www.trjfas.org
ISSN 1303-2712
Turkish Journal of Fisheries and Aquatic Sciences 16: 395-399 (2016) DOI: 10.4194/1303-2712-v16_2_19

RESEARCH PAPER

Two New Records For The Brackish water Oligochaeta (Annelida: Naididae: Tubificinae) From The Aegean Coastal Ecosystem (Turkey)

Seray Yildiz[1,*], M. Ruşen Ustaoğlu[1]

[1] Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100 Bornova-İzmir-TURKEY.

* Corresponding Author: Tel.: +90.0532 7607558; Fax: +90.0232 3883685;
E-mail: seray.yildiz@ege.edu.tr

Received 04 March 2016
Accepted 05 April 2016

Abstract

The benthic assemblages of The Lagoon Karina (Söke, Aydın, TURKEY) have been determined seasonally between May 2011 and April 2012. Totally 9 stations, which consist of 8 stations within the lagoon, and a limnocrene brackish waters spring flowing into the lagoon were sampled. As a result of the samplings, *Tubificoides benedii* (d'Udekem, 1855) and *Clitellio arenarius* (Müller, 1776) were reported as new marine Oligochaeta records for the Turkish fauna. Their morphological features were examined under a light microscope and pictures of them were given.

Keywords: Oligochaeta, new record, Aegean Sea, Karina Lagoon, Turkey.

Ege Denizi Kıyısal Ekosistemi'nden (Türkiye) İki Yeni Acısu Oligochaeta (Annelida: Naididae: Tubificinae) Kaydı

Özet

Karina Lagünü'nün (Söke, Aydın, TÜRKİYE) bentik organizmalarını belirlemek amacıyla Mayıs 2011 – Nisan 2012 yılları arasında mevsimsel olarak çalışma yapılmıştır. (8'i lagün içinden ve bir tanesi de lagüne dökülen limnokren acı su kaynağından olmak üzere toplam 9 istasyondan örneklemeler yapılmıştır. Örneklemeler sonucunda, *Tubificoides benedii* (d'Udekem, 1855) ve *Clitellio arenarius* (Müller, 1776) türleri Türkiye denizel Oligoket faunası için yeni kayıt olarak rapor edilmiştir. Bu türlerin morfolojik özellikleri ışık mikroskobunda incelenmiş ve fotoğrafları verilmiştir.

Anahtar Kelimeler: Oligoket, yeni kayıt, Ege Denizi, Karina Lagünü, Türkiye.

Introduction

Oligochaetes, a subclass of the class Clitellata, of the phylum Annelida, have a worldwide distribution and about 1700 valid species of aquatic oligochaetes are known to date; of these, Erseus (2005) said that the most specious aquatic family is Tubificidae, with about 800 described species worldwide, a majority of which are marine (Martin *et al.*, 2008).

The family Tubificidae is the only family with a cosmopolitan distribution and is well represented in the sea and coastal systems (Erseus, 1980). Some tubificids are restricted to brackish water, but the majority of species are indeed marine, some species occurring at bathyal or even abyssal depths (Erseus and Healy, 2001).

Both of the *Tubificoides* and *Clitellio* are genera within the kingdom Animalia, subfamily Tubificinae. At least 56 species of *Tubificoides* and 4 species and subspecies of *Clitellio* have been described (WoRMS Editorial Board, 2016).

Up to now, no any records belong these species have been reported in Turkey (Arslan, 2006; Çınar *et al.*, 2011; Çınar *et al.*, 2014).

The objective of the present study to report *Tubificoides benedii* (d'Udekem, 1855) and *Clitellio arenarius* (Müller, 1776) are as new records for Turkish marine Oligochaeta fauna.

Material and Methods

We collected mud and water samples seasonally from nine different stations (8 stations within the lagoon, and a limnocrene brackish waters spring flowing into the lagoon) on Lagoon Karina (37° 36' North - 27° 10' East, Söke, Aydın, Turkey) between May 2011 and April 2012 in order to determine the

Oligochaeta fauna. As a result of the samplings, *Tubificoides benedii* (d'Udekem, 1855) and *Clitellio arenarius* (Müller, 1776) were reported from only limnocrene brackish waters spring flowing into the lagoon. Samples were fixed on-site with 4% formaldehyde/seawater solution. Fixed material was again sieved with a 500-µm sieve in laboratory. After sorting the material, oligochaete specimens were preserved in 70% ethyl alcohol and prepared for identification as permanent mounts using CMCP 10 (Polyvinil Lactophenol) solution. The keys by Brinkhurst (1982) and by Timm (1999) were used for species identification. The photographs of the species were taken by a digital camera (Olympus, Camedia, C-7070) attached to stereo and compound microscopes. The specimens are deposited in the Museum of the Faculty of Fisheries, Ege University (ESFM) as a whole permanent mouth.

Results

Morphometric, biological and ecological characteristics and the distribution of Oligochaeta species specified as new records for the marine (brackish water) fauna of Turkey are as follows.

***Tubificioides benedii* (d'Udekem, 1855) (Figure 1, 2, 3)**

Material: 3 specimens. Specimens were found only limnocrene brackish waters spring flowing into the lagoon in the study area.

Measurements: Total length = 20-87.5 mm Number of segments = 37-52

Description: Whole body densely papillate. In all bundles, crotchets with smaller upper tooth or with simple sharp tip, about 80-112 µm, in anterior bundles by 2-3, in posterior bundles by 1-2.

Differential characteristics: Similar to *Tubificoides heterochaetus* (Michaelsen, 1926), but *T. heterochaetus* has tiny and sparse papillae on the whole body in young specimens but on tail only in adults. It has 2-5 crotchets in anterior bundles, about 50 µm. Length is 7-9 mm, and also it was found weakly brackish bays and river mouths. Similar to *Tubificoides pseudogaster* (Dahl, 1960), but this species has more setae per bundle (up to six) but they are clearly bifid.

Environment: Marine, Brackish water

Habitat: In brackish water**.** Hard substratum, with stony-sandy areas and coastal vegetation (in the present study).

Distribution:

Baltic Sea (Polish Exclusive Economic Zone), Buy of Fundy (Cobscook Buy), France (Wimereux), Ireland (Irish Exclusive Economic Zone), North Atlantic Ocean (European Waters, Gulf of Maine, North East Atlantic, North West Atlantic), North Sea (Belgian Exclusive Economic Zone) (Timm and Erséus, 2015a).

***Clitellio arenarius* (Müller, 1776) (Figure 4, 5)**

Material. 45 specimens. Specimens were found only limnocrene brackish waters spring flowing into the lagoon in the study area.

Measurements. Total length = 20-75 mm Number of segments = 60-205

Description: Anterior setae 2-5 per bundle, 90-140 µm, and simple or with very fine upper tooth. In mature worms, there is ventral seta in X single, in XI lacking.

Environment: Marine, Brackish water

Habitat: Hard substratum, with stony-sandy areas and coastal vegetation (in present study)

Figure 1: Densely papillate whole body of *Tubificoides benedii* (d'Udekem, 1855).

Figure 2: Densely papillate whole body of *Tubificoides benedii* (d'Udekem, 1855).

Figure 3: Anterior dorsal setae with smaller upper tooth of *Tubificoides benedii* (d'Udekem, 1855).

Figure 4: Whole body of *Clitellio arenarius* (Müller, 1776).

Distribution: Baltic Sea (Polish Exclusive Economic Zone), Buy of Fundy (Cobscook Buy), France (Wimereux), North Atlantic Ocean (European Waters, Gulf of Maine, North East Atlantic, North West Atlantic) (Timm and Erséus, 2015b).

Discussion

Knowledge about the marine oligochaete fauna of Turkey is limited at present. Although freshwater oligochaetes have been studied in different regions of Turkey, only a few studies are available on the marine representatives of the group; Demir (1952) reported *Enchytraeoides marioni* Roule, 1889 and Kalkan *et al.*, (2007) reported *Enchytraeus buchholzi* Vejdovský, 1879 from Sea of Marmara. Matamoros *et al.*, (2007) described a new marine oligochaeta species *Marionina triplex* Matamoros, Yıldız & Erséus, 2007 from The Black Sea. Balık *et al.*, (2004) reported on species of Oligochaeta and Aphanoneura from the Gediz Delta (Izmir, Turkey), namely *Lumbricillus lineatus* (Müller, 1774), *Lumbricillus tuba* Stephenson, 1911, *Limnodriloides pierantonii*

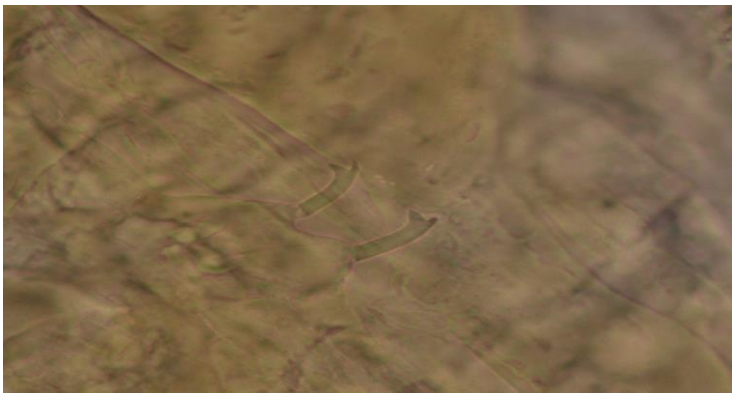

Figure 5: Anterior dorsal setae with very fine upper tooth of *Clitellio arenarius* (Müller, 1776).

(Hrabě, 1971), *Paranais frici* Hrabe, 1941, *Paranais litoralis* (Müller, 1780), *Vejdovskyella comata* (Vejdovský, 1884), and *Tubificoides euxinicus* (Hrabě, 1966). Çınar *et al.*, (2006) investigated the temporal changes in soft-bottom zoobenthic communities in and around Alsancak Harbour (Izmir Bay, Aegean Sea) and only two marine oligochaete species were noted in that study: *Tubificoides swirenkowi* Jaroschencko, 1948 and *Thalassodrilides gurwitschi* (Hrabe, 1971). Çınar *et al*., (2011) also reported *Limnodriloides pierantonii* (Hrabě, 1971) and *Tubificoides vestibulatus* Erséus & Bonomi, 1987 in addition to these two species from Sea of Marmara. Also, Kiseleva (1969) reported *Tubificoides swirencowi* Jarošenko, 1948 and Băcescu *et al.*, (1971) reported *Tubificoides euxinicus* (Hrabě, 1966) from The Black Sea. Oligochaete studies in lagoons are based on recent past in Turkey. A pioneering study by Yıldız *et al.*, (2007) was conducted. In this study, benthic samples collected from some lagoons in 1995 and 1996 with the scope of management and development strategies and improvement project of lagoons in Turkey coasts. Although 9 Oligochaeta species were determined, however only three of them namely *Heterochaeta costata* Claparede, 1863, *Potamothrix heuscheri* (Bretscher, 1900), and *Potamothrix bavaricus* (Öschman, 1913) have characteristics of brackish water or marine. Regarding these studies, three species belonging the genus Tubificoides have been reported in Turkey and no any species belongs to genus Clitellio. Baker (1984) reported The NE Atlantic fauna usually has a relatively low diversity with broad species ranges, and is dominated by *Tubificoides benedeni* and *Clitellio arenarius*. Our findings are compatible with those comments.

Apart from new information on the species, the present records also contribute to the knowledge on the distribution of these species by extending the distribution area to the Turkish part of Asia.

Acknowledgments

This research has been supported by Ege University Investigation Fund (2010/SÜF/018). We are deeply grateful to them for their financial support. Authors also would like to thank Prof. Dr. Murat ÖZBEK for arranging the figures and to Dr. Ayşe TAŞDEMİR, Dr. Esat T. TOPKARA and Mesut Kaptan for their support and help on technical issues in the field.

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