

Two New Species of the Genus *Mycale* (Poecilosclerida: Mycalidae) from Korea

Chung Ja Sim* and Kyung Jin Lee

Department of Biology, College of Natural Sciences, Hannam University, Taejeon 300-791, Korea

Key Words :

Poecilosclerida
Mycalidae
Mycale
Aegogropila
Korea

Two new species belonging to genus *Mycale* are described from the waters around Geojedo Island and Gageodo Island, Korea. *Mycale* (*M.*) *geojensis* n. sp. seems close to *M. (M.) adhaerens parvasigma* Hoshino, 1981, but our new species has three categories of anisochelae. *M. (Aegogropila) hentscheli* n. sp. is closest to *M. (A.) obscura* (Carter, 1882) in shape and spicule, but has no large sigma.

The genus *Mycale* belonging to the family Mycalidae is a very large group of poecilosclerid sponges and over 150 species have been recorded from all around the world (Hadju, 1995). This genus is characterized by subtylostyle megascleres and palmate anisochelae, and other microscleres may include toxa, raphides, microxea and palmate anisochelae (Soest, 1984). Gray (1867) erected five different genera for sponges sharing a comparable set of spicules, *Mycale*, *Aegogropila*, *Grapelia*, *Camia* and *Corybas* (in Hadju, 1995). Topsent (1924) working with European species distinguished four sub-genera. Van Soest (1984) re-evaluated Topsent's subdivision: he recognized four sub-generic groups within *Mycale* on the basis of habit, ectosomal skeleton, choanosomal skeleton, microsclere types present, number of size categories of microsclere present, and size of megascleres. Three of Soest's subgenera, *Mycale*, *Aegogropila* and *Camia*, were given generic status by Bergquist and Fromont (1988). Hadju (1995) recognized a sub-generic group within genus *Mycale*. Only four species of *Mycale* have been reported from the Korean waters (Kim et al., 1968; Rho et al., 1969; Rho and Yang, 1983; Sim and Bae, 1987).

The materials examined in the present study were collected by SCUBA from around Geojedo and Gageodo Islands in Korea. Microscopical preparations were made according to the method described by Rützler (1978) and Hadju (1995). Special attention was taken to unravel details of microsclere morphology with the use of SEM (AKASHI IS-ISS40). Type specimens have been deposited at the Natural History Museum (NHM), Hannam University, Taejeon, Korea.

Results

Class Demospongiae Sollas, 1885
Subclass Ceractinomorpha Lévi, 1953
Order Poecilosclerida Topsent, 1928
Suborder Mycalina Hajdu, van Soest and Hooper, 1994
Family Mycalidae Lundbeck, 1905

Mycale (Mycale) geojensis n. sp.
(Fig. 1A-I)

Type specimen: Holotype (Por. 34, NHM, Hannam Univ.), Hakdong (Geojedo I.) on 29 Jan. 1997, 20 m depth (SCUBA).

Description: Specimens irregular, massive with several branches, size up to 9 × 5 × 4 cm. Surface covered with thin membrane. Oscules opened on top of branch, about 4-5 mm in diameter. Texture lightly compressible. Color dark yellow in life, ivory in spirits (Fig. 1A).

Skeleton. Ectosomal skeleton composed of thin tangential layer of thin subtylostyles intermingled with few rosettes of anisochelae I (100-120 μm in diameter, 10-15 anisochelae each) (Fig. 1B). Anisochelae II and III single. Subectosomal tracts of thick subtylostyles (30-70 μm wide) slightly piercing the surface membrane. Many rosettes of anisochelae I (130-150 μm in diameter, 30-47 anisochelae each) occur in the mesenchyme between reticulation, especially in subectosomal layer (Fig. 1E). Choanosomal skeleton made by stout tracts of thick subtylostyles (50-150 μm wide) (Fig. 1C). Single anisochelae II and III scattered between dense choanosomal bundles. Sigma and single anisochelae II and III abundant all over sponge.

Spicules. Megascleres

Thin subtylostyle 250-330 × 3-6 μm
Thick subtylostyle 260-330 × 8-10 μm

* To whom correspondence should be addressed.
Tel: 82-42-629-7485, Fax: 82-42-625-3277
E-mail: cjsim@mail.hannam.ac.kr

Microscleres	
Anisochelae I	45-50 μm
Anisochelae II	20-25 μm
Anisochelae III	15-18 μm
Sigma	20-28 μm

Etymology: This species is named after its type locality.

Remarks: *Mycale* (*M.*) *geojensis* n. sp. seems close to *M. (M.) adhaerens parvasigma* Hoshino, 1981 on the

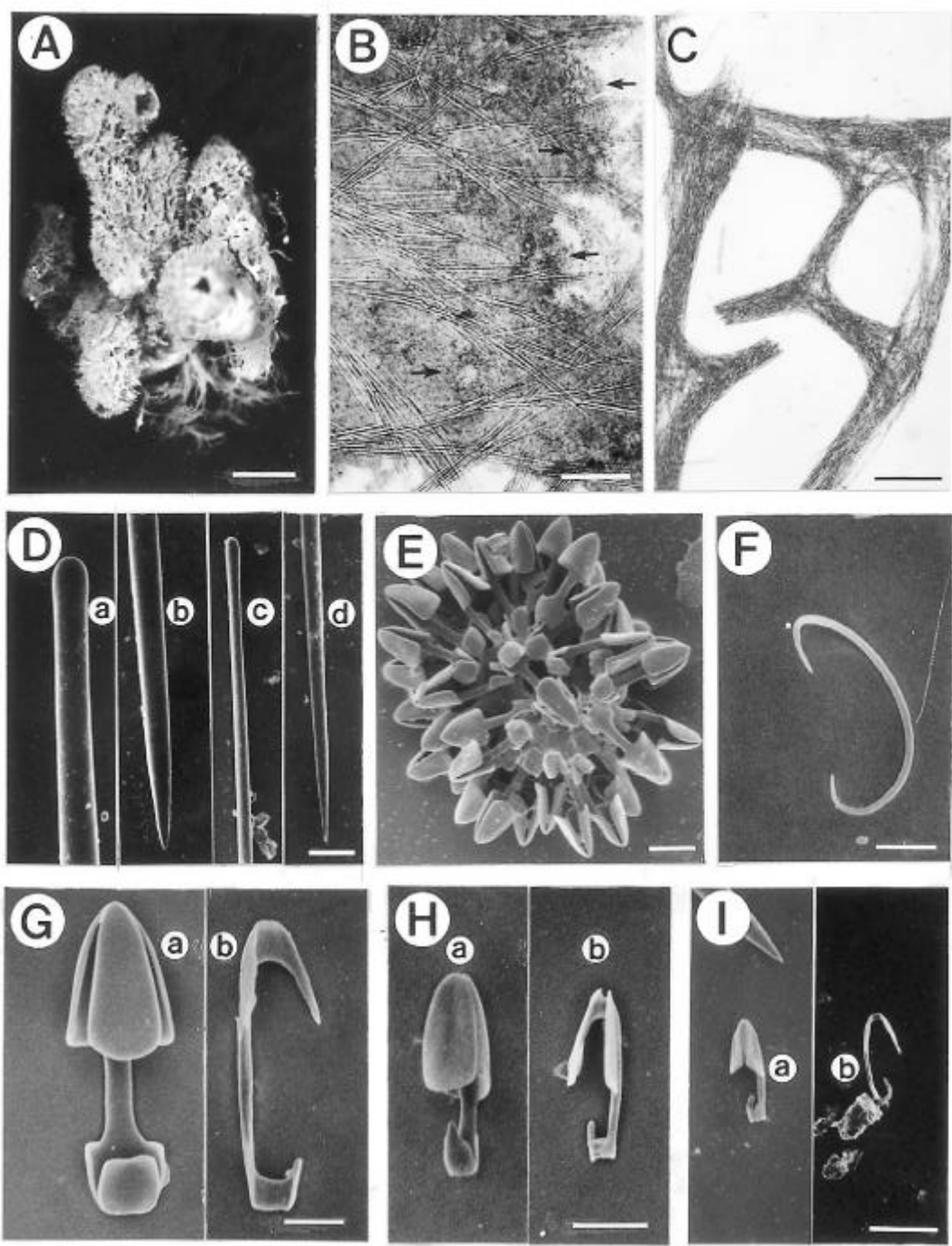


Fig. 1. *Mycale* (*Mycale*) *geojensis* n. sp.. A, Whole specimen, upper surface. B, Skeletal structure of subectosome (tangential section, rosettes indicated by arrow). C, Choanosomal skeleton made by stout tracts of thick subtylostyles. D, Megasccleres (SEM), a, the head of thick subtylostyles; b, the point of thick subtylostyles; c, the head of thin subtylostyles; d, the point of thin subtylostyles. E, Rosette of anisochelae I (SEM). F-I, Microscleres (SEM); F, sigma. G, a, anisochelae I; b, reduced alae of anisochelae I. H, a, anisochelae II; b, reduced alae of anisochelae II. I, a, anisochelae III; b, reduced alae of anisochelae III. Scale bars=10 μm (F-I), 20 μm (D, E), 50 μm (B), 100 μm (C), and 2 cm (A).

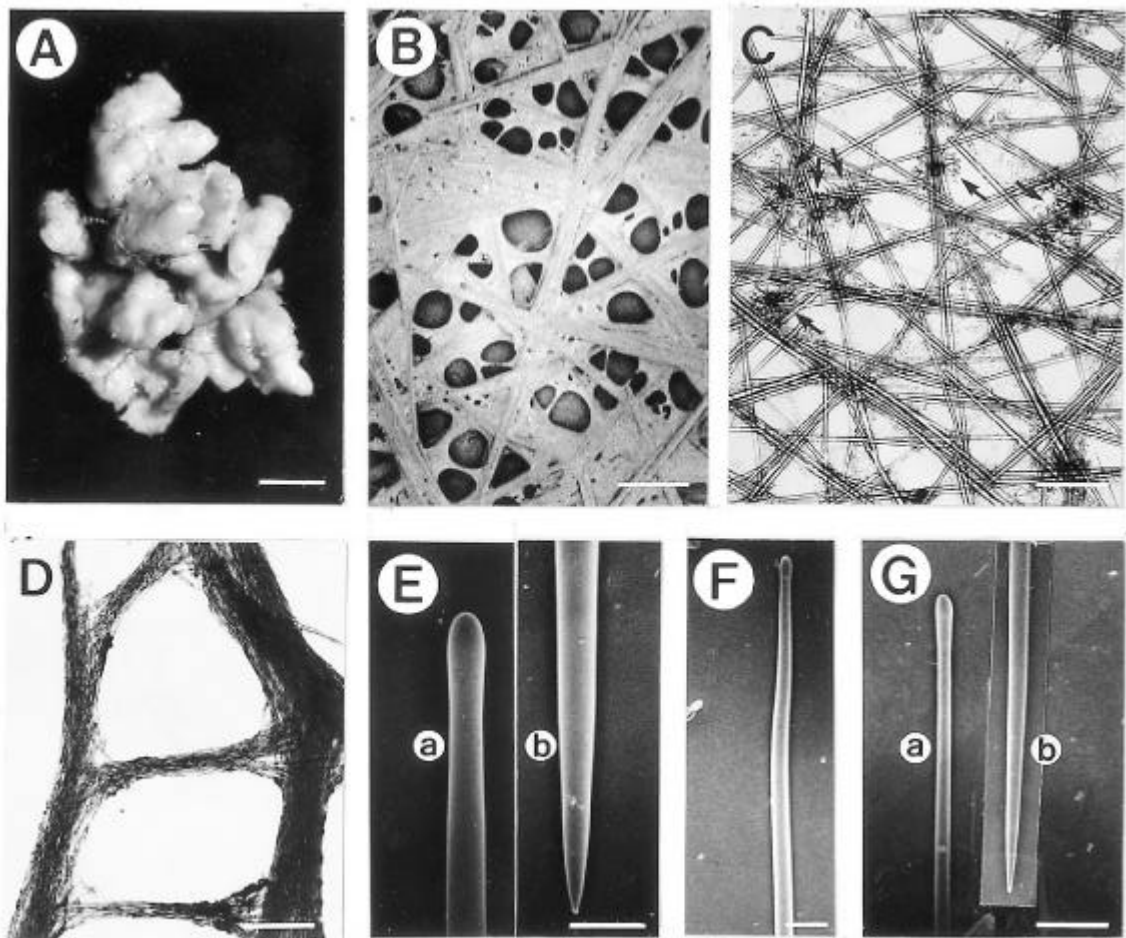


Fig. 2. *Mycale (Aegogropila) hentscheli* n. sp. A, Whole specimen, upper surface. B, Skeletal structure of membrane (tangential section, SEM). C, Skeletal structure with rosettes of membrane (tangential section, rosettes indicated by arrow). D, Choanosomal reticulation with bundles of thick subtylostyles. E-G Megascleres (SEM); E, Head of thick subtylostyles (a) and apex of subtylostyles (b). F, Slightly flexuous subtylostyle. G, Head of thin subtylostyle (a) and apex of subtylostyle (b). Scale bars=20 μ m (E-G), 50 μ m (B, C), 200 μ m (D), and 1 cm (A).

basis of the shape of anisochelae I and II. However, these two species are clearly separated by the following differences. Hoshino's species possesses two categories of anisochelae, but the new species has three categories of anisochelae. In rosette, Hoshino's species consists of about 12 anisochelae, but the present species has 30-47 anisochelae. *M. (M.) adhaerens nullasrosette* Hoshino, 1981 does not have rosette and anisochelae III.

Mycale (Aegogropila) hentscheli n. sp.
(Fig. 2. A-M, Fig. 3. A-F)

Type specimen: Holotype (Por. 35, NHM, Hannam Univ.), Gageodo I., on 13 Aug. 1999, 20 m depth (SCUBA).

Description: Specimens irregular, encrusting, and massive with little mammillate form. Among several fragments, largest one measured $3 \times 2.5 \times 1.3$ cm. Surface smooth and covered with thin dermal membrane. Oscules open

on top of mammiform, about 1-2.5 mm in diameter. Texture soft and fragile. Color blue purple in life, but endosome brown (Fig. 1A).

Skeleton. Ectosomal skeleton, tangential reticulation of thin subtylostyles with net-form, race-like dermal layer (Fig. 2B, C). Choanosomal skeleton, thick track of spicule fibre (60-220 μ m wide), branching at various angle and becoming more plumose near surface (Fig. 2D). Spicule fibres generally poor in spongin, but very tightly attached and thus difficult to solve. Many microscleres dispersed in all of sponge mesohyle. Rosettes of anisochelae I (80-100 μ m in diameter, 10-18 anisochelae each), and anisochelae II and III very abundant in dermal mesohyle. Reduced form of anisochelae I also abundant.

Megascleres. Two categories of subtylostyle, slightly flexuous (Fig. 2E-G).

Microscleres. Three categories of anisochelae, sigma (Fig. 3B-F). Head of anisochelae I three times height of foot, frontal alae of head forming larger angle with shaft than one of foot (Fig. 3B). Anisochelae II, shaft

slightly bent at near middle, lateral alae forming long wing-like processes (Fig. 3Ca-c and E). Central axis of shaft with a long tongue like a projection where frontal alae is attached toward foot (Fig. 3E arrow a). Upper end of head and base of foot opened (Fig. 3Cc and E arrow b). Anisochelae III very similar to anisochelae II in shape, but smaller in size, with thin frontal alae, higher than shaft at opening (Fig. 3Cd, D).

Spicules. Megascleses

Thick subtylostyle 300-460 × 6-10 μm
Thin subtylostyle 250-350 × 1-3 μm

Microscleses

Anisochelae I 35-40 μm
Anisochelae II 20-25 μm
Anisochelae III 15-20 μm
Sigma 15-25 μm

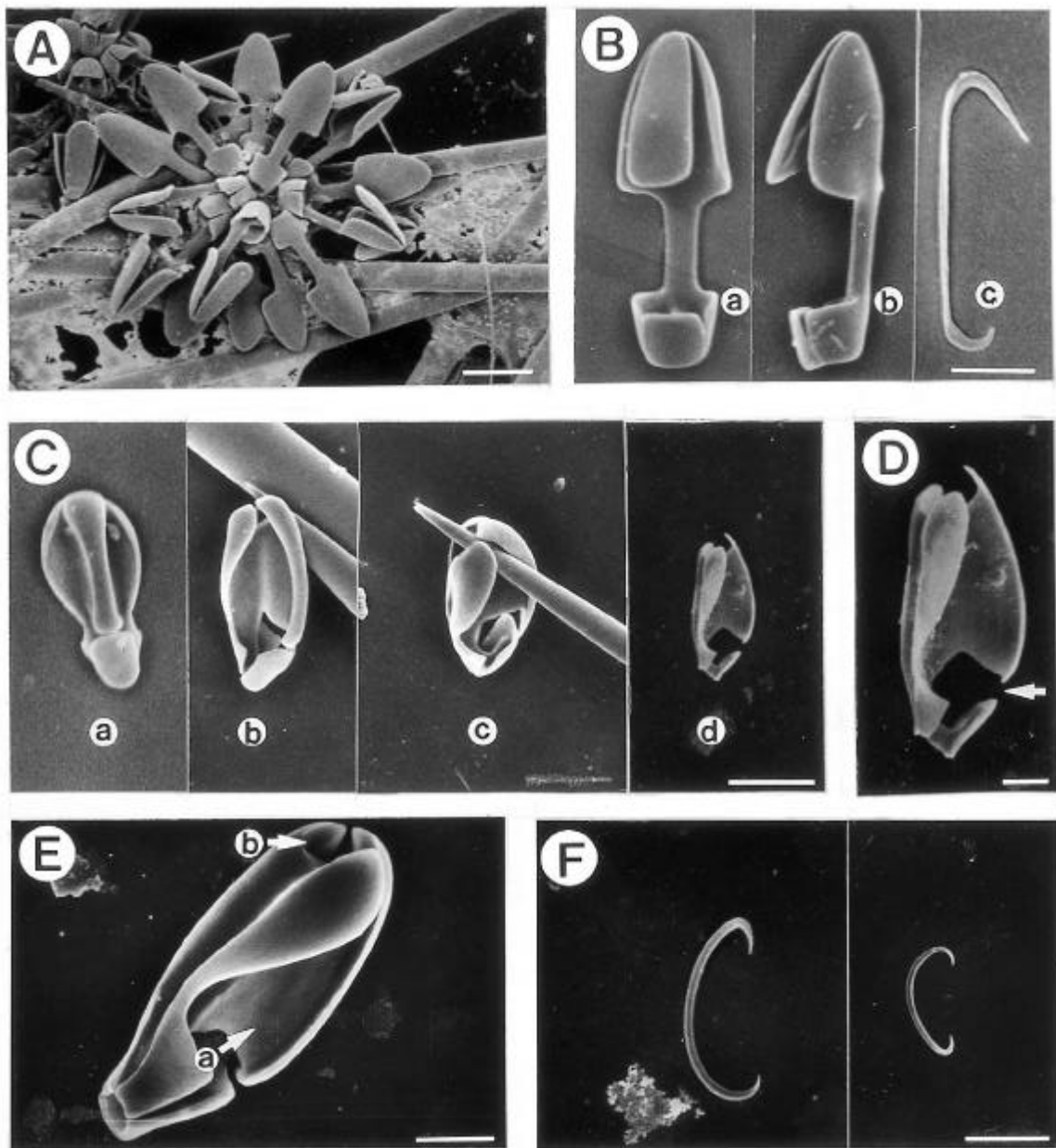


Fig. 3. *Mycale* (*Aegogopila*) *hentscheli* n. sp.. A, Rosette of anisochelae I (SEM). Scanning electron microscopy of microscleses (B-F). B, Frontal view of anisochelae I (a), profile view of anisochelae I (b) and reduced alae of anisochelae I (c). C, Frontal view of anisochelae II (a), profile view of anisochelae II (b), profile view anisochelae II opened top of head (c), and profile view of anisochelae III (d). D, Anisochelae III, space between head and foot (arrow). E, Anisochelae II (arrow a, tongue projected from shaft; arrow b, opened upper end). F, Sigmas. Scale bars=3 μm (E), 10 μm (B-D, F), and 20 μm (A).

Etyymology: The species is named after Dr. Ernst Hentschel who markedly contributed to the present knowledge of special small anisochelae of *Mycale*.

Remarks: This species appears most close to *Mycale (Aegogropila) obscura* (Carter, 1882) (in Hentschel, 1911) in shape and spicule. However, the new species has no large sigma and is slightly different in the form of small anisochelae. Hentschel's species has no anisochelae II. All other described species of *Mycale* are distinguished by shape of anisochelae II and III.

Acknowledgements

This work was supported by Korea Research Foundation Grant (KRF-99-015-DP0338).

References

Bergquist PR and Fromont PJ (1988) The marine fauna of New Zealand: Porifera, Demospongiae. Part 4. Poecilosclerida. *N Z Oceanogr Inst Mem* 96: 1-197.
Hajdu E (1995) Macroevolutionary Patterns within the Demo-

sponge Order Poecilosclerida. Amsterdam University Press, Amsterdam, pp 1-136.
Hentschel E (1911) Tetraaxonida. 2. Teil. Die Fauna Südwest-Australiens. *G Fish Jena* 3: 279-393.
Hoshino T (1981) Shallow-water demosponges of western Japan. I. *J Sci Hiroshima Univ Ser B Div 1* 29: 47-205.
Kim HS, Rho BJ and Sim CJ (1968) Marine sponges in South Korea (1). *Korean J Zool* 11: 1-11.
Rho BJ, Kim HS and Sim CJ (1969) Marine sponges in South Korea (2). *J Korean Res Inst Bet Liv Ewha Woman's Univ* 3: 153-160.
Rho BJ and Yang CI (1983) A taxonomic study on the marine sponges in Korea. 2. Ceratinomorpha. *J Korean Res Inst Bet Liv Ewha Woman's Univ* 32: 25-45.
Rützler K (1978) Sponges in coral reefs. In: Stoddart DR and Johannes RE (eds), Coral Reefs: Research Methods. *Monogr Oceanogr Neth UNESCO* 5: 299-313.
Sim CJ and Bae JH (1987) On the classification of marine sponges of the Hongdo and its adjacent waters. *J Sci Res Inst Hannam Univ* 17: 169-189.
Soest RWM Van (1984) Marine sponges from Curacao and other Caribbean localities. Part . Poecilosclerida. *Stud Fauna Curacao Cribb Isl* 199: 1-167.
Topsent E (1924) Révision des *Mycale* de l'Europe Occidentale. *Ann Inst Océanogr Monaco* 1: 77-116.

[Received December 16, 2000; accepted January 22, 2001]