

# Two new species of genus *Luffariella* (Dictyoceratida: Thorectidae) from Korea

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Two new species of the genus *Luffariella* (Dictyoceratida: Thorectidae), *L. tubula* n. sp. and *L. koreana* n. sp. were collected from Jeju-do, Korea. These species differ significantly from the previously reported five species in terms of shape and skeletal structure. *L. tubula* n. sp. has two categories in thickness of secondary fibres which were different from other species. *L. koreana* n. sp. is very similar to *L. variabilis* from Tahiti in skeletal structure, but differs in sponge shape with irregular branching and indistinct surface conules. Primary fibres of the two new species are separated from secondary and tertiary fibres.

Keywords: *Luffariella*, Thorectidae, Dictyoceratida, new species, Korea

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## INTRODUCTION

The genus *Luffariella* in the Family Thorectidae was erected by Thiele (1899). To date, they poorly known, with only five species reported worldwide. The five species are as follows: *Luffariella variabilis* (Polejaeff, 1884) from Tahiti, *L. geometrica* Kirkpatrick 1900 from Funafuti, *L. herdmani* (Dendy, 1905) from Ceylon seas, *L. caliculata* Bergquist, 1995 and *L. cylindrica* Bergquist, 1995 from New Caledonia. This genus was characterized by simple skeletal structure (Lendenfeld, 1889; Bergquist, 1980; 1995; Hooper and Van Soest, 2002). In this present study, we reported two new *Luffariella* species and the first record of this genus in Korea. These new species are described and illustrations are provided.

## MATERIALS AND METHODS

Sponges were collected from a depth of 10 m using SCUBA on Sep. 2012 from Jejudo Island, Korea. All specimens were fixed in 95%. The external features of sponges was 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). The type specimens were deposited in the National Institute of Biological

Resources (NIBR), Incheon, Korea.

## SYSTEMATIC ACCOUNTS

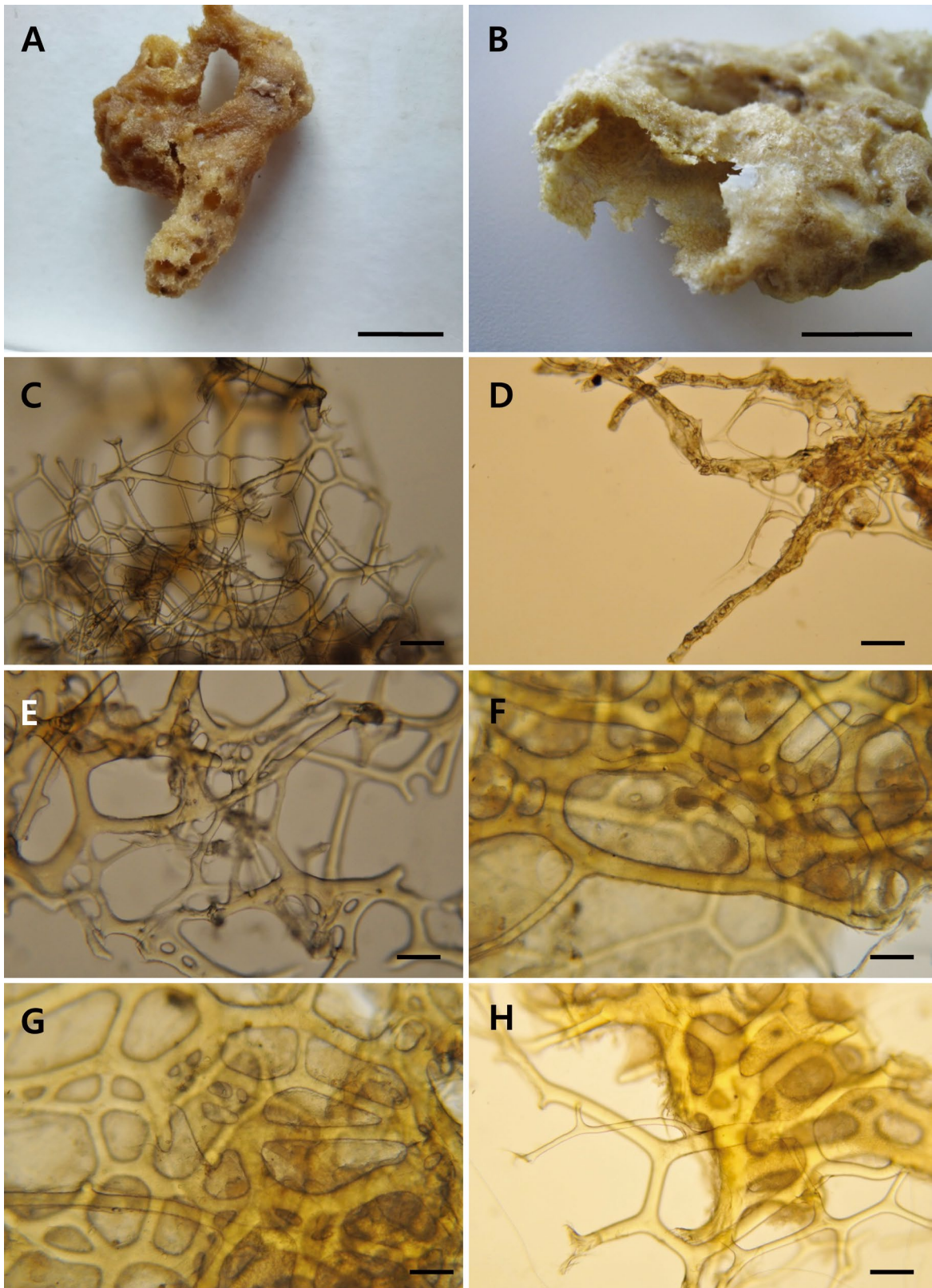
Phylum Porifera Grant, 1836  
Class Demospongiae Sollas, 1885  
Order Dictyoceratida Minchin, 1900  
Family Thorectidae, Bergquist, 1978  
Subfamily Thorectinae, Bergquist, 1978  
Genus *Luffariella* Thiele, 1899

### *Luffariella tubula* n. sp. (Fig. 1)

**Type specimen.** Holotype (NIBRIV0000305501), Munseom, Seogwipo-si, Jeju-do, 3 Sep 2012, Eom TY, by SCUBA, depth 10 m, deposited in the NIBR.

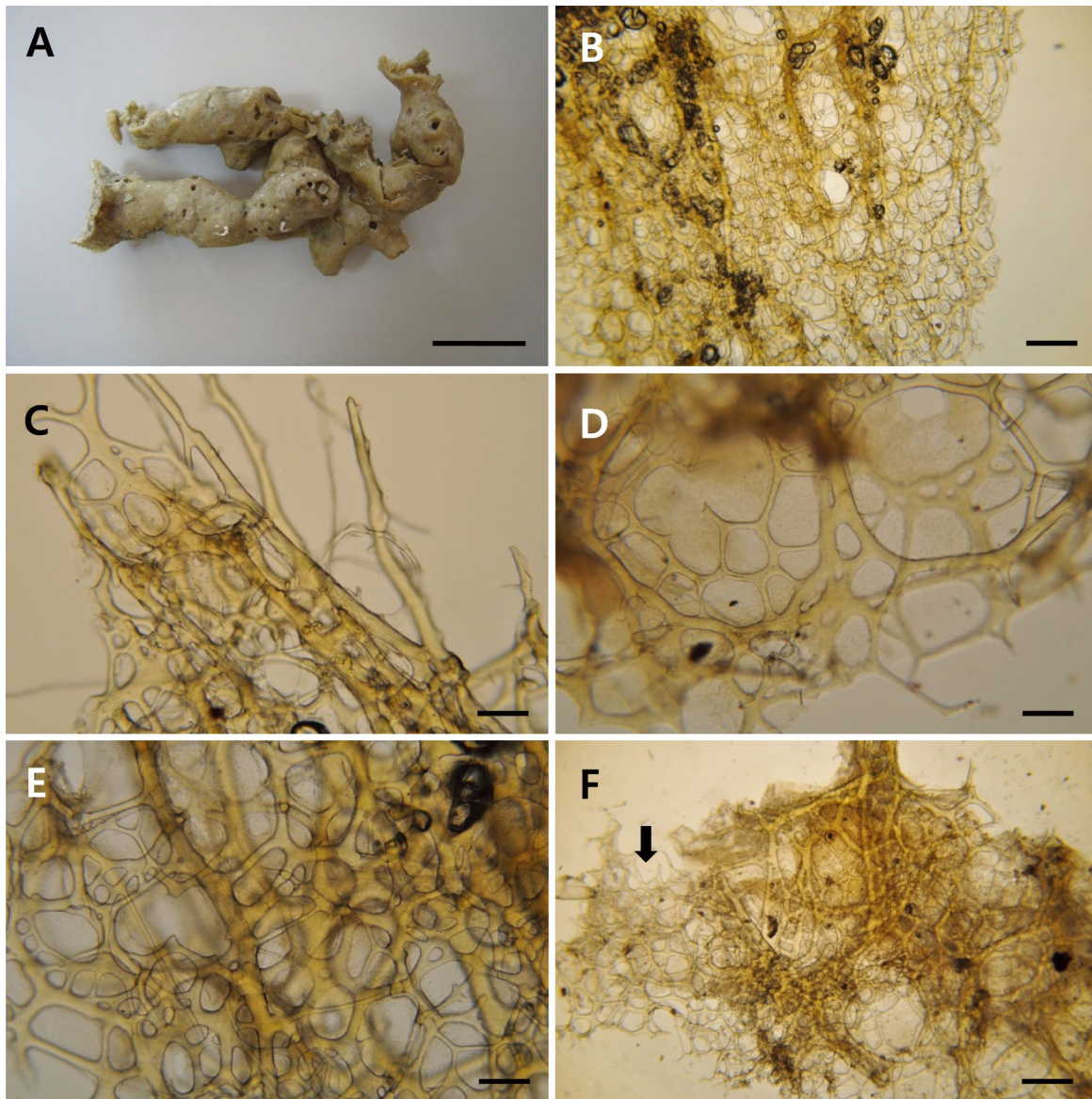
**Description.** Irregular small mass with tube-like branch repent form, size up to 6.5 × 4 cm. Surface covered with thin membrane, conules indistinct. Thin walled tube, 1-2 mm thick. Several vent holes, 2-5 mm in diameter, open at end of tube. Color in life yellowish beige. Texture very hard and incompressible. Sponge have a large quantity of collagen with fibres network.

**Skeleton:** The skeleton consists of reticulation of thin-walled. Meshed network of thick primary fibres, separated from secondary and tertiary fibres (Fig. 1C).



**Fig. 1.** *Luffariella tubula* n. sp. A, entire animal; B, closed surface; C, primary fibres separate from secondary and tertiary fibres; D, cored primary fibres near surface; E, F, choanosome skeletal structure. G, skeletal structure with collagen; H, thick branched primary fibres with secondary and tertiary fibres. Scale bars: A = 2 cm, B = 1 cm, C, D = 200  $\mu$ m, E-H = 100  $\mu$ m.





**Fig. 2.** *Luffariella koreana* n. sp. A, entire animal; B, skeletal structure; C, surface primary fibre; D, closed skeletal structure; E, primary fibres surrounded secondary and tertiary fibres; F, secondary and primary fibres separated with each other (arrow). Scale bars: A=3 cm, B=50  $\mu$ m C-E=100  $\mu$ m, F=50  $\mu$ m.

Primary fibres usually uncored from debris, but cored fibres appeared near surface membrane rarely. Primary fibres usually irregular shape and variable in diameter, but cored fibres, 150  $\mu$ m in diameter, near surface. Uncored primary fibres, 80-200  $\mu$ m in diameter, at choanosome (Fig. 1H). Two sizes of regular secondary fibres, 60-100  $\mu$ m and 40-60  $\mu$ m in diameter. Tertiary fibres, 10-15  $\mu$ m in diameter (Fig. 1C).

**Etymology.** This species is named after its tube-like shape.

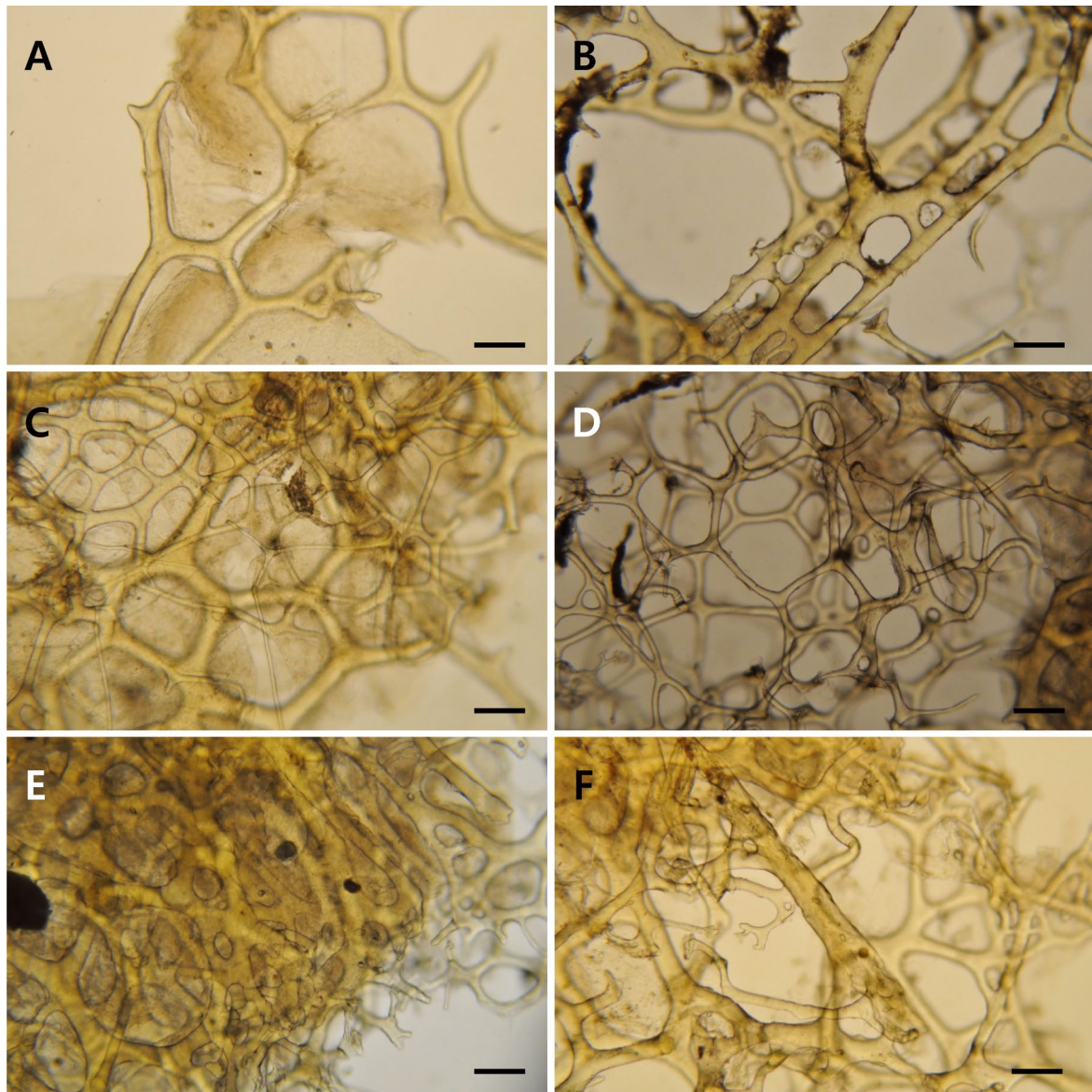
**Remarks.** This new species is very similar to the genus *Hyattella* in the skeletal structure of secondary fibres, but

differs in lacking cored primary fibres. Thickly branched primary and tertiary fibres appeared in choanosome.

#### *Luffariella koreana* n. sp. (Figs. 2, 3)

**Type specimen.** Holotype (NIBRIV0000305502), Munseom, Seogwipo-si, Jeju-do, 5 Sep 2012, Eom TY, by scuba, depth 10 m, deposited in the NIBR.

**Description.** Irregular mass with three tube-like branch on sponge side. Size up to 12  $\times$  4.5 cm and branches, 1-2 cm in diameter. Surface covered with thin membrane. Surface conules indistinct. Several vents open over



**Fig. 3.** *Luffariella koreana* n. sp. A, surface membrane with secondary fibres; B, closed primary fibres; C, tertiary fibres; D, thin secondary fibres; E, base skeletal structure; F, cored primary fibres. Scale bars: A-F = 100  $\mu$ m.

**Table 1.** Comparison of New species of Genus *Luffariella*

Species	Growth form	Primary fibres ( $\mu$ m)	Secondary fibres ( $\mu$ m)	Tertiary fibres ( $\mu$ m)
<i>L. caliculata</i>	Cup-shaped	120-150 (no cored)	10-50	2-5
<i>L. cylindrical</i>	Erect cylindrical	60-80 (lightly cored)	20-30	4-7
<i>L. geometrica</i>	Cushion-shaped	175-210	110	16
<i>L. variabilis</i>	Massive, upright	200	67	10
<i>L. herdmani</i>	Flattened crust with digitiform processes	80 (cored many spicules)	80 16	
<i>L. tubula</i> n. sp.	Mass with tube branch	150 (lightly cored)	40-60 60-100	10-15
<i>L. koreana</i> n. sp.	Mass with tube branch	80-150 (no cored)	20-70	8-10



sponge surface. Color in life dirty gray. Texture firm and compressible.

**Skeleton:** Thin walled tube-like branches consist of dens fibres network with strong collagen. Primary fibres usually uncored, but small part of fibres lightly cored at surface. Near surface, primary fibres arrayed in groups of two or three fibres and connected by secondary fibres in a ladder-like (Fig. 3B). Primary fibres at surface, 80-350  $\mu\text{m}$  in diameter and 350  $\mu\text{m}$  in diameter at choanosome, irregularly arranged at base of sponge. Secondary fibres, 20-70  $\mu\text{m}$  in diameter. Large meshed regular network, 250-600  $\mu\text{m}$  wide, appeared near surface membrane (Fig. 3A). Primary and secondary fibres network separated from each other. Tertiary fibres, 8-10  $\mu\text{m}$  in diameter, branched out from secondary fibres at choanosome (Fig. 3C).

**Etymology.** This species is named after the type locality, Korea.

**Remarks.** This new species is very similar to *Luffariella cylindrica* Bergquist 1995 and *L. variabilis* Polajaeff 1884, partly in its arrangement of skeletal structure, but differs in sponge growth form. Growth form of this new species branches out laterally like repent form, but *L. cylindrica* and *L. variabilis* are erect form.

## DISCUSSION

Two new *Luffariella* species from Jejudo Island, Korea are mass in growth form with lacunae and tube-like branches. The thin walled tubes are very hard and firm because the skeletal fibres are mixed with large amounts of collagen.

Most of the surface has thin membrane with regular meshed secondary fibres. The small and large secondary fibres' mesh net and fine tertiary fibres are separated from thick branched primary fibres (Fig. 1C, Fig. 2F). Cored primary fibres appeared near surface rarely, similar to the genus *Hyattella*'s Figures have major differences from choanosomal uncored primary fibres. Tertiary fibres are uncommon.

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## REFERENCES

- Bergquist, P.R. 1980. A revision of the supraspecific classification of the orders Dictyoceratida, Dendroceratida and Verongida (class Demospongiae). *New Zealand Journal of Zoology* 7(4):443-503.
- Bergquist, P.R. 1995. Dictyoceratida, Dendroceratida and Verongida from the New Caledonia Lagoon (Porifera: Demospongiae). *Memoirs of the Queensland Museum* 38(1):1-51.
- Dendy, A. 1905. Report on the sponges collected by Professor Herdman, at Ceylon, in 1902. Pp. 57-246, pls I-XVI. In: W.A. Herdman (ed.), Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Mannar. 3 (Supplement 18). (Royal Society: London).
- Hooper, J.N.A. and R.W.M. Van Soest. 2002. *Systema Porifera: a guide to the classification of sponges*. Kluwer Academic/ Pleum Publisher Press, New York, pp. 1-1101.
- Kirkpatrick, R. 1990b. Description of sponges from Funafuti. *Annals and Magazine of Natural History* (7) 6(34):345-362.
- Lendenfeld, R. Von. 1889. A monograph of the horny sponges. (Trübner and Co.: London): 3-4, 1-936.
- Poléjaeff, N. 1884. Report on the Keratosa collected by H.M.S. 'Challenger' during the years 1873-1876. Report on the Scientific Results of the Voyage of H.M.S. 'Challenger', 1873-1876. *Zoology* 11:1-88.
- Thiele, J. 1899. Studien über pazifische Spongien. II. Ueber einige Spongien von Celebes. *Zoologica. Original-Abhandlungen aus dem Gesamtaebiete der Zoologie*. Stuttgart 24(2):1-33.

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