

New Records of Endocoelanthearia and Nynantheae (Anthozoa: Zoantharia: Actiniaria) from Korea

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ABSTRACT

Actinarians were collected from the rocks and sand bed of Jejudo Island, Ulleungdo Island, and Wangdolcho in Korean waters from 2004 to 2009. They were classified as two species of two families belonging to the suborders Endocoelanthearia and Nynantheae. Especially, suborder Endocoelanthearia, with distinct development of mesenteries, was firstly added to Korean athenarian fauna with the species, *Halcurias carlgreni* McMurrich, 1901. *Calliactis polypus* (Forskål, 1775) showing the commensalism with hermit crab, was easily distinguished from *C. japonica* by external features and the composition of cnidae. These two species were described in detail with tables and figures.

Keywords: taxonomy, Anthozoa, Actiniaria, Halcuriidae, Homathiidae

INTRODUCTION

The order Actiniaria was recently redivided into four suborders, Endocoelanthearia, Nynantheae, Protantheae, Ptychodactylae (Fautin, 2005). Only 27 species of Nynantheae with three infraorders have been reported in the Korean waters so far (Song, 2004). Among the species, 23 and 4 species are belonging to infraorder Thenaria and Athenaria, respectively. The infraorder Thenaria which is characterized by a well developed flat pedal disc are divided into three superfamilies, Acontiaria, Endomyaria, and Mesomyaria. Actiniaria belonging to suborder Endocoelanthearia has the distinct arrangement of mesenteries from a regular form (Manuel, 1988), which develop in endocoels, while mesenteries of species in the other three suborders develop in exocoels.

In this paper, each species in the suborder Endocoelanthearia and in the superfamily Acontiaria of suborder Nynantheae is newly added. Consequently, Korean actinarians become one species in the suborder Endocoelanthearia and 28 species in the suborder Nynantheae (Song, 1984, 1992, 2003, 2004; Song and Lee, 1998; Song and Cha, 2001, 2002, 2004).

MATERIALS AND METHODS

All specimens were collected from the subtidal zones in the southern coast of Jejudo Island, Ulleungdo Island, and

Wangdolcho of East Sea by SCUBA from 2004 to 2009. The living actinarians were photographed using a 5060-WZ digital camera (Olympus) equipped an Underwater Patima 7070 Housing. The collected specimens were photographed by G7 digital camera (Canon) prior to being anesthetized with menthol for 4-6 hours, and then fixed in 4-5% (v/v) neutral formalin with seawater.

For the identification, each specimen was examined for external features such as the size of each part of individuals, number of tentacles, and coloration under a Semi SV-6 stereomicroscope (Zeiss).

Preserved specimens were examined based on the morphological characters ascertained microscopically and histologically. The cnidae were examined by squashing a bit of tissue in a drop of phenol-glycerol solution and measuring with an ocular micrometer at a magnification of 1,000 using light microscopes (Olympus BH-2 and Zeiss Axioscope 2).

Anatomical studies were conducted by routine histological procedure with paraffin embedded tissue slices. They were observed under a Semi SV-11 stereomicroscope (Zeiss) and images were acquired by a 5060-WZ digital camera (Olympus) attached to the stereomicroscope.

SYSTEMATIC ACCOUNTS

Phylum Cnidaria Hatschek, 1888

Class Anthozoa Ehrenberg, 1834

Subclass Zoantharia de Blainville, 1830

Order Actiniaria Hertwig, 1882

¹*Suborder Endocoelanthearia Carlgren, 1928

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Actiniaria with peculiar development of mesenteries different from normal type. After first 6 pairs of mesenteries developed, following pairs arranged in lateral endocoelae. Mesenteries divisible into macro- and microcnemes or not. Well developed pedal disc but without basilar muscles. Margin tentaculate and column without verrucae. Tentacles variable in number. No sphincter. Longitudinal muscles of tentacles and radial muscles of oral disc meso-ectodermal. Siphonoglyph one or two.

¹*Family Halcuriidae Carlgren, 1918

Body elongated not lobed. Column with or without nematocyst batteries. Tentacles rather few, up to 70 in more than two cycles, and without basal swellings on their aboral side. One siphonoglyph. Mesenteries divisible into macro- and microcnemes, 6 or 10 pairs of macrocnemes. Some of microcnemes perfect. Retractors of macrocnemes well developed and restricted. Macrocnemes fertile with filaments, but microcnemes sterile without filaments.

²*Genus *Halcurias* McMurrich, 1893

Body almost smooth, but often with nematocyst batteries. Distal margin of column not lobed. Margin tentaculate or with parapet. No sphincter. Tentacles up to 70 arranged in cycles. Typical arrangement of mesenterial pairs in 4 cycles, 10(6+4)+8+16. Macrocnemes 10 pairs, fertile, filamented and with strongly restricted, reniform retractors. Microcnemes only in upper part of body, some of them perfect. Parietobasilar muscles rather well developed to fairly weak. Dioecious.

³**Halcurias carlgreni* McMurrich, 1901
(Figs. 1, 2, 5A-D, Tables 1, 2)

Halcurias carlgreni McMurrich, 1901, p. 159; Carlgren, 1940, p. 22; 1949, p. 19; Uchida, 2004, p. 9, pl. 1, figs. A, B; Uchida and Soyama, 2001, p. 17.

Materials examined. 1 ind., Jeju Island, Munseom (33° 13'40.82"N, 126° 34'05.55"E), 10 Apr. 2004 (S.J. Hwang), 35 m deep; 1 ind., Jeju Island, Munseom (33° 13'40.06"N, 126° 33'49.62"E), 9 May. 2004 (S.J. Hwang), 32 m deep; 1 ind., Ulleungdo Island, 22 Jun. 2005 (S.J. Hwang), 32 m deep; 1 ind. ♂, Wangdolcho (36° 43'874"N, 129° 44'169"E), 7 Jun. 2006 (J.I. Song, S.J. Hwang, E.J. Choi and H.W. Moon), 15-30 m deep; 3 inds., Wangdolcho (36° 41'345"N, 129° 45'075"E), 8 Jun. 2006 (J.I. Song, S.J. Hwang, E.J.

Choi and H.W. Moon), 15 m deep; 3 inds., Jeju Island, Munseom (33° 13'40.06"N, 126° 33'49.62"E), 3 Feb. 2009 (S.J. Hwang and E.J. Choi), 34-41 m deep.

Description. Body elongate and cylindrical. Column almost smooth, with longitudinal and horizontal striate, color points, not lobed in distal part. In preserved specimens small nematocyst batteries on distal part of column scarcely visible under stereomicroscope. Margin with parapet, consequently with fosse. Number of tentacles up to 68 in adult and 31-35 in young. Body size in Table 1. Inner tentacles longer than outer. Length of inner 3-9 mm and outer 2-7 mm in extended young, and 4-13 mm and 3-11.5 mm in extended adult respectively. In contracted state, height of body 5 mm and 12-15 mm, diameter of column 4 mm and 8-11 mm, diameter of oral disc 1.2 mm and 3-4 mm, diameter of pedal disc 3 mm and 4-6 mm in young and adult, respectively. In extended state, height of body 9-10.5 mm and 24.5-38 mm, diameter of column 4.5-7 mm and 8-16 mm, diameter of oral disc 1-2.5 mm and 3.5-5 mm, diameter of pedal disc 5-6 mm and 10-20 mm in young and adult, respectively.

Actinopharynx with one siphonoglyph, 16-17 distinctly well developed longitudinal ridges. Mesogloea of column comparing thicker than endoderm and ectoderm. Distal margin of column tentaculate. Longitudinal muscles not found in ectoderm of column. Tentacular muscles meso-ectodermal. Mesenteries arranged in 4 cycles (6+4+8+16), of which first 10 pairs perfect macrocnemes and later 24 pairs imperfect microcnemes. Macrocnemes with filaments and well developed restricted retractors extended along whole body, but microcnemes without filaments and retractors developed at only upper part of body. Gonads only developed in macrocnemes under lower actinopharynx. Retractor muscles restricted, and less reniform at upper part of actinopharynx, but clearly reniform from lower part of actinopharynx. Parietobasilar muscles developed at middle part of column, but basilar muscles absent. Dioecious. Spermatids observed in macrocnemes of specimens collected on June 2006. For asexual reproduction, pedal disc of specimens only sampled on June 2005 and 2006 appeared distinct swellings presumed pedal laceration.

Cnidom: spirocysts, basitrichs, microbasic p-mastigophores.

Distribution and size of cnidae are measured as follow (Table 2).

In color of living adult, column vivid orange with little dark orange spots in middle parts. Upper side of column pale orange and downward to pedal disc yellowish orange. Pedal disc and oral cone brilliant lemon yellow. Oral disc and tentacles with longitudinal orange stripes on both sides almost colorless. In living young, column almost pale orange with

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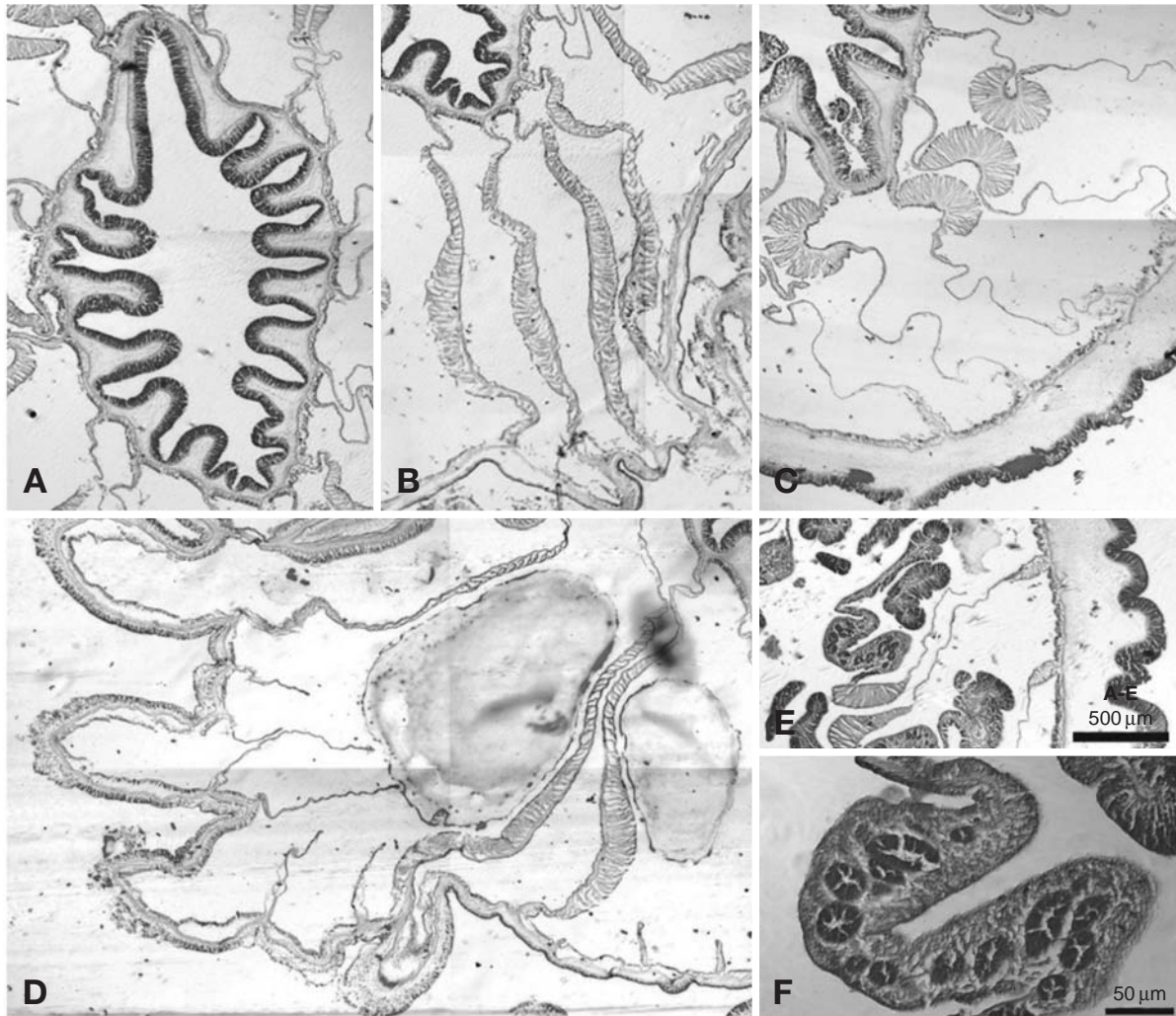


Fig. 1. Mesenteries of *Halcurias carlgreni*. A, siphonoglyph and pharyngeal ridges at lower actinopharynx; B, directive at upper actinopharynx; C, directive at lower actinopharynx; D, perfect, imperfect 2nd and 3rd mesenteries; E, mesenterial filaments with spermeries; F, developing spermeries.

little dark tone spots. Oral disc colorless or yellow. Pedal disc and tentacles colorless. Preserved specimens colorless.

Habitat. This species inhabits at horizontal rocky substrate between 15 and 41 m deep.

Remarks. It is a little different from *H. carlgreni* by Uchida (2004) in that the mesenteries of the third cycle are not perfect and lacking retractor muscles in our specimens. For spirocysts in Actiniaria, there is usually slender type, but stout type is numerously observed together with slender spirocysts in this species from our specimens (spirocysts II) and Uchida, 2004. In addition, other species of *Halcurias* also have stout spirocysts. The shape of stout spirocyst is fairly different with that of slender one. The diameter of both ends are somewhat thinner when they are compared with plump middle part, but almost same in diameter. How-

ever, thin capsules and coiling pattern of stout spirocyst are similar with those of slender one. *H. carlgreni* shows a variety of depth distribution from 15 m depth in Korean waters to greater depths in water of China Sea (55-137 m) and Japanese waters (30-250 m) (Carlgren, 1949; Uchida, 2004). **Distribution.** Korea (Jeju Island, East Sea, Korea Strait), Japan (Hirado Strait, Goto Island, Noto-Kawajiri, Shinomizaki, Satono, Tanami, Izu-Oshima, Uozu Harbor), China Sea.

Suborder Nynantheae Carlgren, 1899

Actiniaria with a rounded or flat base with or without basilar muscles. Column smooth or with outgrowths of one sort or another, rarely (and then especially in uppermost part) provided with ectodermal muscles. Sphincter absent or

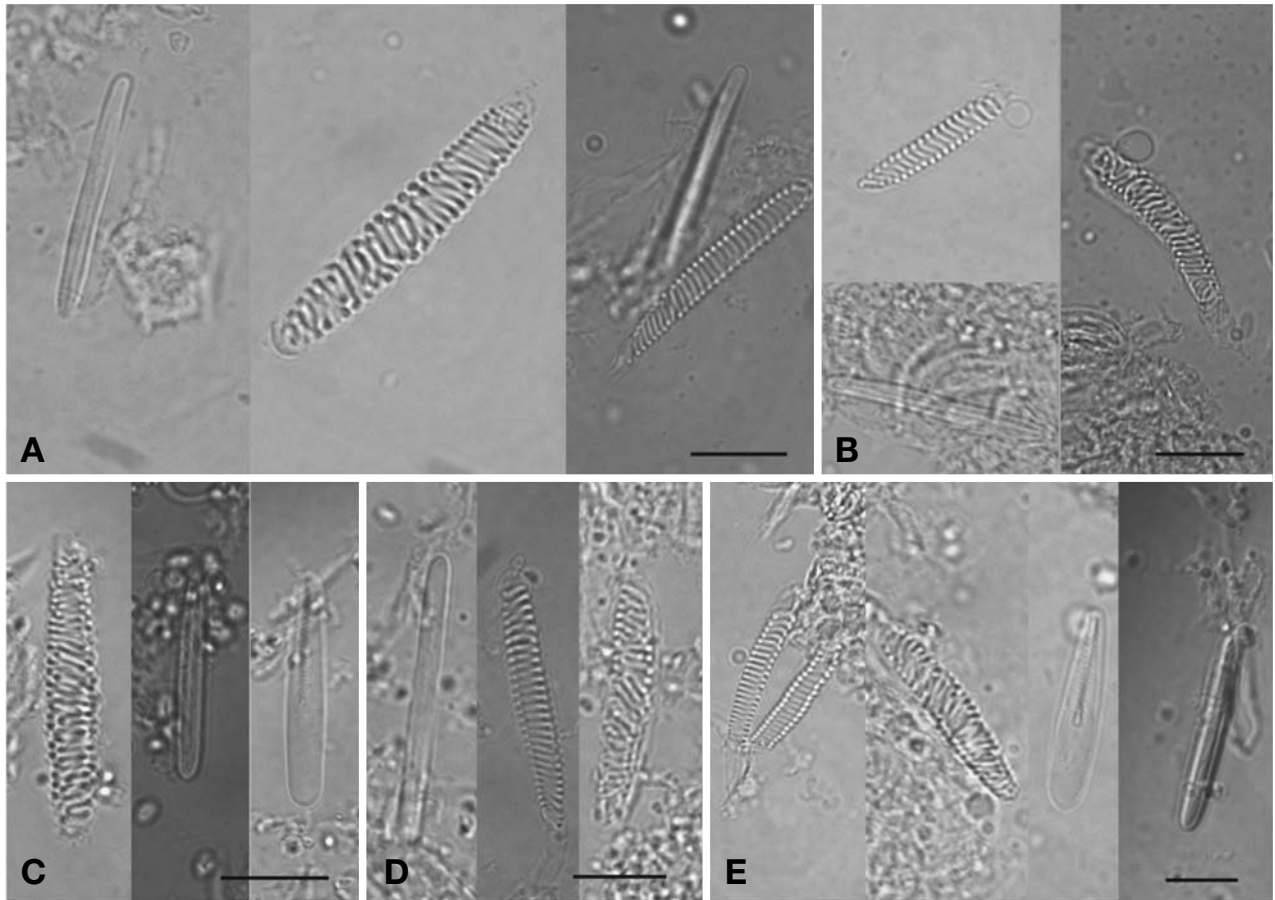


Fig. 2. Cnidae of *Halcurias carlgreni*. A, tip of tentacle; B, base of tentacle; C, actinopharynx; D, column; E, filament. Scale bars=10 μm.

Table 1. External size (mm) in relation to age and state of *Halcurias carlgreni* specimens (*L* length, *D* diameter)

Parts	State							
	Contracted				Extended			
	Young		Adult		Young		Adult	
	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>
Tentacle-inner	3.8-6		4-11.5		3-9		4-13	
-outer	2-5		3-10		2-7		3-11.5	
Total height	5		12-15		9-10.5		24.5-38	
Column		4		8-11		4.5-7		8-16
Oral disc		1.2		3-4		1-2.5		3.5-5
Pedal disc		3		4-6		5-6		10-20

present, endodermal or mesogloea. Tentacles simple or complex, commonly arranged in cycles, sometimes in radial rows. Siphonoglyphs usually attached to directives, rarely to non-directives, when directives absent. Mesenteries arranged in cycles, commonly hexamerously. Secondary mesenteries develop in exocoels. Retractors of paired non-directives face one another. Mesenterial filaments with ciliated tracts. Holo-

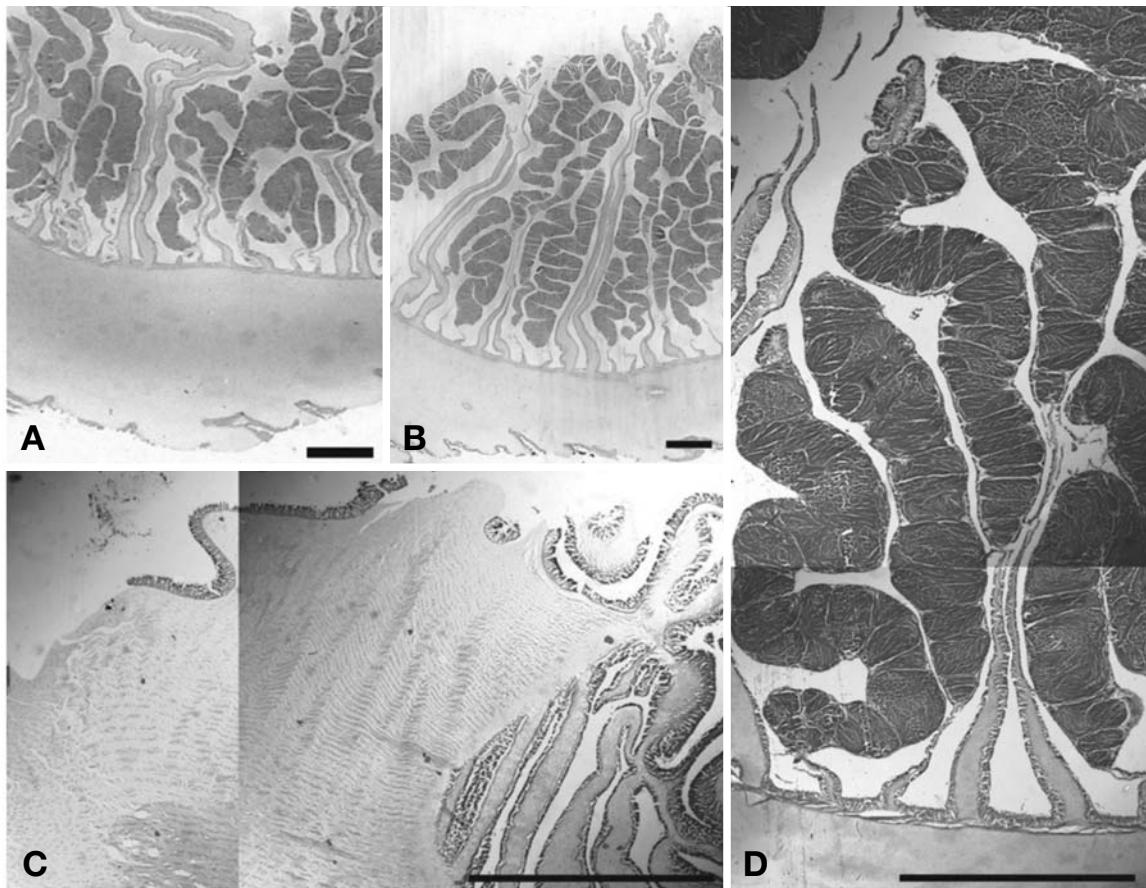
trichous nematocysts only exceptionally present, and never in endoderm.

Infraorder Thenaria Carlgren, 1899

Nynantheae with basilar muscles. Aboral end flattened and adherent, distinctly differentiated from column. Bodywall

Table 2. Size range and mean value of cnidae according to parts of *Halcurias carlgreni* (*n* number of cnidae measured)

Parts	Cnidae	Length × Width (mean ± SD, μm)	<i>n</i>
Tentacle-tip	Spirocysts I	15.0-40.0 × 2.0-6.0 (25.5 × 6.8 ± 4.0 × 1.2)	130
	Spirocysts II	31.0-46.0 × 7.0-8.0 (37.1 × 7.3 ± 4.4 × 0.4)	32
	Basitrichs	20.0-35.0 × 2.0-4.0 (26.7 × 2.7 ± 3.1 × 0.6)	125
-base	Spirocysts I	15.0-38.0 × 2.5-6.5 (26.7 × 4.5 ± 5.3 × 0.9)	166
	Spirocysts II	28.0-43.0 × 7.0-10.0 (34.9 × 7.8 ± 4.3 × 0.7)	30
	Basitrichs	21.0-33.0 × 2.0-3.0 (24.8 × 2.3 ± 2.5 × 0.4)	59
Column	Spirocysts I	13.0-26.0 × 2.0-4.0 (20.7 × 3.3 ± 3.8 × 0.6)	32
	Spirocysts II	22.0-37.0 × 5.0-7.0 (28.4 × 5.4 ± 3.6 × 0.5)	40
	Basitrichs	16.0-37.0 × 1.5-3.0 (25.3 × 2.1 ± 4.5 × 0.3)	163
Actinopharynx	Spirocysts II	20.0-40.0 × 5.0-8.0 (29.1 × 5.9 ± 4.6 × 0.7)	209
	Basitrichs	20.0-33.0 × 2.0-4.0 (26.2 × 2.7 ± 2.7 × 0.5)	141
	Microbasic p-mastigophores	21.0-30.0 × 4.0-6.0 (24.9 × 4.9 ± 2.1 × 0.7)	85
Filament	Spirocysts I	18.0-22.0 × 3.0-4.0 (20.9 × 3.5 ± 1.5 × 0.5)	10
	Spirocysts II	22.0-31.0 × 4.5-8.0 (27.1 × 6.0 ± 2.8 × 0.9)	36
	Basitrichs	20.0-30.0 × 2.0-3.0 (25.7 × 2.4 ± 3.3 × 0.5)	12
	Microbasic p-mastigophores	18.0-30.0 × 4.0-6.0 (24.4 × 4.9 ± 2.7 × 0.6)	89

**Fig. 3.** Mesenteries of *Calliactis polypus*. A, directive, 1st, 2nd, 3rd, and 4th mesenteries; B, perfect 1st and imperfect 2nd, 3rd and 4th mesenteries; C, sphincter muscle; D, spermeries in 3rd and 4th mesenteries. Scale bars=1 mm.

of variable appearance, sometimes divisible into different regions; often with verrucae, marginal spherules or pseudos-

pherules, vesicles of other protuberances. Sphincter endodermal or mesogloal, but sometimes absent. Tentacles and

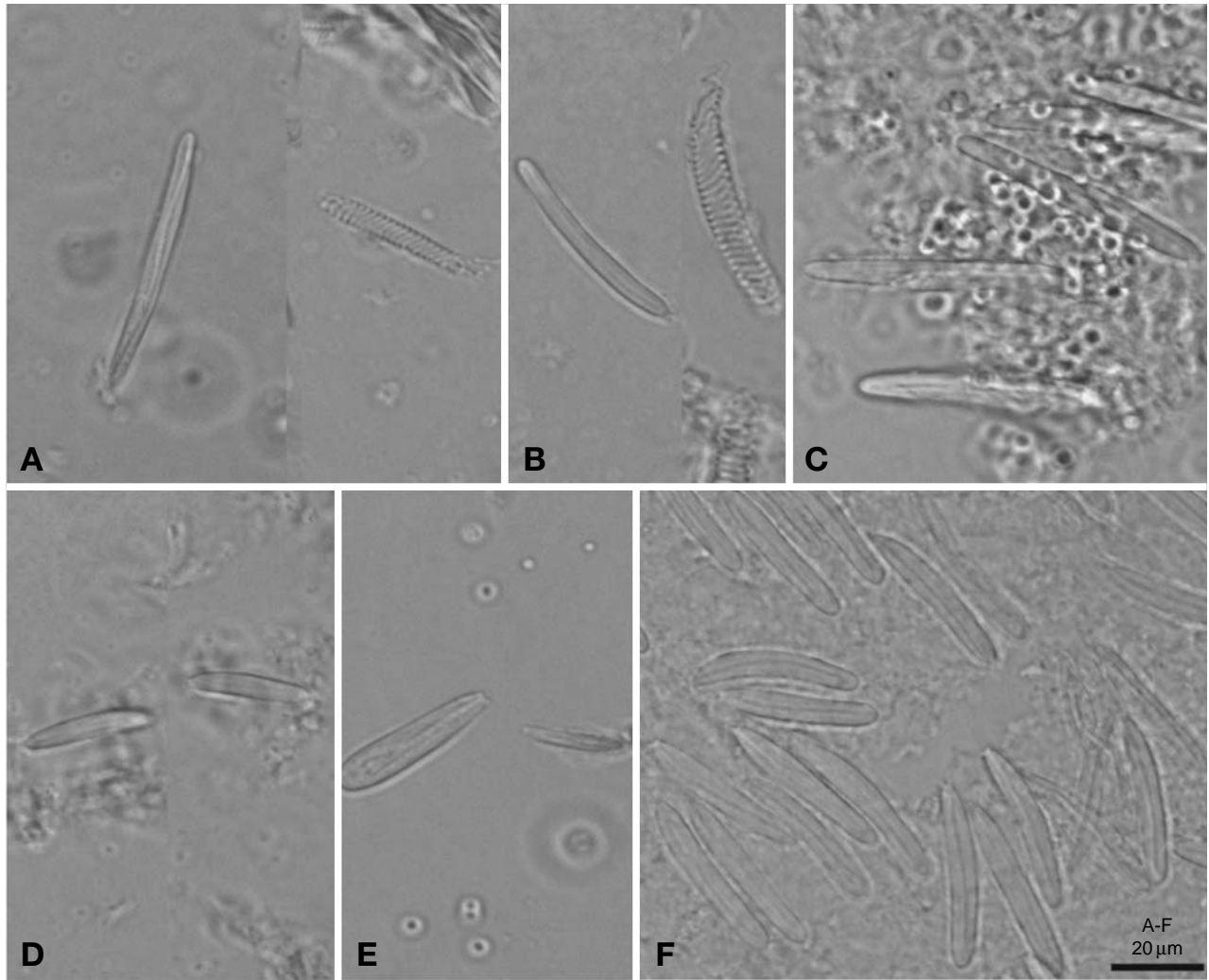


Fig. 4. Cnidae of *Calliactis polypus*. A, tip of tentacle; B, base of tentacle; C, actinopharynx; D, column; E, filament; F, acontia.

mesenteries numerous, former cyclically or radially arranged. Mesenteries rarely differentiated into macro- and microcnemes. Retractors weak or strong, rarely circumscribed. Acontia present or absent. Three superfamilies belonged.

Superfamily Acontiaria Stephenson, 1935

Thenaria with acontia or acontia-like organ. Sphincter commonly mesogloal, sometimes endodermal or absent.

Family Hormathiidae Carlgren, 1932

Acontiaria with strong mesogloal sphincter. Mesenteries not divisible into macro- and microcnemes. Usually 6 pairs of perfect mesenteries, sometimes more, and usually sterile, rarely fertile.

Genus *Calliactis* Verrill, 1869

Hormanthiidae with well developed base. Column smooth, more or less cylindrical, not or only differentiated into scapus with weak cuticle and scapulas, often thick, sometimes with numerous ectodermal invagination. No collar. Tentacles simple, conical, little short, more numerous than mesenteries at base, with longitudinal ectodermal or meso-ectodermal muscles. Cinclids present in proximal part of column from base. Sphincter strong, mesogloal. Two broad siphonoglyphs. Mesenteris six pairs, perfect and sterile, more numerous at margin than base. Two pairs of directives. Retractors off mesenteries fairly weak, diffuse. Parietobasilar and basilar muscles weak to well developed. Commensal with hermit crabs often.

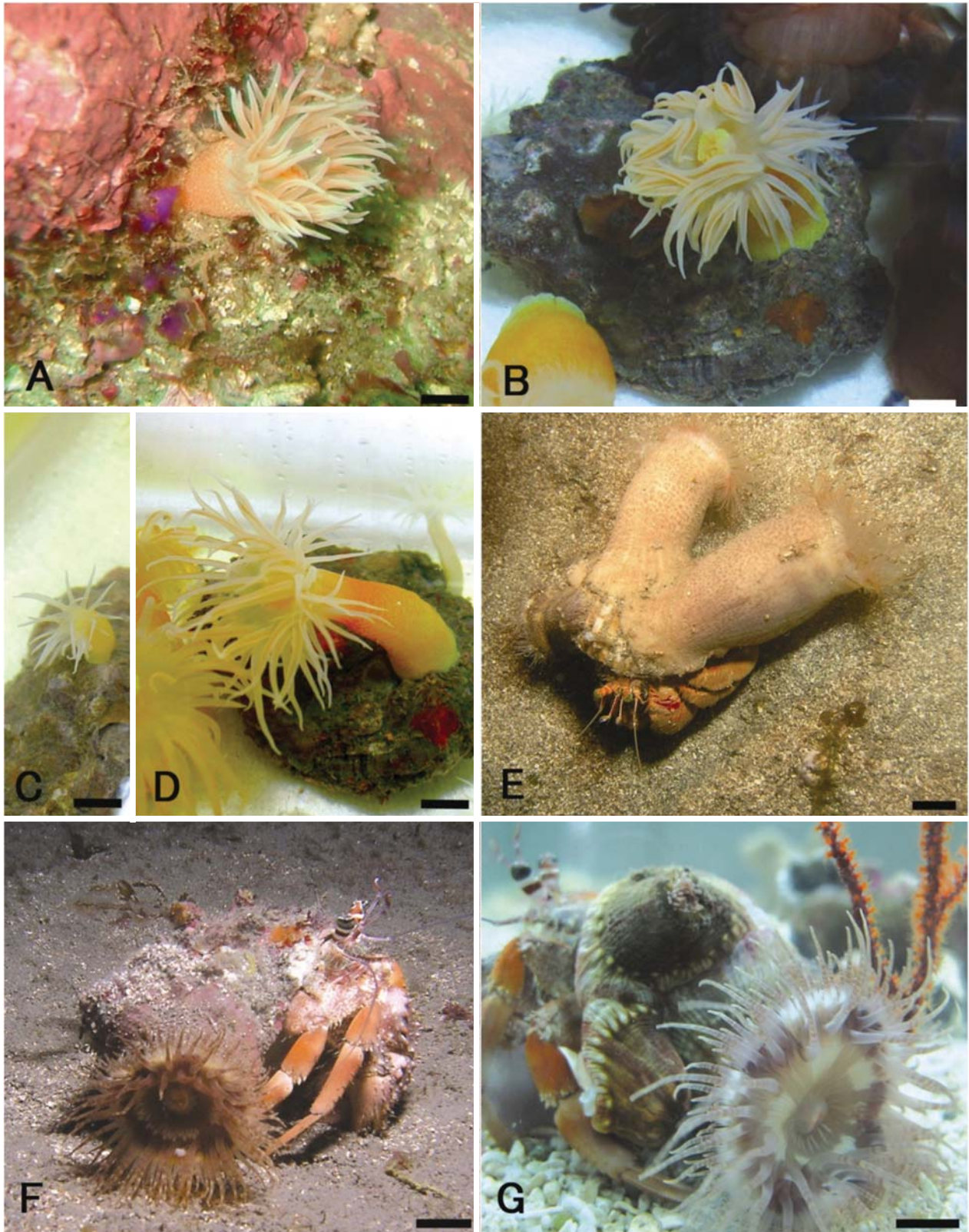


Fig. 5. Living anemones. A-D, *Halcurias carlgreni*; E, *Calliactis japonica*; F-G, *Calliactis polypus*. Scale bars=1 cm.

Table 3. External size (mm) in relation to age of *Calliactis polypus* (*L* length, *D* diameter)

Parts	State							
	Contracted				Extended			
	Young		Adult		Young		Adult	
	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>	<i>L</i>	<i>D</i>
Tentacle-inner			1-6			12-15		12-25
-outer			0.5-1.5			2-4		2-6
Total height	7-14		13-26		15-22		35-45	
Column	11-18 (diameter)		11-36 × 12-36 (diameter)		13-15 (diameter)		28-30 (diameter)	
Oral disc	1-13 (diameter)		4.5-15 (diameter)		15-20 (diameter)		35-40 (diameter)	
Pedal disc	14-18 × 16-26 (diameter)		11-38 × 16-41 (diameter)		20-27 × 33-34 (diameter)		45-50 × 50-75 (diameter)	

Table 4. Size range and mean value of cnidae according to parts of *Calliactis polypus* (*n* number of cnidae measured)

Parts	Cnidae	Length × Width (mean ± SD, μm)	<i>n</i>
Tentacle-tip	Spirocysts	15.0-36.0 × 2.0-4.0 (24.2 × 2.5 ± 4.7 × 0.5)	90
	Basitrichs	18.0-31.0 × 1.5-3.0 (25.7 × 2.2 ± 2.7 × 0.4)	90
-base	Spirocysts	15.0-30.0 × 2.0-5.0 (23.6 × 3.2 ± 3.3 × 0.6)	90
	Basitrichs	13.0-26.0 × 1.5-3.0 (22.1 × 2.1 ± 1.6 × 0.3)	90
Column	Basitrichs	7.0-19.0 × 1.5-3.0 (11.7 × 2.1 ± 2.6 × 0.3)	90
Actinopharynx	Basitrichs	14.0-30.0 × 2.0-4.0 (23.0 × 2.6 ± 4.0 × 0.5)	150
Filament	Basitrichs	9.0-15.0 × 1.0-2.0 (11.9 × 1.8 ± 1.6 × 0.3)	90
	Microbasic p-mastigophores	19.0-23.0 × 3.0-5.0 (20.6 × 4.1 ± 1.0 × 0.5)	60
Acontia	Basitrichs	18.0-31.0 × 2.0-4.0 (22.6 × 2.9 ± 3.0 × 0.4)	150

Table 5. Comparison of cnidae (μm) of *Calliactis polypus* reported in the literature and this study

Parts	Cnidae	See England, 1971	This study
Tentacle	Spirocysts	14.4-38.4 × 1.8-4.2	15.0-36.0 × 2.0-5.0
	Basitrichs	20.4-31.2 × 1.8-2.4	18.0-31.0 × 1.5-3.0
Column	Basitrichs I	6.0-10.8 × 1.8-2.4	7.0-19.0 × 1.5-3.0
	Basitrichs II	Absent	Absent
	Microbasic p-mastigophores	12.0-18.0 × 2.4-3.0	Absent
Actinopharynx	Basitrichs I	12.0-15.6 × 1.8 (sometimes absent)	Absent
	Basitrichs II	18.0-27.6 × 2.4-3.0	14.0-30.0 × 2.0-4.0
Filament	Basitrichs	9.6-15.6 × 1.8	9.0-15.0 × 1.0-2.0
	Microbasic p-mastigophores	15.6-27.6 × 2.4-4.2	19.0-23.0 × 3.0-5.0
Acontia	Basitrichs I	18.0-27.6 × 2.4-3.0	18.0-31.0 × 2.0-4.0
	Basitrichs II	Absent	Absent

¹**Calliactis polypus* (Forskål, 1775) (Figs. 3, 4, 5F, 5G, Tables 3-6)

Priapus polypus Forskål, 1775, p. 102.

Calliactis (Priapus) polypus: Carlgren, 1900, p. 55; 1928, p. 197; 1949, p. 97.

Calliactis vincentina Pax, 1922, p. 88; Carlgren, 1949, p. 97.

Calliactis valdiviae: Carlgren 1928, p. 197.

Anthothoe vincentina: Carlgren, 1949, p. 103.

Calliactis polypus: Hertwig, 1882, p. 65; Stephenson, 1920,

p. 528; England, 1971, p. 23, tables 1-3, pl. 1, figs. A-C, pls. 2, 3; Uchida and Soyama, 2001, p. 31.

Materials examined. 1 ind., Jejudo Island, Seogwipo, 9 Jul. 1985 (J.I. Song); 2 inds., Jejudo Island, Seopseom (33° 13' 51.86''N, 126° 35'47.67''E), 9 Dec. 2007 (S.J. Hwang and I.Y. Cho), 9-10 m deep; 4 inds. ♂, Jejudo Island, Seogwipo, 17 Apr. 2008 (S.J. Hwang, I.Y. Cho and D.S. Kim); 4 inds., Jejudo Island, Munseom (33° 13'40.82''N, 126° 34'05.55''E),

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Table 6. Comparison of external size (mm) of *Calliactis polypus* reported in the literature and this study

Parts	State	See England, 1971		This study	
		Height	Diameter	Height	Diameter (young/adult)
Column	Contracted Expanded	20			11-18/11-36 × 12-36 13-15/28-30
Oral disc	Contracted Expanded				1-13/4.5-15 15-20/35-40
Pedal disc	Contracted Expanded		~50		14-18 × 16-26/11-38 × 16-41 20-27 × 33-34/45-50 × 50-75

20 Jun. 2010 (S.J. Hwang, E.A. Choi and J.I. Song), 5-16 m deep.

Description. Body cylindrical but more or less flat in contracted state. Column smooth with longitudinal and horizontal striates, and has usually one circle of perforate 24 cinclides or sometimes two circles of them at limbus in larger specimens. Column wall very thin and divided into short scapulus and scapus. Oral disc circular with smooth conical tentacles at margin, and oral disc wider than column in diameter. Number of tentacles 124-190 expecting in 6 cycles of mesenterial arrangement. Pedal disc well developed, strongly adherent on gastropod shell, and in diameter, pedal disc exceeds over oral disc and column. Body size in Table 3. Inner tentacles longer than outer, and inner and outer 1-25 mm long and 0.5-6 mm long in adult specimens, respectively. In contracted state, height of body 7-14 mm and 13-26 mm, diameter of column 11-18 mm and 11-36 × 12-36 mm, diameter of oral disc 1-13 mm and 4.5-15 mm, diameter of pedal disc 14-18 × 16-26 mm and 11-38 × 16-41 mm in young and adult, respectively. In extended state, height of body 15-22 mm and 34-45 mm, diameter of column 13-15 mm and 28-30 mm, diameter of oral disc 15-20 mm and 35-40 mm, diameter of pedal disc 20-27 × 33-34 mm and 45-50 × 50-75 mm in young and adult, respectively.

Actinopharynx with two siphonoglyphs. Longitudinal muscle of tentacles ectodermal and circular muscle of column weak, diffuse. Sphincter muscle very strong, mesogloea, and transversally stratified alveolae. Mesogloea of column very thick compared with thin ectoderm and endoderm, with thickness of about 10 to 20 times of endoderm. Mesenteries hexamerously arranged up to 4th cycles around actinopharynx. Margin and base of column have more mesentery pairs than center. First six pairs including directives, perfect and sterile, and another all mesenteries from 2nd to 5th cycle imperfect, usually fertile at older cycles. 1st to 4th pairs bear filaments and acontia, and also weak diffuse retractor muscles. Gonads only developed in mesenteries of 3rd and 4th cycles. Parietobasilar and basilar muscles weak. Dioecious. Spermatocytes observed in the specimen collected on April 2008.

Cnidom: spirocysts, basitrichs, microbasic p-mastigophores.

phores.

Distribution and size of cnidae are measured as follow (Table 4).

In color of living actinarian, column dark brown mixed with yellow ochre and purple. Oral disc purplish brown, with prominent white patterns around middle of disc, and orange radiate bands around mouth. Tentacle base, one third of whole, white, and purplish brown and pale yellow circular patterns around last two third. Yellow ochre cinclides right above limbus, and pedal disc white with longitudinally purplish brown stripes. Preserved specimens greenish.

Habitat. This species shows commensalism with hermit crab, *Dardanus impressus*, inhabiting on rocks or sand bed between depth of 5 and 16 m. Four to ten individuals of this actinarian adherent firmly to one gastropod shell bearing thick cuticle.

Remarks. It is a little different from *C. polypus* by Hertwig (1882) and England (1971) that the mesenteries of the 7th cycle are not developed in our specimens, but it can be occurred in the larger specimen. And also, mesogloea of column was much thicker in our specimens than in specimens by England (1971). For nematocysts of column, basitrichs are more or less longer, and microbasic p-mastigophores are absent in our specimens. However, microbasic p-mastigophores were previously scarce or sometimes absent (England, 1971). This species exist together with *C. japonica* at the same habitat in Jeju Island. However, differences between *C. polypus* and *C. japonica* are easily distinguished based on external feature such as the size and color pattern, and also type and size of cnidae (Fig. 5E-G). In *C. japonica*, microbasic p-mastigophores are not observed in filaments, only larger basitrichs in actinopharynx, and larger basitrichs additionally in acontia (Song and Lee, 1998). Also, column of *C. japonica* is more cylindrical and larger than *C. polypus* (Song and Lee, 1998).

Distribution. Korea (Jeju Island), Japan (Wakayama), Pacific (French Polynesia, Great Barrier Reef, Hawaii), Atlantic (Cape Verde Islands), Indian (Maldives, Christmas Island, Aden, Red Sea, Durban, Zanzibar).

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