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Description of *Mediomastus opertaculeus* sp. nov. (Annelida: Capitellidae) from Hokkaido, Northern Japan

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We describe a new species of capitellid polychaete, *Mediomastus opertaculeus* sp. nov., from an intertidal rocky shore in Hokkaido, northern Japan. This new species is distinguishable from all other 13 congeners by such characteristics as (1) staining pattern with methyl green (presumably indicating glandular cells in the epidermis), (2) absence of capillary chaetae in the abdomen, (3) absence of paddle-like chaetae in the thorax, and (4) shapes of the thoracic capillary chaetae and hooded hooks. Aligned partial sequences (624 bases) of cytochrome *c* oxidase subunit I gene from four paratypes of *M. opertaculeus* differed at 1–4 sites, corresponding to Kimura two-parameter (K2P) distances of 0.002–0.006. K2P distances were 0.216–0.218 between our sequences and that from an unidentified *Mediomastus* sp. from Darwin Harbor, Australia, indicating these are not conspecific.

Key Words: *Mediomastus*, Capitellidae, polychaete, Hokkaido, new species, COI.

Introduction

Polychaetes in the genus *Mediomastus* Hartman, 1944 are free-living, mostly marine, benthic forms, occurring in all oceans of the world. Hartman (1944) established this genus for *M. californiensis* Hartman, 1944, with the following characters: a thorax of 11 segments, including a well-developed achaetigerous peristomial ring; segments two to five with capillary chaetae; and segments six to 11 with hooded hooks. Warren *et al.* (1994) reviewed the genus, which now contains 13 species (Hartmann-Schröder 1959, 1962; Day 1961; Hartman 1969; Rasmussen 1973; Ben-Eliahu 1976; Warren *et al.* 1994; Green 2002). In waters around East and Southeast Asia, two species are known, *viz.*, *Mediomastus warrenae* Green, 2002 from the Andaman Sea (Green 2002) and *M. californiensis* from Sagami Bay (Imajima 2006). In addition to those, unidentified species (as "*Mediomastus* sp.") have been reported from Japan (Sato 2000; Kato *et al.* 2003; Suyama *et al.* 2003; Imajima 2006; Niki *et al.* 2006; Nishi and Tanaka 2007), Taiwan (Paxton and Chou 2000), Brunei (Chaw *et al.* 1992), and Thailand (Green 2002; Fujioka *et al.* 2007).

In collections made at Abashiri, Hokkaido, northern Japan, we found a number of capitellid specimens. Subsequent morphological observations and pattern of methyl-green staining on the body surface (probably representing glandular cells in the epidermis) indicated that these represented an undescribed species of *Mediomastus*. For supporting data in describing the species as new to science, we sequenced part of the cytochrome *c* oxidase subunit I (COI) gene for comparison with existing sequences.

Materials and Methods

Worms were collected from sandy sediments among roots of the sea-grass *Phyllospadix iwatensis* Makino on an intertidal rocky shore at Abashiri, Hokkaido, Japan (44°05′N, 144°26′E) on 21 July 2012. For four of the 11 specimens collected, the anterior portion of the body (including about 11 segments) was fixed in 10% formalin seawater and later transferred to 70% ethanol after rinsing in deionized water, in order to observe morphology, and the posterior portion was preserved in 99% ethanol for DNA extraction. The other seven worms were fixed whole in 10% seawater formalin and later transferred to 70% ethanol after rinsing in deionized water.

Observations were made with a stereoscopic microscope, compound light microscope, and scanning electron microscope (SEM). For observation of chaetae, transverse sections of the body cut with a scalpel were mounted on glass slides and embedded in Hoyer's medium under a cover slip. For SEM observation, specimens were dehydrated in an ethanol series, critical-point dried with CO_2, and coated with gold. Methyl green staining was performed with the method of Warren *et al.* (1994); specimens were submerged for 2 min in a solution of 0.5% methyl green in 80% ethanol, and then rinsed in 80% ethanol to eliminate excess stain.

DNA was extracted from posterior segments by the silica method (Boom *et al.* 1990). PCR and sequencing were performed as described by Yoshihara *et al.* (2012); primers LCO1490 and HC02198 (Folmer *et al.* 1994) were used to PCR-amplify and sequence part of the mitochondrial COI gene. Sequence alignment and genetic distance calculations

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