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Aquatic Invasions Records

The first record of *Phyllorhiza punctata* von Lendenfeld, 1884 from the southern Aegean Coast of Turkey

Nurçin Gülşahin* and Ahmet Nuri Tarkan

Muğla University, Faculty of Fisheries, Department of Hydrobiology, 48000 Muğla, Turkey

E-mail: ngulsahin@mu.edu.tr (NG), tarkann@mu.edu.tr (ANT)

**Corresponding author*

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Abstract

The Australian spotted jellyfish *Phyllorhiza punctata* was reported in September 2011, in Sülüngür Lake, Muğla, on the Southern Aegean coast of Turkey. This is the second record from Turkey. The first record was in 2010 in Iskenderun, on the Levantine coast of Turkey.

Key words: *Phyllorhiza punctata*, Sülüngür Lake, Southern Aegean, alien

Introduction

Phyllorhiza punctata von Lendenfeld, 1884 (Cnidaria: Scyphozoa: Rhizostomeae) is indigenous to the tropical western Pacific Ocean (Graham et al. 2003). *Phyllorhiza punctata* was reported from America (Carlton and Geller 1993; Graham et al. 2003), the Caribbean Sea (Silveira and Cornelius 2000), Pacific Ocean (Larson and Arneson 1990; Clarke and Abey 1998) and Atlantic Ocean (Mianzan and Cornelius 1999).

It was first observed in the Mediterranean Sea in 1965. Since then it has been reported from different locations in the Mediterranean Sea (Galil et al. 1990, 2009; Abed-Navandi and Kikinger 2007; Boero et al. 2009; Fuentes et al 2011). In 2010, the species was recorded from İskenderun Bay, SE Turkey (Çevik et al. 2011). In this study, we discuss the presence of *P. punctata* in the southern Aegean Sea by reporting the species from that location for the first time.

Materials and methods

Sülüngür Lake is part of the Köyceğiz-Dalyan lagoon system, a protected natural reserve in the province of Muğla, southwestern Turkey (Ekdal and Tanık 2008). Sülüngür Lake is connected with both Köyceğiz Lake and the Mediterranean Sea. The lake has two salinity layers. An upper salinity layer, which moves from Köyceğiz Lake to the Mediterranean Sea shows seasonal variations whereas a bottom salinity layer moving from the Mediterranean Sea to the Köyceğiz Lake is constant (Gürel 2000). Maximum depth of the lake is about 10 m.

In September 27, 2011, ten specimens of *P. punctata* were collected from two stations in the Sülüngür Lake. The individuals were weighed and their umbrella diameters were measured (Table 1). The specimens were preserved in 4% formalin solution and deposited in Muğla University, Faculty of Fisheries (Collection number: MUSUM/CNI/2011/3-13). Temperature, salinity and dissolved oxygen values of the lake were measured with YSI Multiprobe System (Table 2).

Results and discussion

Medusae were counted along three direct lines, each of them was 2 km in length and 10 m wide. The observation was carried out from both sides (5 m transect width off each side) of a boat whilst the boat drove at the lowest speed. Abundance of *Phyllorhiza punctata* individuals was determined as 4 ind./10m^2. Medusae swarmed during four weeks (September 8, 2011 - October 2, 2011) and 1-2 dead individuals were

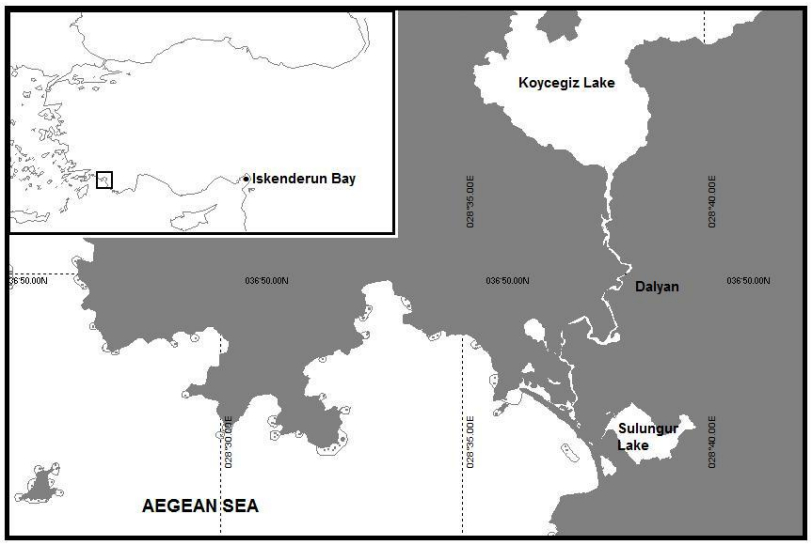

Figure 1. Köyceğiz-Dalyan Lagoon System.

Figure 2. Sülüngür Lake and sampling stations.

Table 1. Weight and umbrella diameters of *Phyllorhiza punctata* specimens (Abbreviations: Ind.: individual).

	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7	Ind. 8	Ind. 9	Ind.10
Weight (g)	7800	6728	5647	3290	1756	1326	464	234	161	142
Umbrella diameter (cm)	50.3	44.9	39.6	33.8	26.4	22.1	18.7	12.2	10.2	8.5

seen every 10 m along the coast line of the Sülüngür Lake (September 27, 2011). *Phyllorhiza punctata* averaged 45 cm in bell diameter with a maximum reported size of 62 cm (Graham et al. 2003). In our study, maximum size of *P. punctata* in bell diameter was measured at 50.3 cm.

No jellyfish were previously detected in Sülüngür Lake (personal communications with people living in Dalyan and working in fish farms).

Fishing and fish farming of some fish families (Mugilidae, Sparidae, Moronidae, Cyprinidae, Anguillidae, Serranidae, Siluridae, etc.) are

Figure 3. *Phyllorhiza punctata* in the Sülüngür Lake (Photograph by N. Gülşahin and Maria Jonker).

Table 2. Temperature, salinity and dissolved oxygen values of the stations in Sülüngür Lake.

Station No:	Temperature (°C)	Salinity (psu)	Dissolved oxygen (mg/l)
1 (surface)	21.64	23.32	8.71
1 (5 m)	24.74	30.46	9.15
2 (surface)	26.71	21.05	8.73
2 (5 m)	28.82	26.13	8.76

produced in Köyceğiz-Dalyan Lagoon System. Mugilids compose 79% of total fish production (approximately 209 tons) and eggs of gray mullets are processed as caviar (Buhan 1998). *Mugil cephalus* Linnaeus, 1758 constitutes species composition with other mullet species like *Liza aurata* (Risso, 1810), *Liza saliens* (Risso, 1810), *Liza ramada* (Risso, 1827) and *Chelon labrosus* (Risso, 1827) (Buhan et al. 1998). Besides mullet species, *Anguilla anguilla* (Linnaeus, 1758), *Cyprinus carpio* Linnaeus, 1758, *Lichia amia* (Linnaeus, 1758), *Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817), *Leuciscus cephalus* (Linnaeus, 1758), *Silurus glanis* Linnaeus, 1758, *Pagellus mormyrus* (Linnaeus, 1758), *Diplodus annularis* (Linnaeus, 1758), *Barbus plebejus escherichi* Steindachner, 1897, *Capoeta* sp., *Atherina* sp. and *Gambusia affinis* (Baird & Girard, 1853) are native to the system (Buhan 1998). According to Akin et al. (2005), *Atherina* and *Tilapia* species are the most abundant species in Köyceğiz-Dalyan Lagoon System. Also, fishing is carried on with fish traps and cages in Sülüngür Lake (Buhan 1998). Sea bream and sea bass farming are performed in fish cages in the lake (Buhan et al. 1998). Therefore, Sülüngür Lake is an important habitat for *P. punctata* which feeds on fish eggs and larvae. In October and November when strong winds and waves come from the Mediterranean Sea, Mediterranean water enters the Köyceğiz-Dalyan Lagoon System through the bottom of the system (Gürel 2000). Water exchange between the system and the Mediterranean Sea, and strong winds and currents at the entrance of the system could effect the entrance of *P. punctata* to the system.

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References

Abed-Navandi D, Kikinger R (2007) First record of the tropical scyphomedusa *Phyllorhiza punctata* von Ledenfeld, 1884 (Cnidaria: Rhizostomeae) in the Central Mediterranean Sea. *Aquatic Invasions* 2: 391-394, http://dx.doi.org/10.3391/ai.2007.2.4.7

Akin S, Buhan E, Winemiller KO, Yılmaz H (2005) Fish assemblage structure of Koycegiz Lagoone Estuary, Turkey: Spatial and temporal distribution patterns in relation to environmental variation. *Estuarine, Coastal and Shelf Science* 64: 671-684, http://dx.doi.org/10.1016/j.ecss.2005.03.019

Boero F, Putti M, Trainito E, Prontera E, Piraino S, Shiganova TA (2009) First records of *Mnemiopsis leidyi* (Ctenophora) from the Ligurian, Thyrrhenian and Ionian Seas (Western Mediterranean) and first record of *Phyllorhiza punctata* (Cnidaria) from the Western Mediterranean. *Aquatic Invasions* 4: 675-680, http://dx.doi:10. 3391/ai.2009.4.4.13

Buhan E (1998) development of Lagoon Management of Köyceğiz Lagoon System by Researcing Present Situation and Grey Mullet Populations. Ministry of Agriculture fisheries Research Enstitute, issue B, No:3, Muğla, Turkey

Buhan E, Yılmaz H, Mater S, Morkan Y (1998) Lagoon Management and Fisheries of Köyceğiz Lagoon System, Fisheries Symposium of East Anatolia, June 10-12, 1998, Erzurum, Turkey

Carlton JT, Geller JB (1993) Ecological roulette: the global transport of non-indigenous marine organisms. *Science* 261: 78-82, http://dx.doi.org/10.1126/science.261.5117.78

Clarke TA, Abey GS (1998) The use of small mid-water attraction devices for investigation of the pelagic juveniles of carangid fishes in Kaneohe Bay, Hawaii. *Bulletin of Marine Science* 62(3): 947-955

Cevik C, Derici OB, Cevik F, Cavas L (2011) First record of *Phyllorhiza punctata* von Lendenfeld, 1884 (Scyphozoa: Rhizostomeae: Mastigiidae) from Turkey. *Aquatic Invasions* 6, Suppl. 1: S27-S28, http://dx.doi.org/10.3391/ai.2011.6.S1.006

Ekdal A, Tanık A (2008) Salinity simulations in the water quality modeling of Köyceğiz-Dalyan Lagoon. Itümagazine/*e* kontrol of water pollution. Volume 18, 1, pp 55-64

Fuentes V, Straehler-Pohl I, Atienza D, Franco I, Tilves U, Gentile M, Acevedo M, Olariaga A, Gili J (2011) Life cycle of the jellyfish *Rhizostoma pulmo* and its distribution, seasonality and inter-annual variability along the Catalan coast and the Mar Menor (Spain, NW Mediterranean). *Marine Biology* 158: 2247-2266, http://dx.doi.org/10.1007/s002 27-011-1730-7

Galil BS, Spanier E, Ferguson WW (1990) The Scyphomedusae of the Mediterranean coast of Israel, including two lessepsian migrants new to the Mediterranean. *Zoologische Mededelingen*, Leiden 64: 95-105

Galil BS, Shoval L, Goren M (2009) *Phyllorhiza punctata* von Lendenfeld, 1884 (Scyphozoa: Rhizostomeae: Mastigiidae) reappeared off the Mediterranean coast of Israel. *Aquatic Invasions* 4: 481-483, http://dx.doi.org/10.3391/ai.2009.4.3.6

Graham WM, Martin DL, Felder DL, Asper VL, Perry HM (2003) Ecological and economic implications of a tropical jellyfish invader in the Gulf of Mexico. *Biological Invasions* 5: 53-69, http://dx.doi.org/10.1023/A:1024046707234

Gürel M (2000) Nutrient Dynamics in Coastal Lagoons: Dalyan Lagoon Case Study, Istanbul Technical University Institute of Sciences, PhD thesis, Istanbul

Larson RJ, Arneson AC (1990) Two medusae new to the coast of California: *Carybdea marsupialis* (Linnaeus, 1758), a cubomedusa and *Phyllorhiza punctata* von Ledenfeld, 1884, a rhizostome scyphomedusa. *Bulletin of the Southern California Academy of Sciences* 89: 130-136

Mianzan HM, Cornelius PFS (1999) Cubomedusae and Scyphomedusae. In: Boltovskoy D (ed) South Atlantic Zooplankton, Volume 1. Backhuys Publishers, Leiden, pp 513-559

Silveira FL, Cornelius PFS (2000) New observations on medusae (Cnidaria, Scyphozoa, Rhizostomae) from the northeast and south Brazil. *Acta Biologica Leopoldensia* 22: 9-18