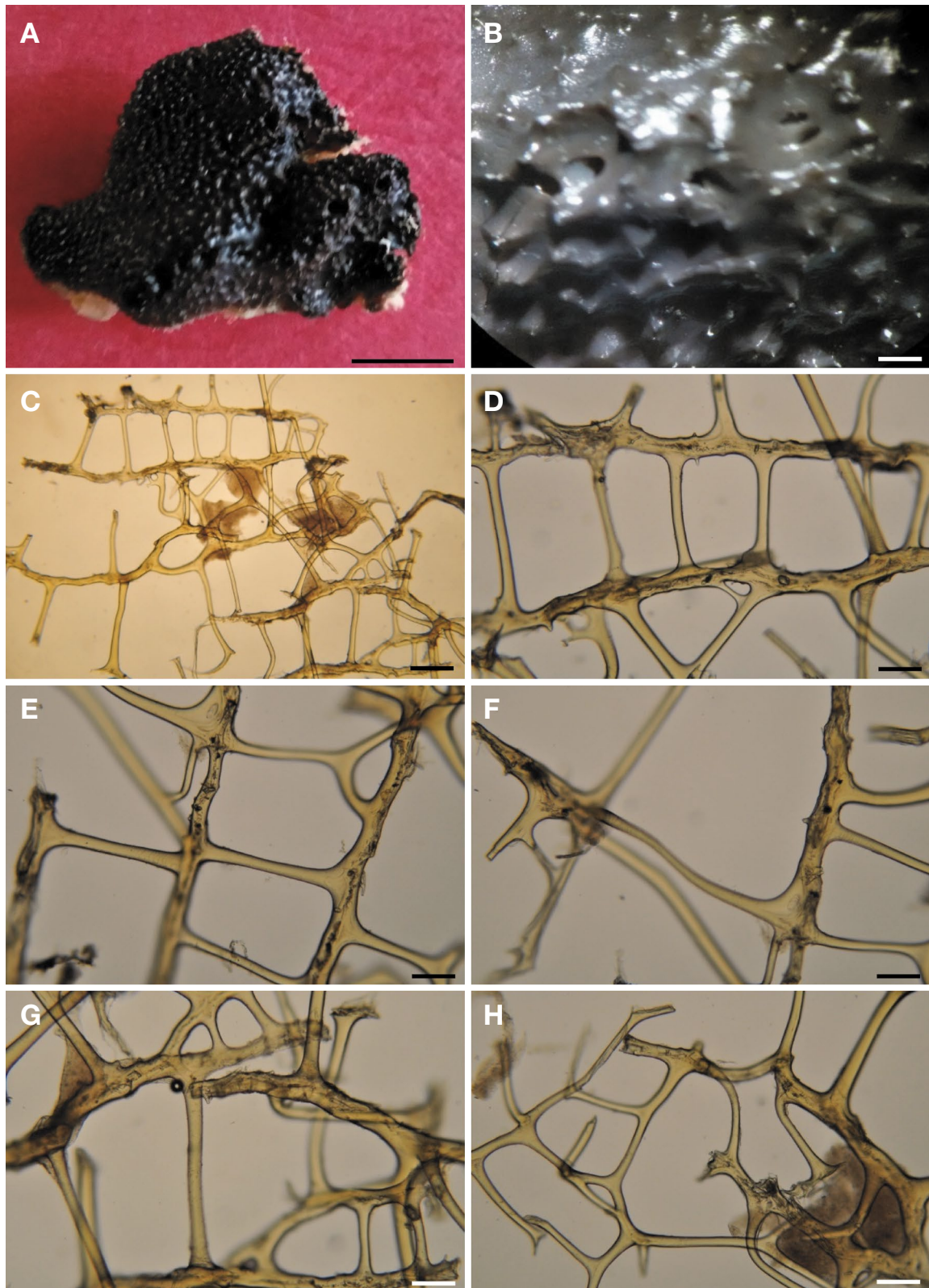
### 1. *Scalarispongia songakensis* n. sp. (Figs. 1, 2)

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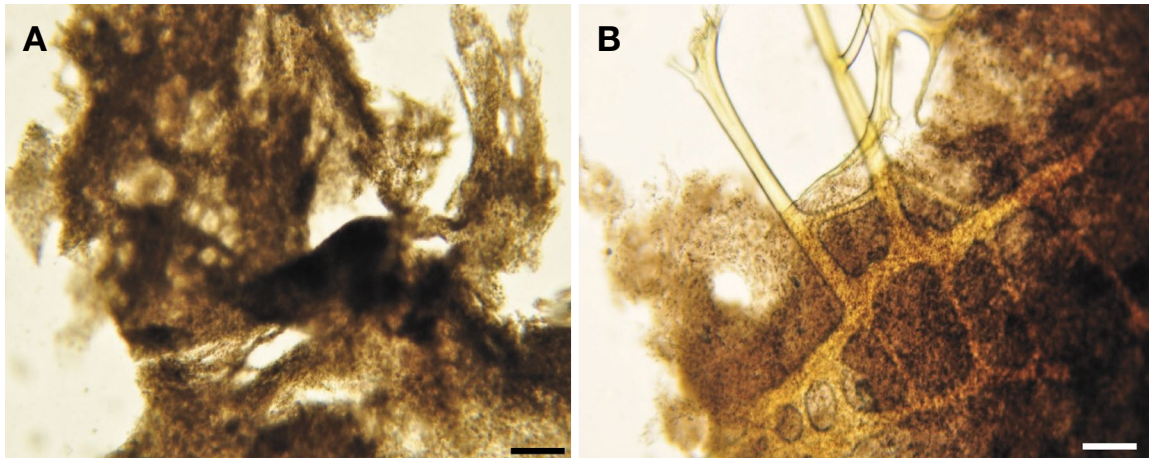
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**Fig. 1.** *Scalarispongia songakensis* n. sp. A, External morphology; B, Surface under the dissecting microscope; C-E, Choanosome skeletal structure; F, Bridged secondary fibres near conules; G, H, Irregular surface skeletal structure. Scale bars: A=1 cm, B=1 mm, C=200 µm, D-H=100 µm.



**Fig. 2.** *Scalarispongia songakensis* n. sp. A, Perforated pigmented membrane; B, Fibres with membranae. Scale bars: A, B = 100 µm.

**Material examined.** Holotype (NIBRIV0000868049), Korea: Jeju-do, Seogwipo-si, Deajeong-eup, Sangmo-ri (the shore of the Sea near Mt. Songaksan), 23 Feb 2004, SCUBA diving, rocky substrate, depth 10 m, collected by Moon SE and Kim HJ.

**Description.** Thick mass sponge, size up to  $3.5 \times 2.5 \times 1.5$  cm. Surface smooth, honeycomb shape with short conules covered with pigmented and perforated thin membrane. Thin fibres do not emerge from surface. Oscules open on ridge of sponge side by side, 0.3–1.5 mm in diameter. Color in life, black, beige inside outside. Texture firm and compressible.

**Skeleton.** Primary fibres, 50–100 µm in diameter. Secondary fibres, 30–50 µm in diameter. Rare occurring partly wide or bridged secondary fibres between primary fibres, 500–600 µm in diameter and very regular ladder-like fibres 700–800 µm in diameter, at choanosome.

**Etymology.** The species name, *songakensis*, is named after a locality, Mt. Songaksan, Korea.

**Remarks.** In this new species, ladder-like pattern at the choanosome is very simple and occurs regularly. This new species is similar to *Scalarispongia lenis* Kim, Lee and Sim, 2020 in sponge shape but differs in skeletal structure. The length of secondary fibres between primary fibres of this new species is much longer than *S. lenis*' and meshes of new species are not divided into two sections like *S. lenis*' meshes at near conules.

### 2. *Scalarispongia radricula* n. sp. (Fig. 3)

LSID urn:lsid:zoobank.org:act:F1581B2D-7AA9-4161-BF08-E18663C97880

**Material examined.** Holotype (NIBRIV0000868050), Korea: Jeju-do, Seogwipo-si, Deajeong-eup, Sangmo-ri (the shore of

the Sea near Mt. Songaksan), 23 Feb 2004, SCUBA diving, rocky substrate, depth 10 m, collected by Moon SE and Kim HJ.

**Description.** Thick mass sponge, size up to  $4 \times 2.5 \times 1.5$  cm. Surface rough, honeycomb shape with short conules covered with pigmented thin membrane. Sponge surface covered with numerous other invertebrates and seaweeds. Thin fibres emerge from surface. Oscules very rare, 0.3–0.5 mm in diameter. Color in life, black outside, beige inside. Texture firm and compressible.

**Skeleton.** Primary fibres, 80–100 µm in diameter. Secondary fibres, 30–50 µm in diameter, and length of bridged secondary fibres between primary fibres, 350–500 µm and 750–850 µm in diameter. Surface skeletal structure arranged irregularly, but choanosome fibres regular with ladder-like pattern. Pseudo-tertiary fibres very rare, 10–20 µm in diameter at the sponge base (Fig. 3H).

**Etymology.** This species name, *radricula*, is named after root-like shape of pseudo-tertiary fibres at the sponge base.

**Remarks.** This new species resembles *Scalarispongia songakensis* (in the studied specimens) in sponge shape, but differs in skeletal structure. This new species has pseudo-tertiary fibres at the sponge base. Pseudo-tertiary fibres are rare and only found at the base of sponge.

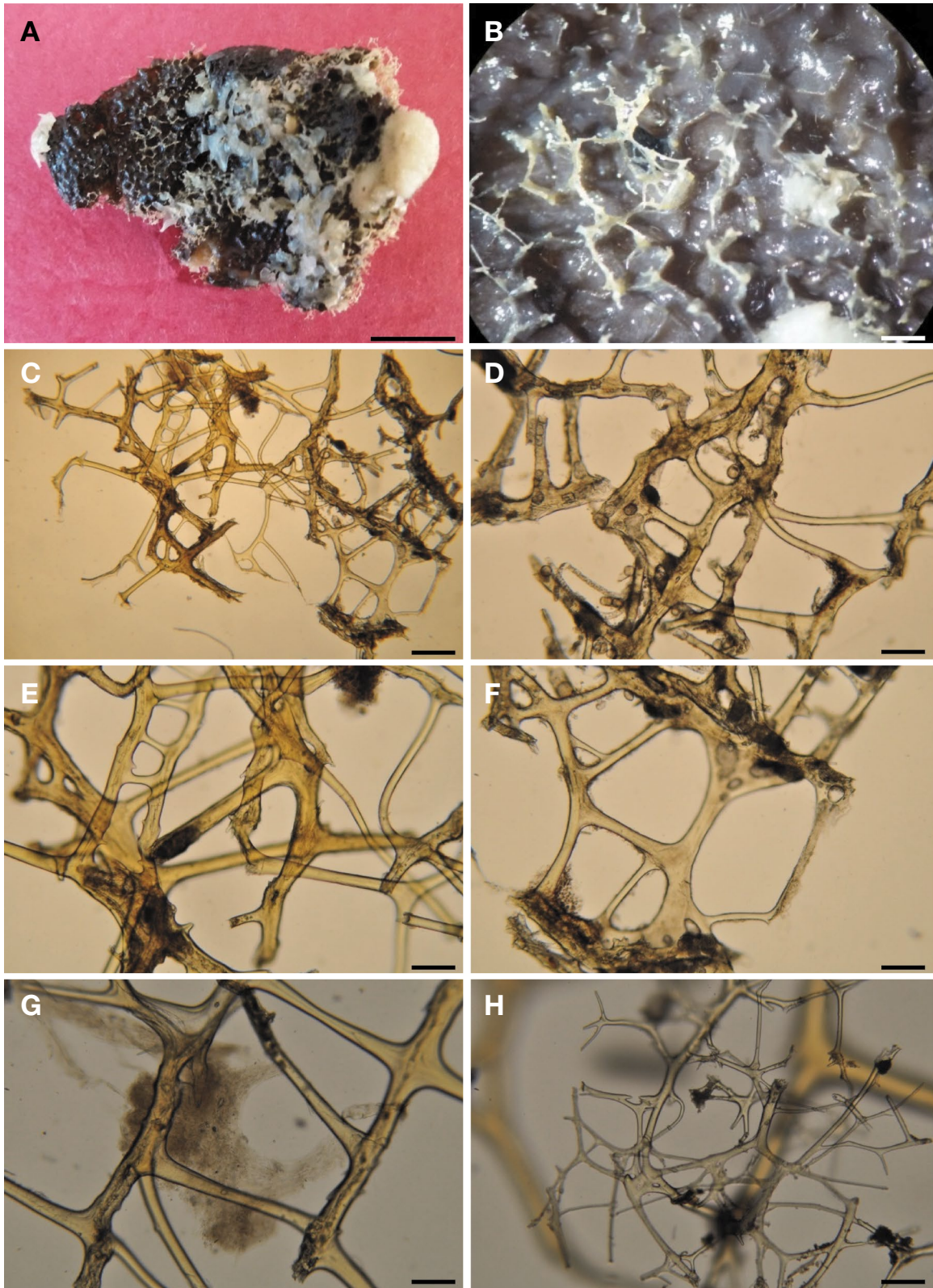
### 3. *Scalarispongia maraensis* n. sp. (Fig. 4)

LSID urn:lsid:zoobank.org:act:E5800976-816E-4A58-812C-0309A4511A88

**Material examined.** Holotype (NIBRIV0000868051), Korea: Jeju-do, Seogwipo-si, Marado Island, 25 Oct 1991, intertidal zone, rocky substrate.

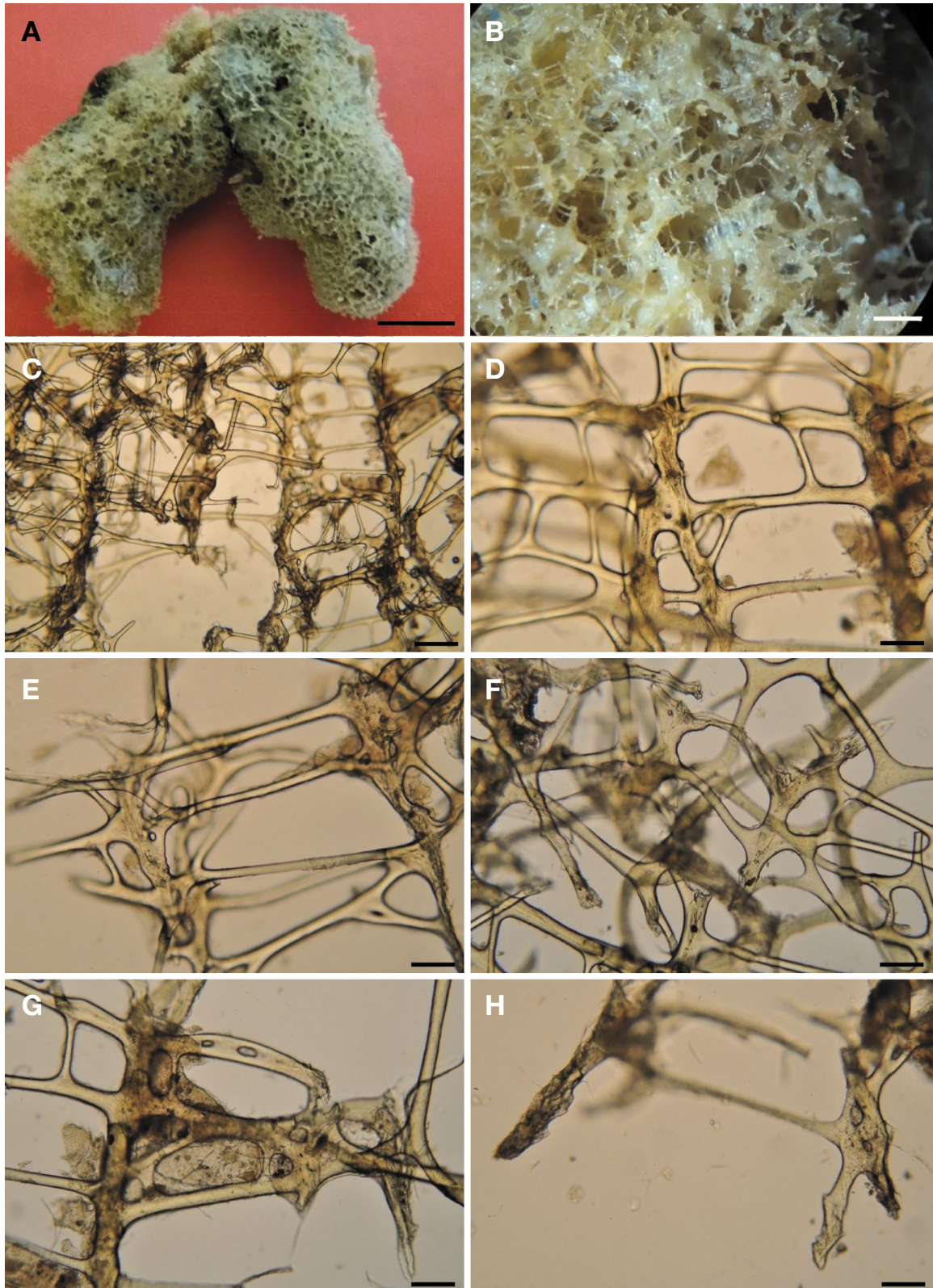
**Description.** Thick encrusting small mass sponge, size up





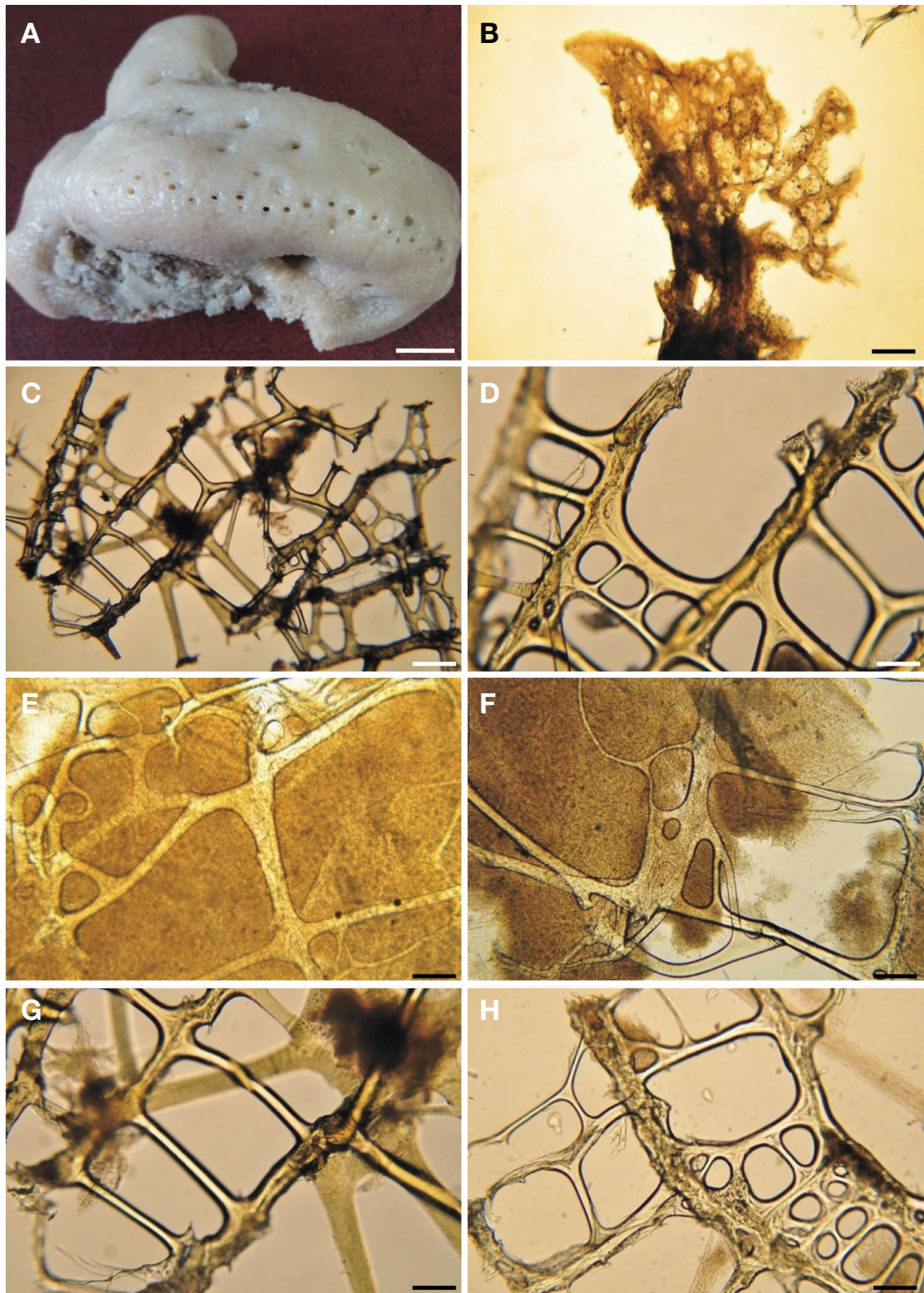
**Fig. 3.** *Sclerispongia radicula* n. sp. A, External morphology; B, Surface under the dissecting microscope; C-F, Surface skeletal structure; G, Ladder-like skeletal structure at the choanosome; H, Pseudo-tertiary fibres at the base. Scale bars: A=1 cm, B=1 mm, C=200 µm, D-H=100 µm.





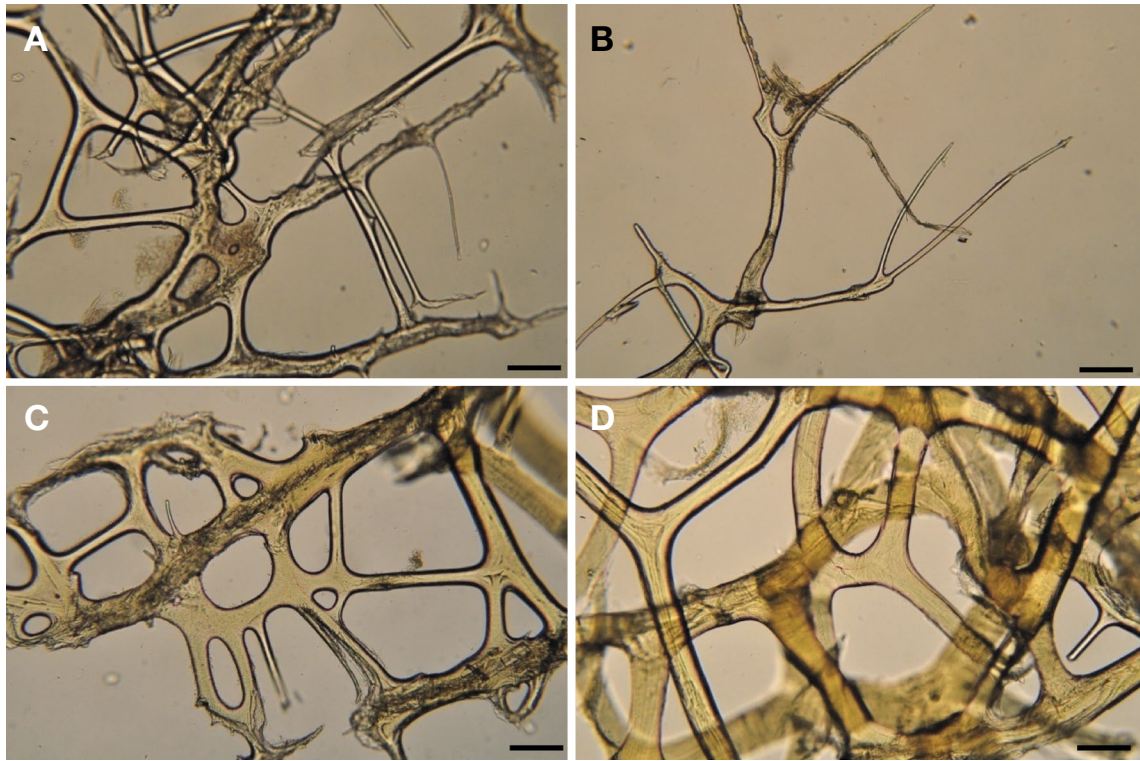
**Fig. 4.** *Scalarispongia maraensis* n. sp. A, External morphology; B, Surface under the dissecting microscope; C, Ladder-like skeletal structure; D, Primary and secondary fibres; E, Bridged secondary fibres between primary fibres; F, Irregular skeletal structure; G, Primary and secondary fibres; H, Primary and secondary fibres at near conules. Scale bars: A=1 cm, B=1 mm, C=200  $\mu$ m, D-H=100  $\mu$ m.





**Fig. 5.** *Scalarispongia massa* n. sp. A, External morphology; B, Porous surface membrane; C, Choanosome skeletal structure; D, Ladder-like skeletal structure near conules; E, F, Irregular skeletal structure with membrane; G, H, Ladder-like skeletal structure. Scale bars: A=1 cm, B, C=200  $\mu$ m, D-H=100  $\mu$ m.





**Fig. 6.** *Scalarispongia massa* n. sp. A, B, Pseudo-tertiary fibres; C, D, Irregular skeletal structure. Scale bars: A–D = 100  $\mu$ m.

to  $6 \times 3 \times 2.5$  cm. Surface smooth, covered with thick membrane, which has several pores open in some areas. Oscules 1–1.5 mm in diameter. Color, beige in alcohol. Texture firm and compressible.

**Skeleton.** Primary fibres, partly with wide webbing, 70–130  $\mu$ m in diameter. Secondary fibres, 30–60  $\mu$ m in diameter. Length of bridged secondary fibres between primary fibres at near conules, 340–760  $\mu$ m or 700–1,100  $\mu$ m in diameter (Fig. 4H).

**Etymology.** The species name, *maraensis*, is named after locality Marado, Jejudo Island, Korea.

**Remarks.** This new species is very similar to *Scalarispongia subjiensis* Kim, Lee and Sim, 2020 in sponge shape but differs in skeletal structure. Primary fibres of this new species are very unique, fibres are not simple but mostly with wide webbing. Length of bridged secondary fibres between primary fibres at near conules is longer than other species of this genus.

#### 4. *Scalarispongia massa* n. sp. (Figs. 5, 6)

LSID urn:lsid:zoobank.org:act:66746AE3-4ACC-406F-BDB1-23DD4B09CAF0

*Spongia officinalis*; Sim, 1985: 23, 24, Pl. 1, fig. 2.

**Material examined.** Holotype (NIBRIV0000868052), Korea: Jeju-do, Seogwipo-si, 2 Jul 1984, intertidal zone, rocky substrate.

**Description.** Thick encrusting mass sponge (slightly spherical), size up to  $8 \times 6 \times 4$  cm. Surface smooth with finely conulose, covered with porous membrane (Fig. 5B). Numerous open oscules, 0.5–1.5 mm in diameter, form a long line on the ridge of the subspherical sponge. Color in life black outside, brown inside and white in spirit. Texture firm and compressible.

**Skeleton.** Primary fibres, 100–120  $\mu$ m in diameter. Secondary fibres, 30–50–80  $\mu$ m in diameter, ladder-like secondary fibres occur at choanosome and sponge base. Length of secondary fibres between primary fibres, 300–600–700  $\mu$ m in diameter. Pseudo-tertiary fibres at base, 10  $\mu$ m in diameter.

**Etymology.** This species name, *massa*, is named after lump shape of the sponge.

**Remarks.** We reorganized *Spongia officinalis* Linnaeus, 1795 (specimen in Sim, 1985) to this new species. This new species is a thick mass while other *Scalarispongia* species are mostly incrusting and small. Open oscules form a long line at the ridge of sponge body. Some part of skeletal structure has secondary webbing (Fig. 5H).

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## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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