

## SHORT COMMUNICATION

### **Morphological identification of parasites found in the stomach contents of bycaught striped dolphins (*Stenella coeruleoalba*) from Turkish Eastern Mediterranean Sea coast**

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#### **Abstract**

One of the causes for major health problems in marine mammals is parasites in their digestive systems. These parasites are common and they result in various pathological disorders such as ulceration, obstructions, gastric and intestinal bleeding in cetaceans. In Turkey there have been studies on feeding ecology of cetaceans; however there is insufficient information on parasites, including those found in stomachs. In this study, macroparasites were collected and examined from the stomach contents of six striped dolphins (*Stenella coeruleoalba*) bycaught during the swordfish fishing off the Turkish coastal town Fethiye in the Eastern Mediterranean Sea in 2003 and 2004. All stomachs were infected by nematodes. These nematodes were preserved in 70% ethanol and examined and measured after cleaning and transparation by lactophenol. They were identified as *Anisakis* spp., *Contracaecum* spp., *Pseudoterranova* spp. and *Steneurus minor*. Different larval forms were observed. This is the first study on parasites found in the stomach contents of striped dolphins in Eastern Mediterranean. It is, however, only a preliminary one, thus more samples should be collected and examined to understand the cetacean parasites in the Turkish waters.

**Keywords:** *Stenella coeruleoalba*, Eastern Mediterranean, digestive system parasite, Anisakidea

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#### **Introduction**

Marine mammals are affected by various kinds of parasites. These parasites include diverse fauna of nematodes, trematodes, cestodes and ectoparasites. To

study parasites in cetaceans, one needs to examine live specimens or fresh carcasses of cetaceans. However, the sampling of free ranging animals is difficult to perform in the wild. Researches, therefore, have to rely on unpredictable, occasional strandings or bycatch (Raga *et al.* 1997; Dhermain *et al.* 2002). The samples used in this study were also collected by bycatch.

Endoparasites can cause various pathological disorders in marine mammals. Digestive system parasites can cause internal bleeding, ulceration, obstruction and malnutrition (Dailey 2001). Nematodes of the family Anisakidae (*Anisakis*, *Contraceacum*, *Pseudoterronava*) are composed of several complexes of sibling species that have systematic effect and members of three genera are the most common nematodes of cetaceans, as reported from most marine mammal species examined (Dailey 2001).

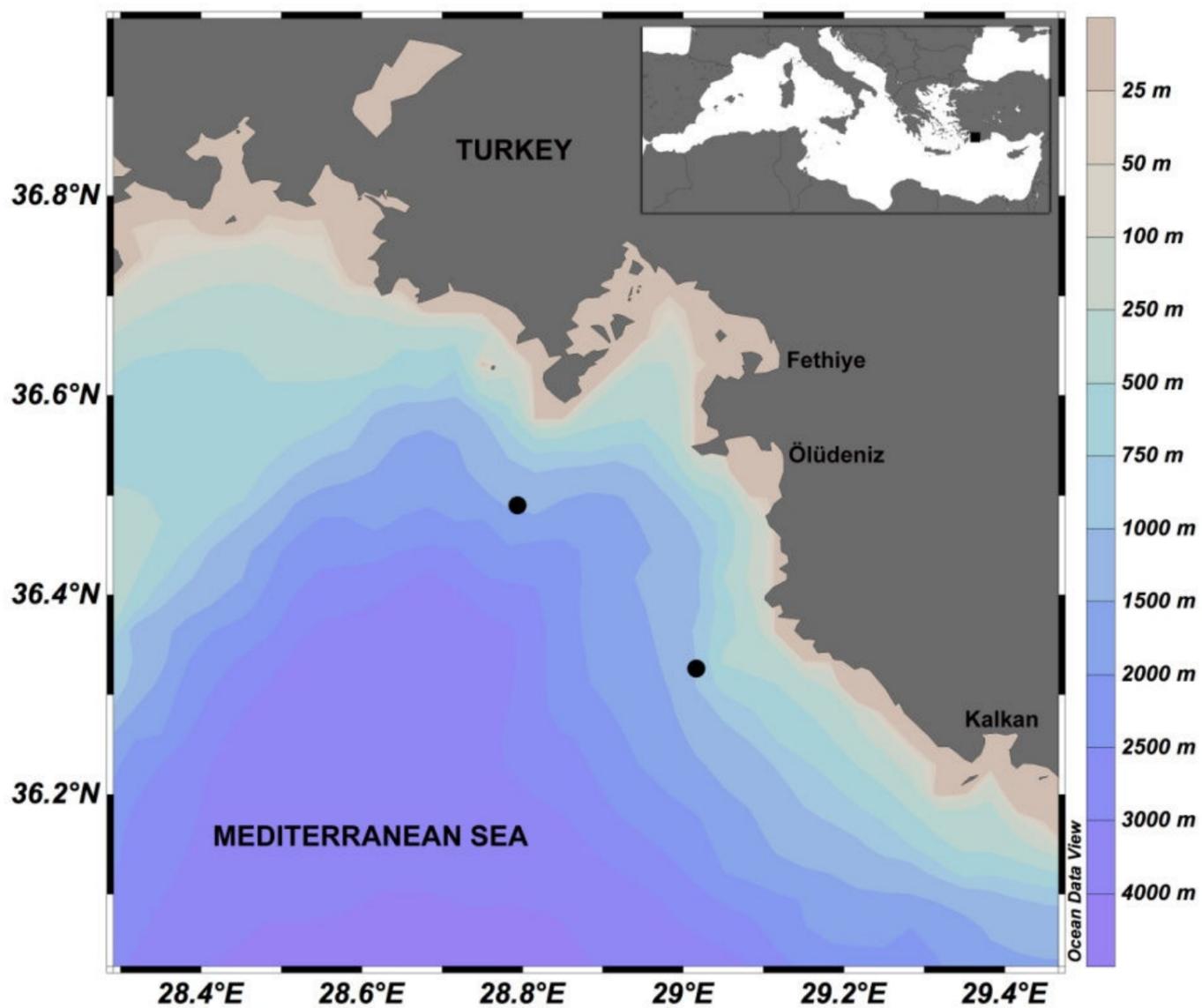
For most parasites, cetaceans are their final hosts. Some nematodes like *Anisakis* spp. migrate to muscles in the last hosts and can cause pathological conditions in stomach mucosa and submucosa (Motta *et al.* 2008). Due to limited conditions in the field, muscles and stomach mucosa could not be examined for possible parasite infestations.

There are few studies about digestive track parasites of striped dolphins in the Mediterranean. *Pholeter gastrophilus* and *Anisakis* spp. have been reported on the Spanish Mediterranean coasts in the striped dolphins (*Stenella coeruleoalba*) (Duignan *et al.* 1992; Aznar *et al.* 2006). Danyer *et al.* (2010) reported *Contraceacum aduncum* and *Anisakis* spp. in harbor porpoises (*Phocoena phocoena*) in the stomach contents on the western coast of the Turkish Black Sea. Before that study, there had not been any studies on parasites in the Turkish seas.

The aim of this study is to obtain baseline information on parasites in the striped dolphin's stomach in the Turkish coast of Mediterranean so that we can be prepared for any parasite infestation in live stranded animals and rehabilitation cases.

## **Materials and Methods**

Six striped dolphins were bycaught during the swordfish fishing off the Turkish coastal town Fethiye (Figure 1) in the Eastern Mediterranean Sea in 2003 and 2004 (see also Dede 2008). While their stomach content was examined, macroparasites were collected and stored in 70% ethanol, examined later in 2010.



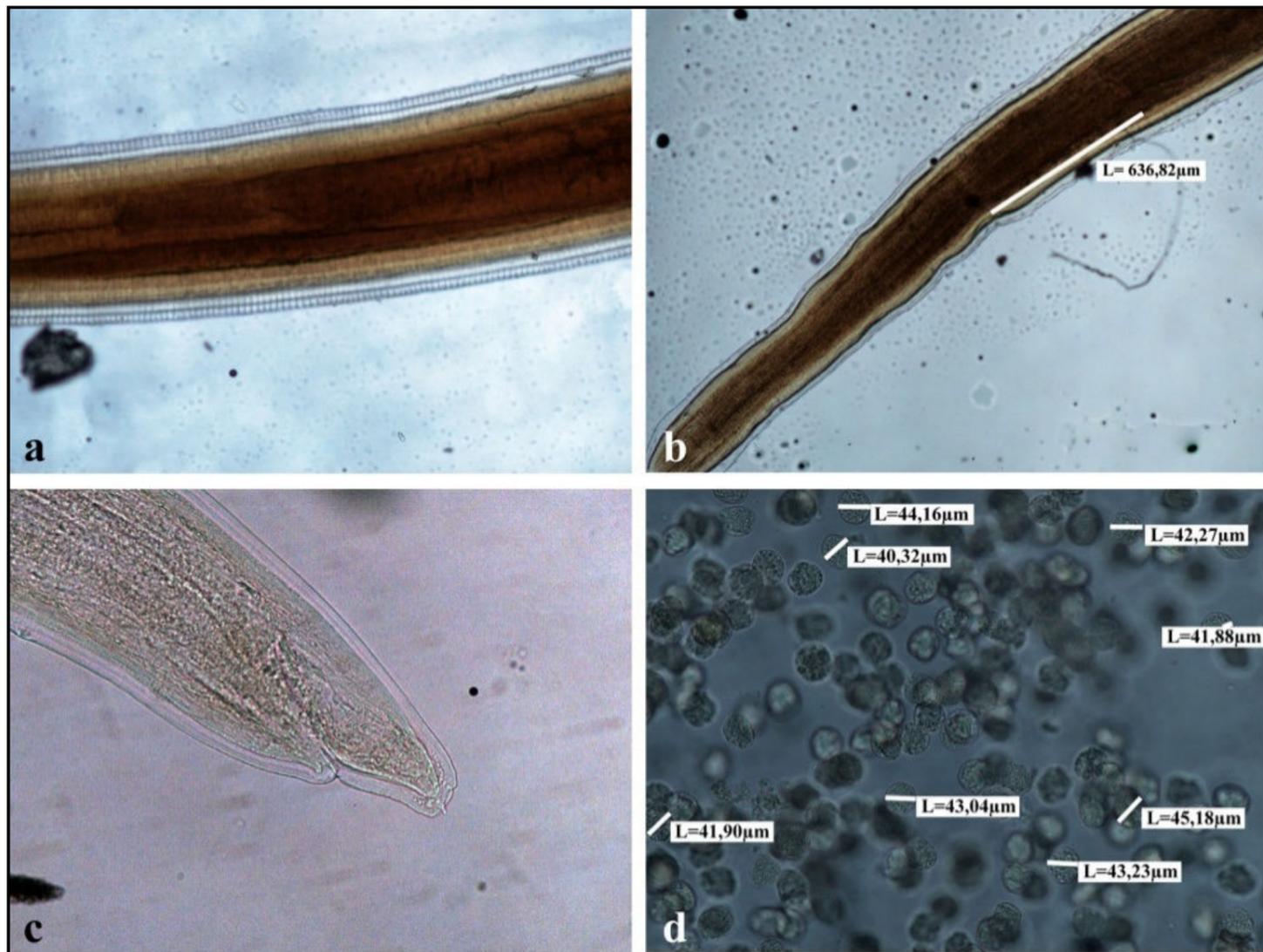
**Figure 1.** Bycatch locations of the striped dolphins in the study area.

Nematodes were inspected under stereomicroscopes and classified with respect to their lengths. They were cleared by using lactophenol, saline water, 70% ethanol and glycerol (Berland 1961). Most of nematodes shrunk due to storage in ethanol until the analysis. They were examined under light microscopes and measurements were taken on lips, nerve ring to head, esophagus, ventricles, secum, anus to tail, and spicules. Nematodes were identified according to the morphological criteria proposed by Berland (1961). Measurements were compared to those reported by Grabda (1976), Shamsi *et al.* (2009), Sohn and Seol (1994), Delyamure (1968).

## Results

Nematodes were identified from gastrointestinal parasites as *Anisakis* spp., *Contraceacum* spp., *Pseudoterranova* spp., and *Stenerus minor*. Average values of measurements were taken. In the Anisakidae life cycle, adult parasites immigrate to muscles (Grabda 1976). Thus, mostly larval forms of parasites were found.

Even though we identified adult forms of *Contraceacum* spp., *Anisakis* spp. and *Pseudoterranova* spp. were seen mostly in larval form (Figure 2). *Anisakis* spp., which is a common species in the Mediterranean, was found in all stomachs.



**Figure 2.** Microscopic images of parasites.

a) *Pseudoterranova* sp. ventriculus b) *Anisakis* sp. ventriculus c) *Anisakis* sp. posterior d) *Contraceacum* spp. eggs

### Discussion and Conclusion

Striped dolphins of this study were not examined fully in terms of parasitology. Only stomachs were collected. More comprehensive study could have been done if whole bodies had been examined. One of the parasites found in the stomach contents of the striped dolphins was identified as *Stenurus minor*, although it is a cranial sinus parasite (Lehnert *et al.* 2005). Normally *S. minor* is a parasite found in tympanic bulla and lungs and sometimes has a role in mass stranding. *S. minor* has effects on auditory organs. Mild otitis media, balance problems, hearing and echolocation can occur by the effect of this parasite infestation (Gibson *et al.* 1998). This parasite can be swallowed by host (pers. comm. R. Lick). Accidentally swallowed *Stenurus globicephalae* has been reported by Fernández *et al.* (2003) on Risso's dolphin (*Grampus griseus*). *Anisakis simplex* is a common parasite found in marine mammal species (Dailey 2001). Marine mammals infected with this parasite from fish through their feeding.

Since this is the first study on the parasite fauna in the striped dolphins in the Eastern Mediterranean coast of Turkey, no reference was available for the subject in the same area. The literature review, therefore, was performed on the prey fish of striped dolphins. In Greece from 18.83% of the examined 462 fish have Anisakidae larvae. According to Chaligiannisa *et al.* (2012), Atlantic mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*), chub mackerel (*Scomber japonicus*), European hake (*Merluccius merluccius*), annular sea bream (*Diplodus annularis*) and Atlantic horse mackerel (*Trachurus trachurus*), were most highly infected species by L3 larvae of *Anisakis* type I or *Hysterothylacium* sp.

There are some studies about digestive track parasites of cetaceans in the Mediterranean. In the Western Mediterranean coasts, a cyst of *Pholeter gastrophilus* and some crater like ulcers of *Anisakis simplex* have been reported in Risso's dolphin (Fernández *et al.* 2003). Parallel to this, *P. gastrophilus* and *Anisakis* spp. have been reported on the Spanish Mediterranean coasts in the striped dolphins (Duignan *et al.* 1992) and *P. gastrophilus* in four odontocete species including striped dolphins (Aznar *et al.* 2006). Parasitic granulomas in the stomachs of striped dolphins were reported on the Italian Mediterranean coast due to *P. gastrophilus* infection as well (Cornaglia *et al.* 2000). On the Eastern Mediterranean coast of Israel, probably parasite caused ulcers of stomach mucosa of Risso's dolphins was reported (Fridera *et al.* 2002). A sperm whales (*Physeter macrocephalus*) stomach contents were examined in the south of Crete, but no parasite was found (Roberts 2003).

This is the first study on parasites found in the stomach contents of striped dolphins in Eastern Mediterranean. It is, however, only a preliminary one, thus more samples should be collected and examined to understand the cetacean parasites in the Turkish waters. The present study shows that the parasite fauna of the striped dolphin stomachs in the Eastern Mediterranean coast of Turkey was similar to those found in the cetaceans' stomachs of the Western Mediterranean and Black Sea. Parasitological studies are utterly important for cetacean diversity. Parasitism can occur indifferently to pathologies and strandings in the wild. However, more studies are needed for understanding parasites in cetaceans in the Turkish waters. As Dhermain *et al.* (2002) concluded *Anisakis* in the stomach should be systematically examined. In the future, genetic analyses will be able to provide more specific information for parasitological studies. Nevertheless, basic information was obtained on nematode fauna in the striped dolphins' stomachs from the Turkish Mediterranean coasts.

### **Acknowledgments**

This study was presented in the 25<sup>th</sup> Annual Conference of the European Cetacean Society in 2011, Cadiz and supported by the Organizing Committee. We are heartily

thankful to Drs Bayram Öztürk, Ayaka Amaha Öztürk, Hayrettin Akkaya and Tanay Bilal for their supports and encouraging us to make this study. We are grateful to Danny Morricks, Pierre Gallego, Mercedes Fernández, Antonio Raga, Alexei Birkun, Sergey Krivokhizhin, and Roland Lick for sharing their knowledge and to Ceren Buminoğlu for her quick and precise editing.

## **Türkiye'nin Doğu Akdeniz kıyılarında tesadüfi ağa yakalanan çizgili yunusların (*Stenella coeruleoalba*) mide içeriklerinde bulunan parazitlerin morfolojik tayini**

### **Özet**

Deniz memelilerinde önemli sağlık sorunlarından biri sindirim sistemi parazitleridir. Bu parazitler ülserasyon, tıkanma, mide ve bağırsak kanamaları gibi patolojiler oluşturabilirler. Türkiye'de Setaselerin beslenme ekolojileri üstüne çalışmalar olsa da bulunan midelerin parazitleri konusunda bilgi çok azdır. Bu çalışmada, Doğu Akdeniz'de sahil kasabası olan Fethiye'de 2003-2004 yıllarında kılıçbalığı avcılığı sırasında ağa tesadüfi yakalanan altı adet çizgili yunusun (*Stenella coeruleoalba*) mide içeriğinden toplanan makroskopik parazitler incelenmiştir. Tüm midelerde parazit enfestasyonu görülmüştür. Parazitler %70 Etanolde muhafaza edilmiştir. Temizlemenin ardından laktofenol ile şeffaflaştırılmış ve incelenmiştir. Nematodlar *Anisakis* spp., *Contracaecum* spp., *Pseudoterranova* spp. ve *Steneurus minor* olarak tespit edilmiştir. Ölçümleri alınmış ve değişik larval formları tespit edilmiştir. Bu çalışma Türkiye'de çizgili yunusların mide içeriklerindeki parazitler üzerine yapılan ilk çalışmadır. Türkiye'deki setase parazitleri hakkında bilgi edinmek için daha çok örnekle çalışmalar yapılmalıdır.

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**Received:** 13.04.2012

**Accepted:** 16.04.2012