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## New Pelagic Gastropoda Species Encountered on the Turkish Coast of the Levant Sea

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**Abstract:** In this work, 9 species of pelagic gastropods were studied during bottom trawling and net sampling for zooplankton of Akkuyu in Erdemli and in İskenderun Bay (the northeastern Mediterranean). Among those, *Pterotrachea hippocampus* Philippi, 1836, *Cavolinia tridentate* (Forsskal, 1775), *Limacina (Munthea) trochiformis* (D'Orbigny, 1836), and *Corolla spectabilis* (Dall, 1871) were first records for Turkish mollusk fauna, and the remaining, *Atlanta peronii* Lesuer, 1817, *Firoloida desmarestia* Lesuer, 1817, *Clio pyramidata* Linné, 1767, *Creseis acicula* Rang, 1828, and *Creseis virgula* Rang, 1828 were first records for the Mediterranean coast of Turkey.

**Key Words:** Turkish coast, Levant Sea, pelagic mollusks

### Türkiye'nin Güney Akdeniz Sahillerinde Rastlanan Yeni Pelajik (Gastropoda) Molluska Türleri

**Özet:** Bu çalışmada, İskenderun Körfezi, Erdemli ve Akkuyu bölgesinde yapılan Zooplankton ve dip trolü çalışmaları sırasında örneklenen 9 pelajik Gastropoda (Molluska) türü incelenmiştir. Bu türlerden 4'ü *Pterotrachea hippocampus* Philippi, 1836, *Cavolinia tridentate* (Forsskal, 1775), *Limacina (Munthea) trochiformis* (D'Orbigny, 1836), *Corolla spectabilis* (Dall, 1871) Türkiye kıyılarında, 5'i ise (*Atlanta peronii* Lesuer, 1817, *Firoloida desmarestia* Lesuer, 1817, *Clio pyramidata* Linné, 1767, *Creseis acicula* Rang, 1828, *Creseis virgula* Rang, 1828) Türkiye'nin Akdeniz kıyılarında ilk kez rastlanmaktadır.

**Anahtar Sözcükler:** Türkiye kıyıları, Levantin Denizi, pelajik molluska

### Introduction

Mollusks, which live a holoplanktonic life in pelagic areas, are composed of various sub-groups included in the class Gastropoda. While there are approximately 17,000 members of this class living in pelagic and benthic zones of seas all over the world (1), only 150 members live in pelagic zones as holoplanktonic animals (2). Heteropoda of the subclass Prosobranchia and Thecosomata (shelled Pteropoda) and Gymnosomata (unshelled Pteropoda) of the subclass Opisthobranchia constitute the majority of this group. Some of these species, which are distributed primarily in tropical and sub-tropical oceans and seas, are very important for marine ecosystems.

Early data concerning the pelagic mollusks along the Northeastern Mediterranean coastlines of Turkey were

first recorded in İskenderun Bay by Akyüz (3), Gökçalp (4), and Gücü et al. (5).

Additional data were recorded by Kimor and wood (6) and Pasteur et al. (7) in the Eastern Mediterranean, including the Northeastern Mediterranean coast. In this study, 9 species of pelagic mollusks, sampled with a zooplankton net or deep trawling during surveys conducted at various periods in the Northeastern Mediterranean coast of Turkey, are reported.

### Materials and Methods

The species obtained in this study were encountered during bottom trawling and zooplankton studies conducted on February 9, 2000 in Babadil Port, situated between Sancak Cape and Besparmak Island, and on May

23, 2003 in İskenderun Bay, the Northeastern Mediterranean (Figure 1).

A Mediterranean-type bottom trawl and an UNESCO WP2 model standard zooplankton net of 200 µm mesh size and a diameter of 57 cm were used. Additional

samples were collected during swimming in front of the Institute of Marine Sciences, Erdemli, and in Mersin Bay on September 10, 2002 and June 14, 2003, respectively. Collected material was fixed in 4% formalin. For the identification of the species we referred to the literature

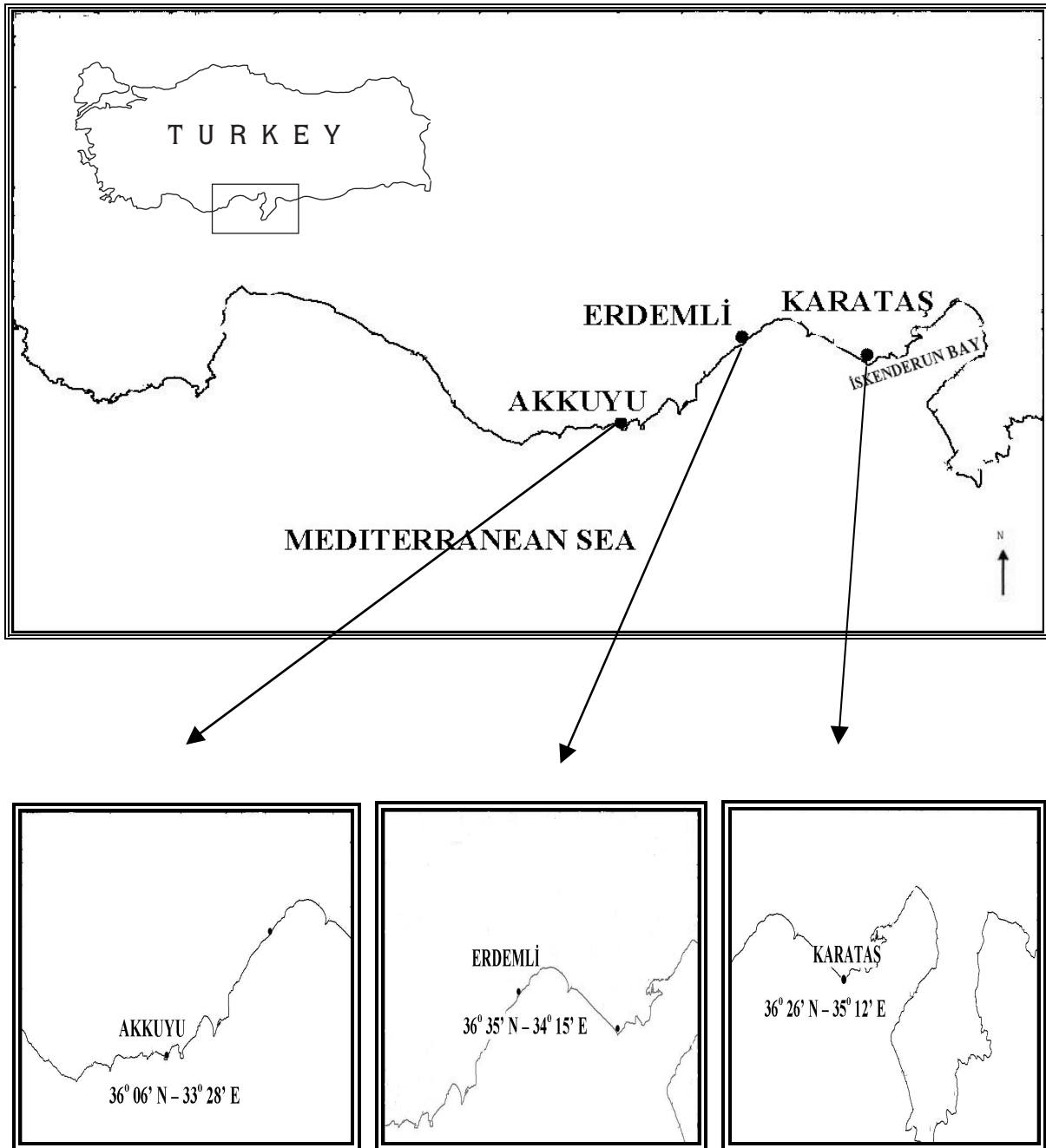


Figure 1. Map of the studied areas with locations of sampling stations.

(2,8-13). Since the pseudoconches of Pseudothecosomata, which were obtained by bottom trawling, were broken, drawings of these species were completed by using some other morphological body characteristics presented by Van der Spoel and Dadon (13). Systematics of the identified species were examined according to Sabelli et al. (14).

## Results

In this study, 9 pelagic gastropods (3 Prosobranchia and 6 Opisthobranchia species) were recorded. Of these species, *Pterotrachea hippocampus* Philippi, 1836, *Cavolinia tridentata* (Forsskal, 1775), *Limacina (Munthea) trochiformis* (D'Orbigny, 1836), and *Corolla spectabilis* Dall, 1871 were first records in Turkish seas. *Atlanta peronii* Lesueur, 1817, *Firoloida desmarestia*, Lesueur, 1817, *Clio pyramidata* Linné, 1767, *Creseis acicula* Rang, 1828, and *Creseis virgula* Rang, 1828 were first records for the Mediterranean coastline of Turkey. The description and distribution of the species are as follows:

**Subclass:** Prosobranchia

**Family:** Firolidae

*Pterotrachea hippocampus* Philippi, 1836 (Figure 2)

**Synonyms:** *Pterotrachea apunctata* Bonnevie, 1920, *Pterotrachea cuvierli* Chamisso & Eysenhardt, 1821, *Pterotrachea gibbosa* (Lesueur & Peron, 1817), *Pterotrachea orthophalmus* (Tesch, 1906), and *Pterotrachea xenoptera* Tesch, 1906.

**Material:** 2 individuals were obtained by horizontal surface plankton towing. Mean length: 75 mm; locality: İskenderun Bay (lat 36° 09' N, long 36° 42' E); sampling date: 23.05.2003.

**Description:** There is no shell or operculum and tentacles are lacking. The sucker on the swimming fin is present only in males. The highly transparent body is elongated and cylindrical, with pigment spots embedded in the transparent epidermis. The small visceral mass is mostly embedded in tissue within the main body axis, with gill branches projecting from the body. Eyes are triangular. The visceral mass is twice as long as it is wide (9,13).

**Distribution:** Eastern Mediterranean: Cyprus. Western Mediterranean: Ionian Sea, Southern France, Western Italy, and Sicily. Atlantic and Indo-Pacific Oceans (13).

**Subclass:** Opisthobranchia

**Family:** Cavolinidae

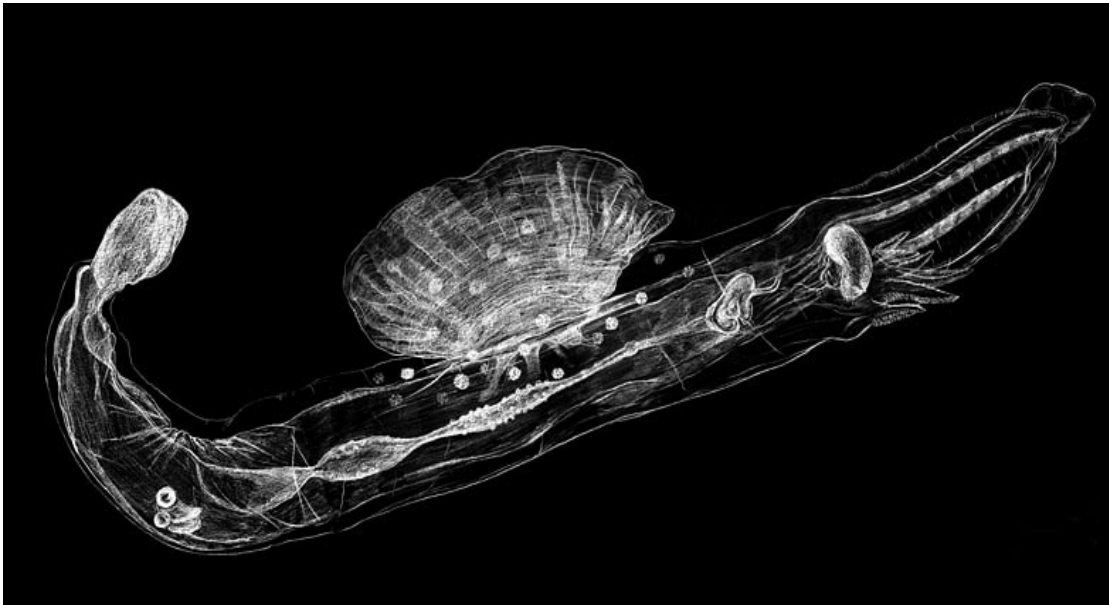


Figure 2. *Pterotrachea hippocampus* Philippi, 1836; length: 75 mm.

*Cavolinia tridentata* (Forsskål, 1775) (Figure 3).

**Synonyms:** *Cavolinia affinis* (D'Orbigny, 1836), *Cavolinia bermudensis* Van der Spoel, 1974, *Cavolinia complanata* (Gegenbaur, 1855), and *Cavolinia natans* (Abildgaard, 1791).

**Material:** 4 individuals were obtained by horizontal surface plankton towing. Mean length: 10 mm; locality: Babadil Port (lat 36° 06' N, long 33° 28' E); sampling date: 9.02.2000.

**Description:** Shell with flat dorsal side; moderately developed ribs on the ventral side; moderately vaulted. A light-brown hue over virtually the entire shell. No keel along lateral sides. Shell margin between caudal and lateral spines is concave and its upper stretch is more or less straight and horizontal. Growth line is faint and transverse striation is poorly developed. Tips of the lateral spines are directed slightly caudal. The caudal spine is short and straight. Well-developed arch-shaped ribs at the base of the dorsal lip (13).

**Distribution:** Eastern Mediterranean: Egypt, Cyprus, and Aegean Sea. Western Mediterranean: Adriatic Sea, Western Basin (Northern and Central Areas, North Africa). Eastern Atlantic: France, Portugal, Morocco, Madeira, and Canary Islands. Western Atlantic: North America, Antilles. Indo-West Pacific: East Africa and Madagascar. South Australian region: Tasmania. East Pacific: California and Galapagos Island (13).

**Family:** Limacinidae

*Limacina (Munthea) trochiformis* (D'Orbigny, 1836) (Figure 4).

**Synonyms:** *Limacina contorta* Sykes, 1905 and *Limacina naticoides* Souleyet, 1852.

**Material:** Of the numerous specimens that were collected with a hand bucket from the shore in front of the Institute of Marine Sciences 5 km west of Erdemli (Northeastern Mediterranean) during a bloom of this species, 45 were examined. Mean shell height: 0.8 mm; locality: Erdemli (lat 36° 35' N, long – 34° 15' E); sampling date: 14.06.2003.

**Description:** High spire and body whorl increasing rapidly in diameter, with up to 5 rapidly growing colorless whorls. It has a narrow, deep umbilicus. Thicker parts along the columella and upper aperture lip are purple-brown and smooth, except for faint growth lines. It has a clear suture. Columellar aperture border is slightly concave. Wing protrusions are absent. Embryonic shell with spiral ornamentation of irregularly ramified flat ridges and a depression separating protoconch I and II. Protoconch I is smooth and protoconch II has growth lines. Shell height: 1 mm (13).

**Distribution:** Eastern Mediterranean: Levant Sea and Aegean Sea. Western Mediterranean: Adriatic Sea, Western Basin (Central Area), and Alboran Sea. Eastern Atlantic: From 41°N south to Brazil. Indo-Pacific: Somalia, Arabian Sea, Gulf of Oman, and Persian Gulf. East Pacific: California to Peru (15).

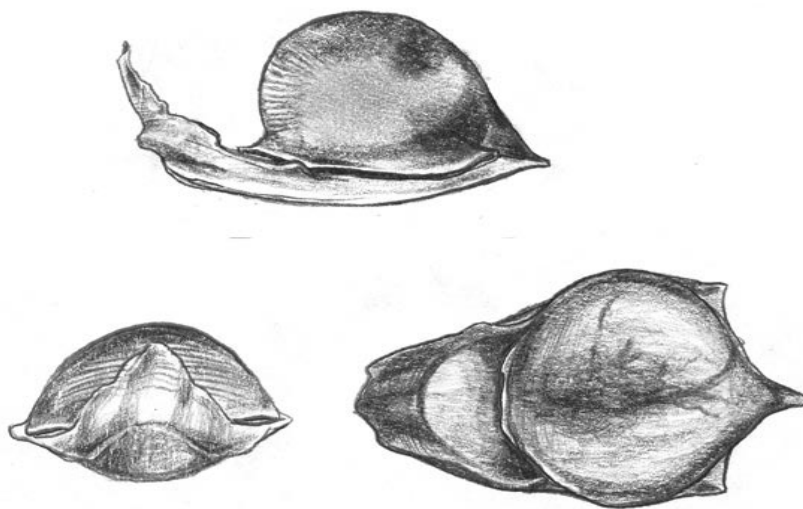


Figure 3. *Cavolinia tridentata* (Niebuhr, 1775 ex Forsskal, ms); length: 10 mm.

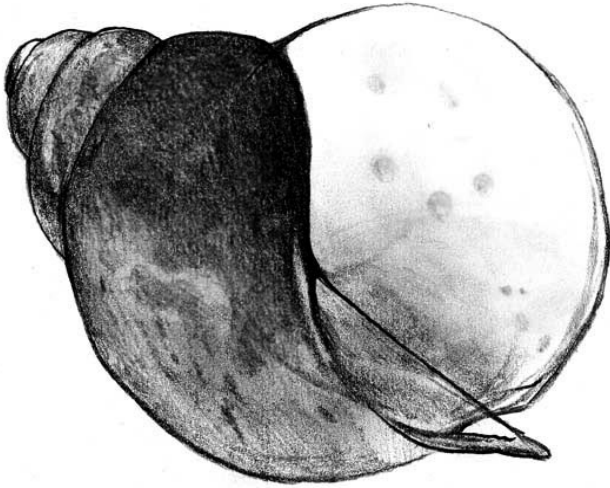


Figure 4. *Limacina (Munthea) trochiformis* (D'Orbigny, 1836); height: 0.8 mm.

Family: Cymbuliidae

*Corolla spectabilis* Dall, 1871 (Figure 5).

Synonyms: *Corolla vitrea* (Heath & Spaulding, 1901)

Material: 5 individuals were obtained during the bottom trawling surveys and 1 individual was obtained during swimming in front of the Institute of Marine Sciences, Erdemli. Mean diameter of swimming disc: 68 mm; locality: Erdemli (lat 36° 35' N, long -34° 15' E);

sampling date: 10.09.2002. Karataş (lat 36° 26' N, long - 35° 12' E); sampling date: 18.07.2003. Babadil Port (lat 36° 06' N, long - 33° 28' E); sampling date: 17.09.2003.

**Description:** Swimming disc is broadly round to quadrangular, sometimes with 2 depressions in the posterior margin (13), and with slight indentations along the anterior and lateral margins (*Gleba*, however, has distinct indentations on the anterior margin) (2). Small mucus glands are observed along the border of the swimming disc. Proboscis is thick and short, and its length and width are nearly equal (*Gleba* has a thin and long proboscis and its length is greater than its width) (10).

**Distribution:** Atlantic and Pacific Oceans (13), and the Mediterranean (14).

### Discussion

Since there is a lack of sufficient studies on pelagic mollusks in Turkish seas, their existence, population density, and distribution are not precisely known.

The only work of this nature found in the literature was of the zooplankton of İzmir Bay, which was conducted by Onmuş in 2002 (16), and was a study of the distribution of *Creseis acicula*.



Figure 5. *Corolla spectabilis* Dall, 1871; diameter of swimming disc: 68 mm.

Therefore, the record of most pelagic mollusk species consists of only those found during general zooplankton studies.

To date, from Turkish seas (excluding the Black Sea), only 10 pelagic mollusk species, *Atlanta peronii* [Atlantidae], *Firoloida desmarestia*, *Pterotrachea coronata* [Firolidae], *Janthina janthina*, *J. nitens* [Janthinidae], *Clio pyramidata*, *Creseis acicula*, *C. virgula*, *Styliola subula* [Cavolinidae], and *Limacina retroversa* [Limacinidae] have been reported (17,18).

The number of pelagic mollusk species found in the Mediterranean Sea was reported to be 72 (14). The number of pelagic mollusk species reported from nearby seas, whose hydrographical conditions are almost the same as in Turkish seas, is as follows: 21 from Israeli coasts, 14 from Lebanese coasts, 17 from Cyprus, and 29 from Greek coasts (15,19-24).

The present study was conducted in the northern coasts of the Levant Sea, which includes an important portion of the Turkish seas. While *Atlanta peronii* [Heteropoda, Atlantidae], *Firoloida desmaresti* [Heteropoda, Firolidae], *Clio pyramidata*, *Creseis acicula*, and *C. virgula* [Thecosomata, Cavolinidae] were among the species found during this study and were the first records for the Turkish coast of the Mediterranean Sea,

*Pterotrachea hippocampus* [Heteropoda, Firolidae], *Cavolinia tridentata* [Thecosomata, Cavolinidae] (although Aker (18) reported a *Cavolina* genus during his studies carried out in Turkish territorial waters of the northern Aegean Sea, he did not provide any information on species), and *Limacina trochiformis* [Thecosomata, Limacinidae] were the first records for all of Turkey's coasts.

Among these species, *Pterotrachea hippocampus* was previously reported from the Greek coast of the Aegean Sea (23,24) and from Israeli coasts (15). *C. tridentata* and *L. trochiformis* were reported from Cyprus (21,22,25), and from the Greek coast of the Aegean Sea (23,24), as well as from Israeli coasts (15).

While *Corolla spectabilis* [Thecosomata, Cymbuliidae], which is found in tropical and sub-tropical seas, was previously reported by Berdar et al. (26) from the western Mediterranean Sea, in this study, this species was reported for the first from the Levant Sea and any Turkish coast.

As a result of the present study, the number of pelagic mollusks reported from Turkish seas increased from 10 to 14. Moreover, this work contributes to the knowledge of the distribution of pelagic mollusks in the Mediterranean and other Turkish seas.

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