

## A New Record of *Dendrophyllia compressa* (Anthozoa: Hexacorallia: Scleractinia: Dendrophylliidae) from Korea

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### ABSTRACT

*Dendrophyllia compressa* Ogawa and Takahashi, 1995 is newly reported from Korea. The specimen was collected off Seogwipo, Jeju-do, Korea in 1969. It is described herein based on the morphological characters of the skeletal structures. *Dendrophyllia compressa* is characterized by its small and bushy growth form with branches, vertical growth direction, small calicular diameter, compressed calice, Pourtalès Plan with vertical septal inner edges, flat and spongy columella, exerted septal upper margins, and epitheca. *Dendrophyllia compressa* has been synonymized with *Cladopsammia eguchii* (Wells, 1982). However, the former species differs from the latter species in its growth form, growth direction, colony size, corallite size, and corallite shape.

**Keywords:** Anthozoa, Scleractinia, Dendrophylliidae, *Dendrophyllia*, Korea

### INTRODUCTION

The family Dendrophylliidae Gray, 1847 comprises 167 species in 21 genera (Cairns, 2001; Roberts et al., 2009; World Register of Marine Species, 2015). Among these species, 29 species in the genus *Dendrophyllia* have been reported worldwide (Roberts et al., 2009; World Register of Marine Species, 2015). Six species have been recorded from the Jeju-do, South Sea, and East Sea in Korea (Song, 1982, 1988, 1991, 2004; Song and Lee, 1998): *Dendrophyllia arbuscula* van der Horst, 1922, *D. boschmai* van der Horst, 1926, *D. cyathoheloides* Eguchi, 1965, *D. cribrosa* Milne-Edwards and Haime, 1851, *D. florulenta* Alcock, 1902, and *D. ijimai* Yabe and Eguchi, 1934. The genus *Dendrophyllia* is characterized by its treelike growth forms with branches, absence of zooxanthellae, and presence of Pourtalès Plan (Cairns, 2001). The present paper reports a new record of *D. compressa* from Korea. *Dendrophyllia compressa* Ogawa and Takahashi, 1995 has been synonymized with *Cladopsammia eguchii* (Wells, 1982) by Wells (1982, 1983) and Cairns (1991, 1994). However, this paper indicates that the former species differs from the latter species in its growth form, growth direction, colony size, and corallite size as Ogawa and Takahashi (1995), and Tachikawa (2005) des-

cribed.

The specimen was collected from the subtidal zone off Seogwipo, Jeju-do, Korea in 1969. It was dissolved in sodium hypochlorite solution diluted with distilled water for 24 hours to remove all the soft tissues, washed in distilled water, and dried for the examination of the skeletal structures. The external growth forms and shapes of the coralla were photographed with a digital camera (D7000; Nikon Corp., Tokyo, Japan). The internal skeletal structures of the corallites were examined under a stereomicroscope (Leica S8APO; Leica Microsystems, Wetzlar, Germany), photographed with a mounted camera (Leica Microsystems), and measured with an image analyzer (LAS ver. 3.6; Leica Microsystems). Multi-focused photographs were taken and combined by an image editing program (HeliconFocus 5.3 Pro; Helicon Soft Ltd., Kharkov, Ukraine) to obtain clear images of the skeletal structures. The classification of scleractinians and the morphological terms in the present study are referenced from Wells (1956), Cairns (1994, 2001), and Cairns and Kitahara (2012). The examined specimen is deposited at the Ewha Womans University Natural History Museum, Korea. The following abbreviations are used: C, costal cycle; GCD, greater calicular diameter; LCD, lesser calicular diameter; GCD : LCD, ratio of greater calicular

diameter to lesser calicular diameter; S, septal cycle.

## SYSTEMATIC ACCOUNTS

Order Scleractinia Bourne, 1900

Family Dendrophylliidae Gray, 1847

**Diagnosis.** Synapticulotheca developed. Septa composed of one fan system. Pourtalès Plan present.

Genus *Dendrophyllia* de Blainville, 1830

**Diagnosis.** Colonial, attached. Extratentacular budding. Growth form monopodial and arborescent or bushy or sympodial. Costae usually well defined with small granules. Pourtalès Plan developed. Pali present or absent. Columella spongy or papillose.

<sup>1</sup>\**Dendrophyllia compressa* Ogawa and Takahashi, 1995 (Table 1, Fig. 1)

*Dendrophyllia arbuscula* var. *compressa* Eguchi, 1973: 84, Pl. 1, fig. 3.

*Dendrophyllia compressa* Ogawa and Takahashi, 1995: 20, Pl. 4, figs. 1–3, Pl. 7, figs. 6, 7; 2000: 13, 15.

**Material examined.** Korea: Jeju-do: 1 ind., Seogwipo-si, off Seogwipo, 14 Dec 1969, Rho BJ (EWZS 4113).

**Description.** Corallum colonial, attached. Growth form

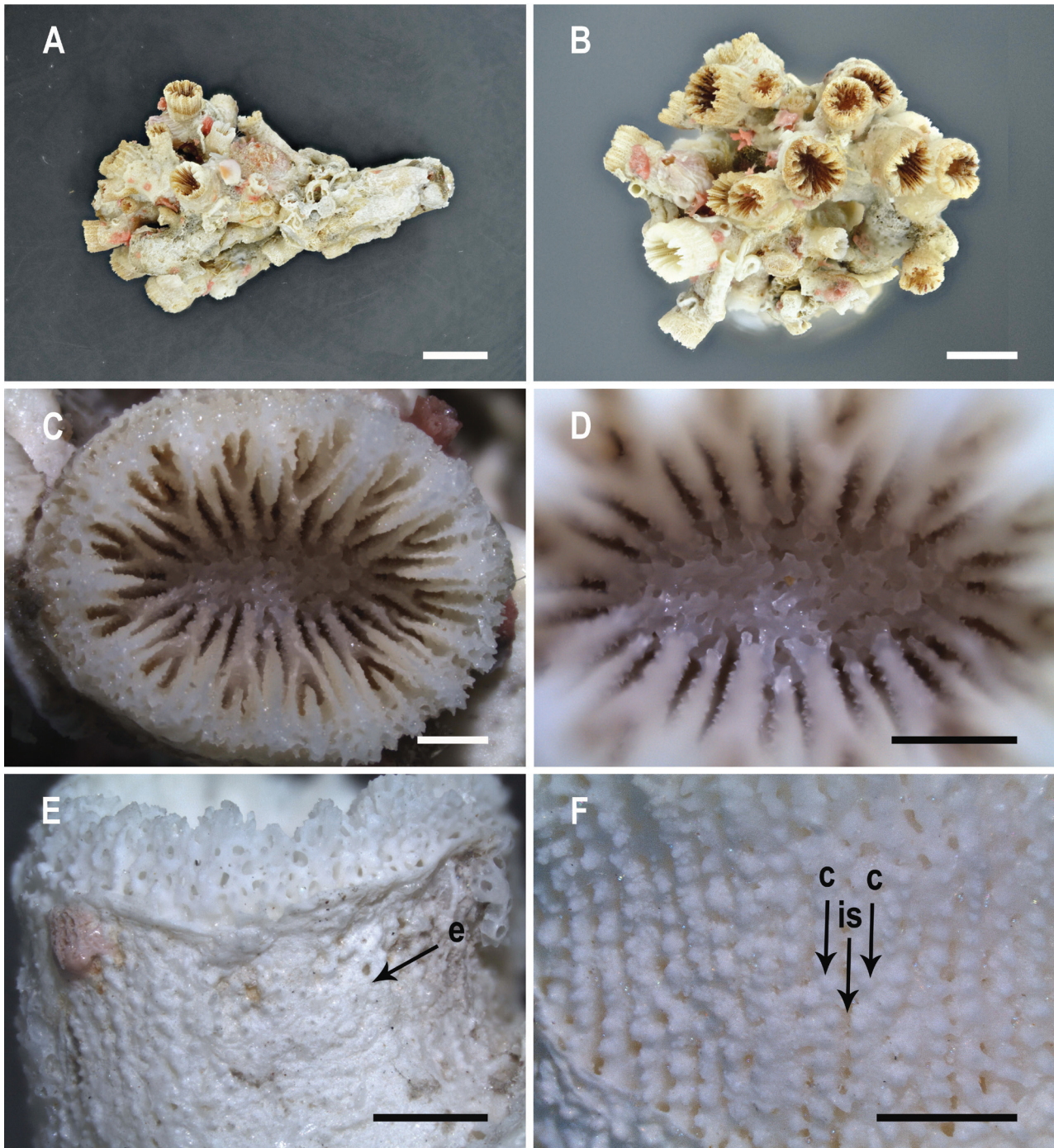
bushy, corallites loosely united without main trunk, 30–35 mm in width, 60 mm in height. Growth direction vertical. Extratentacular budding. Branching once or twice irregularly. Corallites (fully grown) cylindrical with  $3.79\text{--}5.70 \times 4.88\text{--}6.19$  (minimum  $1.5 \times 1.5$ ) mm in calicular diameter (GCD : LCD 1.04–1.47), 8–45 mm in height. Axial corallites  $3.46\text{--}4.92 \times 4.95\text{--}6.40$  mm in calicular diameter (GCD : LCD 1.01–1.52), 15–45 mm in height. Lateral corallites  $2.95\text{--}4.04 \times 3.29\text{--}4.98$  mm in calicular diameter (GCD : LCD 1.04–1.29), 3–8 mm in height. Calice compressed, elliptical or circular in fully grown corallites. Columella elliptical or circular, fully covered, flat, spongy or fascicular or papillose,  $0.82\text{--}1.58 \times 1.68\text{--}2.75$  (minimum  $0.35 \times 0.52$ ) mm in diameter. Fossa 3–5 (minimum 1) mm in depth. Theca synapticulotheca, defined with costae, intercostal striae. Costae granulated, 0.04–0.44 mm in width.  $C1 > C2 > C3$  in width. Costal granules 0.02–0.24 mm in diameter. Intercostal striae indistinctively porous, 0.03–0.25 mm in width. Epitheca present in some corallites. Pourtalès Plan well developed. Septa hexamerously arranged with 46–64 (minimum 20) in 4–5 cycles. In 5 cycles,  $S1 \geq \text{outer } S5 \geq S2 > \text{inner } S4 > S3 > \text{inner } S5 > \text{outer } S4$ . Pairs of S5 united before common outer S4 and extended to inner S4. In 4 cycles,  $S1 \geq \text{outer } S4 \geq S2 > \text{inner } S4 > S3$ . Pairs of S4 united before common S3. S1 fused with its neighboring outer S4 or outer S5, S2 fused with its neighboring inner S4 or outer S5, S3 fused with its neighboring inner S5 or none at outer thecal margins. S1, S2, outer S5 or outer S4 fused with columella. Septal upper margins of S1, S2, S3 exerted, 0.29–0.66 mm above theca.

**Table 1.** Morphological characters of *Dendrophyllia compressa*

Characters (mm)			Mean	SD	n
Corallites	Calicular diameter	LCD	4.66	0.58	10
		GCD	5.64	0.43	10
	GCD : LCD	1.22	0.14	10	
	Height	17.40	10.10	10	
Axial corallites	Calicular diameter	LCD	4.49	0.50	7
		GCD	5.54	0.52	7
	GCD : LCD	1.25	0.17	7	
	Height	22.86	10.29	7	
Lateral corallites	Calicular diameter	LCD	3.57	0.40	7
		GCD	3.96	0.62	7
	GCD : LCD	1.11	0.08	7	
	Height	5.57	1.81	7	
Columella	Diameter	LCD	1.05	0.24	10
		GCD	2.06	0.37	10
Fossa depth			3.80	0.79	10
Costae width			0.17	0.07	120
Intercostal striae width			0.09	0.03	140
No. of septa			52.20	5.05	10

LCD, lesser calicular diameter; GCD, greater calicular diameter; GCD : LCD, ratio of greater calicular diameter to lesser calicular diameter; SD, standard deviation; n, sample size.

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**Fig. 1.** *Dendrophyllia compressa*. A, Growth form, bushy; B, Corallites, compressed cylinders; C, Septal arrangement, Pourtalès Plan with hexamerous 5 cycles; D, Columella, full, flat, spongy; E, Epitheca (e); F, Costae (c) granulated, intercostal striae (is) porous. Scale bars: A, B=1 cm, C-F=1 mm.

Inner edges of S1, S2 entire, vertical. Septal faces covered with small spines.

**Ecology.** Barnacles, tube worms, hydroids, oysters and bryozoans live in ectosymbiosis on the corallum of the species.

**Remarks.** The examined specimen in the present study agrees well with *Dendrophyllia compressa* described by Ogawa and Takahashi (1995) in Japan. *Dendrophyllia compressa* has been synonymized with *Cladopsammia eguchii*

**Table 2.** Comparison of *Dendrophyllia compressa*, *Cladopsammia eguchii*, and *Dendrophyllia minima* morphological characters

Morphological characters (average, mm)	<i>D. compressa</i>		<i>C. eguchii</i>		<i>D. minima</i>
	Present study	Ogawa and Takahashi (1995)	Ogawa et al. (1998), Tachikawa (2005), Choi and Song (2014)	Wells (1982, 1983), Cairns (1991, 1994)	Ogawa and Takahashi (2000)
Growth form	Small bushy of corallites united without main trunk, vertical growth direction	Quasi-solitary or bushy, main trunk obscure	Solitary or quasi-colonial; phaceloid, horizontal growth direction	Solitary or low clusters of short corallites; phaceloid	Small bushy
Branching	Present, 1 or 2 irregularly	Present, branches bifurcating or irregularly budding	Rare	Rare; not uncommon	Present, branching sparsely
Colony size: width/height	30–35/60	10–120/18–61	–/9.6–32.7; 15–90/50–65	25/–	33/30
Corallite shape/calice	Cylindrical/circular or elliptical	–	Subturbinate/circular (immature), elliptical or compressed (mature)	Cylindrical/circular (small), elongate or compressed (large)	–
Calicular diameter: LCD×GCD	1.50–5.70×1.50–6.40 (4.66×5.64)	3.6–6.6×4.1–8.9 (5.0×6.2)	6.2–8.9×9.3–15.0 (7.0×10.1); 2.5–10.0×3.0–16.0 (10.0×15.0)	Min. 3–4 (immature), 4.5–5.5 (small), max. 5.5×13; 6.5×13.5; up to 9×13	3.7–4.2×4.0–5.7 (4.1×4.8)
Corallite height	3–45 (17.40)	6.2–50.0 (19.0)	9.6–32.7; up to 28; 6–40 (31)	–	7.9–13.0 (10.9)
GCD : LCD	1.00–1.52 (1.22)	– (1.24)	1.45–1.68, max. 2.06; 1.32–2.01; 1.2–1.6 (1.5)	Max. 2.08	– (1.17)
Fossa depth	1–5 (3.8)	2.0–5.0 (3.4)	4.5–7.0 (5.8); 1.5–9.0 (9.0)	Deep or moderate	3.0–4.0 (3.6)
Septal arrangement/No. of septa	Pourtalès Plan, hexamerous, 3–5 (5) cycles/20–64 (52.2)	Pourtalès Plan hexamerous, 4–5 cycles/–	Pourtalès Plan hexamerous or heptamerous, 4–6 (5) cycles/max. 104; 33–96 (92)	Weak Pourtalès Plan, hexamerous 4–5 cycles/36–80; max. 96	Pourtalès Plan, hexamerous, complete 4 cycles
Costae width	0.04–0.44 (0.17)	–	0.12–0.60 (0.29)	0.35	<0.02
Epitheca	Present	–	Present	Present	Present
Color in living	–	Coenosarc orange, polyps transparent	Coenosarc orange; reddish pink	Polyps vermilion to pinkish vermilion (Galápagos), yellow (Bay of Panama), pinkish orange or orange (Hawaii), orange brown or reddish (Japan)	Coenecyme orange (basal part), yellow (distal part), tentacles transparent
Budding	Extratentacular	Extra-, intra-tentacular	Extratentacular	Extratentacular	–

LCD, lesser calicular diameter; GCD, greater calicular diameter; GCD : LCD, ratio of greater calicular diameter to lesser calicular diameter; – (dash), not available.

(previously *Balanophyllia eguchii*) by Wells (1982, 1983) and Cairns (1991, 1994). There are some similarities between the two species, namely, the bushy growth form, budding from corallite edges, compressed calice, flat spongy columella, septal arrangement, and presence of epitheca. In particular, the fully grown corallites of the specimen examined in the present study are more closely similar to

large fully grown corallites than to equivalently small-sized and immature corallites of *C. eguchii* in the well-defined Pourtalès Plan, and vertical inner edges of S1 and S2. Nonetheless, the specimen examined in this study is distinguished from *C. eguchii* by its bushy growth form with branches, vertical growth direction, smaller colony size, smaller calicular diameter, and cylindrical corallite shape as Ogawa and

Takahashi (1995), and Tachikawa (2005) pointed out in the description of *D. compressa* (Table 2).

*Dendrophyllia compressa* Ogawa and Takahashi, 1995 is similar to *D. minima* Ogawa and Takahashi, 2000 in its bushy growth form, small calicular diameter, presence of Pourtalès Plan, and presence of epitheca. However, the former species differs from the latter species with regard to the larger calicular diameter, more numerous septa of hexamerous 5 cycles, and wider costae (Ogawa and Takahashi, 2000) (Table 2).

On the other hand, Eguchi first reported this species as *D. arbuscula* var. *compressa* Eguchi and Sasaki, 1973 (Eguchi, 1973). Although Ogawa and Takahashi subsequently elevated *D. arbuscula* var. *compressa* to *D. compressa*, they attributed the authorship of the species to “Eguchi and Sasaki, 1973” (Ogawa and Takahashi, 1995). However, as suggested by Tachikawa (2005), the authorship of *D. compressa* should be “Ogawa and Takahashi, 1995” on the basis of Article 45.5.1 in International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 2015)<sup>1\*</sup>. **Distribution.** Pacific Ocean: Korea (Jeju-do); Japan (Southern Honshu).

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<sup>1\*</sup>The Article 45.5.1 of the International Code of Zoological Nomenclature states, “A name that has infrasubspecific rank cannot be made available from its original publication by any subsequent action (such as elevation in rank) except by a ruling of the Commission.... The subsequent author for the subsequent action thereby establishes a new name with its own authorship and date.”

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