

Phylogenetic Position of the Queer, Backward-bent Entoproct *Loxosoma axisadversum* (Entoprocta: Solitaria: Loxosomatidae)

Hiroshi Kajihara^{1,3}, Shinri Tomioka¹, Keiichi Kakui¹, and Tohru Iseto²

¹ Faculty of Science, Hokkaido University, Sapporo, Hokkaido 060-0810, Japan
E-mail: kazi@mail.sci.hokudai.ac.jp

² Global Oceanographic Data Center, Japan Agency for Marine-Earth Science and Technology, Toyohara 224-3, Nago, Okinawa 905-2172, Japan

³ Corresponding author

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The solitary entoproct *Loxosoma axisadversum* Konno, 1972 was found on the body surface of the maldanid polychaete *Nicomache personata* Johnson, 1901 obtained among roots of the seagrass *Phyllospadix iwatensis* Makino collected at a depth of about 1 m in Oshoro Bay, Hokkaido, Japan. The species had previously been known from elsewhere in northern Japan, attached to another maldanid, *Nicomache minor* Arwidsson, 1907. The morphology of the new material is briefly described with photographs taken in life. A preliminary phylogenetic analysis using concatenated partial sequences of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene, as well as the nuclear 18S and 28S rRNA genes, placed *L. axisadversum* as the sister taxon to all the rest of Solitaria included in the analysis, indicating non-monophyly of the genus *Loxosoma* Keferstein, 1862.

Key Words: Sea of Japan, marine invertebrates, COI, ribosomal RNA, Kamptozoa, ectosymbiont.

Introduction

The solitary entoproct *Loxosoma axisadversum* Konno, 1972 was originally described based on specimens found attached to the body of the maldanid polychaete *Nicomache minor* Arwidsson, 1907 collected in Fukaura, Aomori Prefecture, Japan (Konno 1972). The species was subsequently reported from Aomori and Hokkaido Prefectures at Akkeshi, Asamushi, Shiretoko, and Shiriyazaki (Fig. 1), on the same species of host polychaete (Konno 1978, 1985). *Loxosoma axisadversum* is morphologically unique in the phylum in that the calyx is recurved so that the mouth is located above the anus within the tentacle crown, contrary to the normal arrangement in other solitary entoprocts, in which the anus is situated above the mouth. Among the 25 species (Nielsen 2010) of *Loxosoma* Keferstein, 1862 as defined by Nielsen (1996), *L. axisadversum* is the smallest in body size, with a maximum body length of just 220 μm , whereas larger species such as *L. pectinaricola* Franzén, 1962 can reach 4 mm (Nielsen 1964). In addition, within the genus, *L. axisadversum* has the lowest number of tentacles, viz., only six, whereas the highest number is found in *L. nung* Nielsen, 1996, which has 34.

Fuchs *et al.* (2010) provided the most comprehensive phylogenetic study of the phylum Entoprocta, although only one species of *Loxosoma* was included, viz., *L. pectinaricola*. Thus, monophyly of this genus was not assessed, but it was shown that *Loxosomella* Mortensen, 1911 is paraphyletic with regard to *Loxocorone* Iseto, 2002, *Loxomitra* Nielsen,

1964, and *Loxosoma*. Our recent new find of *L. axisadversum* prompted us to use molecular methods to investigate the species' phylogenetic position among loxosomatids, with a particular interest in whether it groups with *L. pectinaricola*, thereby supporting the monophyly of *Loxosoma* as currently diagnosed.

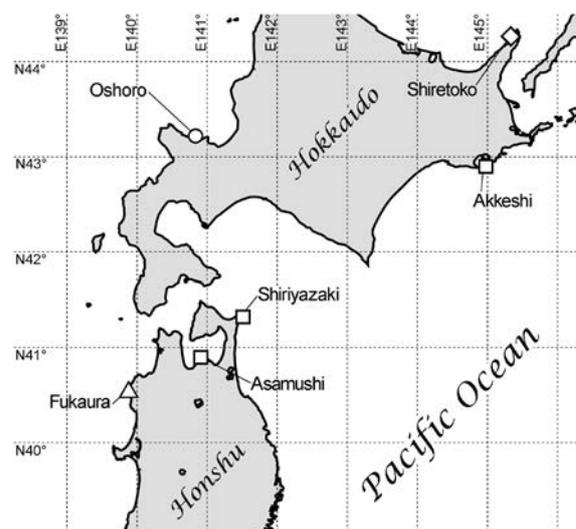


Fig. 1. Map of northern Japan, showing known localities of *Loxosoma axisadversum* Konno, 1972. Sources: triangle, Konno (1972); squares, Konno (1978); diamond, Konno (1985); circle, present study.