

First Record of Epitokous Metamorphosis and Swimming Behaviour of *Glycera nicobarica* (Polychaeta: Glyceridae), in the Seto Inland Sea, Western Japan

Yusof Shuaib Ibrahim^{1,2} and Masanori Sato¹

¹Department of Earth and Environmental Sciences, Graduate School of Engineering and Science, Kagoshima University, 1-21-35 Korimoto, Kagoshima 890-0065, Japan

²Department of Marine Sciences, Faculty of Marine Science and Maritime Studies, University Malaysia Terengganu, (UMT) 21030 Kuala Terengganu, Terengganu, Malaysia
E-mail: ayuk_8101@yahoo.com (YSI); sato@sci.kagoshima-u.ac.jp (MS)

²Corresponding author

(Received 17 March 2013; Accepted 22 September 2013)

Epitokous metamorphosis and swimming behaviour of the glycerid polychaete *Glycera nicobarica* Grube, 1866 are recorded for the first time, as the first such observation for any Asian glycerid. A total of 88 mature adults (epitokes) swimming in the surface water were collected from six sites in the Seto Inland Sea, Japan, at various phases of the moon, mostly within two hours after sunset in July to November in 2009 to 2011. By a morphological comparison with 36 immature benthic individuals (atokes) of comparable body size, we confirmed characteristic features of epitokous metamorphosis, including flattening of the body, reduction of the proboscis, enlargement of the parapodia, elongation and increase in number of the chaetae, and addition of simple capillaries in the neuropodia. The epitokous metamorphosis of *G. nicobarica* is basically similar to those previously described in eight other species of *Glycera*.

Key Words: *Glycera nicobarica*, reproduction, epitokous metamorphosis, swimming, Seto Inland Sea, Japan.

Introduction

The genus *Glycera*, belonging to the family Glyceridae (Polychaeta), includes 44 valid species of carnivorous annelid worms living from intertidal to abyssal depths (Magalhães and Rizzo 2012). Studies on their reproduction are limited, but swimming behaviour of mature males and females for spawning and/or epitokous metamorphosis have been reported from North America, Central America, Europe, and Africa in the following nine species: *G. alba* (O. F. Müller, 1776), *G. americana* Leidy, 1855, *G. brevicirris* Grube, 1870, *G. capitata* Ørsted, 1842, *G. dibranchiata* Ehlers, 1868, *G. lapidum* Quatrefages, 1866, ? *G. unicornis* Savigny, 1818, *G. sphyrabrancha* Schmarda, 1861, and *G. tessellata* Grube, 1863 (Arwidsson 1898; McIntosh 1910; Chamberlin 1919; Fage and Legendre 1927; Gravier and Dantan 1928; Støp-Bowitz 1941; Allen 1957; Simpson 1962; Pettibone 1963; Böttgeman 2002). Neither epitokous metamorphosis nor swimming behaviour of glycerid species have been recorded from Asia.

Glycera nicobarica Grube, 1866 is distributed along the coasts of the Indian and western Pacific Oceans (Böttgeman 2002) and is one of the most common glycerid species inhabiting shallow coastal areas in Japan (Imajima 2007; Yamanishi and Sato 2007). There is no previous report on the reproduction of this species.

During our night sampling of swimming polychaetes in the Seto Inland Sea, Japan, we collected epitokous adults of *G. nicobarica*. In this paper, we describe their swimming behaviour and epitokous metamorphosis.

Materials and Methods

Field sampling for sexually mature individuals (epitokes) of *Glycera nicobarica* was carried out at six sites in the Seto Inland Sea, western Japan (Fig. 1) on a total of 10 days at various phases of the moon in July to November in 2009 to 2011. On each day, one or two persons searched for swimming worms for a minimum of one hour (usually during the period from sunset to midnight) with two kinds of underwater lamps: a strong fish-luring lamp (KU-5MB, 4.5 KW, Koto Electric) of the *Toyoshio-maru* research vessel of Hiroshima University used at four ports (Uno, Okayama Prefecture; Imabari, Ehime Prefecture; Yanai, Yamaguchi Prefecture; Himeshima, Oita Prefecture) (Fig. 1, solid circles 1, 3, 4, 6), and a small, hand-held fish-luring lamp (BF-8952, Panasonic) used at three sites (a small harbor at Tadanoumi, Hiroshima Prefecture; the port of Yanai, Yamaguchi Prefecture; off Nagashima Island, Kaminoseki, Yamaguchi Prefecture) (Fig. 1, solid circles 2, 4, 5). On 10 and 11 November 2010 and on 9 and 10 November 2011, the survey was conducted all night long. A total of 88 epitokous specimens (21