

First Record for Two Species [*Balanoglossus clavigerus* delle Chiaje, 1829, *Glandiceps talaboti* (Marion, 1876)] of the Phylum Hemichordata on the Coast of Turkey

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Abstract: In this study, for the first time, 2 species (*Balanoglossus clavigerus* delle Chiaje, 1829 and *Glandiceps talaboti* (Marion, 1876)) belonging to the phylum Hemichordata, which have not previously been encountered in Turkish seas, are recorded from the northeastern Mediterranean Sea (Yumurtalık Bight, and Babadil port).

Key Words: Hemichordata, *Balanoglossus clavigerus*, *Glandiceps talaboti*, Turkish seas

Türkiye Kıyılarında İlk Kez Rastlanan Hemichordata Filumu'nun İki Türü [*Balanoglossus clavigerus* delle Chiaje, 1829, *Glandiceps talaboti* (Marion, 1876)]

Özet: Bu çalışmada, Türkiye denizlerinde bulunurluğu daha önce rapor edilmemiş Hemichordata filumu ve bu filuma ait iki tür *Balanoglossus clavigerus* (Enteropneusta-Ptychoderidae), *Glandiceps talaboti* (Enteropneusta-Spengelidae) kuzeydoğu Akdeniz'den (Yumurtalık koyu ve Babadil limanı) rapor edilmektedir.

Anahtar Sözcükler: Hemichordata, *Balanoglossus clavigerus*, *Glandiceps talaboti*, Türkiye denizleri

Introduction

Hemichordata, one of the smallest phyla in the seas, has previously been taken into consideration within the phylum Chordata, since most of its characteristics, such as pharyngeal gill pores, a partially neurulated dorsal cord, and a stomochord that bears some similarities to the Chordata notochord, are similar to those of the Vertebrata. However, since Hemichordata do not have characteristics such as a ventral nerve cord, a protostome-like direction of blood flow, a liver-like organ protruding dorsally from the gut (rather than ventrally as in chordates), a notochord-like pygocord located ventrally and posteriorly, a ventral postanal tail and a dorsal endostyle-like organ, they are currently evaluated as a distinct phylum (Hyman, 1959; Gerhart, 2000).

Furthermore, sensitive 18S rDNA analyses have indicated that Hemichordata are closer to the Echinodermata rather than to the Chordata (Cameron et al., 2000). The Hemichordata, currently known to contain 100 living species, consists of 3 distinct groups. One of these are the Pterobranchia, small creatures leading a

sessile and sedentary life in colonies. In the second group are the Enteropneusta, worm-like, benthic creatures living buried in mud. Finally, there are the Planctosphaeriodea, which consist of only one species and whose pelagic tornaria larvae are known, while there are no records regarding its mature form (Buchsbaum et al., 1987).

The zoobenthic studies initiated by foreign researchers in Turkish coastal waters in the 19th century were later intensified during the 1950s in the Sea of Marmara and the Bosphorus, the Aegean Sea, and eventually in İzmir Bay and its vicinity. Although not at the desired level and number, such studies have recently been conducted in the other coastal waters of Turkey.

Throughout these zoobenthic studies conducted in Turkish coastal waters to date, the phylum Hemichordata has never been recorded.

In this study, 2 Hemichordata species encountered during the zoobenthic studies conducted in the Yumurtalık Bight, a part of İskenderun Bay, and in Babadil port in the Akkuyu region of the northeastern Mediterranean Sea are described.

Materials and Method

The species recorded in this study were identified during the zoobenthic studies conducted in the Yumurtalık Bight of the Gulf of İskenderun in the intertidal zone in 1999, and in Babadil port in the Akkuyu region in an infralittoral zone in 2000 (Figure 1). The sediment obtained from the sandy-muddy biotopes using shovels in the tidal zone and using dredges in the infralittoral zone was sifted with a 2 mm standard sieve. The species obtained in both studies were immediately taken to laboratories and photographed, and pictures were drawn using a binocular microscope. Subsequently, they were stored in 70% alcohol.

Species were identified using a range of references (Spengel, 1893; Van der Horst, 1927; Hyman, 1959; Riedl, 1983; Hayward and Ryland, 1990; Cameron, 2002).

Results

In this study, 2 species of the Enteropneusta group of the phylum Hemichordata, namely *Balanoglossus clavigerus* (Enteropneusta-Ptychoderidae) (Figure 1) and *Glandiceps talaboti* (Enteropneusta-Spengelidae), which have not previously been encountered in Turkish seas, are recorded. The definitions and distributions of these species are as follows:

Family: Ptychoderidae

Balanoglossus clavigerus (delle CHIAJE, 1829) (Figure 2, Figure 3).

Material: 5 individuals were obtained. Locality: Yumurtalık Bight, Mean length: 21 cm, mean breadth: 4 mm, mean proboscis: 5 x 3 mm, mean collar: 3 x 5 mm.

Description: The elongated body is cylindroid without external appendages and of a soft consistency covered

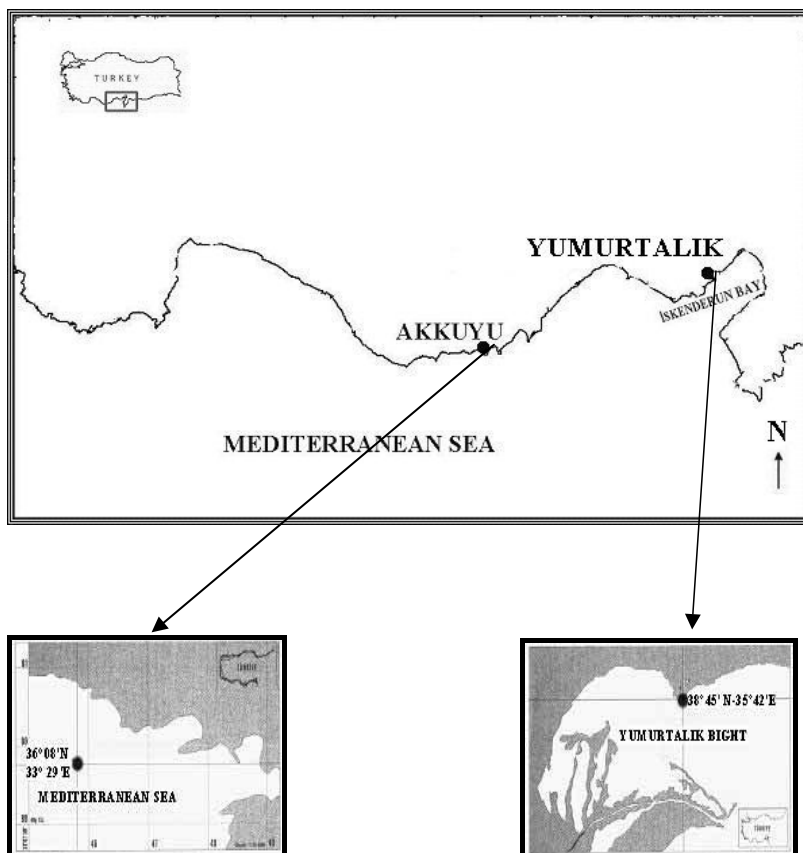


Figure 1. Map of sampling locations.



Figure 2. *Balanoglossus clavigerus* delle (CHIAJE, 1829) photograph.

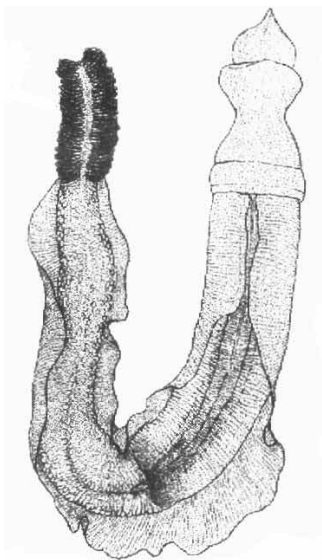


Figure 3. *Balanoglossus clavigerus* delle (CHIAJE, 1829) drawing.

with a mucous secretion and devoid of any form of exoskeleton. Genital folds thin, well developed and forming “wings”. Dorsal margins of wings meet anteriorly just behind collar, but then diverge widely. Gonopores open near gill slits, at the base of wings. Number of branchial slits 200 or more. Anterior hepatic caeca pale, closely and regularly arranged. Main mass of caeca is greenish, densely packed and irregular (Spengel, 1893; Van der Horst, 1927; Hyman, 1959; Riedl, 1983; Hayward and Ryland, 1990; Cameron, 2002).

These species which are widely distributed in the Mediterranean Sea and the Atlantic Ocean live in U-shaped galleries that they dig especially in intertidal zones in sandy and sandy-muddy biotopes. Their feces can be observed on beaches as sand mounds with small curls.

Family: Spengelidae

Glandiceps talaboti (MARION, 1876) (Figure 4, Figure 5).

Material: 3 individuals (incomplete in body form due to autotomy) were obtained. Locality: Babadıl port, mean length: 5 cm (excluding parts which are left behind due to autotomy), mean breadth: 6 mm, mean proboscis: 6 x 5 mm, mean collar: 5 x 5 mm.

Description: Like the previous species, the body is elongated and cylindroid and is covered with mucus. There is no outer skeleton. Lateral septa, hepatic sacculations, synapticules and peribuccal spaces are absent. The gills are curled, and are reddish-brown or reddish-orange in color. They thrive particularly in North-African coasts along the Mediterranean Sea and in the Gulf of Naples (Italy) in sandy-muddy biotopes at depths of 30–50 m. They do not make definite burrows but live buried in sandy or muddy bottoms. Presumably, in such cases, the animal is separated from its surroundings by a mucous lining (Spengel, 1893; Van der Horst, 1927; Hyman, 1959; Riedl, 1983; Hayward and Ryland, 1990; Cameron, 2002).

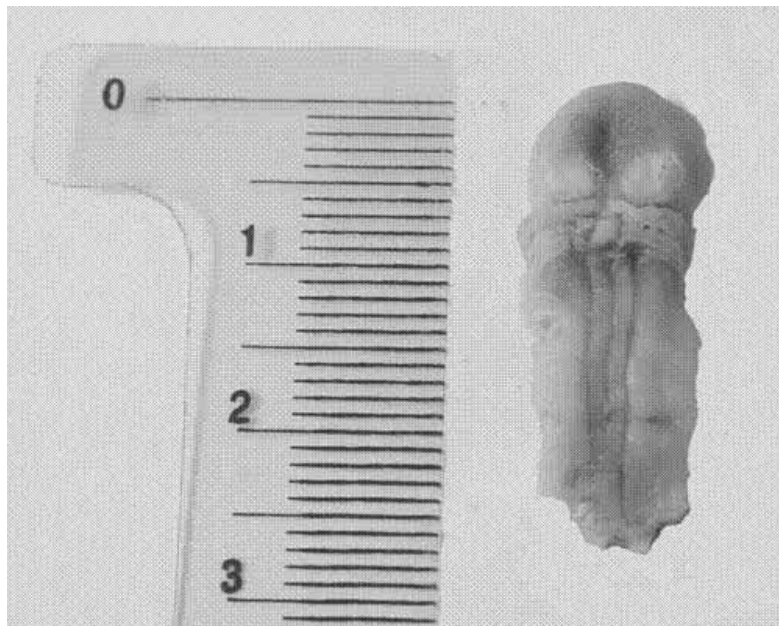


Figure 4. *Glandiceps talaboti* (MARION, 1876) photograph.

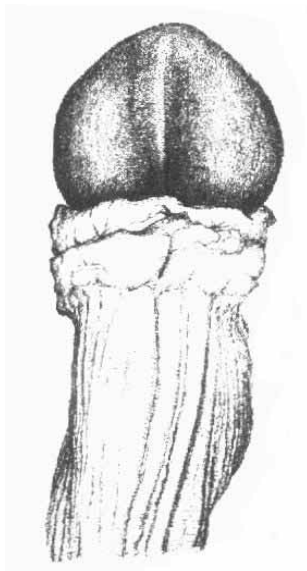


Figure 5. *Glandiceps talaboti* (MARION, 1876) drawing.

Discussion

Throughout the studies conducted so far in the Mediterranean, particularly in the Western Mediterranean, 7 species of Hemichordata, which are generally distributed in temperate and tropical seas, have been recorded. These are *Saccoglossus mereschkowskii*,

S. gurneyi, *B. clavigerus*, *Glossobalanus elongatus*, *G. minutus*, *Glandiceps talaboti*, and *Rhabdopleura normani* (HYMAN, 1959; ERMS). Of these, *S. gurneyi* was reported to be one of the Lessepsian species penetrating the Mediterranean through the Suez Canal - though this is not certain - and was encountered for the first time in the south of the Mediterranean on Egyptian coasts (Alexandria) (Por, 1978; Zibrowius, 1991). Subsequently, it was reported that this species had spread up to the Lebanese coasts in the northern Mediterranean (Zibrowius, H. pers.comm.). However, the zoobenthic studies conducted in the Turkish coastal waters have not so far yielded any records regarding the presence of the phylum Hemichordata.

Of the species identified through this study, *B. clavigerus* is one of the most common and wellknown species of the phylum Hemichordata. It can be found in almost every part of the Mediterranean in the sandy and sandy-muddy biotopes of intertidal zones.

B. clavigerus, which lives buried in sandy-muddy bottoms, was first encountered in Turkish coastal waters in the Yumurtalik Bight. However, *G. talaboti* is known to be present in the Gulf of Naples (Italy) in the Mediterranean and along the coasts of Alexandria (Egypt) and northern Africa. *G. talaboti*, which is generally found in muddy biotopes of infralittoral zones at depths of 30-

350 m, has, for the first time, been recorded in Turkish coasts at 40 m depth in a muddy biotope of Babadil port in the Akkuyu region.

Since the Enteropneusta lead a solitary life buried in mud in aquatic surroundings from intertidal zones to various muddy depths, it is extremely difficult to obtain them, especially those which live at greater depths. Furthermore, because they are delicate creatures and tend to break into fragments, it is difficult to secure complete specimens, especially in the case of the larger species.

The aquatic areas where samplings are performed are very few in number because the benthic studies conducted in Turkish seas, as in other aquatic areas, are not at the desired level and number. This may be regarded as one of the factors that prevent a thorough reflection of the diversity of the species in Turkish seas. However, when the fact that the seas neighboring

Turkish coastal waters have varying hydrographic and ecological characteristics is taken into consideration, it is highly probable that the diversity of the species is greater than what is at present. There is no doubt that through the use of more advanced techniques and equipment and the sampling of more aquatic areas there will be a remarkable increase in the number of the species in Turkish seas in the near future.

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