

Five New Species of Genus *Hyattella* (Dictyoceratida: Spongiidae) from Korea

Chung Ja Sim¹, Young A Kim², Kyung Jin Lee^{3,*}

¹Department of Biological Sciences, Hannam University, Daejeon 300-811, Korea

²Korea Institute of Ocean Science & Technology, Ansan 426-744, Korea

³Strategic Planning Division, National Institute of Biological Resources, Incheon 404-708, Korea

ABSTRACT

Five new species of the genus *Hyattella* (Dictyoceratida: Spongiidae); *Hyattella chaguiensis* n. sp., *H. munseomensis* n. sp., *H. sumsangiensis* n. sp., *H. bakusi* n. sp., and *H. purpurea* n. sp., were collected from Jeju-do, Korea. *Hyattella chaguiensis* n. sp. is similar to *H. mara* Sim and Lee, 2014 in shape, but differs in dermal membrane and primary fibres. *Hyattella munseomensis* n. sp. differs in cored primary fibres, having middle-size sand. *Hyattella sumsangiensis* n. sp. is characterized by color changes and very soft texture. *Hyattella bakusi* n. sp. and *H. purpurea* n. sp. are similar in shape, having tube-like elevated holes, but differ in skeletal structures.

Keywords: *Hyattella*, Spongiidae, Dictyoceratida, new species, Korea

INTRODUCTION

The genus *Hyattella* within family Spongiidae is characterized by a cavernous sponge body, and numerous cored primary fibres in the skeletal structure (Cook and Bergquist, 2001; Hooper and Van Soest, 2002). Among the genus *Hyattella*, three species *H. intestinalis* (Lamarck, 1814) from the Indo-pacific, *H. cavernosa* (Pallas, 1766) from the West Indian and *H. sinuosa* (Pallas, 1766) from Indian Ocean are well known and well characterized species. Bergquist (1980) reviewed 14 species of *Hyattella* reported from Australia by Von Lendenfeld (1889). Among them, except three species, all of the genus *Hyattella* have been placed in other genera or synonymized. Many authors reported genus *Hyattella* (Willson, 1902; Dendy, 1905; De Laubenfels, 1936, 1948, 1954; Wiedenmayer, 1977; Van Soest, 1978). To date, 12 valid species of the genus *Hyattella* have been reported worldwide (Van Soest et al., 2014). Four species, *H. sinchangensis*, *H. mara*, *H. jeolmyeongyeo* and *H. lendenfeldi* have been reported from Korean waters (Sim and Lee, 2014).

MATERIALS AND METHODS

Specimens were collected from depth of 5–25 m at Jeju-do by SCUBA diving, during the period 2000–2012. All specimens were fixed in 95% or absolute ethanol. Identification was made on the basis of external features of the sponges, including growth form and skeletal structure.

This procedure followed the methods of Sim and Lee (2002). Sponges were examined under stereomicroscope (Stemi SV 6; Carl Zeiss) and light microscope (Axioscop II; Carl Zeiss). The Voucher specimens examined in this study were deposited at the National Institute of Biological Resources (NIBR), Incheon, Korea.

SYSTEMATIC ACCOUNTS

Phylum Porifera Grant, 1836
Class Demospongiae Sollas, 1885
Order Dictyoceratida Minchin, 1900
Family Spongiidae Gray, 1867
Genus *Hyattella* Lendenfeld, 1888

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*To whom correspondence should be addressed
Tel: 82-32-590-7275, Fax: 82-32-590-7079
E-mail: kjlee89@korea.kr

¹*Hyattella chaguiensis* n. sp. (Fig. 1)

Material examined. Holotype (NIBRIV0000300313), Korea, Jeju-do, Jeju-si, Hankyung-myeon, Gosan-ri, Chaguído Island, 19 Oct 2001, Lee KJ, by SCUBA diving, depth 5 m, deposited in the NIBR.

Description. Massive sponge, size up to 8 × 6 × 3 cm. Surface, smooth with numerous holes and many irregular folds of thin sheets like paper. Dermal membrane with thin regular network fibres, 5–10 μm in diameter. Thin fibres separate readily from dermal membrane. Texture, soft and compressible. Color, beige in life.

Skeleton: Primary fibres, 40–60 μm in diameter, very

slightly cored with small sands. Uncored secondary fibres, 15–45 μm in diameter, well developed and make complex mesh. Thin long secondary fibres, 5–10 μm in diameter, run from thick secondary fibres which appear near surface.

Etymology. This species is named after the type locality, Chaguído Island, Jeju-do, Korea.

Remarks. This new species is similar to *Hyattella mara* Sim and Lee, 2014 in shape but differs in dermal membrane and primary fibres. The primary fibres of the former are slightly cored with small sands, but the latter cored with sand and spicules. The surface membrane of the former has regular network with thin fibres, while the latter has not thin regular network.

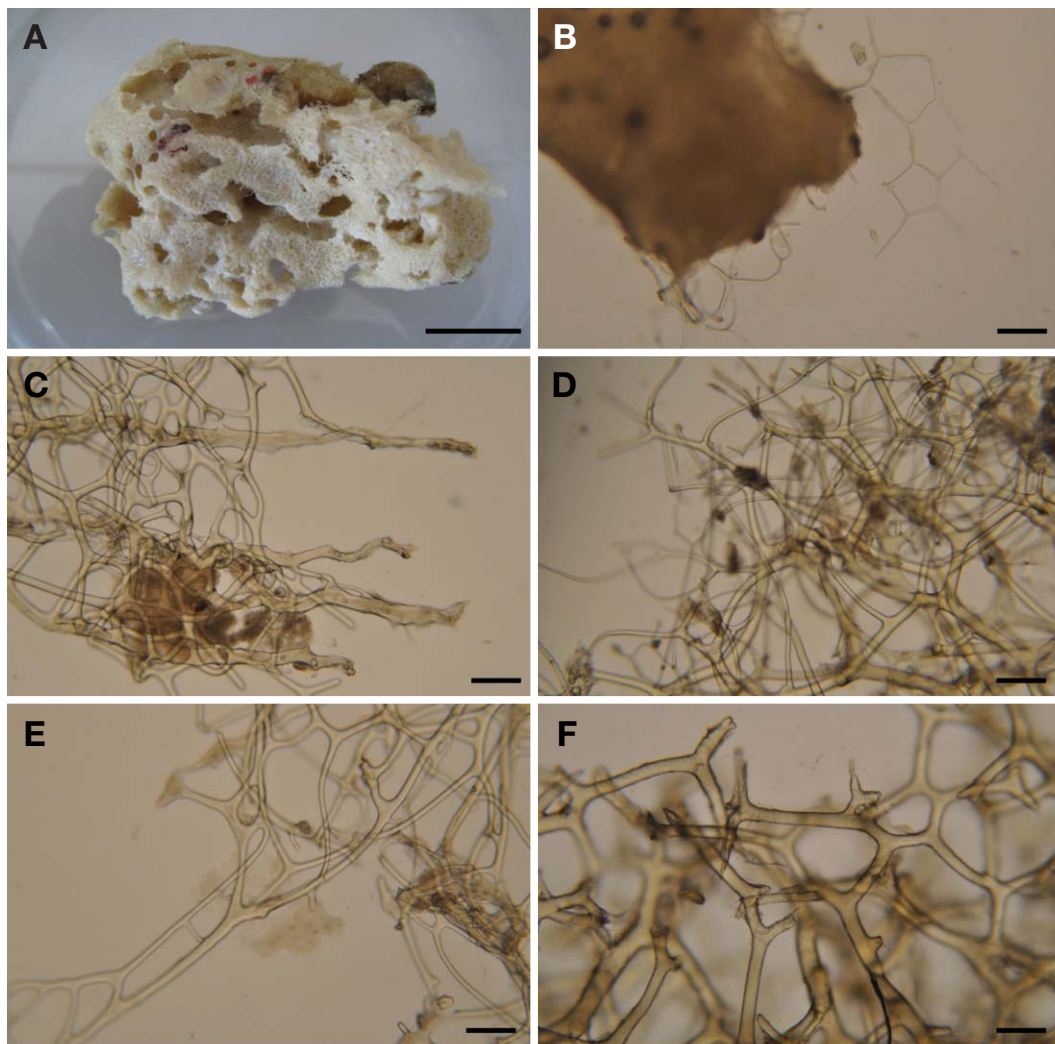


Fig. 1. *Hyattella chaguiensis* n. sp. A, Entire animal; B, Thin fibres network within dermal membrane; C, Surface primary fibres; D, Thin long fibres from secondary fibres; E, Thin long secondary fibres; F, Thick secondary fibres at the base. Scale bars: A=2 cm, B–F=100 μm.

Korean name: ¹*차귀히아텔라해면 (신칭)

¹**Hyattella munseomensis* n. sp. (Fig. 2)

Material examined. Holotype (NIBRIV0000300314), Korea, Jeju-do, Seogwipo-si, Munseom, 7 Nov 2000, Lee KJ by SCUBA diving, 20 m in depth, deposited in the NIBR.

Description. Thickly incrusting, cushion shape, size up to 16 × 6 × 7 cm. One large oscule like hole, 1.5 cm in diameter, open on side of sponge body. Small multi-hole, 2–3 mm in diameter, irregularly scattered over sponge surface. Smooth surface has thin membrane with fibre network. Color, beige and partially purple in life. Texture firm and compressible because of very cavernous interior.

Skeleton: primary fibres, 40 μm in diameter, cored with small sands. Secondary fibres, 20–60 μm in diameter. Thin long secondary fibres, 10 μm in diameter, run from thick secondary fibres.

Etymology. This species is named after the type locality, Munseom, Seogwipo-si, Jeju-do, Korea.

Remarks. This new species is similar to *Hyattella sinchangensis* Sim and Lee, 2014 in growth form, but differs in several large oscule-like hole. Thin long secondary fibres may not really be tertiary fibres, even though originate from the thick secondary fibres. They only extend into the surface membrane.

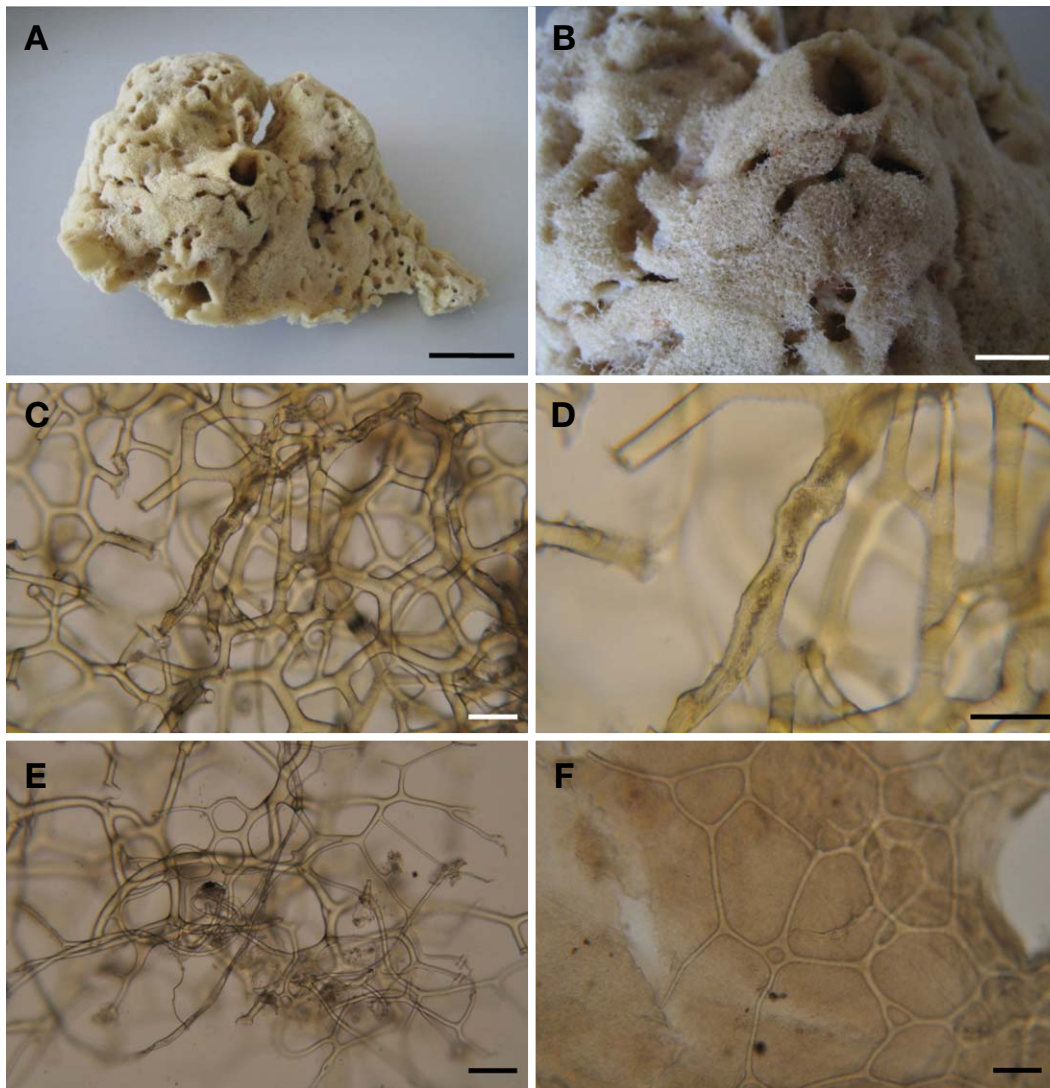


Fig. 2. *Hyattella munseomensis* n. sp. A, Entire animal; B, Closed surface; C, Primary and secondary fibres; D, Closed primary fibres; E, Thin long secondary fibres; F, Surface membrane with fibre network. Scale bars: A=3 cm, B=1 cm, C–F=100 μm.

Korean name: ¹*문섬히아텔라해면 (신칭)

¹**Hyattella sumsangiensis* n. sp. (Fig. 3)

Material examined. Holotype (NIBRIV0000300315), Korea, Jeju-do, Chuja-myeon, Sumsangi, 11 Oct 2012, Kim HS, by SCUBA diving, depth 30 m, deposited in the NIBR.

Description. Massive, very cavernous sponge, size up to 7 × 4 × 5 cm. Surface with thin membrane, very smooth. Diverse oscules-like hole in size, 3–5 mm in diameter, open at sponge surface. Color, purple in life but gradually change to dark brown in alcohol. Texture, very soft and compressible.

Skeleton: primary fibres, 80–100 μm in diameter, densely cored with large sands. Secondary fibres, 30–50 μm in diameter, made regular mesh.

Etymology. This species is named after the type locality, Sumsangi, Chujado Island, Jeju-do, Korea.

Remarks. This new species is similar to *Hyattella sinchangsensis* Sim and Lee, 2014 in growth form but differs in very soft texture and color change.

²**Hyattella bakusi* n. sp. (Fig. 4)

Material examined. Holotype (NIBRIV0000300316), Korea, Jeju-do, Jeju-si, Chuja-myeon, Jeolmyeongyeo, 2 Aug 2002, Lee KJ, by SCUBA diving, depth 25–35 m, deposited in the

NIBR.

Description. Thickly encrusting, size up to 15 × 7 × 2 cm. Uneven surface with wrinkles and several elevated hole-like tubes, 1 cm diameter, 1–1.5 cm height. Texture, firm and compressible. Color, brownish violet in life.

Skeleton: primary fibres at surface 40–80–100 μm in diameter, made fascicle, clear sand core, secondary fibres 25–40 μm in diameter made regular mesh.

Etymology. This species name *bakusi* is named after the Late Dr. Gerald J. Bakus, who was a professor in the Department of Biological Sciences, University of Southern California, a marine ecologist and sponge taxonomist.

Remarks. This new species is similar to *Hyattella chaguiensis* n. sp. on the surface, with slightly fasciculated primary fibres, but differs in cored sand. This new species has dense cored sand in primary fibres.

³**Hyattella purpurea* n. sp. (Fig. 5)

Material examined. Holotype (NIBRIV0000300317), Korea, Jeju-do, Jeju-si, Chuja-myeon, 9 Oct 2012, Kim HS, by SCUBA diving, depth 25 m, deposited in the NIBR.

Description. Thickly encrusted on the substrate, size up to 16 × 4 × 5 cm. Surface has many long tubes with oscule-like

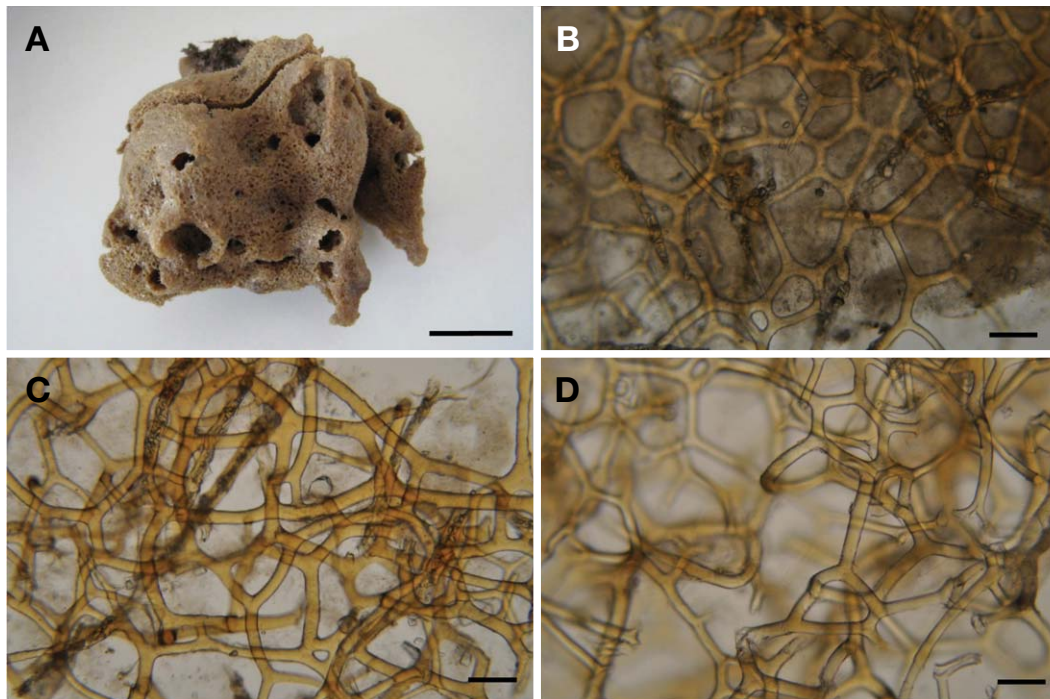


Fig. 3. *Hyattella sumsangiensis* n. sp. A, Entire animal; B, Dermal membrane with primary and secondary fibres; C, Primary and secondary fibres in choanosome; D, Secondary fibres. Scale bars: A=2 cm, B–D=100 μm.

Korean name: ¹*섬생이히아텔라해면 (신칭), ²*바쿠시히아텔라해면 (신칭), ³*보라히아텔라해면 (신칭)

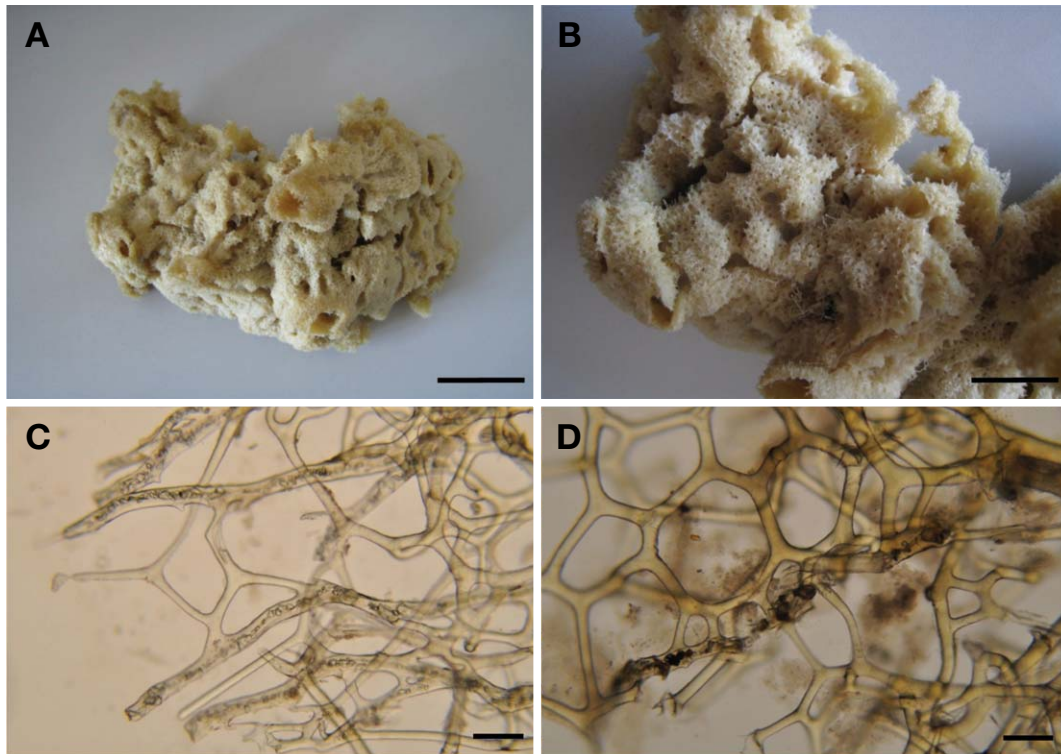


Fig. 4. *Hyattella bakusi* n. sp. A, Entire animal; B, Surface; C, Fasciculate primary fibres at the surface; D, Primary and secondary fibres in choanosome. Scale bars: A=3 cm, B=6 cm, C, D=100 μ m.

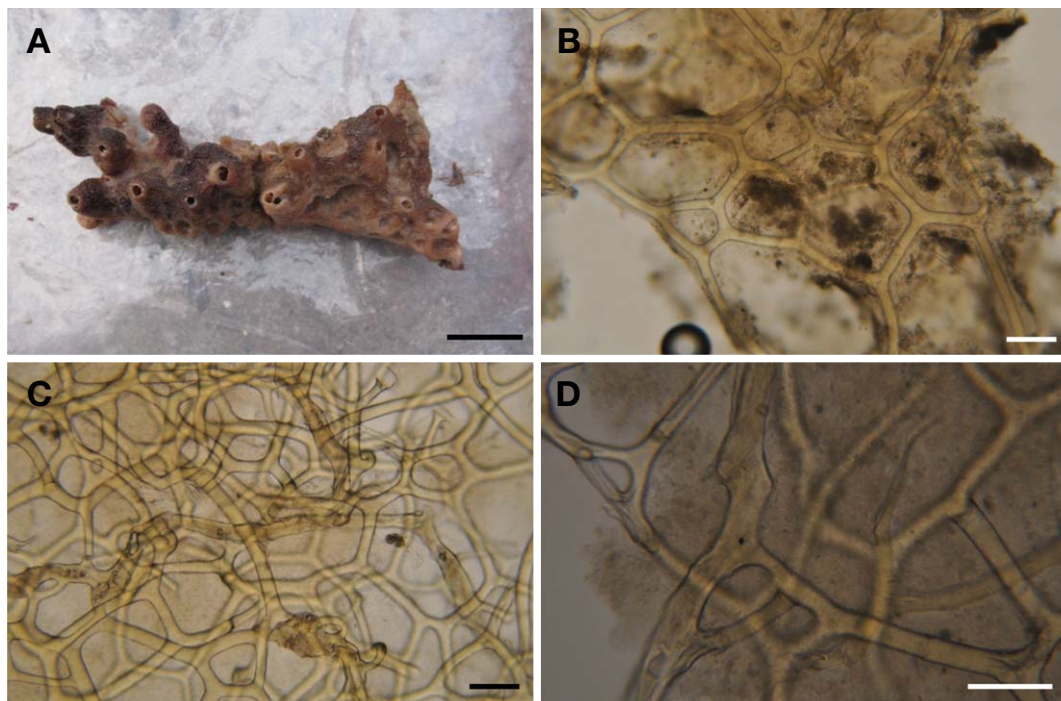


Fig. 5. *Hyattella purpurea* n. sp. A, Entire animal; B, Dermal membrane with fibres network; C, Primary and secondary fibres; D, Closed primary fibres. Scale bars: A=3 cm, B-D=100 μ m.

Table 1. Comparison of new species of genus *Hyattella*

	Growth form	Surface	Dermal membrane	Primary fibres (μm in diameter)	Secondary fibres (μm in diameter)	Colour
<i>H. chaguiensis</i>	Massive	Smooth with numerous holes	With thin regular fibre network	40–60 Cored with small sand	5–10–45	Beige
<i>H. munseomensis</i>	Thickly encrusting	Smooth with large oscula-like multi hole	With fibre network	40 Cored with small sand	10–20–60	Beige and purple
<i>H. sungsangiensis</i>	Massive	Smooth with large oscule-like hole	With thick fibre network	80–100 Cored with large sand	30–50	Purple
<i>H. bakusi</i>	Thick mass	Uneven and wrinkled	–	40–80–100 Dense cored with sand	25–40	Brownish violet
<i>H. purpurea</i>	Thick encrusting with long tube-like hole	Smooth	With thick regular network	60–150 Rarely cored with sand	10–40	Dark purple

holes, 5–8 mm in diameter, coalescent at bottom. Thin membrane over surface with thick regular fibre network, and mucous. Surface color dark purple, interior pale brown and beige. Texture soft, compressible and easy to tear. Inside of sponge, cavernous. Small conules occur at surface.

Skeleton: primary fibres, 60–150 μm in diameter, very rarely cored with sands. Secondary fibres, 10–40 μm in diameters, not cored, and meshes, 45–90 μm in diameter or 234–436 μm in diameter.

Etymology. This species is named after the live color purple.

Remarks. This new species is similar to *Hyattella bakusi* n. sp. in shape, elevated tube, but differs in rarely cored primary fibres and thick surface fibre network.

DISCUSSION

In this study, the finding of five new *Hyattella* species from Jeju Island increases the total number of *Hyattella* species in the Korean water, from four to nine species. Except one, *Hyattella lendenfeldi* Sim and Lee, 2014, from Gageo Island, most of the reported *H.* species, occurring in the Jeju Island, shows the very high diversity compared to other areas. All our *Hyattella* specimens are very cavernous through the sponge body and thick mass encrusting growth form. Some have elevated tube-like hole at the upper surface. De Laubenfels (1954) stated that the ectosome of *Hyattella concertina* is loaded with foreign spicules and sand particles, whereas in our specimens do not have foreign material in the ectosome. Van Soest (1978) have redescribed about the *Hyattella intestinalis* (Lamarck), but most of them are tropical and are

different from our specimens in skeletal structure. Our study was focused on cavernous sponge shape, cored primary fibres and secondary fibres network. Several species are distinct from each other in cored primary fibres, secondary fibres network and growth form (Table 1).

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