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New Report on Marine Macrobenthic Oligochaeta (Annelida: Clitellata) from Sarawak, Borneo

Mohamad Taufek Zakirah

Sarawak Museum Department, Annex Building,
P. Ramlee Road, 93400 Kuching, Sarawak.
zakirah@sarawak.gov.my

ABSTRACT

Two species of Naididae (subfamily Rhyacodrilinae and Limnodriloidinae) and one species of Megascolidae were described from Sarawak coastal waters. The marine oligochaetes specimens identified as *Monophylephorus rubroniveus*, *Smithsonidrilus* sp. and *Pontodrilus litoralis*. All three species found in the present study are new records of marine oligochaetes from Sarawak coastal waters. The finding of this study is expected to be useful as baseline information for future ecological and systematic studies of marine oligochaetes in Malaysia.

Keywords: Clitellata, Oligochaeta, marine Naididae, Megascolidae, Sarawak, Borneo



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INTRODUCTION

Taxonomy is a way of scientific classification system to describe, classify and name the organisms by grouping into different levels of hierarchy (Henderson, 2003). Classifications play an important role for understanding of organisms in any particular ecosystem (Lévêque and Mounolou, 2003). Marine oligochaeta is one of the members of macrobenthos belonging to Phylum Annelida (Class Clitellata) (Pechenik, 2010). However, taxonomy studies of marine oligochaeta especially in Southeast Asia regions and Malaysia in particular are scarce compared to temperate country (Cook and Brinkhurst, 1973; Erséus, 1979; Brinkhurst, 1982; Erséus, 1982; Milligan, 1996). Generally, marine oligochaeta are segmented, bilateral symmetrical, cylindrical animals with tapering ends but unlike terrestrial species (earthworms) the marine species are smaller (Brinkhurst, 1982). The anterior-most part of an oligochaete is the prostomium (in front of the mouth) and is not counted as a segment (Plate 1). Each segment marked as roman numbering beginning at the peristomium (segment number I).

Most characters that define the Clitellata relate to their reproductive biology, for example the presence of a clitellum, hermaphroditism, the organisation of reproductive organs (Lasserre, 1975; Brinkhurst, 1982; Pechenik, 2010). Among 1700 species of currently known aquatic oligochaete, 600 are marine or estuarine (Erséus, 2005). The most diverse and abundant aquatic oligochaete is the Naididae which includes about 1000 species, 450 of which are marine (Martin *et al.*, 2008). Most live between sand grains (interstitial) at depth from shallow intertidal beach to deep sea (Erséus, 1984; Ruppert *et al.*, 2004). They are very small, usually having a length ranging from 1 mm to 4 cm

(Brinkhurst, 1982; Milligan, 1996). Oligochaete are simultaneous hermaphrodites; mature worms have male and female genitalia at the same time.

Typically, most marine oligochaeta have 4 bundles of setae for each segment. Setae are absent on the prostomium (segment I) and anal segment (pygidium) but generally present from segment II onwards (Brinkhurst, 1982). There are several main types of setae such as hair setae (long, thin, hair-like), bifid (forked-like) tip and genital setae (Plate 2). High magnification is needed to see the form of the tip setae (Brinkhurst, 1982). Most marine oligochaeta species can only be identified to the lowest taxa when sexually matures (Cook and Brinkhurst, 1973; Brinkhurst, 1982; Milligan, 1996). The clitellum of marine oligochaeta is a thickening of the body wall of a few segments (normally two) in the vicinity of the gonads and genital pores of sexually mature oligochaete (Cook and Brinkhurst, 1973; Brinkhurst, 1982). The clitellum is often difficult to see as most of the segments appear identical externally, but the clitellar region usually formed slightly thicker and more opaque than normal segments. This clitellar region consists of genital organs that are important for the identification process which is fixed depending on the family (Brinkhurst, 1982).

The marine oligochaetes taxonomy of the tropical, subtropical and temperate regions has been studied by various authors. For example, material from the Hawaiian Islands was accounted for by Erseus and Davis (1989), Bermuda Beach by Healy and Coates (1999), Hong Kong by Erséus (1992); Australia by Baker (1984), Florida by Milligan (1996) and the U.S.A. East Coast by Kvist *et al.* (2008). Unlike other annelid members such as a polychaete, marine oligochaete display conspicuous morphological characteristics and identification rely on the external anatomy (Cook and Brinkhurst, 1973; Brinkhurst, 1982; Milligan, 1996). Milligan (1996) pointed out the major taxonomic barriers of regional marine oligochaeta diversity as lack of experts. In macrobenthos studies, oligochaetes are often overlooked as they are difficult to identify and recognised simply as “Oligochaeta 1 or unidentified Oligochaeta” (Erseus, 2002).

Several studies have been done previously to investigate the distribution of aquatic oligochaete in Malaysia. However, these studies were confined to freshwater habitat and aimed to assess water quality due to anthropogenic stresses (Yap *et al.*, 2003; Azrina *et al.*, 2006; Abd-Aziz *et al.*, 2010; Al-Shami *et al.*, 2011). To date, there are no records of marine oligochaeta study from Malaysia and other Asian regions. Hence, to resolve some of the lacking information, this study is conducted to investigate marine oligochaetes species from Sarawak coastal waters. Therefore, this study aims to document the first description of marine Naididae from Sarawak, Borneo.

METHODS

Study Site

The survey of intertidal oligochaete of Sarawak coastal waters was carried out in six stations (Figure 1) along the Sarawak coastal waters in 2014 and 2015 (Table 1). The sediment samples were qualitatively collected at low tide level on the intertidal using a spade. In each station, samples were sieved by using