

Taxonomic Review of Korean *Watersipora* (Bryozoa, Gymnolaemata, Cheilostomata)

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ABSTRACT

Watersipora subovoidea (d'Orbigny, 1852) from Korea is synonymous with *Watersipora subtorquata* (d'Orbigny, 1842), which shows a wide range of variation in the width of zoecium and orifice. *Watersipora platypora* n. sp. which was previously known as *Dakaria bidentata* and *Watersipora arcuata* in Korea is reported to be new species.

Key words: Synonymy, *Watersipora subtorquata*, *Watersipora platypora* n. sp., Marine Bryozoa, Korea

INTRODUCTION

Because watersiporids lack such diagnostic structures as avicularia and ovicells, it is often difficult to identify species. Watersiporids are capable of widespread transport and survival by their fouling mode, environmental tolerances, and competitive advantages. Therefore, many taxonomists concluded that only a single cosmopolitan species, which shows a wide range of variation, may exist in the genus in the 1900's (Soule and Soule, 1976).

Soule and Soule (1976) and Gordon (1989) discussed the synonymy of this species group. They verified *Watersipora subtorquata* (d'Orbigny, 1842), *W. cucullata* (Busk, 1854), and *W. atrofusca* (Busk, 1855), but the identity of *W. subovoidea* is still questionable. Gordon (1989) suggested that the species name *subovoidea* should be dropped because it was confused since Harmer (1957) revived the name *W. subovoidea*.

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Concerning Korean *Watersipora*, *Watersipora subovoidea* (see Seo and Rho, 1989; Seo, 1992; Song and Won, 1992; Seo, 1998), synonymous to *Dakaria subovoidea* (see Rho and Lee, 1980; Rho and Kim, 1981; Rho and Seo, 1984; Song, 1985; Kim and Choe, 1987), is the most common species in Korea (Seo, 1996). However, it has been a confused species in Korea as well as in Japan, where it has been known as *Watersipora cucullata* (see Mawatari, 1952a, b), *W. cucullata* var. *watersi* (see Mawatari, 1952c), *W. subovoidea* (see Mawatari, 1963, 1981), and probably *Dakaria typica* (Okada and Mawatari, 1937).

The purpose of this study is to review the genus *Watersipora* in Korea by measuring the size of the orifices and zooecia with the Digital Image Analysis System.

The examined specimens are deposited at Woosuk University and Ewha Womans University.

TAXONOMIC ACCOUNT

Phylum Bryozoa Ehrenberg, 1831 태형동물문

Class Gymnolaemata Allman, 1856 나후강

Order Cheilostomata Busk, 1852 순구목

Suborder Ascophora Levinsen, 1909 유낭아목

Family Watersiporidae Vigneaux, 1949 물구멍이끼벌레과

Genus *Watersipora* Neviani, 1895 물구멍이끼벌레속

1. *Watersipora subtorquata* (d'Orbigny, 1842) 자주빛이끼벌레 (Fig. 1)

Escharina torquata d'Orbigny, 1842, ?, pl. 4, fig. 3.

Dakaria subovoidea: Rho and Lee, 1980; Rho and Kim, 1981; Rho and Seo, 1984; Song, 1985; Kim and Choe, 1987.

Watersipora subovoidea: Seo and Rho, 1989; Seo, 1992; Song and Won, 1992; Seo, 1998.

Description. Colony usually encrusting on rock, shell and seaweed in intertidal zone; dark grey-black centrally with purplish red margins, sometimes dark orange. Zooecia elongated rectangular, 770-1222 μm long, 371-653 μm wide; the frontal wall evenly perforated by numerous pseudopores, with a pair of areolae distally, one either side of the sinus. Orifice 196-294 μm long, 231-338 μm wide, with rounded or widely V-shaped sinus. Peristome raised, variable, often with proximally curling edges in older zooids, distal rim often with a narrow crest also. Condyles weakly developed. Operculum has a darker mushroom-shaped area centrally and distally. No spines, avicularia and ovicells.

Remarks. This species has been collected from 46 localities in Korean waters (Fig. 2). The specimens from 18 localities were randomly chosen for measurement (Table 1). These specimens show a wide range of variation in size. Especially zooecium and orifice are wider than the one from foreign specimens. All of the specimens belonging to this species from Korea had been known as *Dakaria subovoidea* and *Watersipora subovoidea* until now. However, the name "subovoidea" have caused the confusion in identifying the species of genus *Watersipora* since Harmer (1957). Besides, it is known that *Watersipora subtorquata* of New Zealand was introduced from Japan, so this species extended into the Indo-Pacific Ocean from the Atlantic Ocean (Gordon, 1989). Therefore, *Watersipora subtorquata* is a valid name for the Korean specimens of this species.

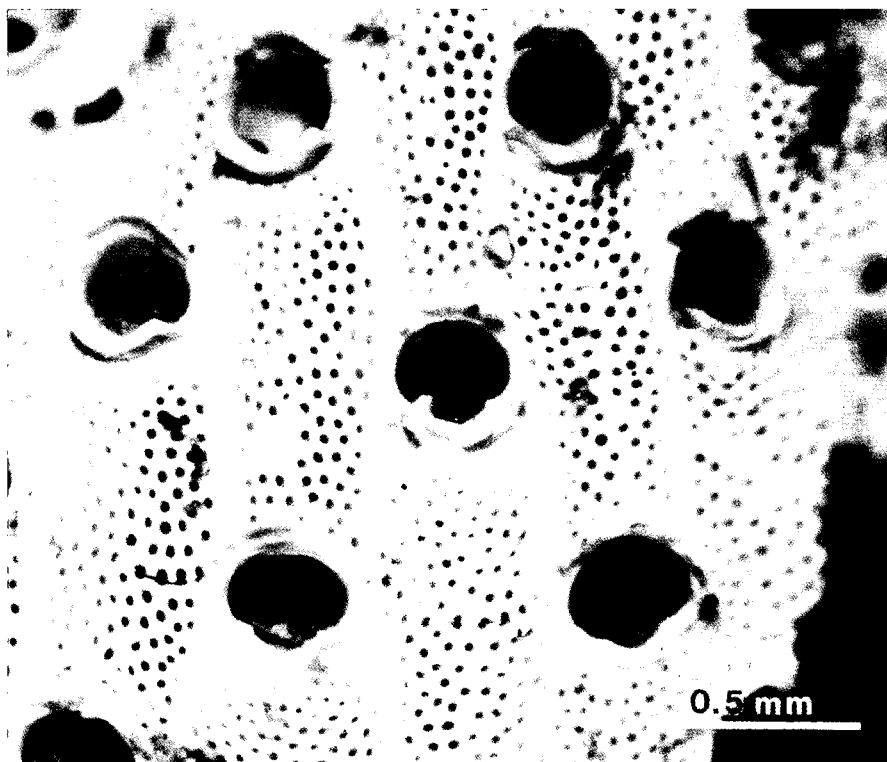


Fig. 1. *Watersipora subtorquata*. The specimen collected from Anhung shows developed distal and proximal peristomes.

Distribution. Brazil, West Indies, Bermuda, Cape Verde Islands, Japan, Torres Strait, Great Barrier Reef, New Zealand.

2. *Watersipora platypora* n. sp. 큰입이기벌레 (신칭) (**Fig. 3**)

Dakaria bidentata: Rho and Seo, 1984, p. 85, pl. 6, figs. 1, 2.

Watersipora arcuata: Seo, 1992, p. 150.

Type specimens. Holotype: Colony attached to the stem of seaweed collected from Sogwipo, Chejudo, on 10, 11 July 1965 by B. J. Rho. The depth is unknown. Paratypes: Colonies from Sogwipo, on 11 July 1965 by B. J. Rho, Wimi-ri, 8 July 1972, B. J. Rho, 13 July 1979 by H. K. Kim, Mipo, 25 May 1981, J. E. Seo, Pomdo, on 21 May 1982 by J. I. Song, 17 January 1985 by J. E. Seo, Sammaebong on 18 January 1985 by J. E. Seo. The substrata are seaweed and shell. All of the specimens are deposited at the Department of Biology, Woosuk University.

Description. Colonies encrusting, to erect, multilamellar, forming large, irregular and fragile colony, nearly black. Zoecia arranged alternative regularly, rectangular, trunk shaped, 860-1200 μm long, 300-400 μm wide; with a pair of areolae distally, one either side of the orifice. Frontal surface perforated by approximately 100 pseudopores, Orifice much wider than long, 220 μm long, 320-340 μm wide; proximal margin concave; condyles small and hidden inconspicuously.

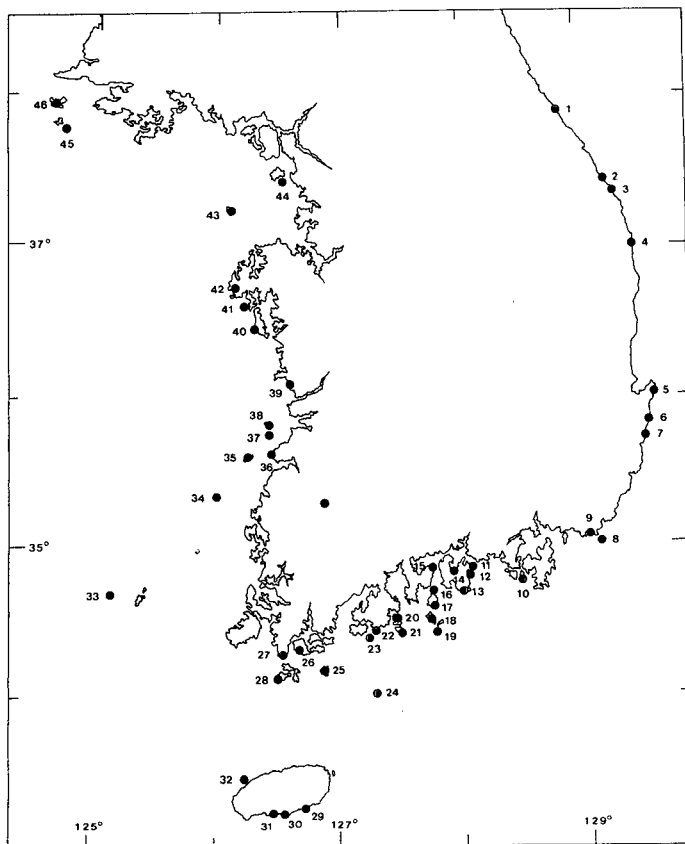


Fig. 2. A map showing the localities where *W. subtorquata* was collected. 1, Chumunjin; 2, Samchok; 3, Kundok; 4, Ulchin; 5, Kuryongpo; 6, Kampo; 7, Wolsong; 8, Orukdo; 9, Mipo; 10, Pijindo; 11, Shinsudo; 12, Mijo; 13, Nodo; 14, Sangju; 15, Pangjukpo; 16, Yosu; 17, Odongdo; 18, Kumodo; 19, Sorido; 20, Pongnam; 21, Chukjong; 22, Naebal; 23, Chijuk; 24, Annorudo; 25, Chongsando; 26, Wando; 27, Hoenggando; 28, Pogildo; 29, Supdo; 30, Sogwipo; 31, Taepo; 32, Piyangdo; 33, Hondo; 34, Anmado; 35, Wido; 36, Kyokpo; 37, Turido; 38, Shinsido; 39, Sochon; 40, Anmyondo (Pangpo); 41, Shinjindo; 42, Anhung; 43, Tokchokdo; 44, Chakyakdo; 45, Sochongdo; 46, Paengnyongdo.

Peristome slightly developed. Spines, avicularia, and ovicells absent.

Remarks. *Dakaria bidentata* (see Rho and Seo, 1984) and *Watersipora arcuata* (see Seo, 1992) are synonymous to *Watersipora platypora*. *Watersipora platypora* n. sp. is the most closely related to *W. arcuata* Banta, 1969 showing the characteristic concave proximal border of the orifice (Banta, 1969). New species, however, can be distinguished from *W. arcuata* by its broader orifice. Compared with *Watersipora arcuata*, which zoecium is 910 μm long, 380 μm wide and orifice is 200 μm long, 225 μm wide in average, the orifice of *Watersipora platypora* is wider, 320-340 μm . The numbers of pseudopores are more than ones of *W. arcuata*, which has 150 pseudopores.

Etymology. The specific name is derived from Greek, referring to the broad orifice of the species.

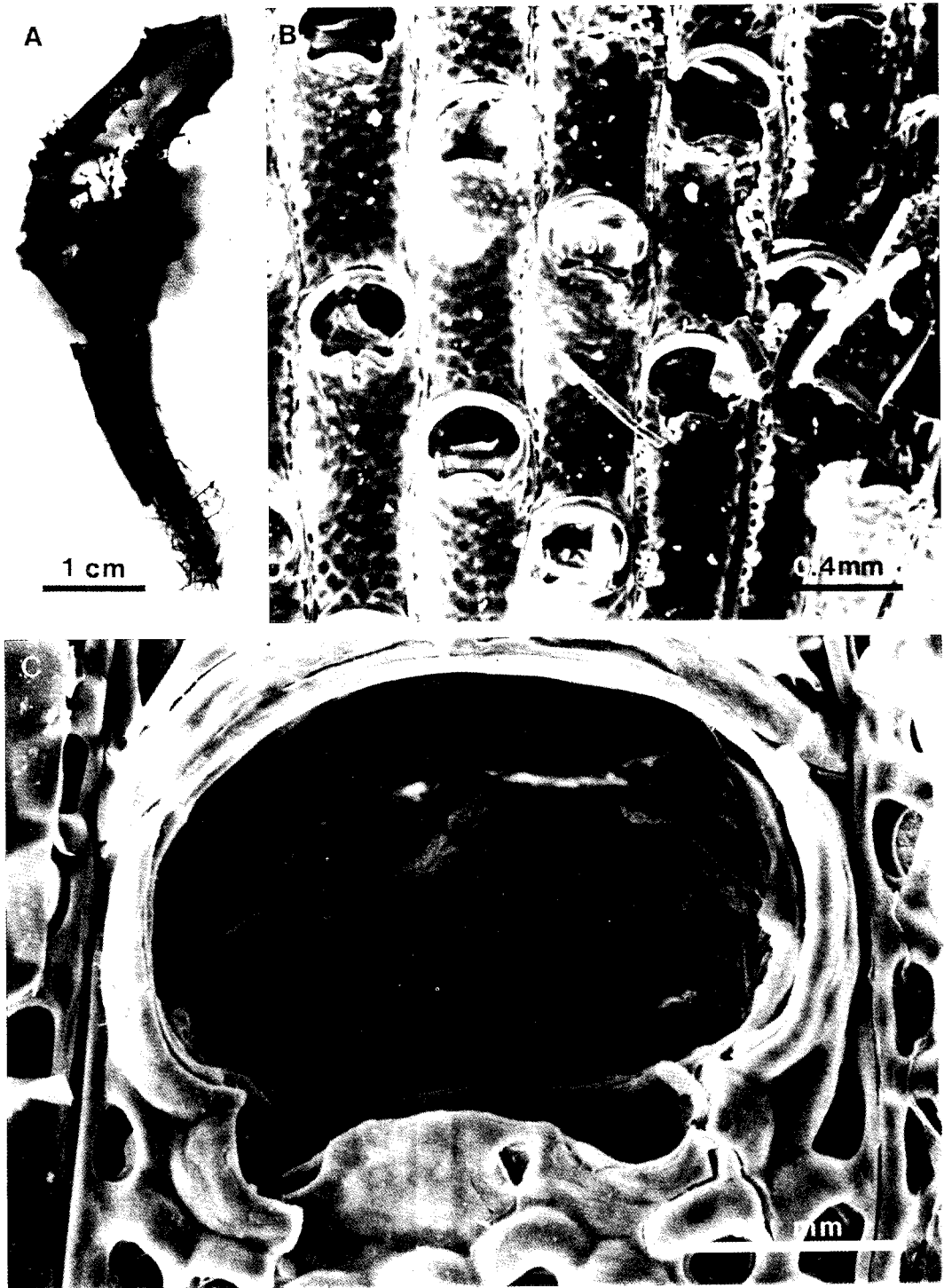


Fig. 3. *Watersipora platypora* n. sp. A, colony attaching to the stem of seaweed; B, arrangement of zooids; C, broad orifice with concave proximal margin.

Table 1. Comparison of average size. Variation in *Watersipora subtorquata* of Korean, Pacific, and Atlantic Waters.

Locality	Zooecium		Orifice		Sinus
	L	W	L	W	W
Chumunjin	1222	508	261	284	118
Samchok	906	423	236	274	122
Kundok	827	472	229	264	109
Kuryongpo	1046	577	251	333	191
Mipo	965	371	234	287	122
Mijo	880	415	196	231	102
Odongdo	770	435	227	238	148
Kumodo	849	455	213	280	107
Komondo (Annorudo)	947	515	235	312	166
Taepo	1525	514	240	294	125
Anmado	1079	548	257	338	156
Wido	1092	593	259	342	134
Kyokpo	1023	453	284	294	138
Anmyondo (Pangpo)	1162	519	257	320	146
Shinjindo	1088	475	268	298	120
Anhung	1138	432	254	270	142
Tokchokdo	828	653	241	266	129
Chakyakdo	954	484	249	306	131
Brazil	913	384	230	271	107
Bermuda	1044	425	231	243	99
West Indies	993	458	211	230	115
Japan	1092	437	195	250	109
New Zealand	1120	485			

* L: Length; W: Width

* Averages of 10 zooecia in microns

* The size of the foreign specimens were cited from Soule and Soule (1976), and Gordon (1989).

DISCUSSION

Table 1 shows the measurement of the size of the zooecia, orifices, and sinus of *Watersipora subtorquata* collected from 18 localities of Korea. Korean specimens show a wide range of variation in size, especially the width of zooecium, as compared with the specimens from Brazil, Bermuda, the West Indies, New Zealand and Japan. Harmer (1957) caused synonymy confusion about this species by reviving the *Watersipora* species group as one species, *W. subovoidea*. For that reason, Gordon (1989) wrote the species name *subovoidea* should be dropped. Besides, *Watersipora subtorquata* which used to be a tropical species has been collected from

Massachusetts, which indicates a temperate extension of this species (Soule and Soule, 1976). Therefore, it is valid that *Watersipora subovoidea* from Korea is synonymous with *W. subtorquata* showing a wide range of size.

The type locality of *Watersipora subtorquata* is Rio de Janeiro, Brazil. This species was reported as one of the exotic marine fouling species introduced into New Zealand and identified in 1982. Furthermore, its introduction may have been from Japan (Gordon and Mawatari, 1992). This well-known subcosmopolitan species is one of the most ubiquitous fouling bryozoans in New Zealand for the present, occurring at a significant number of ports and smaller harbors (Gordon and Mawatari, 1992). In Korea, this species was reported from Incheon Bay in 1941 for the first time (Kamita and Sato, 1941). It is possible that this species was invasive to Korea as early as the 1900's.

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한국산 *Watersipora*의 분류학적 재검토

서 지 은
(우석대학교 생물학과)

요 약

지금까지 *Watersipora subovoidea*와 *Dakaria subovoidea*로 보고되어 왔던 한국산 *Watersipora* 1종을 *Watersipora subtorquata* (d'Orbigny, 1842)의 동종이명으로 보고하고자 한다. 또한 충실구의 형태와 크기가 특징적인 *Watersipora platypora*를 신종으로 보고한다. 이로서 한국산 *Watersipora* 속에 속하는 종은 *Watersipora subtorquata*와 *Watersipora platypora* 두종이다.