



A new species of sea anemone from the Chilean fjord region, *Paraisanthus fabiani* (Actiniaria: Isanthidae), with a discussion of the family Isanthidae Carlgren, 1938

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Abstract

A new species of *Paraisanthus*, *P. fabiani*, is described from Chile, the eighth species of this small family of mesomyarian anemones. Specimens of this species are characterized by six pairs of macrocnemes and 18 pairs of microcnemes in the middle and lower column and a fourth incomplete cycle of extremely small mesenteries in the uppermost column, between 66 and 110 tentacles, and a smooth column without holotrachs or heterotrachs. Specimens occur from the shallow subtidal to at least 30 m around exposed islands and in less protected channels of the fjord region between Chiloé Island (41°7'04.8''S; 73°53'02.4''W) and the Madre de Dios Archipelago (50°20'23.1''S; 75°22'39.2''W). They often protrude from small rocky crevices or between polychaete tubes, so that *in situ* only the oral disc is visible. The description is based on examination of 27 specimens collected between 1997 and 2007 and on documentation of live specimens in both their natural environment and aquaria. *Paraisanthus fabiani* was found at only 15 of over 150 study sites along the Chilean coast. If it was present at a site, generally more than 10 specimens were found. For the first time, *in situ* photographs are provided for a member of the family Isanthidae. In addition, live photographs are provided for the type species of the family Isanthidae, *Isanthus capensis* from South Africa. Family Isanthidae constitutes five genera, which are distinguished mainly by number of macrocnemes, texture and division of the column, and direction of growth of mesenteries.

Key words: Coelenterata, Cnidaria, Anthozoa, benthos, shallow water

Resumen

Se describe una nueva especie de *Paraisanthus* de Chile, *P. fabiani*. Esta especie representa la octava de la pequeña familia de anémonas mesomiarias Isanthidae. Los ejemplares de esta especie se caracterizan por seis pares de macrocnemes y 18 pares de microcnemes en la columna media e inferior, y un cuarto ciclo de mesenterios extremadamente pequeños, incompleto, en la parte superior de la columna, entre 66 y 110 tentáculos, y una columna lisa sin holotricos o heterotricos. Los ejemplares se encuentran en el submareal inferior, al menos hasta a 30 metros de profundidad, alrededor de las islas expuestas y canales menos protegidos de la región de los fiordos, entre la Isla de Chiloé (41°47'04.8''S; 73°53'02.4''W) y el Archipiélago Madre de Dios (50°20'23.1''S; 75°22'39.20''W). A menudo sobresalen de pequeñas grietas rocosas o entre tubos de poliquetos por lo que, *in situ*, sólo es visible su disco oral. La descripción se ha realizado a partir del estudio de 27 ejemplares recolectados entre 1997 y 2007 además de la documentación de ejemplares vivos en su hábitat y acuario. *Paraisanthus fabiani* sólo ha sido encontrada en 15 de las más de 150 localidades de muestreo a lo largo de la costa chilena. Cuando la especie estuvo presente en una localidad, generalmente se encontraron más de 10 individuos. Por primera vez se aportan fotografías *in situ* de un miembro de la familia Isanthidae. Además, se muestran fotografías de ejemplares vivos de la especie tipo de la familia Isanthidae, *Isanthus capensis* de Sudáfrica. La familia Isanthidae incluye ocho especies en cinco géneros, los cuales se distinguen principalmente por el número de macrocnemes, la textura y subdivisión de la columna, y la relación entre mesenterios en el margen y el disco pedio.

Introduction

Isanthidae is a small and poorly known family of mesomyarian sea anemones erected by Carlgren based on the South African species *Isanthus capensis* Carlgren, 1938. The family, characterized by a mesogloal sphincter and mesenteries divided into macro- and microcnemes, contains five genera: *Isanthus* Carlgren, 1938, *Zaolutus* Hand, 1955, *Austroneophellia* Zamponi, 1978, *Eltaninactis* Dunn, 1983, and *Paraisanthus* Sanamyan and Sanamyan, 1998. Carlgren (1949) doubtfully added *Neophellia* Uchida, 1938, to the family even though the description of the species *Neophellia mutsuensis* Uchida, 1938, from Japan contradicts the generic diagnosis. Song (1992) moved *Neophellia mutsuensis* into *Flosmaris* (family Isophellidae Stephenson, 1935) because she found acontia on the macrocnemes.

The new species *Paraisanthus fabiani* is described from shallow water of the Chilean fjord region and constitutes the eighth species in this family. Photos of histological sections and of cnidae, drawings of fired cnidae, and cnida size ranges and statistics are given. For the first time, photographs of living specimens are provided for a member of family Isanthidae. In addition, photos of live specimens of the type species *Isanthus capensis* are given. All genera and species hitherto included in the family Isanthidae are listed together with information on morphology and distribution (Table 1).

Material and methods

Between 1994 and 2007, we observed, collected, examined, and preserved more than 1500 specimens of shallow-water (to 40 m depth) actiniarians and corallimorpharians at over 150 sites along the Chilean coast from Arica (18°30'S; 70°19'W) to Fuerte Bulnes, Straits of Magellan (53°36'S; 70°56'W) (Fig. 1). For a map of the sampling sites of north and central Chile, see Häussermann (2003); for a map of sampling sites of southern Chile, see Häussermann and Försterra (2007). Whenever possible, distance between adjacent study sites was less than 200 km. In the Chilean fjord region, we collected 27 specimens of *Paraisanthus fabiani* and observed and photographed several dozens more in their habitat. We kept some specimens for several days in aquaria for detailed documentation. We relaxed the specimens with menthol crystals for 45–180 min and fixed them in 10% seawater formalin. Specimens were stored in formalin for at least 4 mo before being transferred to 70% ethanol. Additionally, we preserved some specimens in 96% ethanol for molecular studies. For the histological examinations, we embedded parts of five specimens in paraffin, sectioned them at 8–9 µm, and stained them with Azocarmin triple staining (Humason 1967). We examined fired and unfired cnidae from living and preserved specimens using a light microscope (1000x oil immersion), drew or photographed, and measured them. Cnida terminology follows England (1991).

Material of *Paraisanthus fabiani* n. sp. (Figs. 2–5):

Specimens collected by Verena Häussermann and Günter Försterra were deposited at the Museo de Zoología de la Universidad de Concepción, Chile (MZUC-UCCC), at the Zoologische Staatssammlung München, Germany (ZSM), at the National Museum of Natural History, Smithsonian Institution, Washington, D. C., USA (USNM) and at the Museo de la Universidad Austral de Chile, Valdivia, Chile (IZUA).

Paraisanthus fabiani sampling sites and information (Fig. 1):

S1: Faro Corona/Chiloé Island (41°47.08'S; 73°53.04'W), 3–6 m, 29 January 1998, 17 and 19 December 1999; S2: Quellón/Chiloé Island, *Macrocystis* forest (43°09'02.1''S; 73°35'30.9''W), 7 m, 3 February 1998; S3: Punta Yencura, Quellón/Chiloé Island (43°09''S; 73°35''W), 6 m, 22 December 1999; S4: Isla Cailín, close to Chiloé Island (43°09'S; 73°35'W), 1.5–13 m; 26 December 1999, 31 January and 5 February 2001; S5: Piedra Lile/Isla Laitec, close to Chiloé Island (43°10.940'S; 73°38.380'W), 11 m, 18 March 2007; S6:

TABLE 1: Comparison of characters of genera in the family Isanthidae including all described species.

Genus	# mesenteries / # perfect mesenteries ^a	Fertile mesenteries	More mesenteries ...	Siphonoglyphs / directives	sphincter	retractor	# tentacles	Column texture and division	Pedal disc
<i>Isanthus</i> Carlgren, 1938	not numerous / 6 pairs	1 st cycle (6 pairs)	0	2/2 pairs	not strong	reniform	not numerous (<i>I. capensis</i> : 48)	smooth, no division, margin distinct	
<i>Paraisanthus</i> Sanamyan & Sanamyan, 1998	24–48 (very small in uppermost part of column)* / 6 pairs	1 st cycle (6 pairs)	Distally	2/2 pairs	well developed	strongly restricted, reniform or almost circumscribed*	48–110*	smooth, no division, margin distinct	well developed
<i>Eltaninactis</i> Dunn, 1983	<=12 / 6 pairs	1 st cycle (6 pairs)	0 or proximally	lacking or indistinct / 2	weak	strong, circumscribed	24*, 16 or 17*	scapus and scapulus, with tenaculi and cuticle	broad (<i>E. infundibulum</i>) and small (<i>E. psammodorum</i>)
<i>Zaolutus</i> Hand, 1955	usually 48 pairs in the middle of column, fifth order distally / <=12	up to 2 cycles (up to 12 pairs)	distally	2/2 pairs	2 sphincters	restricted, those of directives sometimes reniform	numerous (up to 6 cycles)	smooth or with microscopic papillae, no division	circular*
<i>Austroneophellia</i> Zamponi, 1978	2 cycles with altogether 24 pairs / 1 cycle with 12 pairs	none	?	2/2 pairs*	palmate circumscribed*	circumscribed	>50	scapus and capitulum	well developed (broader than column*)

* characters taken from species descriptions.

a. macrocnemes, with filaments

TABLE 1 (continued).

Genus	Pedal disc	Species	Distribution	Depth range	Detailed histological photos or drawings	Illustrations of cnidae	Picture of specimen
<i>Isanthus</i> Carlgren, 1938		a) <i>I. capensis</i> Carlgren, 1938, b) <i>I. homolophilus</i> Chintiroglou & Doumenc, 1998	a) South Africa; b) Makemo and Mururoa Atoll, French Polynesia	a) intertidal; b) 100–1120 m (symbiotic with decapod)	a) sphincter, mesenteries (drawings), b) none	a) types and size ranges; more cnidae types added in Carlgren, 1945, b) types and size ranges including statistics	a) drawing of some tentacles, b) none
<i>Paraisanthus</i> Sanamyan & Sanamyan, 1998	well developed	a) <i>P. tamarae</i> Sanamyan, 1998; b) <i>P. fabiani</i> Häussermann & Försterra, n. sp.	a) Commander Islands; b) South Chile	a) 0–25 m; b) 3–30 m	a) sphincter and transverse section; b) sphincter, transverse section, basilar muscles, longitudinal muscles of tentacles	a) types, size ranges, and drawings (of all tissues); b) types, size ranges including statistics, photos and drawings	a) drawing of contracted specimen; b) photos of live specimens, in situ or collected
<i>Eltaninactis</i> Dunn, 1983	broad (<i>E. infundibulum</i>) and small (<i>E. psammodorandum</i>)	a) <i>E. infundibulum</i> Dunn, 1983 ^a , b) <i>E. psammodorandum</i> Sanamyan, 2001 ^b	a) off Antarctic Peninsula and NW of Chatham Islands; b) Northern Kurile Islands	a) 769–2668 m; b) 439–509 m	a) sphincter, mesentery, longitudinal section of upper column; b) drawing of longitudinal section of upper column, transverse section	a) types, size ranges, and drawings (of all types); b) types, size ranges, and drawings (of all tissues)	a) photo of preserved specimen; b) drawing of contracted specimen
<i>Zaolutus</i> Hand, 1955	circular*	<i>Z. actius</i> Hand, 1955	Monterey Bay, California	shallow water	Sphincter, transverse section	Types, size ranges, and drawings (of all tissues)	photo from side, live specimen
<i>Austroneophellia</i> Zamponi, 1978	well developed (broader than column*)	<i>A. luciae</i> Zamponi, 1978	Santa Clara del Mar, Argentina	not given (probably shallow water)	Outline of sphincter, macrocnemes and microcnemes	Types, size ranges, and shapes (of all tissues)	none

* characters taken from species descriptions.

a. some aspects of musculature problematic: weak sphincter, very weak basilar muscles in some specimens, and pronounced muscle band that runs between the mesenteries that can be correlated neither with parietobasilar nor with basilar muscles

b. only provisionally assigned to genus

Isla Laurel/Guaitecas Islands (44°00'S; 73°46'W), 6 m, 7 March 2005; S7: Isla Leucayek South/Guaitecas Islands (44°04'S; 73°39'W), 25 m, 7 March 2005; S8: Canal Copihue/Archipelago Madre de Dios (50°20'23.1"S; 75°22'39.20"W), 20 m, 9 March 2006.

Type locality: Quellón/Chiloé Island (S2: 43°09'02.1"S; 73°35'30.9"W), 7 m.

Holotype: ZSM 20070246: S2, 7 m, 3 February 1998, specimen with male reproductive tissue, not sectioned, preserved in 10% formalin. In preserved state, pedal disc diameter 14 mm, oral disc diameter 8 mm, column height 10 mm, tentacle length 3–4 mm.

Paratypes (fixed in 10% formalin and transferred to 70% ethanol, unless stated otherwise): ZSM 20051701 (one specimen), S1, 3 m, 29 January 1998; ZSM 20051686 (two specimens), S1, 6 m, 17 and 19 December 1999; ZSM 20070247/1 and ZSM 20070247/2 (histological slides: three transverse and two longitudinal sections of half animal), male, S2; ZSM 20070248 (histological slides: three transverse sections of entire animal), male, S2; ZSM 20051690 (five specimens), Ex. 179 female, S2; ZSM 20051688 (two specimens) and ZSM 20051691 (four specimens), S4, 26 December 1999; ZSM 20051705 (two specimens), preserved in 96% ethanol, S4, 26 December 1999; ZSM 20051721 (one specimen), S4, 10 m, 31 January 2001; ZSM 20070249 (one specimen), male, S7; ZSM 20070250 (one specimen), S6; ZSM 20070251 (one specimen and histological slides: three slides of transverse sections of half specimen), S8; USNM 1101611 (histological slides: two transverse and one longitudinal sections of half specimen each), male, S2; USNM 1101613 (one specimen), S5; USNM 1101612 (one specimen and one histological slide of longitudinal section), male, S7; MZUC (UCCC) 32790 (1 specimen), S6; IZUA-CNI 0138 (one specimen), S5.

Additional sightings of *Paraisanthus fabiani* (Fig. 1):

Isla Carmen/Fiordo Palvidad (43°01.021'S; 72°49.990'W), 14 March 2007; Rada Negra/Fiordo Palvidad (43°01.726'S; 72°46.835'W), 15 and 16 March 2007; Lobera Cueva/Bahía TicToc (43°41'46.9"S; 72°59'35.0"W), 3–10 m, 17 February 2001; Islas Bahía TicToc (43°39'39.4"S; 72°59'52.9"W), 19 February 2001; Islas Las Hermanas/Raul Marin Balmaceda (43°46.285'S / 073°02.632'W), 11 and 12 March 2007; Muelle (dock) Melinka/Guaitecas Islands (43°53'S; 73°45'W), 8–27 m, 6 March 2005; Isla Lavinia, (49°00'48.1"S; 74°58'37.5"W), 10 m, 13 March 2006.

Results

Class Anthozoa Ehrenberg, 1831

Subclass Hexacorallia Haeckel, 1866 (Zoantharia de Blainville, 1830)

Order Actiniaria Hertwig, 1882

Suborder Nynantheae Carlgren, 1899

Tribe Thenaria Carlgren, 1899

Subtribe Mesomyaria Stephenson, 1921

Family Isanthidae Carlgren, 1938

Definition of the family Isanthidae

Carlgren (1938, p. 59) defined the family Isanthidae as "Nynantheae with basilar muscles. Sphincter mesogloal. Mesenteries divisible into macro- and microcnemes. No acontia." In his catalogue, Carlgren (1949, p. 76) changed the family definition to "Thenaria (Mesomyaria) with well developed mesogloal

sphincter. Mesenteries divisible into macro- and microcnemes. No acontia. Retractors of mesenteries very strong, strongly restricted (reniform) to almost circumscribed.” Due to the weak sphincter of *Eltaninactis infundibulum*, Dunn (1983, p. 58) proposed to alter the first sentence of the generic description to “Thenaria (Mesomyaria) with mesogloal sphincter...” instead of “...with well developed mesogloal sphincter...”. Uncertainty remains over the affiliation of the genus *Eltaninactis* to the family Isanthidae, as noted in Sanamyan’s (2001) description of *E. psammophorum*.

Type species: *Isanthus capensis* Carlgren, 1938 (Fig. 6)

Definition of the genus *Paraisanthus* Sanamyan and Sanamyan, 1998:

Isanthidae with well-developed pedal disc. Column smooth. Margin distinct. Sphincter mesogloal, well developed. Radial muscles of oral disc and longitudinal muscles of tentacles ectodermal. Two siphonoglyphs, two pairs of directives. Six pairs of macrocnemes. More mesenteries distally than proximally, at least in adults.

Cnidom: spirocysts, p-mastigophores, basitrichs, heterotrichs, holotrichs.

Type species: *Paraisanthus tamarae* Sanamyan and Sanamyan, 1998

Paraisanthus fabiani new species

External anatomy (Fig. 2). Size *in vivo*, measured in aquaria: oral disc 7–12 mm diameter, column to 10 mm diameter, pedal disc to 19 mm diameter, 13–20 mm long, tentacles about half as long as diameter of oral disc. Size preserved: oral disc to 8 mm diameter, pedal disc to 19 mm diameter, column to 16 mm long, tentacles to 5 mm long.

Colour (Figs. 3A–G). Oral disc red, orange, yellowish, pale rose, pink, light brown or ochre; uniformly coloured or with (often 12) reddish-brown radial lines visible on endocoels, or with 12-lobed, petal-like white and yellow pattern (Fig. 2B). Mesenterial insertions visible through oral disc. Actinopharynx yellow to light brown. Tentacles slightly transparent, rose to red or pink, yellowish, light brown or ochre; uniformly coloured (Figs. 2D–G) or with 3–6 brown transverse bands at inner and outer or only inner side (Figs. 2A–C). Column rose-coloured, reddish, yellowish, orange to ochre, or light brown; uniformly coloured or distalmost $\frac{1}{4}$ – $\frac{1}{5}$ more intensely coloured (often brown; Fig. 2D) with a short transition to paler proximal portion of column; colour generally continuously fading towards pedal disc. Pedal disc coloured as column, not transparent. Preserved specimens whitish to brown.

Oral disc and tentacles. Between 66 and 110 conical tentacles, hexamerously arranged in 5–6 cycles, last cycle generally not complete, length about half diameter of oral disc, inner longer than outer, situated on outer third to half of oral disc, innermost 12 (two cycles) in many animals slightly more central (Fig. 2A), more intensely coloured and directed upward. Oral disc circular, mesenterial insertions in many specimens visible as darker lines (Figs. 2A,C,D,E). Mouth opening central, slightly oval, slightly elevated in many specimens.

Column. *In situ* higher than broad, after sampling broader than high, proximally broader than distally; smooth, often with loose ring of mucus and dirt in proximal part (Figs. 2C,D,G). Small fosse. Column can completely cover tentacles when retracted.

Pedal disc. More or less circular, generally wider than column and oral disc, limbus slightly lobed.

Internal anatomy. In most parts of column, 24 mesenteries hexamerously arranged in four cycles, first cycle (six pairs) including directives fertile macrocnemes with strong circumscribed retractors, second and third cycle (six plus 12 pairs) sterile microcnemes without retractors, fourth cycle incomplete, pairs of extremely small microcnemes only just below margin, unequal proximal extension of mesenteries of a pair. Mesenteries of second cycle wider than those of third cycle. More tentacles than mesenteries in mid-column and at base. Actinopharynx deeply furrowed, with two distinct siphonoglyphs, about half length of column; two pairs of

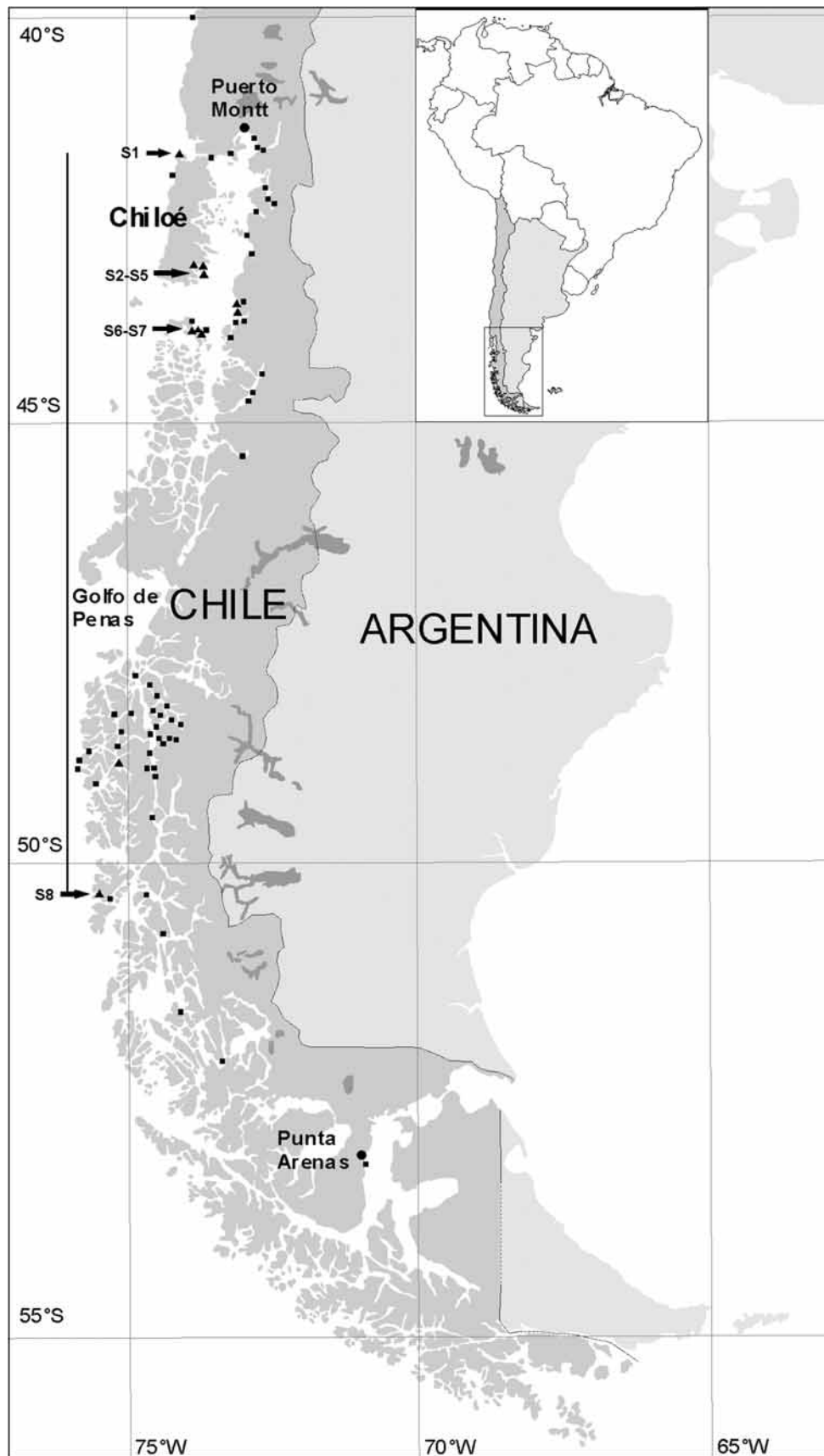


FIGURE 1. Type locality and distribution of *Paraisanthus fabiani* in shallow water of the Chilean fjord region. Black line: latitudinal extent of geographic distribution. Triangles: study sites S1-S8 where *P. fabiani* was observed. Squares: study sites where *P. fabiani* was not observed.

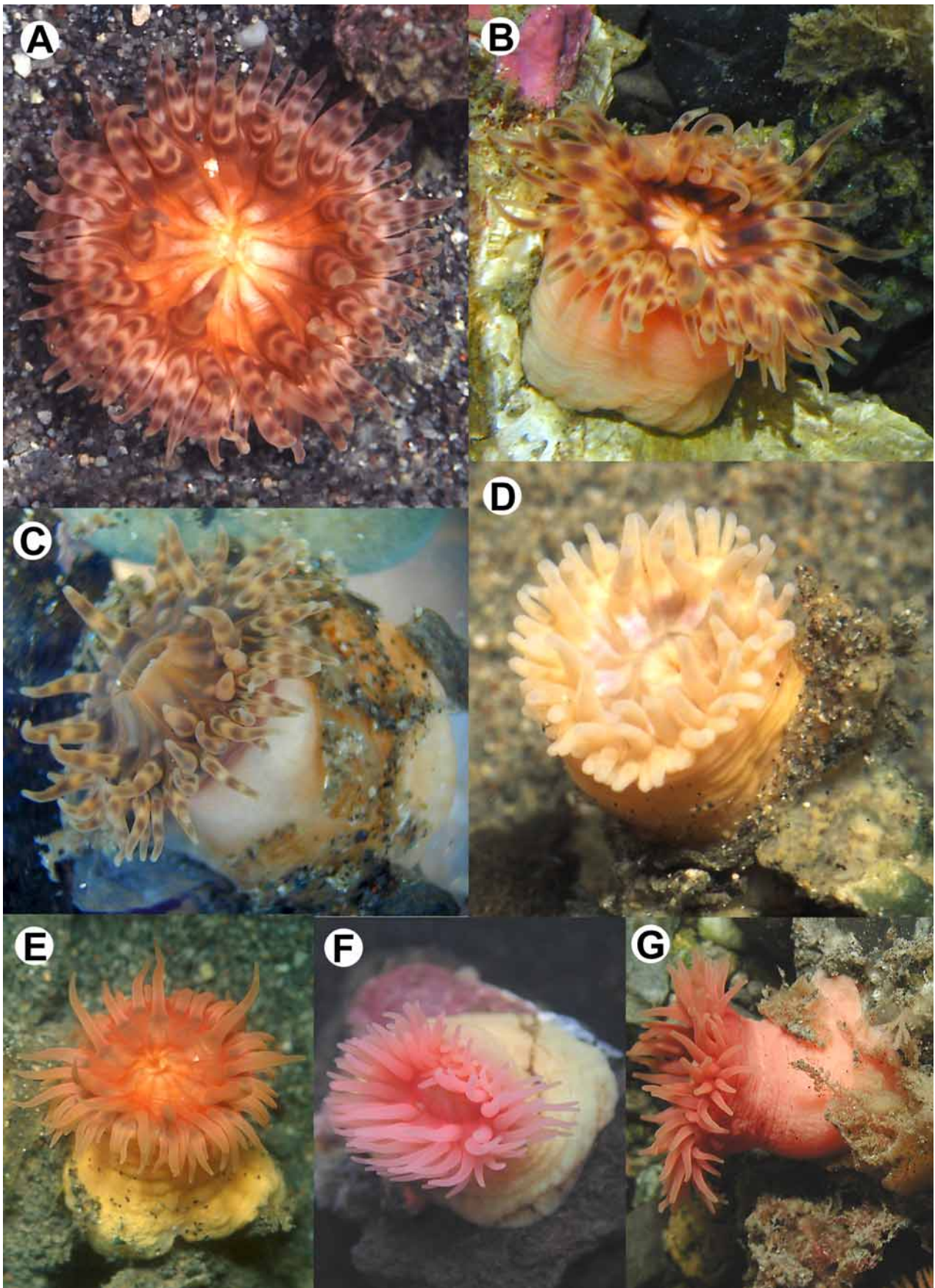


FIGURE 2. Colour varieties of *Paraisanthus fabiani*; all photos taken in aquaria. Oral disc diameter 7–12 mm, pedal disc diameter 7–16 mm, specimens 13–20 mm long. Note the ring of mucus and dirt around the column (Fig. 2C,D,G).

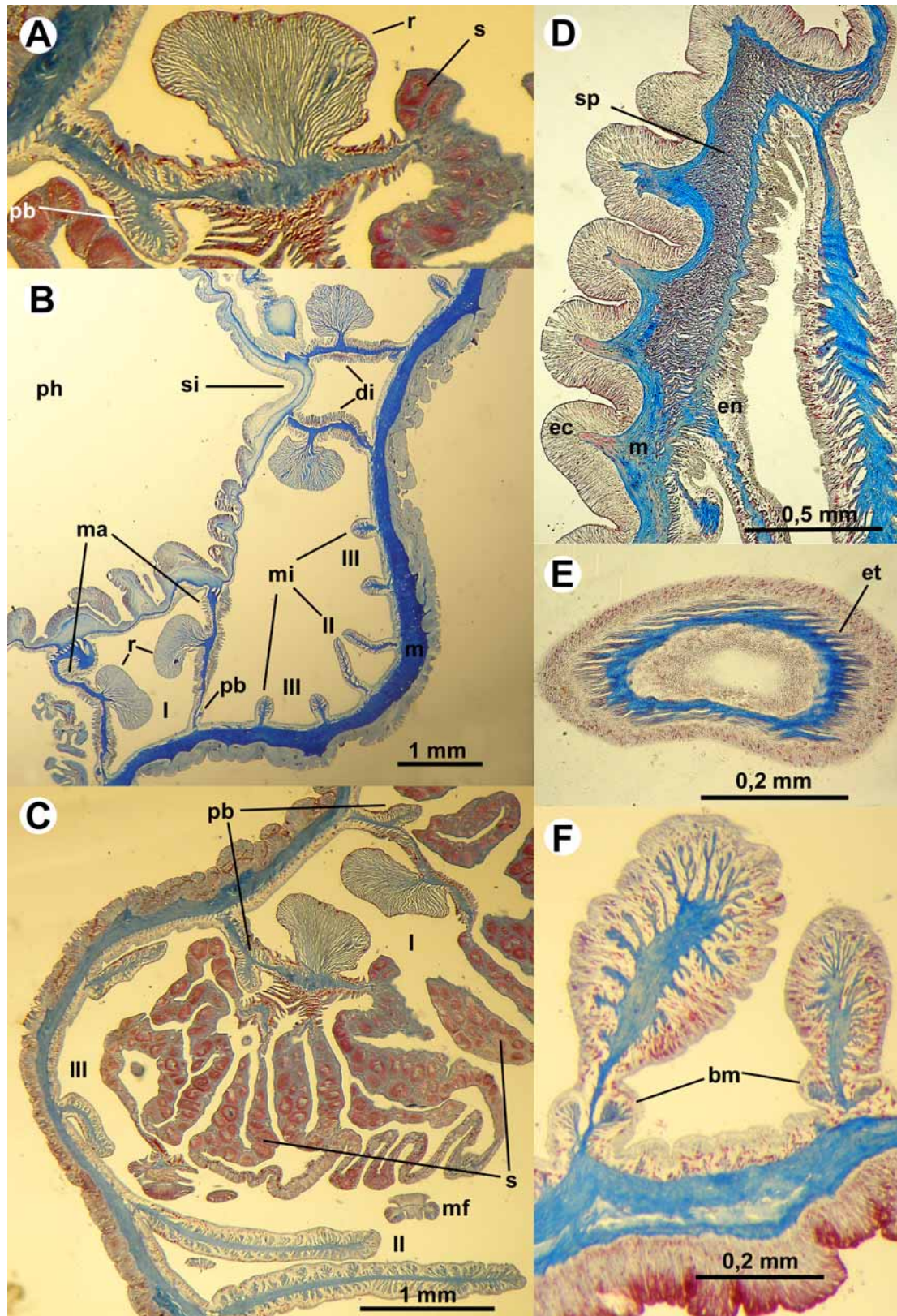


FIGURE 3. Histological sections of *Paraisanthus fabiani*: A, macrocneme with retractor and parietobasilar muscle; B, transverse section of the upper column; C, transverse section of the lower column; D, longitudinal section of the upper column with sphincter; E, cross section through tentacle; F, longitudinal section of the pedal disc with basilar muscles. 1st to 3rd cycle of mesenteries I, II, III, basilar muscles bm, directives d, ectoderm ec, endoderm en, ectodermal longitudinal muscles of tentacle et, mesogloea m, macrocnemes ma, filaments mf, microcnemes mi, parietobasilar muscles pb, actinopharynx ph, retractor muscles r, sperms s, siphonoglyph si, sphincter sp.

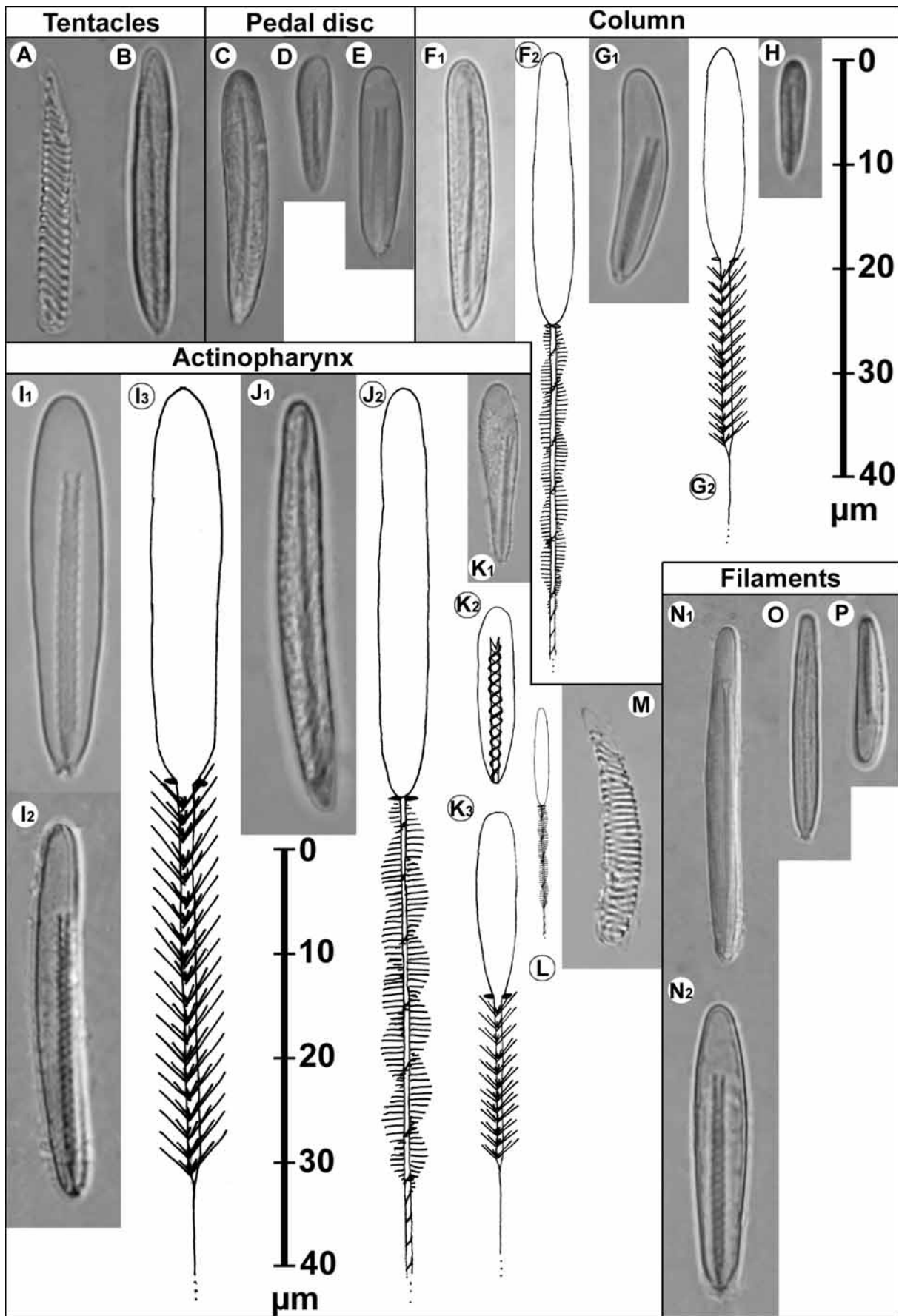


FIGURE 4. Cnidae of *Paraisanthus fabiani*. Letters A-P correspond to cnidae listed in Table 2.

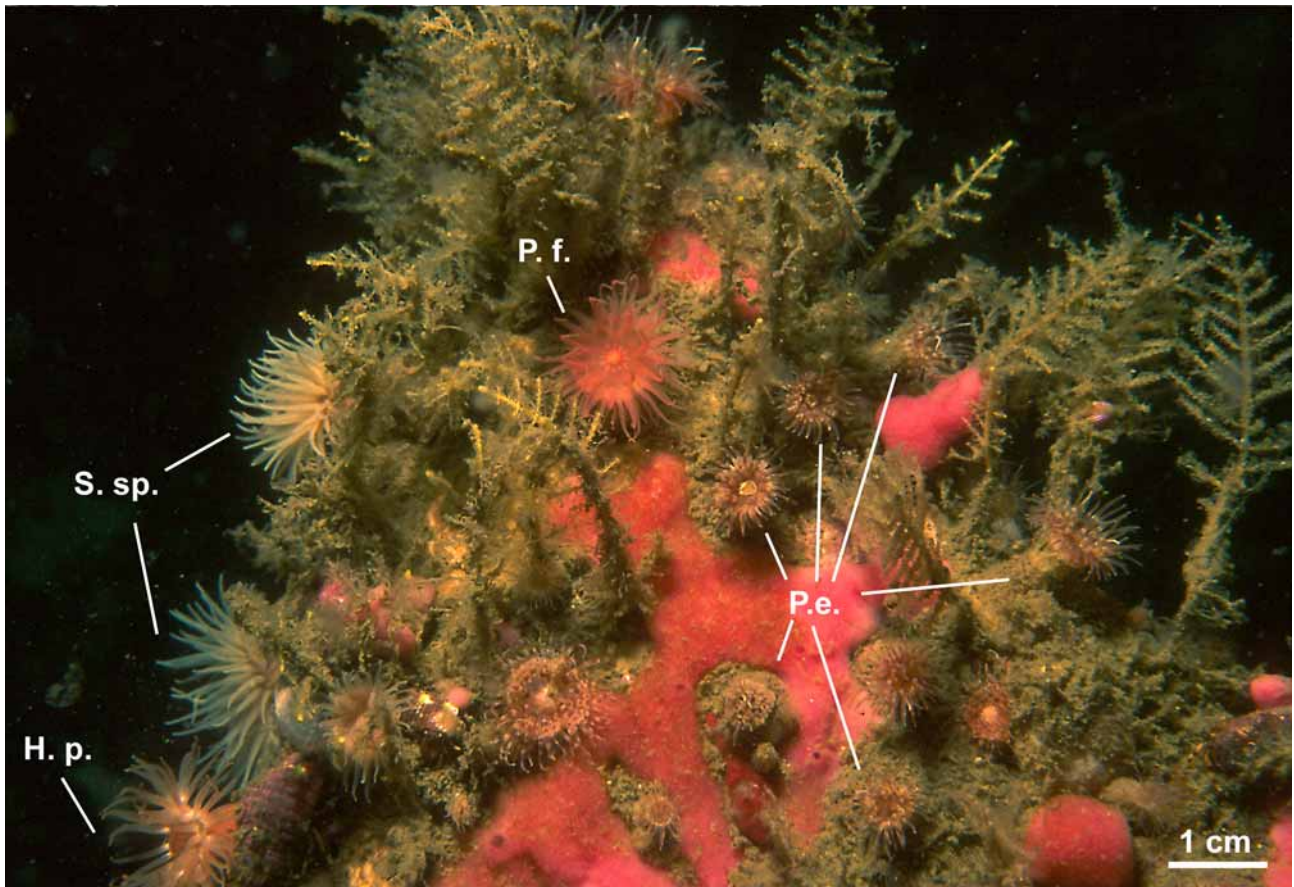


FIGURE 5. Specimens of *Paraisanthus fabiani* and some other sea anemone species with which this species is regularly associated *in situ*. H. p.: *Halcurias pilatus*, P.e.: *Phellia exlex*, P.f.: *Paraisanthus fabiani*, S. sp.: Sagartiidae sp., here with an unidentified pink chondrillid sponge, Isla Cailín, 18 m.

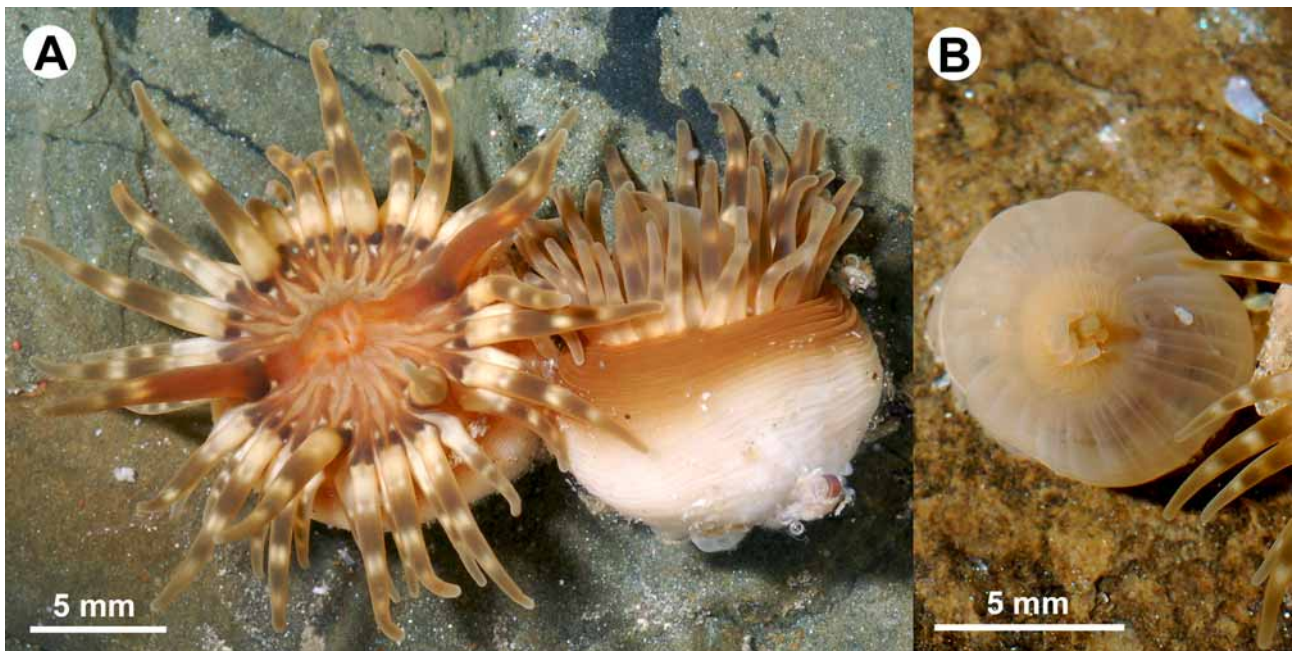


FIGURE 6. Live specimens of *Isanthus capensis*: A, view of oral disc and column; note inner six tentacles slightly closer to the mouth with directive axes distinctly coloured; B, contracted specimen; specimens collected by Charles Griffiths from intertidal area, in sand between rocks, Table Bay, South Africa. Photos courtesy of Charles Griffiths.

TABLE 2. Size and distribution of cnidae of *Paraisanthus fabiani* n. sp. (ZSM 20070247/1, letters refer to Fig. 4), in each tissue in order of abundance: ^s: sporadic, ^f: few, ^c: common and ^v: very common. “m_l” and “m_w” are the means, “d_l” and “d_w” are the standard deviations (all in µm), “t” is the apparent total number of turns of spine-rows on the shaft, “#” is the number of capsules measured, “p” is the proportion of specimens having this cnida type. Exceptional sizes in parentheses. Spirocysts (A,M), basitrichs (B,C,D,F,H,J,L,O), microbasic p-mastigophores (E,N,P), microbasic p-mastigophores B1 (G,I,K).

Tissue/Cnida type abundance	Capsule length (µm)	m _l	d _l	Capsule width (µm)	m _w	d _w	t	#	p
TENTACLES									
spirocysts ^v (A)	15.0-32.0	25.8	3.7	2.0-4.5	3.6	0.7		40	5/5
basitrichs ^v (B)	17.0-30.5 (38.0)	26.7	3.5	2.0-4.0	3.1	0.6	4-5	40	5/5
PEDAL DISC									
large basitrichs ^c (C)	23.0-29.0	26.0	1.6	3.0-4.5	3.7	0.5		39	2/2
small basitrichs ^f (D)	12.0-14.5	13.0	0.7	2.0-3.0	2.3	0.4		11	2/2
microbasic p-mastigophores ^f B (E)	12.0-20.0	17.6	2.4	3.0-4.0	3.6	0.4		9	2/2
COLUMN									
large basitrichs ^{c-v} (F)	(20.0) 25.0-29.0	26.4	1.0	3.0-4.0	3.6	0.4	5-6	39	5/5
microbasic p-mastigophores B1 ^{c-v} (G)	16.0-22.5 (28.0)	20.1	3.1	3.0-4.5	3.8	0.7	~15	13	5/5
small basitrichs ^c (H)	9.0-12.0	11.1	0.9	2.0-3.5	2.4	0.5		13	5/5
ACTINOPHARYNX									
large microbasic p-mastigophores B1 ^c (I)	(26.0)32.0-41.5	36.4	2.9	2.5-4.0	3.2	0.4	~20	39	8/8
large basitrichs ^{c-v} (J)	34.0-43.0 (47.0)	38.9	2.5	3.5-5.0	4.5	0.5	~6	28	8/8
small microbasic p-mastigophores B1 ^s (K: ZSM20051690)*	15.2-19.1	17.0	1.5	3.2-3.8	3.6	0.3	~12	5	2/8
small basitrichs ^c (L: ZSM20051690)*	7.0-11.4	9.5	1.6	1.0-1.9	1.5	0.4	~4	7	1/8
spirocysts ^s (M: Ex. ZSM 20070247/1)*	13.0-34.0	23.1	5.9	2.5-4.0	3.4	0.6		8	4/8
MESENTERIAL FILAMENTS									
large microbasic p-mastigophores B ^c (N)	27.0-36.0	31.8	2.3	3.5-5.0	4.0	0.4	~20	36	5/5
basitrichs ^c (O)	8.0-38.0	21.5	7.6	2.0-4.5	3.0	1.0	3-4	30	5/5
small microbasic p-mastigophores B ^{c-f} (P; ZSM20051701)*	12.7-14.3	13.1	0.8	2.2-2.5	2.4	0.2		7	3/5

*: cnida sizes from another specimen

directives. Oral and marginal stomata; marginal stomata circular, in the centre of stronger mesenteries (stomata not always visible in smaller specimens). Sexes separate, no signs of asexual reproduction. Five of the sectioned specimens with reproductive tissue, collected in February and March, four male (ZSM 20070246, ZSM 20070247/1, ZSM 20070249, USNM 1101612), one female (ZSM 20051690). No zooxanthellae.

Sphincter mesogloal, strong, nearly entire width of mesogloea (Fig. 3D), restricted to uppermost part ($\sim 1/8-1/10$) of column. Macrocneme retractors strong, strongly restricted to circumscribed (Figs. 3A–C). Parietobasilar muscles distinct on perfect mesenteries (Figs. 3A–C); basilar muscles distinct (Fig. 3F). Longitudinal muscles of tentacles (Fig. 3E) and radial muscles of oral disc ectodermal. Endodermal circular

muscles of column well marked, weaker at sphincter level (Fig. 3D).

Cnidom. Spirocysts, basitrichs, microbasic p-mastigophores B (Fig. 4).

Cnidae of eight specimens were examined.

Etymology. The species is dedicated to our son Fabian who was born on May 16th 2007 some days after the submission of this paper.

Habitat, distribution, and zoogeography. Shallow subtidal to at least 30 m in less protected channels and at exposed islands of Chilean fjord region between Faro Corona, Chiloé Island (41°47'02.0"S; 73°52'58.8"W) and Archipelago Madre de Dios (50°20'23.1"S; 75°22'39.2"W) (Fig. 1). Not present along exposed coast north of fjord region between Faro Corona, North Chiloé Island, and Arica, North Chile (41°47'S to about 15°S), or in southern third of fjord region between Archipelago Madre de Dios and Straits of Magellan (50°20'S to about 53°S) (Fig. 1); neither present in protected fjords and channels with superficial fresh water layer. Thus, it is present in both the Northern and the Central Patagonian Zone (see Pickard 1971; Häussermann 2006), which are separated by Peninsula Taitao and Golfo de Penas (Fig. 1), hypothesized by Lancellotti and Vasquez (2000) and Häussermann and Försterra (2005) to be zoogeographic barriers, but not in the Southern Patagonian Zone south of the Straits of Magellan.

Natural history and field notes. Not abundant at any site, but if present, generally several clustered specimens found (Fig. 5). Pedal disc and column generally hidden in holes or crevices of rocky substrate, between stones or between polychaete tubes into which entire animal retracts when disturbed (Fig. 5). Tentacles of neighbouring specimens regularly in contact with each other. Specimens observed in same habitat with the sea anemones *Halcurias pilatus* McMurrich, 1893, *Phellia exlex* McMurrich, 1904, Sagartiidae sp. (Fig. 5C), and a corallimorpharian (*Corynactis* sp.); in Central Patagonian Zone also with the sea anemone *Metridium senile lobatum* Carlgren, 1899 (Riemann-Zürneck 1975).

Difficult to collect without injury due to cryptic microhabitats; ideally collected with hammer and chisel together with substrate. Specimens relatively sensitive; reattach only slowly to hard substrate in aquarium even if not injured. In the aquarium, specimens soon hide column between or under stones or in holes in substrate (such as dead barnacles). Addition of MgCl₂ to aquarium water (for relaxation) provoked spawning in one specimen collected in February 1998 at Quellón.

Discussion

Taxonomy

Paraisanthus fabiani and similar species

The species most similar to *Paraisanthus fabiani* is *P. tamarae* from the Commander Islands (Northeast Pacific). *Paraisanthus tamarae* possesses 48–74 tentacles (depending on animal size), and *P. fabiani* 66–110 tentacles. In addition, *P. fabiani* lacks cinclides. Cnidae of both species of *Paraisanthus* are similar in size but *P. tamarae* has holotrichs and heterotrichs in the column whereas *P. fabiani* has microbasic p-mastigophores B. The species agree well in colouration: the column is strongly coloured at the distal end and paler to whitish at the lower end. The tentacles have brown transverse circular bands at the inner or inner and outer part, and the oral disc has a complex pattern of brown blotches and radial bands corresponding to the macrocnemes and tentacles (see Fig. 2, and description in Sanamyan & Sanamyan 1998). Both species live in tide pools and/or the shallow subtidal of temperate waters in small holes and rocky crevices or in sand between stones where their column is hidden. They were both found with *Metridium senile* (Linnaeus, 1761).

Like *Paraisanthus fabiani*, *Isanthus capensis* from South Africa has 24 pairs of mesenteries in the lower and middle column, but only 48 tentacles. Unlike *Paraisanthus fabiani*, *I. capensis* has microbasic p-mastigophores in the tentacles, only one size of basitrich in the column, and much smaller basitrichs and only

one size of microbasic p-mastigophores in the actinopharynx. Its colouration and habitat are very similar to those of *P. fabiani* and *P. tamarae*.

Isanthus homolophilus differs in several aspects from the three species already discussed. It lives in deep water and in symbiosis with a decapod crab, in French Polynesia. According to Chintiroglou and Doumenc (1998), *I. homolophilus* differs from *I. capensis* through its tentaculate margin, its 84–96 tentacles, and its absent or weak parietobasilar muscle that is strong in *I. capensis*. The coloration of *I. homolophilus* is unknown.

Specimens of *Paraisanthus fabiani* and *Phellia exlex* may live in the same habitat and have very similar colouration of oral disc and tentacles, but the latter has the column divided into a scapus with cuticle and a scapulus, and bears acontia. Completely orange individuals of *P. fabiani* may be confused with those of *Halcurias pilatus*, which also live in holes and crevices of the same habitats, but the latter have a much longer and more slender column, 10 pairs of perfect mesenteries, and cnida batteries on the column appearing as white spots. When sectioned, *P. fabiani* cannot be confused with any other Chilean anemone due to the macro- and microcnemes in combination with a smooth column and 66–110 tentacles.

The genera *Isanthus* and *Paraisanthus*

Sanamyan and Sanamyan (1998) erected the new genus *Paraisanthus* for material that agreed in most characteristics with *Isanthus*: individuals of both possess six pairs of macrocnemes, a well-developed sphincter, two siphonoglyphs and an undivided smooth column (see Table 1). In *Isanthus*, the number of tentacles equals the number of mesenteries at the base, whereas specimens of *Paraisanthus* have more tentacles than there are mesenteries at the base or in the middle part of the column. These authors refer to England (1987), who stated that any specimen with greater than half a cycle more mesenteries at the margin should be referred to a different taxon (Sanamyan & Sanamyan 1998). Thus, they considered the presence of additional mesenteries at the margin as distinctive enough to constitute a character at the generic level. Sanamyan and Sanamyan (1998) also found holotrichs and heterotrichs in the column of *P. tamarae*, whereas Carlgren (1938, 1945) did not mention these for *I. capensis*. Although the presence of an additional nematocysts type is generally considered a generic character, Fautin and Chia (1986) pointed out that holotrichs may be inducible and thus should not be used as a taxon-defining character (Fautin 1988; Edmands & Fautin 1991).

The present species has more tentacles (66–110) than it has mesenteries at the base and in the middle part of the column (24 pairs) and is therefore assigned to the genus *Paraisanthus*. We did not detect holotrichs or heterotrichs in the column of our specimens. This contradicts Sanamyan and Sanamyan's (1998) definition of the cnidom of *Paraisanthus*. Therefore, we suggest altering the definition of the cnidom to read as follows: *Cnidom: spirocysts, p-mastigophores, basitrichs; in some species heterotrichs and holotrichs*. Our findings confirm that the difference between the genera *Isanthus* and *Paraisanthus* is the relationship of the mesenteries at the distal and proximal ends of the column.

In their description of *Isanthus homolophilus*, Chintiroglou and Doumenc (1998) were unclear about the macrocnemes. Carlgren (1949, p. 8) defined macrocnemes as having “very strong retractors, gonads and filaments”, whereas microcnemes “lack these organs.” Chintiroglou and Doumenc (1998) stated that the first two cycles (thus 12 pairs) of mesenteries in *I. homolophilus* were fertile, and that the third cycle of *I. homolophilus* was without retractor muscles; this suggests that the first two cycles are macrocnemes. If this were true, the description of *I. homolophilus* would contradict the definition of *Isanthus*, and it would not fit into any of the other four existing genera of family Isanthidae (see Table 1). However, Chintiroglou and Doumenc (1998) said that the species possesses six pairs of macrocnemes but their description implies that there are 12 pairs. Unfortunately, they did not provide any photographs or drawings of histological sections. In addition, they described their species as having the same number of mesenteries at the base and at the margin (24 pairs), which suggests that their specimens possess about 48 tentacles. However, *I. homolophilus* has 84–

96 tentacles (Chintiroglou & Doumenc 1998), meaning that it has more mesenteries at the margin than at the base, since the number of tentacles corresponds to the number of mesenteries at the margin. It is possible that the mesenteries at the margin are very small and were overlooked. If *I. homolophilus* has six pairs of macrocnemes, it belongs to *Paraisanthus*. However, if it has 12 pairs of macrocnemes, it does not fit into any of the existing genera. *Isanthus homolophilus* has to be re-examined in detail to resolve its taxonomic placement.

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