

A New Parasmittinid Bryozoan (Cheilostomata) from Korea

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A new parasmittinid bryozoan, *Parasmittina pyriformis*, is reported from four localities in Korea. This new species closely resembles *Parasmittina trispinosa* in having one to three spines and a triangular avicularium lateral to the orifice. However, *P. pyriformis* is characteristic in that a single or paired small pear-shaped avicularia are situated lateral to the orifice and a triangular avicularium occurs in laterals to the orifice or on the frontal wall. The new species is also unique in having two spines in most zooids, but rarely one or three spines, whereas *P. trispinosa* usually has three spines, sometimes two or four.

The cheilostomate bryozoan family Smittinidae Levinsen, 1909 comprises a large number of species, and consists of three genera, *Smittina* Norman, 1903, *Smittoidea* Osburn, 1952 and *Parasmittina* Osburn, 1952. The genus *Parasmittina*, in which 74 species are known from all of the world's seas (unpublished data, Horowitz, 1993) is a complex group which contributes to the confusion in proper placement of the taxa. Because they show so much variation in morphology, it is essential in recent times to use scanning electron microscopy (SEM) in taxonomy. Soule and Soule (1973) described 23 parasmittinid species of 28 smittinids from Hawaiian waters, 15 of which were new. Also, of the 13 species of *Parasmittina* described from Mauritian reefs (Hayward, 1988), five were new to science, as were three of the six species described from Heron Island, Great Barrier Reef (Ryland and Hayward, 1992).

Five parasmittinids of 13 smittinids from Korea, including *Parasmittina elongata* (Okada and Mawatari, 1936), *P. crosslandi* (Hastings, 1930), *P. contraria* Seo, 1993, *P. areolata* (Canu and Bassler, 1927) and *P. triangulis* (Mawatari, 1952), have been reported so far (Rho and Kim, 1981; Song, 1985; Rho and Seo, 1986; Seo, 1993; 1998). Except for *P. triangulis* found from Seochon of the Yellow Sea and Weolseong of the East Sea from research on fouling animals (Song, 1985) as well as from Jejudo Island (Rho and Seo, 1986), the other four species were reported only from the southern coasts of Korean waters including Jejudo Island, which is strongly influenced by the Kuroshio Warm Current (Rho and Kim, 1981; Seo, 1993; 1998).

This is fairly consistent with the finding by Hayward and Parker (1994) which described *Parasmittina* as abundant and taxonomically diverse in coral reef habitats. Thus, many species of parasmittinids seem to range from warm temperate to tropical regions.

This intensive examination of specimens from the southern sea of Korea resulted in one new species of *Parasmittina*. The collected specimens were fixed in formalin solution and preserved in 70% methyl alcohol. Some parts of the colony were bleached and dried in air. They were then gold-coated for observation under a Digital Scanning Electron Microscope. The new species is described, discussed with its allied *P. trispinosa* complex and illustrated with scanning electron micrographs.

Results

Phylum Bryozoa Ehrenberg, 1831
Class Gymnolaemata Allman, 1856
Order Cheilostomata Busk, 1852
Suborder Ascophora Levinsen, 1909
Family Smittinidae Levinsen, 1909
Genus *Parasmittina* Osburn, 1952

Parasmittina pyriformis n. sp.
(Fig. 1)

Material examined: Holotype, one colony encrusting stone taken from the coast at the base of Ulgi light house (35° 44' S, 129° 30' E), 14 September 1999. Paratypes, one colony, Cheongsando Island, 26 July 1981; one colony encrusting trumpet shell, the fish auction house of Jukjeong, Woinarodo Island, 1 July 1991; five colonies, same as holotype; one colony encrusting oyster shell, the coast of Seuldo Island,

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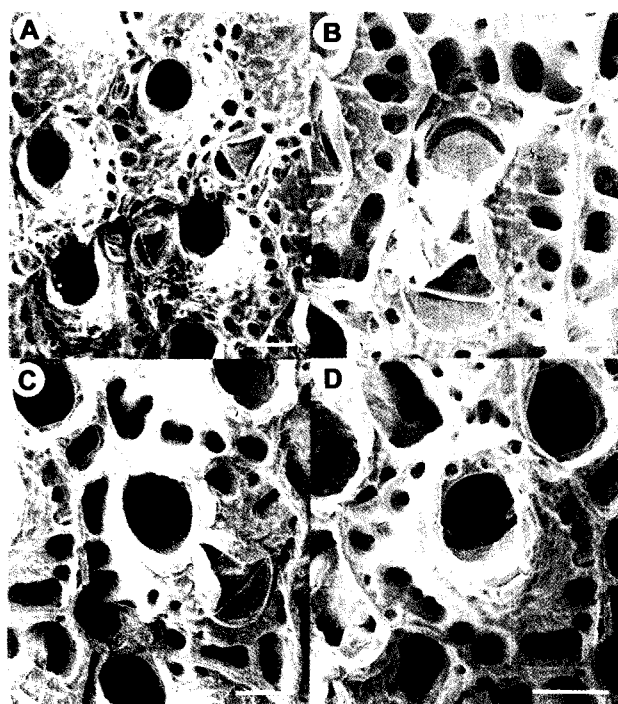


Fig. 1. *Parasmittina pyriformis* n. sp. A, Zooids with two spines and small pear-shaped avicularia. One zooid has a triangular avicularium just lateral to the orifice. Interzooidal avicularium with triangular mandible is shown. B, Zooid has one spine and a big triangular avicularium with complete pivot bar on the frontal wall. C, Lyrula in the primary orifice. D, A pair of condyles in the primary orifice. Scale bars = 0.1 mm.

Bangeojin, 14 September 1999. All of the collectings were done by the author. The holotype will be deposited in the Natural History Museum of Ewha Womans University.

Etymology: The specific name, *pyriformis*, is derived from Latin, *pyrum*, pear, and Latin, *forma*, shape, referring to the pear-shaped small avicularium.

Description of holotype: Colony encrusting stone, very thin, unilamellar, forming patches to several centi-

meters across. Zooids (Fig. 1A) 0.29-0.36 mm wide, 0.37-0.55 mm long, arranged in alternate series in younger zooids, but turned in all directions in the older colony, separated by a salient line, irregular hexagonal rectangular in shape, more irregular in older zooids. Frontal wall granular with areolae, a little convex, vitreous in younger colony (Fig. 1A). Suboral nodulation rarely found but usually forming peristomial rim or oral lappets on each side leaving little round sinus (Fig. 1A). Two spines (Fig. 1A) found inside the distal peristomial rim in the mid-line, rarely one or three spines (Fig. 1B). Primary orifice (Fig. 1C, D) subcircular, 0.11 mm wide, slightly longer than broad, with a pair of pointed and downcurved condyles and a lyrula. Two different shapes of avicularia: One or a pair of small pear-shaped avicularia (Fig. 1A) with a complete pivot bar or rarely a pair of pivots, situated lateral to the orifice or distal corners of zooid, usually directed distolaterally. Large frontal avicularium (Fig. 1B) with triangular mandible and complete pivot bar, directed distally or distomedially, usually originated from the proximal margin of the zooid and encroaching the peristome. Triangular avicularium also situated slightly below the orifice on the side, originating from the lateral margin of the zooid, ascending peristome (Fig. 1C), or rarely just lateral to orifice (Fig. 1A); rostrum of triangular avicularium slightly raised. Interzooidal triangular avicularium (Fig. 1A) sometimes found. Ovicell with several pores on the frontal surface, found only in the specimen collected from Jukjeong.

Remarks: The most useful key characters for identification in the genus *Parasmittina* are the shape, location and direction of avicularium. As shown in Table 1, five parasmittinid species, which are *P. dolabrata*, *P. californica*, *P. collifera*, *P. jeffreysi* and *P. trispinosa*, reported by Osburn (1952), Soule and Soule (1973), Hayward and Ryland (1979), and Dick and Ross (1988), share some characteristics of avicularia with *P. pyriformis* n. sp. All of them have spines more or less than two (Table 2), but show clear differences in the characteristics of avicularia from *P.*

Table 1. Comparison of avicularia of *Parasmittina pyriformis* n. sp. with its allied *P. trispinosa* complex

Species	Big avicularium			Small avicularium		
	Shape	Location	Direction	Shape	Location	Direction
<i>Parasmittina dolabrata</i>	hatchet shaped	distolateral or proximal to orifice	proximally	oval or acute	oral	proximally
<i>P. californica</i>	long subspatulate	lateral to orifice	laterally or distally	pointed, oval or short spatulate	frontal	various oriented
<i>P. collifera</i>	triangular or elongate spatulate	proximal or lateral to orifice	distally	oval	frontal	proximally
<i>P. jeffreysi</i>	triangular	proximal or lateral to orifice	distally	elliptical	frontal	various oriented
<i>P. trispinosa</i>	triangular	near to orifice or frontal	medially or distomedially	oval or elliptical	frontal	proximally
<i>P. pyriformis</i> n. sp.	triangular	proximolateral to orifice or frontal	distally or distomedially	pear-shaped	distolateral to orifice	distolaterally

Table 2. Comparison of spines, ooecia, condyles, lyrula, measurements and distributional form of *Parasmittina pyriformis* with its allied *P. trispinosa* complex

Species	No. of spines	No. of pores of ooecia	Condyles	Lyrula	Measurements (average, mm)		Distributional form
					Zooids (wt x lt)	Orifice (wt)	
<i>P. dolabrata</i>	1-3	3-4	strong	wide	0.45 x 0.61	0.12	tropical
<i>P. californica</i>	1-3	a few	?	moderate	0.40 x 0.60	0.15	warm
<i>P. collifera</i>	2	6-8	strong	moderate	0.35 x 0.50	0.15	temperate-tropical
<i>P. jeffreysi</i>	2-4	2-4	moderate	truncate	0.40 x 0.65	0.16	temperate
<i>P. trispinosa</i>	2-4	2-3	narrow, downcurved	moderate	0.33 x 0.60	0.12	arctic
<i>P. pyriformis</i> , n. sp.	2 rarely 1-3	7	narrow, downcurved	very low	0.33 x 0.46	0.11	cold temperate temperate

wt; width, lt; length.

pyriformis which has two spines. The first two species in Table 1, *P. dolabrata*, and *P. californica*, are distinguished from *P. pyriformis* in having big hatchet shaped and long subspatulate avicularia, respectively. The small pear-shaped avicularia lateral to the orifice, which are directed distolaterally, are so unique that they are easily discriminated from the small avicularia of the other three allied species, *P. jeffreysi*, *P. collifera* and *P. trispinosa*.

Other comparisons of significant characteristics are also shown in Table 2. A few pores are punctured in the ooecia of *P. dolabrata*, *P. californica* and *P. jeffreysi*, whereas *P. collifera* and *P. pyriformis* have more. However, *P. collifera* is characteristic in possessing colli (frontal prominences) and very clearly distinguished from *P. pyriformis*. The condyles of *P. trispinosa* are similar to those relatively of the present new species. However, the latter has low lyrula. In distribution, *P. jeffreysi* is reported to be arctic whereas this new species is a warm temperate species. In addition, *P. pyriformis* is certainly small in the sizes of the zooid and orifice compared with the five allied species.

Various authors have contributed to the confusion by placing almost any parasmittinid with three (sometimes 2-4) spines and with an acute avicularium in *Parasmittina trispinosa* (Soule and Soule, 1973). The specimens from Korea also have the same acute avicularium slightly below the peristome, thus seem to belong to *P. trispinosa*. However, the most distinctive characteristics of the present new species is that the single or paired pear-shaped avicularia, usually directed distolaterally, are situated lateral to the orifice. The other significant difference with *P. trispinosa* is the occurrence of big triangular avicularium on the frontal surface as well as below the orifice. Two spines are shown in almost all of the zooids except for a few zooids showing one or three spines in our specimens. The new species is also comparable with *P. trispinosa*

which has usually three, sometimes two or four spines. Thus our specimens should not be placed in *Parasmittina trispinosa* complex but should be introduced as a new species. All of the colonies were attached to either a stone or a shell.

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