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Hydroid Polyps of the Bosphorus

İstanbul Boğazı'nın Hidroid Polipleri

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Abstract

This study was carried out in order to determine hydroid polyp species present in the Bosphorus and some ecological properties of these species. Samples were collected at 19 stations from depths ranging 0.5-60 m by using spatula, beam-trawl and dredge.
As a result of this study, 14 species belonging to 10 genera and 6 families were determined and 4 species among them (*Tubularia* cf. *indivisa* Linnaeus, 1758, *Halecium beanii* (Johnston, 1838), *Halecium labrosum* Alder, 1859, *Laomedea exigua* M.Sars,1857) were seen to be new records for the fauna of the Bosphorus, according to present literature.

Key Words: Bosphorus, hydroid polyp, zoobenthos.

Introduction

Inventory of the biological diversity of the Turkish seas has not been determined entirely.Especially, information about invertebrate benthic fauna of the Bosphorus, which performs

species exchange between the Sea of Marmara and the Black Sea, is scanty.

Through the Bosphorus, about 340 km^3 of water of the Black Sea are transferred to the Sea of Marmara per annum by means of surface current and about 176 km^3 of water of the Sea of Marmara, originated from the Mediterranean, to the Black Sea per annum by means of bottom current (Stanley and Blanpied, 1980). Water salinity of the Black Sea is about 17.6 ‰ while that of the Sea of Marmara is about 38.5 ‰ (Yüce and Türker, 1991).

Fauna of the Bosphorus, which contains both brackish water and typical sea water, is quite rich as this region may contain the euryhaline forms besides the forms living merely at brackish water or typical sea water. However, the species of this region, sensitive to pollution, are face to face with the danger of becoming extinct because the Bosphorus is under the threat of a heavy pollution.

This study was carried out in order to determine hydroid species of the Bosphorus and their some ecological properties.

Hydroid polyps are situated in fouling organisms. Practically, all hydroids settling on hard substrata or on other organisms may become part of the fouling, except a small number of species highly specialized for a particular kind of substratum such as sea-grasses (Morri and Boero, 1986). To take measures against fouling organisms is obligatory since they damage the materials made by human in the sea. Therefore, it is necessary to know the localities where each species is living.

There is not any research carried out in relation to hydroids of the Bosphorus. Demir (1952), Tortonese (1959) and Caspers (1968) have reported the hydroid species of the Bosphorus in their studies about invertebrate benthic fauna of this region.

There is insufficient data about hydroid species of the Bosphorus. Moreover, information about their habitat is also inadequate.
In this study were determined hydroid species of the Bosphorus and some of their ecological properties.

Materials and Methods

Material was obtained from 19 stations between the depths ranging 0.5-60 m in the Bosphorus in 1993 (Fig.1). Material belonging to coastal fauna by scraping from rock substrate by means of spatula at 0.5 m depth and material belonging to deep fauna by R / V ARAR at various depths from 19 to 60 m by means of beam-trawl and dredge from various substrate. The material was rinsed in wire sieves, hydroids picked from this material and then fixed and preserved in 5 % formalin prepared in sea water. Moreover, the depth and co-ordinates of these stations and temperature and salinity of their waters were determined (Table 1).

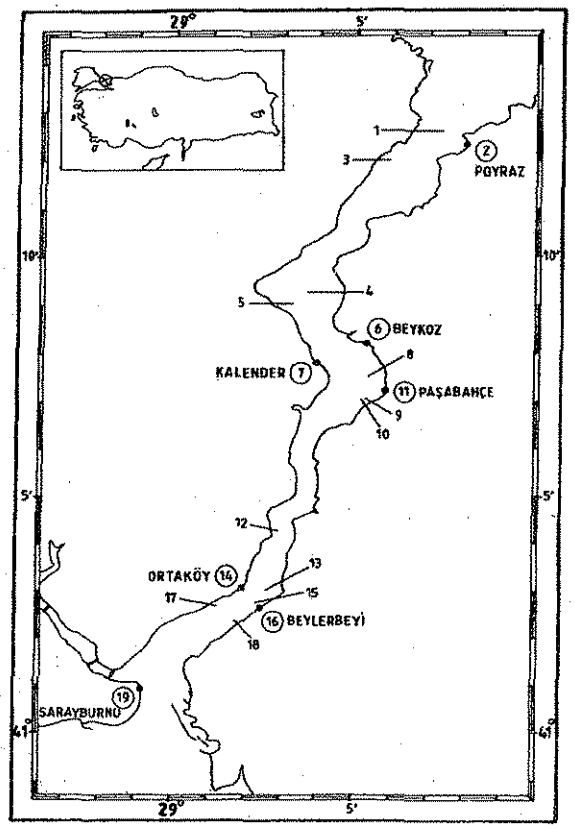

Figure 1.Locations of the research stations

Mainly Hincks (1868), Naumov (1960), Cornelius (1975a, 1975b, 1979, 1982, 1995a,1995b), Morri (1981) and Ramil *et al.* (1992) were utilized in determination of species and Ünsal (1981) was followed in classification of species at family level and upper.

A list of the determined species and their own groups together with the station numbers where the species existed and synonymies, diagnostic morphological characters and original line drawings of 3 species of new recorded 4 species were given (Figs.2-4). Moreover, the distributions of the species were carried out according to salinity (Table2) and zones and depths (Table 3).

Table 1. Data about stations

Station	Location	Depth m	Salinity ‰S	Temperatur T °C
1	41°12'62 N 29°07'38 E	45	23	9.1
2	Poyraz	0.5	17.7	20.5
3	41°12'00 N 29°05'90 E	25	20.5	19.3
4	41°09'30 N 29°03'60 E	43	24	9.4
5	41°09'00 N 29°03'00 E	42	35	14.7
6	Beykoz	0.5	17.5	10.1
7	Kalender	0.5	18.4	23.2
8	41°07'50 N 29°05'30 E	35	24.5	18.5
9	41°07'13 N 29°05'22 E	30	18	11.4
10	41°07'13 N 29°05'18 E	50	21.5	10.5
11	Paşabahçe	0.5	15.7	16.5
12	41°04'30 N 29°02'85 E	50	37	14.2
13	41°03'00 N 29°02'54 E	60	37	13.9
14	Ortaköy	0.5	19.2	10
15	41°02'61 N 29°02'26 E	57	37.5	14.3
16	Beylerbeyi	0.5	18.3	10.2
17	41°02'60 N 29°01'15 E	44	37.5	14
18	41°02'37 N 29°01'92 E	19	19	18
19	Sarayburnu	0.5	17.8	13.5

Salinity of 24.7 ‰ was accepted as a criterion that separates the brackish water from the typical sea water, in investigating the distribution of the species according to salinity (Tait, 1981). Depth of 30 m was accepted as a border separating the infralittoral zone from the sircalittoral zone, in the investigation of the distribution of the species according to zones and depths.

Results

As a result of this study, 14 species belonging to 10 genera and 6 families were determined and 4 species (*Tubularia* cf. *indivisa* Linnaeus, 1758, *Halecium beanii* (Johnston, 1838), *Halecium labrosum* Alder, 1859, *Laomedea exigua* Sars, 1857) among them were designated as new records for the fauna of the Bosphorus, according to present literature.

Determined species were given below together with their upper taxa and station numbers where they existed.

Clasis: HYDROZOA
Order: Hydroidea
Suborder: Athecata
Family: Tubulariidae
Tubularia cf. *indivisa* Linnaeus, 1758
St. 17
Family: Eudendriidae
Eudendrium sp.
St. 13
Suborder: Thecaphora
Family: Sertulariidae
Sertularella polyzonias (Linnaeus, 1758)
St. 13, 17
Family: Haleciidae
Halecium beanii (Johnston, 1838)
St. 6 , 15
Halecium labrosum Alder, 1859
St. 13
Family: Campanulariidae
Clytia hemisphaerica (Linnaeus, 1767)
St. 6, 7, 12
Hartlaubella gelatinosa (Pallas, 1766)

St. 1, 5, 14, 18
Obelia dichotoma (Linnaeus, 1758)
St. 2, 8, 9, 10, 11, 12, 18, 19
Gonothyraea loveni (Allman, 1859)
St. 3, 8., 16
Laomedea angulata Hincks, 1861
St. 4, 10
Laomedea flexuosa Alder, 1856
St. 6
Laomedea exigua M.Sars, 1857
St. 11

Family: Plumulariidae

Ventromma halecioides (Alder, 1859)
St. 2, 14, 16
Aglaophenia pluma (Linnaeus, 1758)
St. 7, 14

New Recorded Species

Tubularia cf. *indivisa* Linnaeus, 1758

Tubularia indivisa, Morri and Boero, 1986:30;Petersen, 1990:196.
Tubularia simplex, Naumov, 1960: 237, fig.107.

Stems are clustered, erect, perisarc of stem without annulation, irregularly twisted and with narrowed base.
Obtained material conforms to *Tubularia indivisa* with above features. But, could not be exactly sure from identification of species since not to be able to observe gonophores and count oral and aboral tentacles.

Halecium beanii (Johnston, 1838)

Halecium beanii, Hincks, 1868:Vol.I, 224, Vol.II, pl. XLIII,fig.2; Vervoort,1972:30,fig.6,7;Cornelius,1975b:391,fig.5;Ünsal,1981: 30, fig.19;Gili *et al.*,1989:77, fig.7A; Cornelius, 1995a: 276, fig.62.

Halecium beani, Broch, 1928: 60, fig.49B; Perrier,1936:21; Naumov, 1960: 447, fig.19G-H, 336.

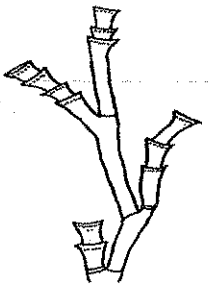

Figure 2. *Halecium beanii.* General view.

Hydrothecae are arranged alternately and they have smooth margin. Hydrothecae are found in groups of 2-5 pieces and in a form where all pieces have merged into each other. Internodes equal. Kidney-shaped female gonothecae has an aperture in centre of concave side.

Halecium labrosum Alder, 1859

Halecium labrosum, Hincks, 1868: Vol.I, 225, Vol.II,pl.XLIV,fig.1 ; Cornelius, 1975b: 396, fig.7 ; Cornelius, 1995a: 282, fig.64.

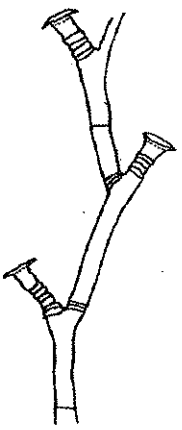

Figure 3. *Halecium labrosum.* General view.

Hydrothecae are arranged alternately. Margin of the hydrothecae is trompet shaped. Hydrothecae are not in a form of pipes merging into each other. Internodes unequal.

Laomedea exigua M.Sars, 1857

Laomedea exigua, Cornelius, 1995b: 278, fig.64.

Campanularia exigua, Hincks, 1868: Vol.I, 172, Vol.II, pl. XXVIII, fig.2 ; Ünsal, 1981: 49, ţek.35.

Obelia exigua, Naumov, 1960: 267, fig.155.

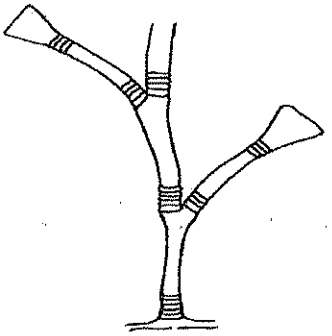

Figure 4.*Laomedea exigua*. General

Hydrothecae are small, robust, narrow-conical and they have smooth, circular margin. Stem is shallowly zig-zag. There are usually 5 basal annuli at the beginning of each internode. Hydrothecal pedicel has 3-4 annules at the base and 3 annules at the top. Lengths of peduncles and internodes are more than twice the length of the hydrothecae.

Ecology

Distribution according to salinity and zones and depths of the 14 species from the Bosphorus is given below.

When the distribution of the species according to salinity was examined, it was seen that 4 species were living merely at typical sea water, 6 species at brackish water, 4 species at both typical sea water and brackish water.

The distribution according to zones and depths showed that 4 species were living only at mediolittoral zone, 5 species at sircalittoral zone, 5 species at 2 or 3 zones.

Table 2. Distribution of the species according to salinity

SPECIES	Salinity (‰S)	
	16-24.7	24.7-37.5
Tubularia cf. indivisa		*
Eudendrium sp.		*
Sertularella polyzonias		*
Halecium beanii	*	*
Halecium labrosum		*
Clytia hemisphaerica	*	*
Obelia gelatinosa	*	*
Obelia dichotoma	*	*
Gonothyraea loveni	*	
Laomedea angulata	*	
Laomedea flexuosa	*	
Laomedea exigua	*	
Ventromma halecioides	*	
Aglaophenia pluma	*	

Discussion

Totally 23 hydroid polyp species [*Sarsia tubulosa* (M. Sars, 1835) *Sarsia eximia* (Allman, 1859), *Ectopleura larynx* Ellis and Solander, 1786, *Bougainvillia muscus* (Allman, 1863), *Podocoryna carnea* M. Sars, 1846, *Phialella quadrata* (Forbes, 1848), *Leuckartiara octona* (Fleming, 1823), *Rhizorhangium arenosum* (Alder, 1862) *Eudendrium capillare* Alder, 1856, *Eudendrium rameum* (Pallas, 1766), *Sertularella polyzonias*(Linnaeus,1758),*Halecium halecinum* (Linnaeus, 1758), *Lafoea dumosa* (Fleming, 1820), *Clytia hemisphaerica* (Linnaeus, 1767), *Obelia bidentata* Clarke, 1875, *Obelia dichotoma* (Linnaeus, 1758), *Gonothyraea loveni* (Allman, 1859), *Laomedea angulata* Hincks, 1861, *Laomedea flexuosa* Alder, 1856, *Hartlaubella gelatinosa* (Pallas, 1766), *Ventromma halecioides* (Alder, 1859), *Aglaophenia pluma* (Linnaeus, 1758), *Aglaophenia octodonta* (Heller, 1868)] had been determined in the Bosphorus

prior to this study.

Table 3. Distribution of the species according to zones and depths

ML: Mediolittoral IL: Infralittoral SL: Sircalittoral

SPECIES	Zones and Depths (m)						
	ML	IL			SL		
	0.5	20	25	30	40	50	60
Tubularia cf. indivisa						*	
Eudendrium sp.							*
Sertularella polyzonias						*	*
Halecium beanii	*						*
Halecium labrosum							*
Clytia hemisphaerica	*					*	
Obelia gelatinosa	*	*				*	
Obelia dichotoma	*	*		*	*	*	
Gonothyraea loveni	*		*		*		
Laomedea angulata						*	
Laomedea flexuosa	*						
Laomedea exigua	*						
Ventromma halecioides	*						
Aglaophenia pluma	*						

In this study, totally 14 species were determined. Four of them are new records for the fauna of the Bosphorus. Ten of 23 species reported before were obtained also in this study but 13 of the rest were not encountered.

However, the number of species of the hydroid polyps of the Bosphorus, has now been increased to 27 with the addition of four new recorded species exposed in this study.

From the species obtained in this study, *Obelia dichotoma* was encountered at 8 of 19 stations and determined as more widespread species in comparison with other 13 species.

When the distribution of the species according to salinity was

examined, it was seen that four species were living merely at typical sea water, six species at brackish water, four species at both typical sea water and brackish water.

The distribution according to zones and depths showed that four species were living only at mediolittoral zone, five species at sircalittoral zone, five species at two or three zones.
In conclusion, with this study, the number of species belonging to hydroid polyps of the Bosphorus has been increased to 27 from 23 with the addition of four new recorded species. Moreover, the places in which these 14 species exactly exist and distribution of these species according to salinity were discovered for the first time by this research.
These data will show the way to studies of taking measures against fouling organisms, in future.

Acknowledgment

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Özet

Bu araştırma İstanbul Boğazı'nda bulunan hidroid polip türlerini ve bu türlerin bazı ekolojik özelliklerini saptamak amacıyla yapılmıştır. Bu amaçla, örnekler 0.5-60 m arasındaki derinliklerde kalan 19 istasyondan spatula, bimtrol ve dreç kullanılarak elde edilmiştir.
Bu çalışma sonucunda 6 familya ve 10 cinse ait 14 tür saptanmış ve eldeki literatüre göre bu türlerden 4 tanesinin (*Tubularia* cf. *indivisa* Linnaeus, 1758, *Halecium beanii* (Johnston, 1838), *Halecium labrosum* Alder, 1859, *Laomedea exigua* M.Sars,1857) İstanbul Boğazı faunası için yeni kayıt oldukları belirlenmiştir.

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