

## Two New Marine Sponges of the Genus *Haliclona* (Haplosclerida: Chalinidae) from Korea

Dong Won Kang<sup>1</sup>, Kyung Jin Lee<sup>2</sup>, Chung Ja Sim<sup>3,\*</sup>

<sup>1</sup>Research and Planning Division, National Science Museum, Daejeon 305-705, Korea

<sup>2</sup>Biological Resources Coordination Division, National Institute of Biological Resources, Environmental Research Complex, Incheon 404-708, Korea

<sup>3</sup>Department of Biological Sciences, College of Life Science and Nano Technology, Hannam University, Daejeon 305-811, Korea

### ABSTRACT

Two new marine sponges, *Haliclona (Haliclona) tonggumiensis* n. sp. and *H. (Reniera) sinyeoensis* n. sp., in the family Chalinidae were collected from Ulleungdo Island and Gageodo Island, Korea from 2007 to 2009. *Haliclona (Haliclona) tonggumiensis* n. sp. is similar to *H. (H.) simulans* (Johnston, 1842) in shape, but the former differs in its ectosomal skeleton structure and spicules' shape and size. The ectosomal skeleton of *H. (H.) tonggumiensis* n. sp. is absent, but that of *H. (H.) simulans* is very regularly arranged, and has tangential reticulation with oxea. The spicule shape of *H. (H.) tonggumiensis* n. sp. is slender, but that of *H. (H.) simulans* is short and cigar-shape. The new species have two sizes of oxea, but *H. (H.) simulans* has one size of oxea. *Haliclona (Reniera) sinyeoensis* n. sp. resembles *H. (R.) tubifera* (George and Wilson, 1919) in the growth form and choanosomal skeleton structure. However, the new species has two kinds of oxea in size, but *H. (R.) tubifera* has only one size.

**Keywords:** *Haliclona*, new species, Chalinidae, Korea

### INTRODUCTION

The family Chalinidae Gray, 1867 which is the largest family of the order Haplosclerida (De Weerd, 1986) has worldwide distribution and is taxonomically most complicated, because of their scarcity, simplicity and sometimes high variability of taxonomic characters (De Weerd, 2000). This family consists of four genera, including *Dendroxea*, *Chalinula*, *Cladocroce*, and *Haliclona*. According to the World Porifera Database (WPD) (Van Soest et al., 2012), 197 species of the genus *Haliclona* are reported from the world. The genus *Haliclona* is subdivided into six subgenera, *Gellius*, *Halichoelona*, *Haliclona*, *Reniera*, *Rhizoniera*, and *Soestella* (Hooper and Van Soest, 2002).

According to the definition of De Weerd (2000) for the genus *Haliclona*, the choanosomal skeleton of subgenus *Haliclona* is regularly reticulated like a ladder by uni-paucispicular primary lines and is regularly connected by unispicular secondary lines. Oxeas are short, rather robust, fusiform

or with acerated points. The choanosomal skeleton of subgenus *Reniera* consists of a delicate, regular, unispicular and isotropic reticulation. Oxeas are frequently blunt-pointed or strongylote. Twenty nine species of genus *Haliclona* have been reported from Korean waters (Kim et al., 1968; Rho and Lee, 1976; Sim, 1981; Rho and Yang, 1983; Sim and Kim, 1988, 2002; Sim and Byeon, 1989; Sim et al., 1992; Sim and Lee, 1997; Kim and Sim, 2004; Kang and Sim, 2007, Jeon and Sim, 2008). Among them, one species of subgenus *Haliclona* and one species of subgenus *Reniera* have been reported (Kang and Sim, 2007 in WPD).

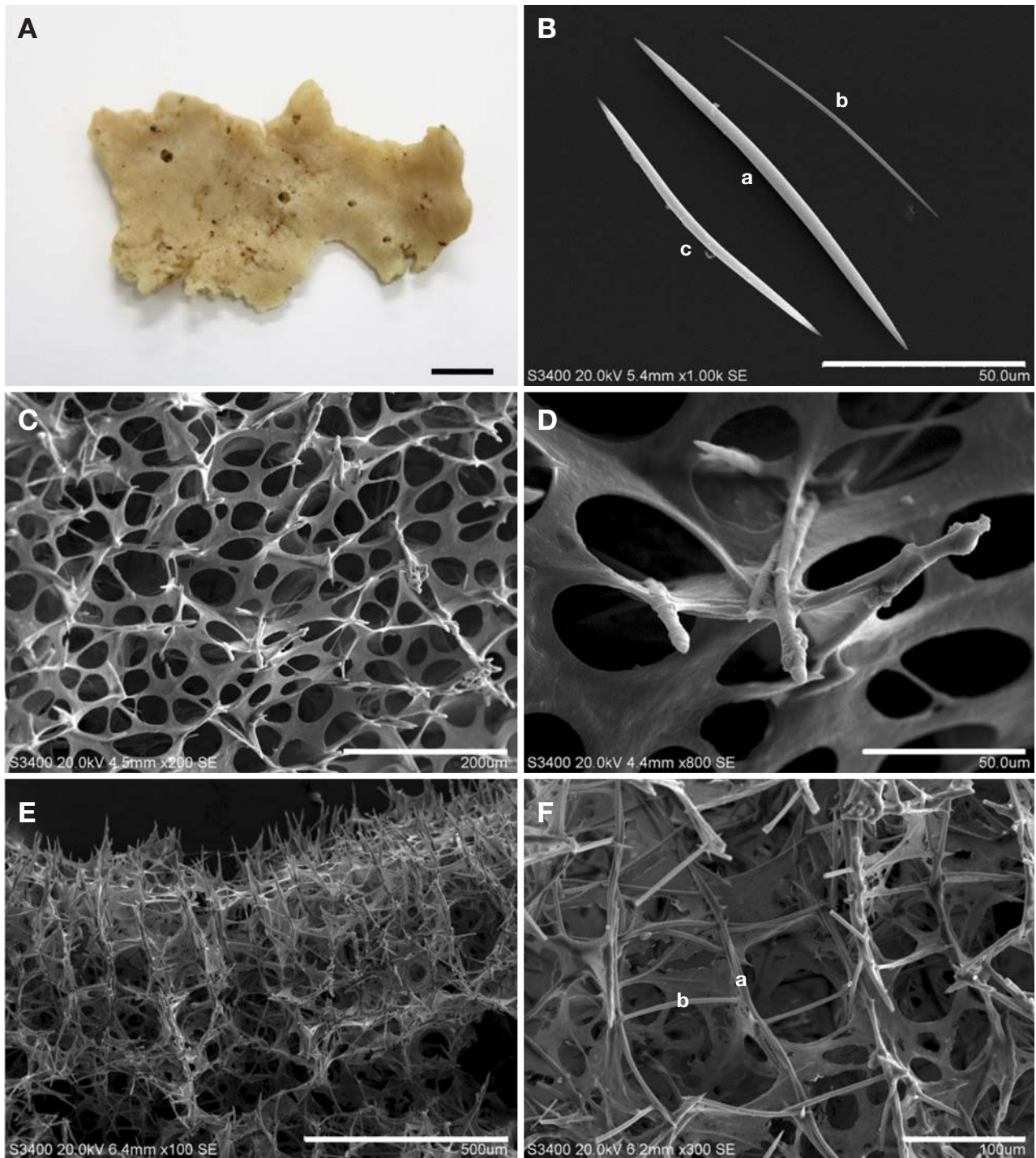
### MATERIALS AND METHODS

Sponges were collected by SCUBA diving from Gageodo Island and Ulleungdo Island, Korea, from 2007 to 2009. Specimens were fixed in 95% or 99.9% ethanol. Spicules were observed under a light microscope (Axioskop II; Carl

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**\*To whom correspondence should be addressed**

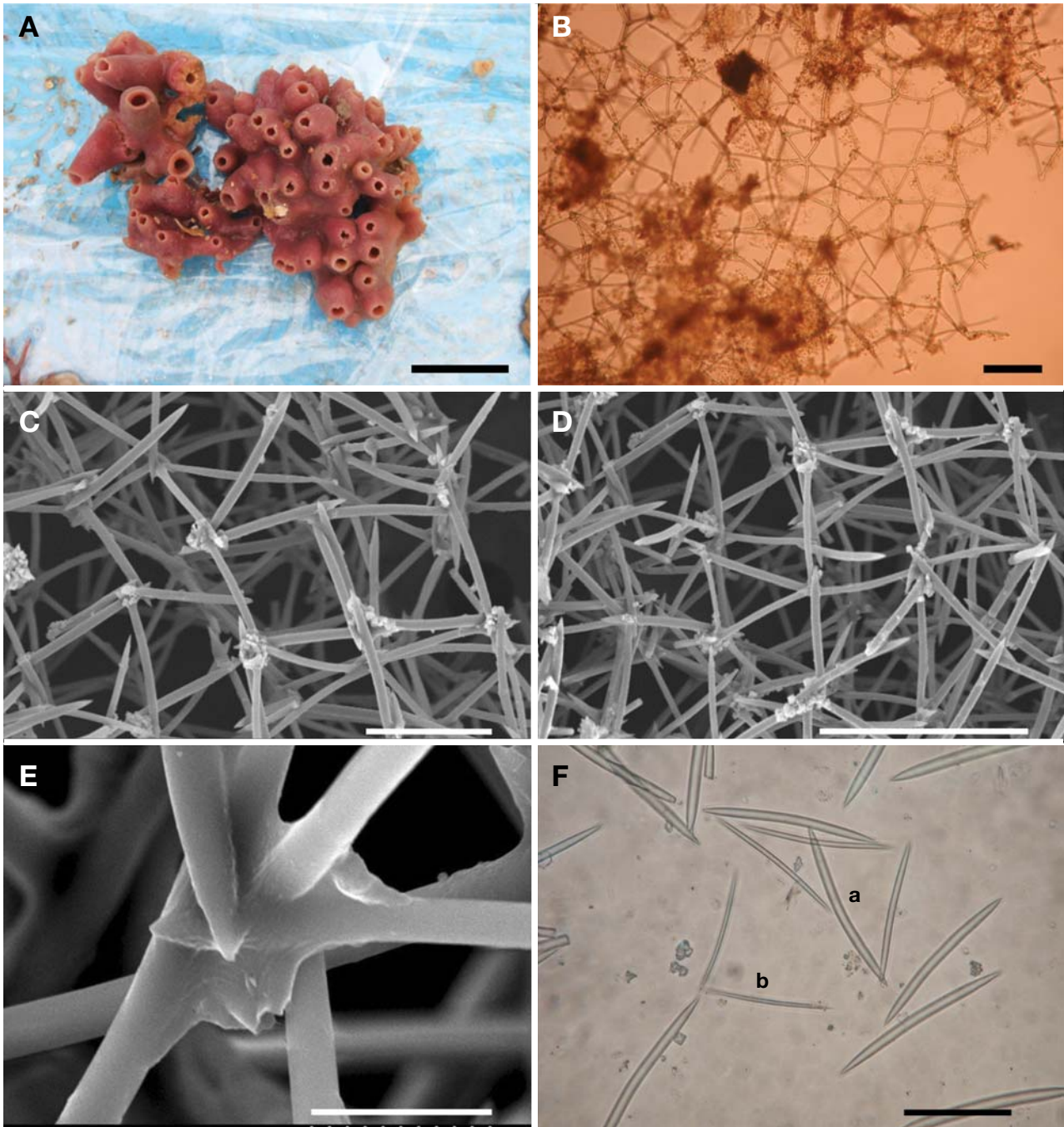
Tel: 82-42-629-8455, Fax: 82-42-629-8280  
E-mail: cjsim@hnu.kr



**Fig. 1.** *Haliclona (Haliclona) tonggumiensis* n. sp. A, Entire animal; B, Spicule (thick oxea [a], thin oxea [b], bent of oxea at the middle [c]); C, D, Surface structure; E, Chaenosomal skeleton; F, Chaenosomal skeleton (uni-paucispicular primary lines [a], regularly connected by unispicular secondary lines [b]). Scale bars: A=1 cm, B, D=50  $\mu$ m, C=200  $\mu$ m, E=500  $\mu$ m, F=100  $\mu$ m.

Zeiss, Jena, Germany). Identification was made on the basis of external features of the sponges, including growth form, skeletal structure, and spicule size and form of spicules. For

the observation of the chaenosomal skeletal structure, thin free-hand sections were made with specimens hardened in alcohol using a surgical blade. Spicules were prepared by



**Fig. 2.** *Haliclona (Reniera) sinyeoensis* n. sp. A, Entire animal; B, Ectosomal skeleton; C, D, Choanosomal skeleton; E, Spongin at the end of spicule; F, Spicule (thick oxea [a], thin oxea [b]). Scale bars: A=3 cm, B, C, F=100  $\mu$ m, D=200  $\mu$ m, E=20  $\mu$ m.

dissolving a piece of sponge in sodium hypochlorite and were examined under a scanning electron microscope (HITACHI S-3500) (Rützler, 1978; Hooper, 1996). Holotypes of two new species have been deposited in the National Institute of Biological Resources (NIBR), Incheon, Korea. Para-

types have been deposited in the National Science Museum of Korea (NSMK) and the Natural History Museum of Hannam University (HUNHM), Daejeon, Korea. The classification used here follows the Systema Porifera (Hooper and Van Soest, 2002).



## SYSTEMATIC ACCOUNTS

Phylum Porifera Grant, 1836  
Class Demospongiae Sollas, 1885  
Order Haplosclerina Topsent, 1928  
Family Chalinidae Gray, 1867  
Genus *Haliclona* Grant, 1863

### <sup>1</sup>\**Haliclona (Haliclona) tonggumiensis* n. sp. (Fig. 1)

**Material examined.** Holotype, Korea: Gyeongsanbuk-do, Ulleung-gun, Seo-myeon, Namyang-ri, Tonggumi, 9 Sep 2009, SCUBA diving, 3 m depth, Kang DW, Rho HS, deposited in the NIBR (NIBRIV0000259987). Paratype are deposited in NSMK (NSMK-POR-0000004) and in HUNHM (por. 110).

**Description.** Growth form thinly encrusting, 0.1 cm thickness and 5 cm width, with small circular oscules. Oscules 0.1–0.2 cm in diameter, scattered on surface. Color pink in life gradually changing to ivory in alcohol. Texture soft, fragile and compressible. Surface smooth and even. Spongin moderate to abundant, yellowish and clearly visible. Skeletal structure on surface reticularly arranged by unispicular oxea under membrane with pores, and single oxea slightly hispid to outer surface. Skeleton in thin surface membrane absent. Choanosomal skeleton composed of ladder-like reticulation by uni-paucispicular primary lines and regularly connected by unispicular secondary lines. Spicules composed of two type of oxea and no microscleres. Thick oxea approximately  $90-110 \times 3.5-5 \mu\text{m}$  in size. Thin oxea approximately  $60-70 \times 1-1.5 \mu\text{m}$  in size. Fusiform thick oxeas, straight to slightly arched or bent at middle.

**Etymology.** This species is named after the type locality, Tonggumi, Ulleungdo Island, Korea.

**Remarks.** *Haliclona (Haliclona) tonggumiensis* n. sp. is similar to *H. (H.) simulans* (Johnston, 1842) in shape, but the former differs in its ectosomal skeleton structure and spicule shape and size. The ectosomal skeleton of *H. (H.) tonggumiensis* n. sp. is absent, but that of *H. (H.) simulans* is very regularly arranged, and has tangential reticulation with oxea (see De Weerd, 1986). The spicule shape of *H. (H.) tonggumiensis* n. sp. is slender but that of *H. (H.) simulans* is short and cigar-shape. The new species have two sizes of oxea but *H. (H.) simulans* has one size of oxea.

### <sup>2</sup>\**Haliclona (Reniera) sinyeoensis* n. sp. (Fig. 2)

**Material examined.** Holotype, Korea: Jeollanam-do, Sinan-

gun, Heuksan-myeon, Gageodo-ri, Sinyeo, 19 Jul 2007, SCU-BA 20 m depth, Kim HS, deposited in the NIBR (NIBRIV0000259988). Paratype (por. 111), deposited in the HUNHM.

**Description.** Cushion-shaped, with several volcano- or chimney-shaped oscular elevations up to 1.5–4 cm high. Up to 7 cm width, 5.5 cm height and 0.6–1.5 cm thickness. Oscules 0.4–1.5 cm in diameter, opened at top of chimney. Color purple and pink in life gradually changing to ivory in alcohol. Texture soft compressible and fragile. Surface smooth, even. Ectosomal skeleton composed of unispicular and isotropic reticulation. Spongin appear at node of spicule. Choanosomal skeleton composed of very regular, ladder-like reticulation, and without clear distinction between primary and secondary lines. Spicules composed of oxeas of two kinds in size, without microscleres. Thick oxeas approximately  $130-150 \times 5-8 \mu\text{m}$  and thin oxeas approximately  $90-115 \times 2.5-4 \mu\text{m}$  in size.

**Etymology.** This species is named after the type locality, Sinyeo, Gageodo Island, Korea.

**Remark.** *Haliclona (Reniera) sinyeoensis* n. sp. resemble *H. (R.) tubifera* (George and Wilson, 1919) (see De Weerd, 2000) in their growth form, shape and choanosomal skeleton. Also, oscules open at the top of each tube. However, the new species has two sizes of oxea, but *H. (R.) tubifera* has only one size.

## ACKNOWLEDGMENTS

This study was supported by a grant from the National Institute of Biological Resources (NIBR) of Korea and a grant funded by the Korea Science and Engineering Foundation (KOSEF) (no. 2012-0006000).

## REFERENCES

- De Weerd WH, 1986. A systematic revision of the north-eastern Atlantic shallow-water Haplosclerida (Porifera, Demospongiae): 2. Chalinidae. *Beaufortia*, 36:81-165.
- De Weerd WH, 2000. A monograph of the shallow-water Chalinidae (Porifera, Haplosclerida) of the Caribbean. *Beaufortia*, 50:1-67.
- Hooper JNA, 1996. Revision of the Microcionidae (Porifera: Poecilosclerida: Demospongiae) with description of Australian species. *Memoirs of the Queensland Museum*, 40:1-626.
- Hooper JNA, Van Soest RWM, 2002. *Systema Porifera. A guide to the classification of sponges*. Vol. 1. Kluwer Academic/Plenum Publishers Press, New York, pp. 1-1101.

- Jeon YJ, Sim CJ, 2008. Two species of Chalinidae (Demospongiae: Haplosclerida) from Korea. *Korean Journal of Systematic Zoology*, 24:147-150.
- Kang DW, Sim CJ, 2007. Two new sponges of the genus *Haliclona* (Demospongiae: Haplosclerida: Chalinidae) from Korea. *Korean Journal of Systematic Zoology*, 23:169-173.
- Kim HJ, Sim CJ, 2004. A new sponge of the genus *Haliclona* (*Gellius*) (Haplosclerida: Chalinidae) from Gageodo Island (So-Huksando), Korea. *Korean Journal of Biological Sciences*, 8:247-250.
- Kim HS, Rho BJ, Sim CJ, 1968. Marine sponges in South Korea (1). *Korean Journal of Systematic Zoology*, 11:37-48.
- Rho BJ, Lee KH, 1976. A survey of marine sponges of Haeundae and its adjacent water. *Journal of Korean Research Institute for Better Living, Ewha Womans University*, 17:93-111.
- Rho BJ, Yang CI, 1983. A systematic study on the marine sponges in Korea. 2. Ceractinomorpha. *Journal of Korean Research Institute for Better Living, Ewha Womans University*, 32:25-45.
- Rützler K, 1978. Sponges in coral reefs. In: *Coral reefs: research methods. Monographs on oceanographic methodology. Vol. 5* (Eds., Stoddart DR, Johannes RE). UNESCO, Paris, pp. 299-313.
- Sim CJ, 1981. A systematic study on the marine sponges in Korea. 1. Ceractinomorpha and Tetractinomorpha. *Soong Jun University Essays and Papers*, 11:83-105.
- Sim CJ, Byeon HS, 1989. A systematic study on the marine sponges in Korea. 9. Ceractinomorpha. *Korean Journal of Systematic Zoology*, 5:33-57.
- Sim CJ, Kim HJ, 2002. Two New records of marine sponge in Jeju Island, Korea. *Korean Journal of Systematic Zoology*, 18:59-63.
- Sim CJ, Kim MH, 1988. A systematic study on the marine sponges in Korea. 7. Demospongiae and Hexactinellida. *Korean Journal of Systematic Zoology*, 4:21-42.
- Sim CJ, Kim YS, Kim YH, 1992. Systematic study on marine sponges in Korea. 10. Demosponges of Cheju Island. *Korean Journal of Systematic Zoology*, 8:301-324.
- Sim CJ, Lee KJ, 1997. Two species of Haplosclerida (Demospongiae) from Kōjedo, Korea. *Korean Journal of Systematic Zoology*, 13:55-60.
- Van Soest RWM, Boury-Esnault N, Hooper JNA, Rützler K, de Voogd NJ, Alvarez de Glasby B, Hajdu E, Pisera AB, Manconi R, Schoenberg C, Janussen D, Tabachnick KR, Klautau M, Picton B, Kelly M, Vacelet J, Dohrmann M, Cristina Diaz M, 2012. World Porifera Database [Internet]. The world register of marine species (WoRMS). World Porifera Database, Accessed 25 Oct 2012, <<http://www.marinespecies.org/porifera>>.

Received September 12, 2012  
 Revised November 21, 2012  
 Accepted November 23, 2012