

A New Record of *Hydrodendron stechowi* (Hydrozoa: Leptothecata: Phylactothecidae) from Korea

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ABSTRACT

In 2020, during a survey of cnidarian fauna around Chuja-do locating in the northern part of Jeju-do, Korea, several hydroids were collected from the subtidal zone by SCUBA diving. Through taxonomic examination, one unrecorded species, *Hydrodendron stechowi* Hirohito, 1995, was found in Korea. It was newly added to the list of Korean hydrozoan fauna. This species was discovered for the first time since its first report as a new species in Japan. Their vivid orange-colored colonies were attached to the sponge on rocky substrate between depths of 15 and 20 m. Thus, a total of five species belonging to genus *Hydrodendron*, including the species reported in this study, have been reported in Korean waters so far.

Keywords: *Hydrodendron stechowi*, Phylactothecidae, Leptothecata, Hydrozoa, Korea

INTRODUCTION

The genus *Hydrodendron* belonging to the monotypic family Phylactothecidae was established by Hincks (1874) with type species *Hydrodendron gorgonoide* (G.O. Sars, 1874) originally described as *Halecium gorgonoide*. This genus had belonged to family Haleciidae together with *Halecium*. It could be distinguished from *Halecium* by having nematothecae. Originally, haleciid species having nematophore belonged to *Hydrodendron*, *Ophiodissa* Stechow, 1919 and *Phylactotheca* Stechow, 1913, respectively. Later, two genera were synonymized with *Hydrodendron*. In 1921, Stechow suggested six subfamilies (Campanopsinae, Hydrantheinae, Haleciinae, Hemithecinae, Sacculininae, and Phylactothecinae) under Haleciidae with a new family Phylactothecidae for Phylactothecinae (nematophore-bearing hydroids). Molecular phylogenetic studies suggested that the position of nematophore-bearing haleciid species was problematic (Moura et al., 2008; Leclère et al., 2009; Maronna et al., 2016). The phylogenetic position of *Hydrodendron* was not placed within Haleciidae, but was replaced to an alternative position related to Plumularioidea based on 16S, 18S, and 28S rRNA analysis. Consequently, Choong et al. (2018) have proposed that it is reasonable to move *Hydrodendron* into the family Phylactothecidae suggested by Stechow (1921) for nematophore-bearing hydroids.

Up to now, 23 valid species have been accepted in the genus *Hydrodendron* (WoRMS Editorial Board, 2021). These species have been found in all oceans (Medel et al., 1998). In Korea, four species, *H. mirabile* (Hincks, 1866), *H. gardineri* (Jarvis, 1922), *H. leloupi* Hirohito, 1983, and *H. tottoni* Rees & Vervoort, 1987, have been reported from the Yellow Sea, South Sea, and Jeju-do (Park, 2010). Genus *Hydrodendron* was traditionally considered as Haleciidae (Park, 1990, 1991, 1992, 2007, 2010). Among four species, only *H. tottoni* has sessile hydrothecae and gonothecae aggregated into coppinia, while others have pedicellate hydrothecae and gonothecae not aggregated into coppinia (Park, 2010). These species attached on hard substrata or algae within 30 m depth.

In this study, a taxonomic examination was conducted for hydroids from Chuja-do located in the northern part of Jeju-do. One unrecorded species, *Hydrodendron stechowi* Hirohito, 1995, has been newly added to the hydrozoan fauna of Korea. Taxonomic position of the genus *Hydrodendron* was also relocated into the family Phylactothecidae.

MATERIALS AND METHODS

Hydroid colonies were collected with a dive knife from the Jikgu-do, a small rocky island belonging to Chuja-do in

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northern area of Jeju-do, between depths of 15 and 20 m, by SCUBA diving in 2020. After collection, photos of living colonies were taken with a digital camera (Tough TG-5; Olympus Corporation, Tokyo, Japan) to record the color of the colonies before fixation. After that, they were transferred into a plastic container with seawater, and then anesthetized with menthol powder for 4–6 h. Anesthetized specimens were preserved in 99% alcohol (v/v) for further examination.

For identification, the morphological characteristics, such as the colonial branching form, shapes of hydrothecae and nematothecae, the size of each part of stem, cladium, node, internode, hydranth, and nematophore was examined under either a stereomicroscope (SteREO Discovery. V8; Carl Zeiss, Jena, Germany) or a light microscope (Axio Lab. A1; Carl Zeiss). During the examination using with microscopes, all images were captured using CMOS sensor microscope digital cameras (KCS-2000SS; Korea Lab Tech, Seongnam, Korea). For obtaining scanning electron microscope (SEM) images of hydrothecae and nematothecae, the air-dried hydrocladia were coated with gold, and then were taken with Mini-SEM (SNE 3200M; SEC Co. Ltd., Suwon, Korea) at the Marine Bryozoans Resources Bank of Korea (MBRBK), Woosuk University, Jincheon.

The specimens were deposited in the National Marine Biodiversity Institute of Korea, Seocheon (MABIK CN00 081032), and Cnidaria Bioresources Bank of Korea, Woosuk University, Jincheon (CBB20CnHyE077).

SYSTEMATIC ACCOUNTS

Phylum Cnidaria Hatschek, 1888
 Class Hydrozoa Owen, 1843
 Subclass Hydroidolina Collins, 2000
 Order Leptothecata Cornelius, 1992
¹*Family Phylactothecidae Stechow, 1921

Diagnosis. Colony erect and stolonial, and arising from hydrorhiza. Stem and branch polysiphonic or monosiphonic. Cladium divided into regular internodes. Hydrotheca sessile or pedicellate, shallow to cup shaped, with delicate diaphragm. Hydranth usually large, not fully retracted into hydrotheca, with or without an intertentacular web. Nematophore present, with nematotheca at various levels of development. Gonotheca solitary or aggregated into coppinia.

Genus *Hydrodendron* Hincks, 1874

Key to species of the genus *Hydrodendron* from Korea

- 1. Hydrotheca pedicellate..... 2
- Hydrotheca sessile..... 4
- 2. Hydrotheca basin-shaped *H. mirabile*
- Hydrotheca funnel-shaped 3
- 3. Nematotheca sessile, goblet-shaped..... *H. gardineri*
- Nematotheca bell-shaped *H. leloupi*
- 4. Nematophore club- shaped..... *H. stechowi*
- Nematophore not-club shaped *H. tottoni*

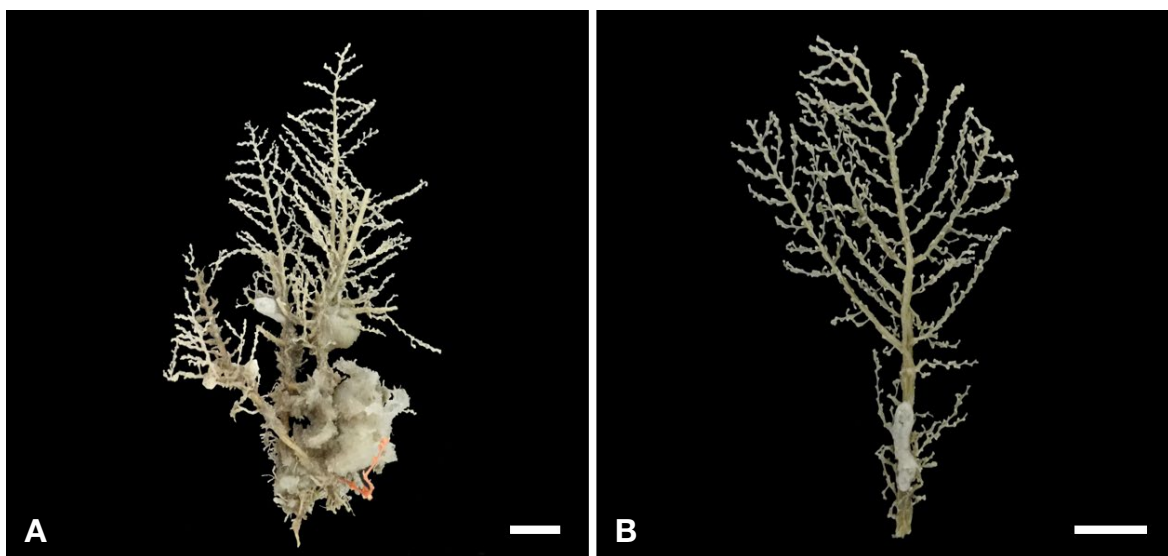


Fig. 1. Colonies of *Hydrodendron stechowi*. A, Colonies connected by stolon; B, Individual colony without hydrorhiza. Scale bars: A, B = 1 cm.

Korean name: ¹*나무무늬히드라과 (신칭)

¹Hydrodendron stechowi* Hirohito, 1995 (Figs. 1–3)**

Hydrodendron stechowi Hirohito, 1995: 32–34, fig. 9a–c, Pl. 2, fig. C.

Material examined. Korea: 5 colonies, Jeju-do, Jeju-si, Chuja-myeon, Jikgudo, 33°58'57" N, 126°15'18" E, 30 Apr 2020, Hwang SJ, Jeong SC, 15–20 m depth by SCUBA diving.

Description. Colony pinnate with erect, straight main stem, branched in complete one plane, formed by up to second levels of branching, feather like in appearance (Fig. 1). Colony 2.0–6.7 cm in height, 0.8–3.4 cm in width. Hydrorhiza

stolonial, connecting colonies, fascicled. Stem stiff, fascicled at base with diameter 0.6–1.9 mm, sometimes irregularly branched and strongly polysiphonic by several accessory tubules, running parallel to stem (Fig. 2A), only monosiphonic at distal tip (Fig. 2B). Stem and branches internodes indistinct. Cladia usually monosiphonic, regularly alternate at an angle of 45–60° to main stem, up to 16 mm long, 0.26–0.30 mm width at base (Fig. 2C). Cladial internodes distinct, separated by approximately transversal nodes, slightly swollen above nodes, 0.60–0.84 mm long, 0.20–0.28 mm wide. Hydrothecae alternated, sessile, very shallow (saucer shaped), widening to marginal rim not

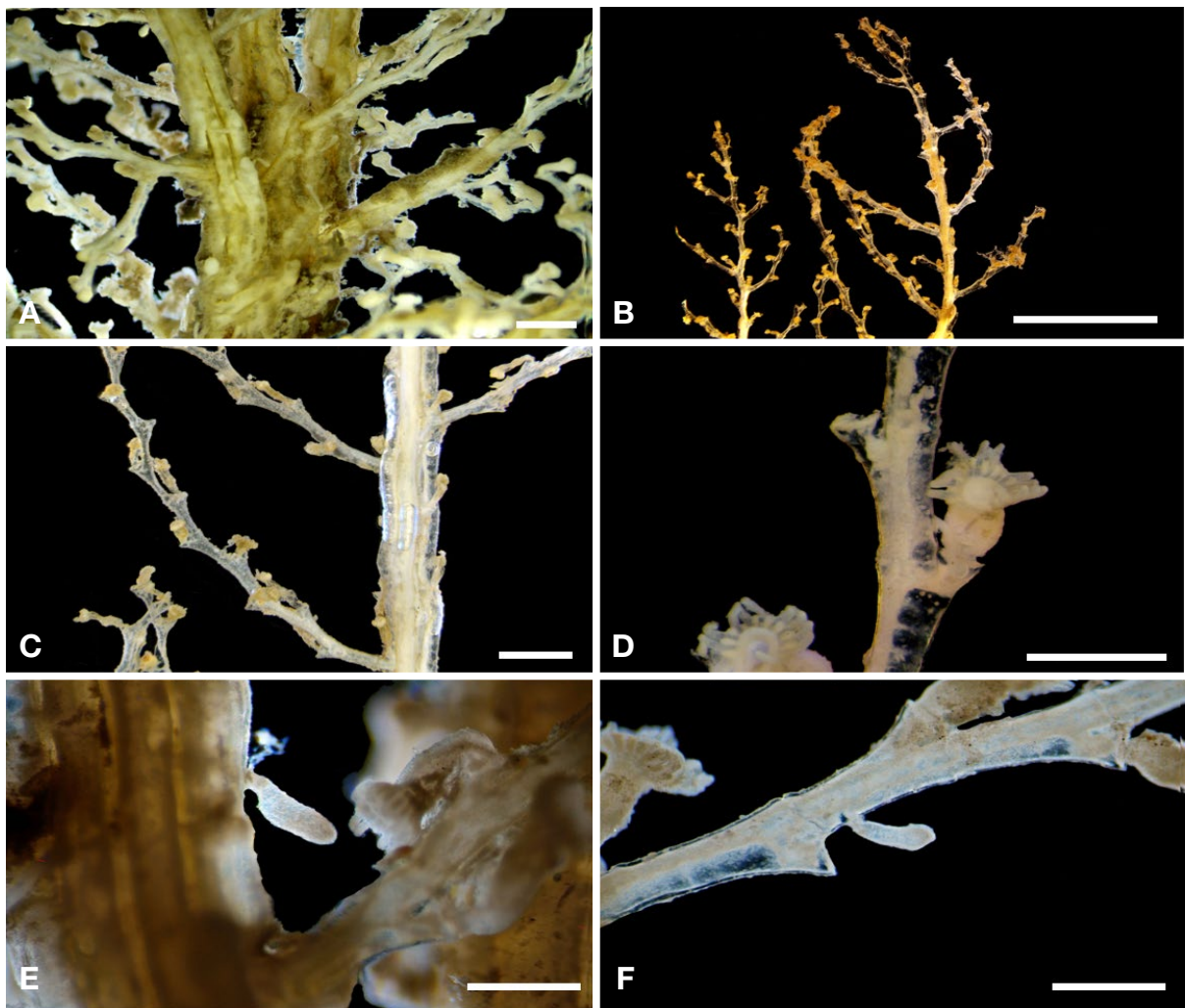


Fig. 2. Stereo microscope images of *Hydrodendron stechowi*. A, Polysiphonic basal part of stem; B, Monosiphonic distal tip of stem; C, Pinnated cladia with distinct internodes; D, Expanded hydranths with intertentacular web; E, Nematophore on stem; F, Club-shaped nematophore on internode. Scale bars: A, C, D=1 mm, B=5 mm, E, F=0.5 mm.

Korean name: ¹*낮은껍나무무늬히드라 (신칭)

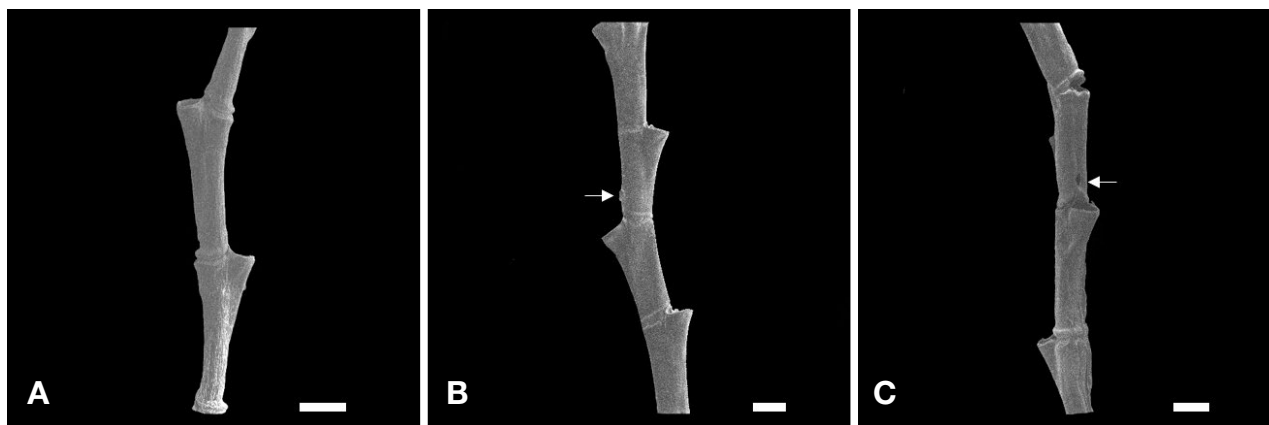


Fig. 3. Scanning electron microscope images of *Hydrodendron stechowi*. A, Internodes with hydrothecae; B, Nematotheca (arrowhead) on basal part of internode; C, Reduced nematotheca with a hole (arrow). Scale bars: A–C=200 μ m.

everted, oblique to axis of internode (Fig. 3A). One hydrotheca per each internode terminating above hydrotheca. Walls of hydrothecae straight, adcauline side very close to internode. Hydrothecae length 0.03–0.06 mm, diameter at base 0.15–0.18 mm, and 0.19–0.26 mm at rim. Hydranths (polyps) large, cylindrical, never retracted into hydrothecae, with often distinct bulges at about 1/3–1/2 from base (Fig. 2D). Hydranth columns length 0.44–0.54 mm, diameter at base 0.11–0.16 mm, 0.22–0.32 mm at bulge, and 0.17–0.31 mm at under tentacles whorl. Tentacles arranged in one whorl around hypostome, 16–18 in number, tapered to tips when fully extended, but stout, with rounded tips, when partly extended. Intertentacular web between two adjacent tentacles well developed. Nematothecae small, very shallow saucer-shaped, or often invisible as destruction, on basal part of internodes on side opposite hydrothecae, 0.01 mm long, 0.06 mm wide at rim (Fig. 3B, C). Nematophore small, club-shaped, slightly swollen at distal end, placed on stem and cladia, 0.38–0.47 mm long, 0.13–0.15 mm wide at widest part (Fig. 2E, F). Gonothecae not found.

Color. Whole colonies are vivid orange in alive, but become colorless in alcohol.

Habitat. Colonies attached on rocks or other sessile invertebrates, such as sponges, in shallow water between 15 m and 20 m depth.

Distribution. North Pacific Ocean: Korea (Jeju-do), Japan (Sagami Bay).

Remarks. This species was described by Hirohito (1995) from Sagami Bay in Japan. It has not been reported after that. Our specimens are quite similar to Hirohito's original description about colonial branching in one plane, polysiphonic stem and monosiphonic cladia, sessile and saucer-shaped hydrothecae, and club-shaped nematophores, although gonothecae were not observed. This species is similar to *Hydrodendron*

tottoni Rees & Vervoort, 1987 from New Zealand. However, nematothecae of *H. tottoni* are on proximal part of each internode and also irregularly scattered on scapus (Totton, 1930; Ralph, 1958; Rees and Vervoort, 1987; Park, 2010). This species also resembles *H. arboreum* (Allman, 1888). However, they are different on that *H. arboreum* nematotheca is goblet- or bell-shaped with much longer internode and node much more inclined to the axis of internode (Allman, 1888; Watson, 2008).

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CONFLICTS OF INTEREST

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

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