

ISOPODS COLLECTED IN IZMIR BAY, AEGEAN SEA

BY

REMZI GELDİAY & AHMET KOCATAŞ

Department of Zoology, Science Faculty, Ege University, Izmir, Turkey

In an intensive investigation of the benthos of Izmir Bay, Turkey, 28 species of littoral and parasitic Isopoda were collected. Of these 28 species, 20 are free living, 3 are parasites on fishes and 5 lead a parasitic mode of life on decapod crustaceans.

This report also includes two brackish water species (*Cyathura carinata* and *Sphaeroma hookeri*), collected during a faunistic survey of Köyceğiz canal in the southern part of the Aegean Sea.

There exists no enumeration of the data about the isopods of the Aegean Sea nor of those of Turkish waters. However, Guérin (1832) collected 13 species of land and marine Isopoda during an expedition to Morea. Lucas (1853) reported 3 species viz., one halophilous and two land forms, from the island of Crete. Stephensen (1915) dealt with material from a Danish expedition to the Mediterranean and adjacent seas and published collective data of the few Isopoda from the Sea of Marmara, the Aegean and Black Seas. The species *Idotea metallica* determined by Stephensen, was later on studied by Collinge (1916) and was named *Idotea stephenseni*, a new species from the Sea of Marmara and the Black Sea. Colombo (1885) reported several isopod species from the Aegean Sea and the Dardanelles. A most valuable investigation on the genus *Eurydice* in the Aegean Sea was carried out by Jones (1969), based on material from the "University College of Swansea expedition" 1967 to Chios Island. He described 7 species from this region, one being a new species, *E. longispina*.

North of the area investigated by us, from the Sea of Marmara, Bosphorus (Ostroumoff, 1896; Sovinski, 1898; Demir, 1952) and Black Sea (Pauli, 1954; Kussakin, 1969) several species of tanaids and isopods have been reported.

Two parasitic species (*Anilocra physodes* and *Nerocila bivittata*) were described by Monod (1931) from Alexandretta Bay, on the south coast of Turkey. He described moreover 2 tanaids and 6 isopods from Syria. In addition to these, isopods and tanaids from the Suez canal were reported on by Omer Cooper (1927) and Larwood (1954); tanaids and isopods from Egypt by Monod (1933); tanaids and isopods from Alexandria were described by Larwood (1940).

The species reported by us are well known in the western Mediterranean (Lucas, 1849; Gourret, 1891; Torelli, 1930; Arcangeli, 1925; Giordani-Soika, 1950; Amar, 1951, 1952; George & Menzies, 1968; Holdich, 1968, 1970). However, these species are now reported for the first time from the Turkish coasts of the Aegean Sea. In addition, 16 species have not yet been reported from any of the Turkish waters.

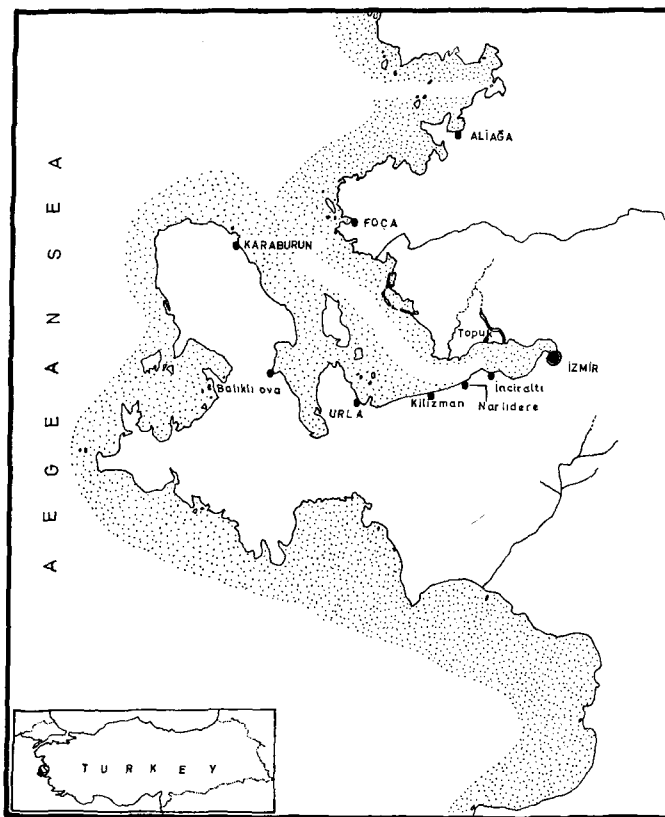


Fig. 1. Izmir Bay with the localities mentioned in the text.

GNATHIIDAE

Gnathia vorax (Lucas, 1849)

Balıklıova, 70 km of Izmir; in holes in wooden boards, caused by mollusc borers; 20-25 m depth; 20 January 1970; 27 specimens.

The species has been reported from various habitats, but it is interesting that the type specimens, like ours, were taken "dans un bois immergé". The species has been reported from depths between 15 and 355 m (Monod, 1926: 486-490).

Gnathia vorax is known from the Atlantic (Greenland (?) and Scotland to Morocco) and the western Mediterranean. It is now reported for the first time from Turkey.

ANTHURIDEA

Paranthura costana Bate & Westwood, 1868

Urla, 30 km W of Izmir; among *Cystoseira*; water clean and rough; 0.3 m depth; 20 May 1970; 1 specimen.

Aliğa, 70 km N of Izmir; among *Padina pavonia* on stones; water clean and rough; 0.5 m depth; 11 June 1969; 1 specimen.

Karaburun, 100 km W of Izmir; among *Cystoseira* and *Padina pavonia* (L.) Gaillon on the stones; water clean and rough; 0.3-1 m depth; 25 July 1969; 2 specimens.

The species has been reported by Bellan-Santini (1969: 222) from a variety of algal and mussel habitats. It is known from the western Mediterranean and the eastern Atlantic. It is now reported for the first time from Turkey.

Cyathura carinata (Krøyer, 1848)

Köyceğiz Canal, Köyceğiz-Muğla; occurring between polychaet tubes (*Mercierella enigmatica* Fauvel) attached to wooden piles of fishing platforms in the canal; average salinity 50/00; 2 May 1970; 7 specimens.

The species is a real brackish water species. According to Salvat (1967: 193) it is euryhaline and occupies mud sediments, but Giordani Soika (1950: 222) found it among *Zostera* vegetation in Venice lagoon. It occurs in the Baltic Sea at 5 m depth and a salinity of 90/00.

A cosmopolitan species, not previously reported from Turkey.

FLABELLIFERA

Sphaeroma serratum (Fabricius, 1787)

Sphaeroma serratum - Sovinski, 1898: 505; Demir, 1952: 364, fig. 151.

Urla, 30 km W of Izmir; from under stones and pebbles near the shore as well as on the shore; water slightly polluted and calm; 30 May 1969; 21 specimens.

Inciralti, 10 km W of Izmir; from under stones and among *Mytilus galloprovincialis* Lamarck; water polluted and calm; 0-0.2 m depth; 18 June 1969; 13 specimens.

Aliğa, 70 km N of Izmir; from under stones and pebbles near and on the shore; water clean and rough; 11 June 1969; 16 specimens.

The species is commonly found under stones on the shore of Izmir Bay.

Sphaeroma serratum is widely distributed in the Mediterranean and Black Sea, and has also been reported from the Suez Canal. In the eastern Atlantic it is known from Ireland and England, south to Mauritania (N.W. Africa). Pauli (1954) and Kussakin (1969) reported it from the Black Sea, while the species has been recorded from the Aegean Sea by Guérin (1832) and Colombo (1885). It has been reported from Turkish waters (the Sea of Marmara and Bosphorus) by Demir (1952); while Sovinski (1898) also mentioned it from the Bosphorus.

Sphaeroma hookeri Leach, 1814

Köyceğiz Canal, Köyceğiz-Muğla; under stones near the bank of the canal; average salinity 50/00; 2 May 1970; abundant.

According to Gruner (1965: 61-67), this is a brackish water species, occurring near sandy beaches or in estuaries, as well as in fresh waters.

Sphaeroma hookeri is known from the western Mediterranean and the Atlantic coast of Europe. It is now reported for the first time from Turkey.

Cymodoce spinosa (Risso, 1816)

Aliğa, 70 km N of Izmir; on stones covered with *Cystoseira* and *Padina pavonia*; water clean and rough; 0.2-1 m depth; 11 June 1969; 5 specimens.

Narlidere, 15 km W of Izmir; on stones covered with various algae; water polluted and calm; 0.3-1 m depth; 26 June 1969; 21 specimens.

Balıktiova, 70 km W of Izmir; in sponges; 20-25 m depth; 2 July 1969; 20 specimens.

Urla harbour, 30 km W of Izmir; on stones covered with *Enteromorpha*; water polluted and calm; 0.2-0.5 m depth; 25 April 1970; 3 specimens.

The species occurs among the different algae and empty *Balanus* tests in Izmir Bay.

Cymodoce spinosa is a typical Mediterranean species. Omer-Cooper (1927) reported it from the Suez Canal. Its occurrence in Turkey is now confirmed for the first time.

***Cymodoce emarginata* Leach, 1818**

Cymodoce emarginata - Sovinski, 1898: 505.

Aliğa, 70 km N of Izmir; on stones covered with various algae; water clean and rough; 0.3-1 m depth; 11 June 1969; 6 specimens.

Urla area, 30 km W of Izmir; on stones covered with various algae; water clean and rough; 0.2-1 m depth; 25 April 1970; 2 specimens.

In Marseilles Bay, Gourret (1891: 25) and Bellan-Santini (1969: 102) have recorded this species from various algae.

Cymodoce emarginata is a common species mainly throughout the Mediterranean, but it is also found in the eastern Atlantic. The only previous record from Turkey known to us is the one by Sovinski (1898).

***Cymodoce tuberculata* Hope, 1851**

Aliğa, 70 km N of Izmir; from empty *Balanus* tests; water clean and rough; 0.2 m depth; 11 June 1969; 1 specimen.

Torelli (1930) has recorded this species from *Balanus* tests in Naples Bay; it has so far not been recorded from other parts of the Mediterranean.

***Dynamene edwardsi* (Lucas, 1849)**

Aliğa, 70 km N of Izmir; on stones covered with various algae; water clean and rough; 0.3-1 m depth; 11 June 1969; 2 specimens.

İnciraltı, 10 km W of Izmir; on stones covered with *Ulva lactuca* L.; water polluted and calm; 18 June 1969; 2 specimens.

Urla area, 30 km W of Izmir; on stones covered with *Cystoseira*, *Padina pavonia* and *Enteromorpha*; water slightly polluted and calm; 25 April 1970; 7 specimens.

In Marseilles Bay, Ledoyer (1968: 178) and Bellan-Santini (1969: 223) recorded it from different algae and it was considered a pollution indicator. Holdich (1970: 433) has recorded juveniles of this species on the algae *Sargassum* and *Cystoseira*, and adults from the tests of *Balanus perforatus* Bruguère and *Hydroides uncinata* von Marenzeller.

Dynamene edwardsi has an Atlanto-Mediterranean distribution (Holdich, 1970). The species has been reported from the Aegean Sea (Chios) by Holdich (1970). It is now reported for the first time from Turkey.

Dynamene torelliae Holdich, 1968

Dynamene rubra - Sovinski, 1898: 504.

Naesea bidentata - Demir, 1952: 366, fig. 152.

Karaburun, 100 km W of Izmir; on stones covered with various algae; water clean and rough; 0.2-1 m depth; 25 July 1969; 2 specimens.

The species has been reported from different algae and from empty *Balanus* tests, from depths between 0.5 and 33 m (Holdich, 1970: 433).

Dynamene torelliae is known in the Mediterranean, the Aegean Sea and probably the Black Sea (Holdich, 1970). Pauli (1954, as *D. bidentata*) and Kussakin (1969, as *N. bidentata*) reported it from the Black Sea, while the species has been reported from the Aegean Sea (Chios) by Holdich (1970). It has been reported from Turkish waters (Sea of Marmara and Bosphorus) by Demir (1952): while Sovinski (1898) also mentioned it from the Bosphorus.

Limnoria tuberculata Sovinski, 1894

Limnoria terebrans var. *tuberculata* Sovinski, 1898: 505.

Limnoria lignorum - Demir, 1952: 367, fig. 53.

İnciralti, 10 km W of Izmir; in wood; water polluted and calm; 0.2 m depth; 18 June 1969; 9 specimens.

Balıklıova, 70 km W of Izmir; in wood; water clean and agitated; 20-25 m depth; by trawling; 20 January 1970; 15 specimens.

The species is cosmopolitan in tropical and subtropical regions (Menzies & Robinson, 1960). Previous records from Turkish waters are: Bosphorus (Sovinski, 1898), Sea of Marmara and Bosphorus (Demir, 1952).

Cirolana neglecta Hansen, 1890

Kilizman, 15 km W of Izmir; in *Posidonia* vegetation; water slightly polluted and rough; 20-22 m depth, trawl; 12 May 1970; 2 specimens.

Picard (1965: 57) has found this species from muddy detritus in the littoral zone and considered it characteristic for this zone.

Cirolana neglecta is known from the western Mediterranean and eastern Atlantic. It is now reported for the first time from Turkey.

Anilocra physodes (Linnaeus, 1758)

Anilocra physodes - Monod, 1931: 406.

Anilocra mediterranea - Demir, 1952: 363, fig. 150.

Aliğa, 70 km N of Izmir; host *Pagellus* sp.; 11 June 1969; 6 specimens.

Balıklıova, 70 km W of Izmir; host *Smaris alcedo* Risso; 20 January 1970; 3 specimens.

Urla area, 30 km W of Izmir; host *Smaris alcedo* Risso; 23 April 1970; 10 specimens.

Gourret (1891: 14) obtained it from different species of fishes and also from 9 to 12 m depth in the littoral vegetation in Marseilles Bay. Trilles (1965: 577) reported it as mainly occurring on fishes of the families Sparidae and Centracanthidae; he found 0.20% of Sparidae and 0.15% of Centracanthidae infected.

Anilocra physodes is known from the entire Mediterranean and eastern Atlantic. Kussakin (1969) reported it from the Black Sea. It has been reported from Turkish waters by Demir (1952), while Monod (1931) mentioned it from Alexandretta.

Nerocila bivittata (Risso, 1816)

Nerocila bivittata — Monod, 1931: 406; Demir, 1952: 362, fig. 149.

Balıklıova, 70 km W of Izmir; host *Pagellus* sp.; 2 July 1969; 2 specimens.

Urla area, 30 km W of Izmir; on *Pagellus* sp.; 23 April 1970; 1 specimen.

Gourret (1891: 12) found this species on different fishes in Marseilles Bay. Giordani Soika (1950: 223) collected it from *Zostera minor* vegetation. Amat (1951: 530) and Balcells (1953: 550) found it on *Mugil auratus* Risso and *M. cephalus* Cuvier.

Nerocila bivittata occurs most abundantly in the Mediterranean, compared to the other seas where it has a sparse distribution (Monod, 1923). The species has been reported several times from Turkish waters: Alexandretta (Monod, 1931), the Sea of Marmara and Bosphorus (Demir, 1952).

Meinertia parallela (Otto, 1828)

Topuk, 5 km W of Izmir; host *Boops boops*; 18 June 1969; 3 specimens.

Mektupçu, Izmir city; host *Boops boops*; 26 October 1969; 5 specimens.

Urla area, 30 km W of Izmir; host *Boops boops*; 23 April 1970; 2 specimens.

Amar (1951: 530) collected this species from *Gadus capelanus* (Risso) and *Smaris* sp. in Banyuls. Trilles (1964: 106, 1968: 68) reported its occurrence in the mouth cavity of fishes, especially that of *Boops boops* (L.), 22.5% being infected.

In the Mediterranean, *Meinertia parallela* is commonly found in the mouth cavity of the fish *Boops boops*. As far as we know, it is now reported for the first time from Turkey.

VALVIFERA

Idotea balthica basteri Audouin, 1827

Idotea tricuspidata - Demir, 1952: 372, fig. 155.

Aliğa, 70 km N of Izmir; among *Zostera* vegetation; water calm and polluted; 0.3-1 m depth; 11 June 1969; 22 specimens.

Mektupçu, Izmir city; among *Enteromorpha* vegetation; water polluted and calm; 0-1 m depth; 20 March 1970; 38 specimens.

Urla harbour, 30 km W of Izmir; on stones covered with *Enteromorpha* and *Ulva*; 25 April 1970; 5 specimens.

Topuk area, 5 km W of Izmir; among *Zostera* vegetation; water slightly polluted and calm; 0.3-1 m depth; 2 specimens.

This subspecies is found in the Mediterranean among debris of *Posidonia* on sandy coasts (Tinturier-Hamelin, 1963: 499). It is known from the entire Mediterranean and the Black Sea. Pauli (1954, as *I. balthica*) and Kussakin (1969) reported it from the Black Sea, while the species has been reported from the

Aegean Sea (Modon and Calamata) by Guérin (1832, as *I. Basteri*), and from Syria and Egypt by Monod (1931, 1933, as *I. baltica*). The only previous record from Turkey is by Demir (1952), who mentioned it from the Bosphorus and the Sea of Marmara.

Idotea hectica (Pallas, 1772)

Idotea hectica - Demir, 1952: 371, pl. 6 fig. 4.

Topuk area, 5 km W of Izmir; among *Zostera* vegetation, water slightly polluted and calm; 0.3-1 m depth; 28 May 1970; 6 specimens.

The species is characteristic of *Zostera* and *Posidonia* vegetation and is known from the Mediterranean and the coasts of western Europe. The only previous record from Turkey is by Demir (1952), who reported it from the Sea of Marmara.

Synisoma capito (Rathke, 1837)

Stenosoma capito - Sovinski, 1898: 505.

Synisoma capito - Demir, 1952: 373, fig. 156.

Aliğa, 70 km N of Izmir; on stones covered with *Cystoseira*; water clean and rough; 0.2-1 m depth; 11 June 1969; 11 specimens.

Urla area, 30 km W of Izmir; on stones covered with various algae; water clean and rough; 0.2-1 m depth; 5 specimens.

Topuk, 5 km W of Izmir; among *Zostera* vegetation; water polluted and calm; 0.3-1 m depth; 28 May 1970; 5 specimens.

Gourret (1891: 30) and Bellan-Santini (1969: 107, 112, 128) reported the species from different algae in Marseilles Bay. It has been collected from depths down to 55 m (Stephensen, 1915: 15; George & Menzies, 1968: 381).

It is known from the Mediterranean (George & Menzies, 1968). Pauli (1954) and Kussakin (1969) reported it from the Black Sea. Previous records from Turkish waters are: Bosphorus (Sovinski, 1898, as *Stenosoma capito*), Sea of Marmara and Bosphorus (Demir, 1952).

Zenobiana prismatica (Risso, 1816)

Urla area, 30 km W of Izmir; in a shallow creek, on stones covered with various algae; water clean and rough; 0.3-1 m depth; 30 May 1969; 2 specimens.

Aliğa, 70 km N of Izmir; in a shallow creek, on stones covered with various algae; water clean and rough; 0.2-1 m depth; 11 June 1969; 4 specimens.

Topuk area, 5 km W of Izmir; in a shallow creek, among *Zostera* vegetation; water polluted and calm; 0.3-1 m depth; 28 May 1970; 7 specimens.

The species is characteristic of *Zostera* and *Posidonia* vegetation, but at the same time we found it amongst various algae. It is known from the western Mediterranean and eastern Atlantic. It is now reported for the first time from Turkey.

ASELLOTA

Jaera nordmanni nordmanni (Rathke, 1837)

Jaera nordmanni - Demir, 1952: 356, fig. 146.

Karaburun, 100 km W of Izmir; from under stones near and on the shore; water clean and rough; 30 specimens.

Being a euryhaline species, *Jaera nordmanni nordmanni* exists in the tidal zone in the sea as well as in springs and streams near the coast (Lemerrier, 1960). No morphological changes are encountered if the freshwater specimens are reared in sea water (Lemerrier, 1960).

This species has a wide distribution (from 30° to 45°N); it is known from the Mediterranean, the Azores (Lemerrier, 1960, 1968) and the Black Sea (Pauli, 1954; Kussakin, 1969). In Turkish waters it has previously been reported only from the Sea of Marmara (Demir, 1952).

***Jaera hopeana* Costa, 1853**

Urla area, 30 km W of Izmir; under pebbles, near and on the shore; 30 May 1969; 11 specimens.
İnciraltı, 10 km W of Izmir; inhabiting holes in wooden boards; water polluted and calm; 0.2 m depth; 18 June 1969; 19 specimens.

Though *Jaera hopeana* has been reported to occur only in Mediterranean (George & Menzies, 1968), Haahtela & Naylor (1965) recorded it living ecto-commensally upon *S. serratum* in British waters. Pauli (1954) and Kussakin (1969) mentioned it from the Black Sea. As far as we know, it is now reported for the first time from Turkey.

***Bagatus* cf. *stebbingi* Monod, 1933**

Balıkliova, 70 km W of Izmir; in *Posidonia* vegetation; water clean and rough; 20-25 m depth, trawl; 2 July 1969; 4 specimens.

Bellan-Santini (1969: 30, 64, 102) has collected this species from various algae in Marseilles Bay. It is known from the entire Mediterranean and the Azores. Monod (1931, 1961) reported it from the Seychelles and Syria. There are no previous records from Turkish waters.

ONISCOIDEA

***Ligia italica* Fabricius, 1798**

Ligia italica - Demir, 1952: 358, fig. 147.

Urla area, 30 km W of Izmir; in rock crevices on the shore, which remain damp all the time; 30 May 1969; 5 specimens.

Aliağa, 70 km N of Izmir; 11 June 1969; 21 specimens.

Karaburun, 100 km W of Izmir; 25 July 1969; 6 specimens.

The species inhabits the spray-zone and is according to French ecologists a characteristic species of the supralittoral zone (Vandel, 1960: 122).

Ligia italica exists in the entire Mediterranean and Black Sea, and has also been reported from the Atlantic coast of Africa. Kussakin (1969) reported it from the Black Sea, while the species has been reported from the Aegean Sea (Pylos and Morea) by Guérin (1832, as *Ligia oceanica*) and Lucas (1853 as *Lygia italica*) (Crete). It has been reported from the Suez Canal (Omer-Cooper, 1927), and Saida (Monod, 1931). The only previous record from Turkey is the one from the Bosphorus and the Sea of Marmara by Demir (1952).

Tylos latreillei Audouin, 1825

Tylos latreillei - Demir, 1952: 360, fig. 148.

Kalabak, 25 km W of Izmir; under *Zostera* cast ashore; 9 June 1970; 15 specimens.

Tylos latreillei is a halophilous species of the supralittoral zone. During the day time it hides in the sand and under objects washed ashore.

The species is known from the entire Mediterranean and the Black Sea. In the eastern Atlantic it is known from Dakar to England and has also been reported from several islands in the Atlantic (Cape Verde Islands, Canaries, Madeira, Azores). Pauli (1954) reported it from the Black Sea, while the species has been recorded from the Aegean Sea (Modon) by Guérin (1832, as *Tylos armadillo*) and from the sea of Marmara in Turkey (Demir, 1952).

Armadilloniscus cf. littoralis Budde-Lund, 1885

Narlidere, 15 km W of Izmir; in damp sand on the seashore; 9 June 1970; 4 specimens.

Armadilloniscus littoralis is a typical halophilous species; like other halophilous species it has a vast distribution, occurring in the Mediterranean, the Azores and Madeira (Vandel, 1962). It is now reported for the first time from Turkey.

EPICARIDEA

Bopyrus squillarum Latreille, 1802

Bopyrus squillarum - Demir, 1952: 354.

Urla harbour, 30 km W of Izmir; on *Palaemon adspersus* Rathke; 25 June 1967; 2 specimens.

Topuk, 5 km W of Izmir; on *Palaemon adspersus*; 11 June 1969; 1 specimen.

Bopyrus squillarum is known from the entire Mediterranean, Britain and Denmark. It has been reported from the Aegean Sea (Morea) by Guérin (1832) and from Turkish waters (Bosphorus and Sea of Marmara) by Demir (1952).

Pleurocrypta microbranchiata G. O. Sars, 1898

Balıktiova, 70 km W of Izmir; on *Galathea intermedia* Lilljeborg; 20-25 m depth; 2 July 1969; 6 specimens.

This species is a parasite in the branchial cavity of *Galathea intermedia* and is known from the western Mediterranean and Atlantic. It is now reported for the first time from Turkey.

Pleurocrypta longibranchiata (Bate & Westwood, 1868)

Foça, 50 km W of Izmir; on *Galathea squamifera* Leach; 30-35 m depth; 20 July 1969; 1 specimen.

We have found no other records of the existence of *Pleurocrypta longibranchiata* in the Mediterranean; however, it has been reported from Norway (Sars, 1899) and Britain (Bate & Westwood, 1868).

Pleurocrypta galathea Hesse, 1865

Foça, 50 km W of Izmir; on *Galathea squamifera*; 30-35 m depth; 20 July 1969; 2 specimens.

This species is a parasite in the branchial cavity of *Galathea squamifera* Leach, *G. dispersa* Bate, and *G. nexa* Embleton. Bonnier (1900: 310) reported it from a depth of 50 m in Naples Bay. *Pleurocrypta galathea* is known from the Mediterranean and Atlantic. It has not been reported before from Turkey.

Pleurocrypta porcellanae Hesse, 1861

Gulf of Izmir; on *Pisidia* cf. *bluteli* (Risso); 0-0.5 m depth; 30 May 1969; 1 specimen.

This species parasitises upon *Pisidia longicornis* (L.) (Bonnier, 1900: 317; Bourdon; 1963: 428). It is now reported for the first time from Turkey.

ACKNOWLEDGEMENTS

We wish to thank Dr. H. E. Gruner, Zoologisches Museum, Berlin, and Dr. R. Bourdon, Station Biologique, Roscoff, France for checking the identifications of the species (free living Isopoda and the Epicaridea respectively) mentioned in this study. We also express our thanks to Dr. L. B. Holthuis, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands, for reading the manuscript.

RÉSUMÉ

Des recherches dans le Golfe d'Izmir ont permis de récolter 28 espèces (20 libres, 8 parasitaires) d'Isopodes. A cette collection, nous avons pu ajouter 2 espèces saumâtres, provenant du Canal de Köyceğiz (au sud de la Mer Egée). A notre connaissance, 16 espèces sont signalées pour la première fois en Turquie.

LITERATURE CITED

- AMAR, R., 1951. Isopodes marins de Banyuls. *Vie Milieu*, **2** (4): 529-530.
 —, 1952. Isopodes marins du littoral Corse. *Bull. Soc. Zool. France*, **77**: 349-355.
 ARCANGELI, A., 1925. Notizie sopra alcuni Isopodi del mar mediterraneo. *Atti Soc. Ital. Sci. nat. Milano*, **63**: 312-319.
 BALCELLS, E. R., 1953. Sur les Isopodes parasites de poissons. *Vie Milieu*, **4** (3): 447-551.
 BATE, C. S. & J. O. WESTWOOD, 1868. A history of the British sessile-eyed Crustacea. **2**: 1-536. (London).
 BELLAN-SANTINI, D., 1962. Etude floristique et faunistique de quelques peuplements infralittoraux de substrat rocheux. *Rec. Trav. Sta. mar. Endoume*, **41** (26): 237-298.
 —, 1969. Contribution à l'étude des peuplements infralittoraux sur substrat rocheux (Etude qualitative et quantitative de la frange supérieure). *Rec. Trav. Sta. mar. Endoume*, **63** (47): 9-294.
 BONNIER, J., 1900. Les Bopyridae. Contribution à l'étude des Epicarides. *Trav. Stat. zool. Wimereux*, **8**: 1-475, pls. 1-41.
 BOURDON, R., 1963. Epicarides et Rhizocéphales de Roscoff. *Cah. Biol. mar.*, **4**: 415-434.
 COLLINGE, W. E., 1916. Description of a new species of *Idotea* (Isopoda) from the sea of Marmora and Black Sea. *Journ. Linn. Soc. London (Zool)*, **33**: 197-201.
 DEMİR, M., 1952. Boğaz ve Adalar Sahillerinin Omurgasız Dip Hayvanları. *Hidrobiol. Mecm. Istanbul*, (A) **2**: 1-615.
 GEORGE, R. Y. & R. J. MENZIES, 1968. Additions to the Mediterranean deep-sea isopod fauna (Vema-14). *Rev. roumain. Biol., (Zool.)* **13**: 367-383.
 GIORDANI SOIKA, A., 1950. I Tanaidacei e gli Isopodi marini della Laguna di Venezia. *Archivio Oceanogr. Limnologia*, **7** (2-3): 213-238.
 GOURRET, P., 1891. Les Lemodipodes et Isopodes du Golfe de Marseille. *Ann. Mus. Hist. nat. Marseille, (Zool.)* **4**: 1-44.

- GRUNER, H. E., 1965. Krebstiere oder Crustacea, V. Isopoda 1. Lieferung. Tierwelt Deutschlands, **51**: 1-149.
- GUÉRIN-MÉNEVILLE, F. E., 1832. I.re classe Crustacés. In: A. BRULLÉ, Des animaux articulés. Expédition scientifique de Morée. Section des sciences physiques, **3** (1) (Zool.) (2): 30-50.
- HAAHTELA, I. & E. NAYLOR, 1965. Jaera hopeana, an intertidal isopod new to the British fauna. J. mar. biol. Ass. U.K., **45**: 367-371.
- HARVEY, C. E., 1969. Breeding and distribution of Sphaeroma (Crustacea: Isopoda) in Britain. Journ. Anim. Ecol., **38** (2): 399-406.
- HOLDICH, D. M., 1968. A systematic revision of the genus Dynamene (Crustacea, Isopoda) with descriptions of three new species. Pubbl. Staz. Zool. Napoli, **36**: 401-426.
- , 1970. The distribution and habitat references of the Afro-European species of Dynamene (Crustacea, Isopoda). Journ. nat. Hist., **4**: 419-438.
- JONES, D. A., 1969. The genus Eurydice (Crustacea, Isopoda) in the Aegean Sea, including E. longispina sp. nov. Cah. Biol. mar., **10**: 15-29.
- KUSSAKIN, O. G., 1969. Isopoda. In: Bestimmungsbuch der Fauna des Schwarzen und Asowschen Meeres, **2**: 408-440. [In Russian].
- LARWOOD, H. J., 1940. The fishery grounds near Alexandria, XXI. — Tanaidacea and Isopoda. Notes Mem. Fouad I Inst. Hidrobiol., **35**: 1-72 (not seen).
- LARWOOD, H. J. C., 1954. Crustacea, Tanaidacea and Isopoda from the Suez Canal. Ann. Mag. nat. Hist., **12** (7) (not seen).
- LEDOYER, M., 1962. Etude de la faune vagile des herbiers superficiels des Zosteracées et de quelques biotopes d'algues littorales. Rec. Trav. Sta. mar. Endoume, **25** (39): 117-235.
- , 1968. Ecologie de la faune vagile des biotopes Méditerranéens, accessibles en scaphandre autonome (région de Marseille principalement), 4. Synthèse de l'étude écologique. Rec. Trav. Sta. mar. Endoume, **44** (60): 126-295.
- LEMERCIER, A., 1960. La super-espèce Jaera nordmanni (Rathke) (Isopodes Asellotes, Janiridae). Crustaceana, **1**: 2-27.
- , 1968. Isopoda Asellota: Janiridae from the Azores. Bull. Mus. munic. Funchal, **22** (99): 30-31.
- LUCAS, H., 1849. Histoire naturelle des animaux articulés. Explorations scientifiques de l'Algérie pendant les années 1840, 1841, 1842. Sciences physiques, Zoologie **1**: 1-403.
- , 1853. Crustacea. Essai sur les animaux articulés qui habitent l'île de Crète. Rev. Mag. Zool., **2** (5): 461-468.
- MENZIES, R. J. & D. J. ROBINSON, 1960. Informe sobre los isopodos taladradores marinos colectados en el oriente de Venezuela. Mem. Soc. cienc. nat. La Salle, **20** (56): 132-137.
- MONOD, T., 1923. Prodrome d'une faune des Tanaidacea et des Isopoda (excl. Epicaridae) des côtes de France (excl. Méditerranée). Mém. Soc. Sci. nat. Charente Inf., **33** (4): 19-125.
- , 1926. Les Gnathiidae. Essai monographique (morphologie, biologie, systématique). Mém. Soc. Sci. nat. Maroc, **13**: 1-667 (not seen).
- , 1931. Crustacés de Syrie. In: A. GRUVEL, Les états de Syrie. Bibl. Faune colon. Franç., **3**: 397-435.
- , 1933. Tanaidacea et Isopoda. In: Mission Robert Ph. Dollfus en Egypte. Mém. Inst. Egypte, **21**: 161-264.
- , 1961. Sur un Isopode Asellote du genre Bagatus recueilli sur un poisson du Sénégal. Crustaceana, **2** (1): 68-77.
- OMER-COOPER, J., 1927. Tanaidacea and Isopoda. In: Zoological results of the Cambridge Expedition to the Suez Canal, 1927. Trans. zool. Soc. London, **22**: 201-209.
- OSTROUMOFF, A., 1896. Comptes-rendus des dragages et du plancton de l'expédition de "Selianik". Bull. Acad. Sci. St. Petersb., **5** (5): 33-92. [In Russian].
- PAULI, V. L., 1954. Free living isopods of the Black Sea. Trudy Sevastopol biol. Sta., **8**: 100-135. [In Russian].
- PICARD, J., 1965. Recherches qualitatives sur les biocoenoses marines des substrats meubles dragables de la région de Marseille. Rec. Trav. Sta. mar. Endoume, **52**: 1-160.
- SALVAT, B., 1967. La macrofaune carcinologique endogée des sédiments meubles intertidaux (Tanaidacés, Isopodes et Amphipodes), éthologie, bionomie et cycle biologique. Mém. Mus. Hist. nat. Paris, (A) **45**: 1-275.
- SARS, G. O., 1899. Isopoda. Account of the Crustacea of Norway, **2**: 1-270. (Bergen Museum).

- SOVINSKI, V., 1898. Vishia Rakoobranzñie (Malacostraca) iz Bosfora. Mém. Soc. Natural. Kiev, **15** (2): 447-518. [In Russian].
- STEPHENSEN, K., 1915. Isopoda, Tanaidacea, Cumacea, Amphipoda (excl. Hyperiidæ). Rep. Danish oceanogr. Exp. 1908-1910 Mediterranean, **2**: 1-53.
- TINTURIER-HAMELIN, E., 1963. Polychromatisme et détermination génétique du sexe chez l'espèce polytypique *Idotea balthica* (Pallas) (Isopoda Valvifera). Cah. Biol. mar., **4**: 473-591.
- TORELLI, B., 1930. Sferomidi del Golfo di Napoli (Revisione degli Sferomidi mediterranei). Pubbl. Staz. zool. Napoli, **10** (3): 297-343.
- TRILLES, J. P., 1962. Remarques morphologiques et biologiques sur les "Isopodes Cymothoidae" parasites de poissons, de l'étang de Thau. Nat. Monspeliensia, (Zool.) **3**: 101-123.
- , 1964. Spécificité parasitaire chez les Isopodes Cymothoidae méditerranéens (note préliminaire). Vie Milieu, **15** (1): 105-116.
- , 1968. Recherches sur les Isopodes Cymothoidae des côtes françaises. Systématique et faunistique: 1-181 (Thèse).
- VANDEL, A., 1960. Isopodes terrestres, 1. Faune de France, **64**: 1-416.
- , 1962. Isopodes terrestres, 2. Faune de France, **66**: 417-931.