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A Report on Parasitic Isopods (Crustacea) from Marine Fishes and Decapods Collected from The Aegean Sea (Turkey)

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SUMMARY: Parasitic isopods were investigated in marine fishes and decapods from the Aegean Sea during 1997-1998. A total of 10 species belonging to families Cymothoidae, Gnathiidae and Bopyridae was collected from various body parts of fishes and decapods. *Ceratothoa capri* and *Paragnathia formica* have been recorded for the first time from Turkish coasts.

Key Words: Parasite, Isopoda, ecology, Aegean Sea, Turkey

Ege Denizi'nde (Türkiye) Örneklenen Deniz Balıkları ve Dekapodların Parazitik İzopodları (Crustacea) Üzerine Bir Rapor

ÖZET: 1997-1998 tarihleri arasında Ege Denizi'nde örneklenen deniz balıkları ve dekapodlarının parazitik isopodları araştırılmıştır. Balık ve dekapod türlerine ait çeşitli vücut parçalarından Cymothoidae, Gnathiidae ve Bopyridae familyalarına ait toplam 10 tür tespit edilmiştir. *Ceratothoa capri* ve *Paragnathia formica* Türkiye kıyılarındaki konakçılarından ilk kez rapor edilmektedir.

Anahtar Sözcükler: Parazit, Isopoda, Ekoloji, Ege Denizi, Türkiye

INTRODUCTION

The order Isopoda includes terrestrial and aquatic species, representing the second largest order of crustaceans. They are widely distributed across all types of habitats, from terrestrial to marine, fresh and ground waters, and some species are known to be parasites.

The parasitic isopods within the scope of this study include members of Cymothoidae, Gnathiidae and Bopyridae families. Among these, Cymothoidae and Gnathiidae species prefer fishes as host, while Bopyridae species are generally found on decapod crustaceans.

The Cymothoid isopods inhabit freshwater, brackish water and the sea environment, as an ectoparasite of various fish species. They may be observed on the body, buccal cavity or gill cavity of the host (9, 33). Gnathiid isopods differ in morphology and behavior, when compared to Cymothoid isopods. They are parasitic only during their larval (Praniza) periods. Gnathiids can be found on the body and buccal cavity of fishes, but also on anemons and tunicates (22).

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Bopyrid isopods are morphologically different from other parasitic isopods, which can be found on shrimps and other free swimming decapods. Their final host, decapods, is preceded by copepods.

The studies on the parasitic isopods distributing along Turkish coasts are relatively few (1-4, 10, 11, 17, 18, 23, 25, 30, 34, 37, 39).

Bariche and Trilles (6), prepared a preliminary check-list of Cymothoids parasitic on marine fishes from Lebanon. Five Cymothoid isopod species are reported from Lebanon coast.

In this study, five Cymothoid species (*Ceratothoa paralella*, *C. oestroides*, *C. capri*, *Anilocra physodes*, *Nerocila bivittata*), four epicarid species (*Bopyrus squillarum*, *Pleurocrypta microbranchiata*, *P. longibranchiata*, *P. porcellanea*) and one gnathiid species (*Paragnathia formica*) are determined from the Aegean Sea coasts of Turkey. Among these species, *C. capri* and *P. formica* are being reported for the first time from Turkey.

MATERIALS AND METHODS

The study was carried out along the littoral zone of the Turkish coast of Aegean Sea. Study area and details on the sampling stations are given in Figure 1. Parasitic isopods were either obtained from decapods (*Palaemon serratus* and *P. elegans*) collected under stones and shallow shores, and from fishes captured during beam-trawl, bottom trawl and beach

seine samplings at various depths. After the host and locality were noted, all specimens were initially fixed in 4% formalin, then preserved in 70% alcohol for later analyses back in the laboratory. A stereomicroscope was used for species identification. Parasitic isopods were kept in the Museum of Ege University Faculty of Fisheries.

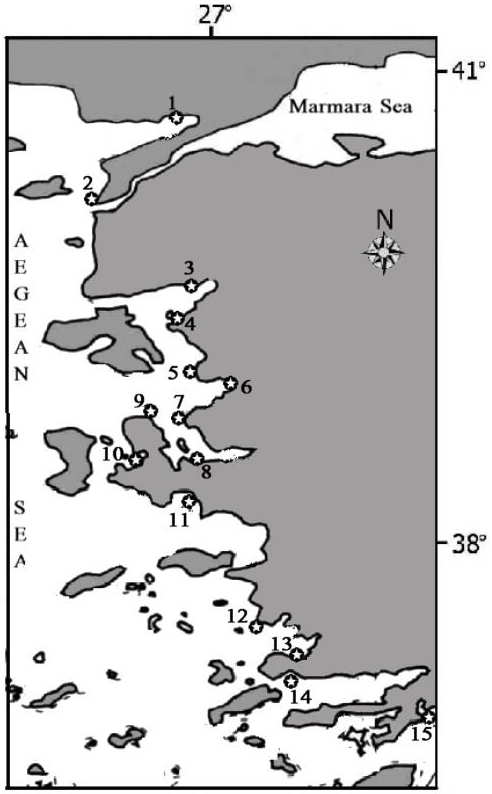

Figure 1. Map of the study area (**1.** Sazlıdere (Saros Bay), **2.** Çanakkale Monument, **3**. Altınoluk (Edremit Bay), **4.** Cunda Island (Ayvalık), **5**. Dikili, **6**. Şakran, **7**. Eski Foça, **8**. Urla-Karantina Island (İzmir Bay), **9**. Yeni port (Karaburun), **10**. Ildır (Çeşme), **11**. Sığacık (Seferihisar), **12**. Akbük (Didim), **13**. Torba (Bodrum), **14**. Bodrum, **15**. Turunç (Marmaris).

RESULTS

Fam: Cymothoidae

Anilocra **Leach, 1808**

Anilocra physodes **(Linne, 1758)**

Material: 33♂, 9♀: st. 8 (4♀, 7♂), st. 9 (1♀,2♂), st. 10 (1♀,1♂), st. 11 (2♀, 10♂), st. 13 (1♀, 3♂), st. 14 (3♂)

A. physodes is an ectoparasite, which we mainly determined on *Sciaena umbra*, *Labrus merula*, *Dentex macrophthalmus*, *Spicara smaris*, *Serranus scriba*, *Sparus aurata*, *Pagellus erythinus* and *Dicentrarchus labrax* during our studies. Previous records indicate a preference of the species to members of families Labridae, Sparidae, Centracanthidae and Serranidae (13, 28, 32, 35).

Distribution: Known to be a widespread species in the Mediterranean Sea and Atlantic coasts (15, 20, 35). Reported from the Black Sea (19), Sea of Marmara and Istanbul Strait (10) and Aegean Sea (3, 11).

Nerocila **Leach, 1808**

Nerocila bivittata **(Risso, 1816)**

Material: 8♂, 2♀: st. 2 (5♂), st. 5 (1♂), st. 8 (1♂, 2♀), st. 9 (1♂)

N. bivittata was collected on various parts of the body and opercle of *Sciaena umbra*, *Labrus merula*, *Dentex macrophthalmus*, *Symphodus tinca* and *Gobius niger*. It is a well known parasite on fishes (5, 12, 13, 32, 35).

Distribution: A widespread species in the Mediterranean Sea. Previous records are available from British coasts (21); French coasts (5, 13, 35), Italian coasts (12) and Greek seas (27). Along Turkish coasts, known from İskenderun Bay (23), Sea of Marmara and Istanbul Strait (10) and Aegean Sea (11).

Ceratotha**, 1852**

Ceratotha paralella **(Otto, 1828)**

Material: 21♂, 28♀: st. 1 (1♂), st. 3 (1♂, 2♀), st. 8 (18♂, 25♀)

A species commonly reported from the buccal cavity of fishes (5, 13, 32). During the studies, it was observed in the mouth of *Boops boops, Spicara smaris, Sparus aurata* and *Zeus faber*.

Distribution: *C. paralella* is known from French coasts, (13, 31, 32), Spanish coasts (5), Aegean Sea coast of Turkey (11).

Ceratotha oestroides **(Risso, 1826)**

Material: 11♂, 28♀: st. 1 (4♀), st. 4 (2♀), st. 8 (10♂, 19♀), st. 10 (1♂, 3♀)

A buccal cavity parasite, which was determined especially from *Boops boops*, *Spicara filexuosa*, *Raja alba* and *Zeus faber* during the samplings. Previous records indicate a diverse infected fish species including members of Centracanthidae and Sparidae, and to a less extend *Sardina pilchardus sardina*, *Trachurus trachurus*, *Phycis mediterranea*, *Mullus barbatus*, and *Abudefduf saxatilis* (10). Recent studies revealed that, *C. oestroides* is also observed on cultured fish species (*Dicentrarchus labrax* and *Sparus auratus*) at Greek seas and the Adriatic Sea (17, 21, 27, 29).

Distribution: A common species in the Mediterranean and Adriatic Seas, distributing as far as to northwestern coasts of Africa and the northeastern Atlantic (16). Its occurrence in Turkey is based on records from Aegean Sea (1).

Ceratothoa capri **(Trilles, 1964)**

Material: 12♂, 27♀: st. 6 (2♀), st. 8 (15♀, 8♂), st. 10 (4♂, 5♀), st. 11 (3♀), st. 12 (2♀)

C. capri specimens were obtained from the buccal cavity of *Boops boops* and *Spicara smaris* during our study, in agreement with previous observations (31).

Distribution: The species was previously reported from French coasts (31, 32), and being recorded for the first time from Turkish coastline.

Fam: Gnathiidae

***Paragnathia* Omer-Cooper**

***Paragnathia formica* (Hesse, 1864)**

Material: 29 juveniles (praniza): st. 7 (5 specimens), st. 8 (22 specimens), st. 9 (3 specimens)

Juvenile praniza specimens of this species can be observed both in the buccal cavity and body of fishes, but mature male and female specimens inhabit muddy substrates of estuaries (24, 38). We collected juvenile (praniza) *P. formica* specimens from different body parts of *Mugil cephalus* and *Pagellus erythrinus*.

Distribution: The species distributes from northwest of Morocco to southern Britain, including the Mediterranean (38). *P. formica* is reported for the first time from Turkish coasts.

Fam: Bopyridae

***Bopyrus* Latreille, 1802**

***Bopyrus squillarum* Latreillei, 1802**

Material: 14♂, 18♀: st. 2 (1♂, 1♀), st. 3 (1♂, 1♀), st. 4 (1♂, 1♀), st. 6 (1♂, 1♀), st. 7 (1♀), st. 8 (3♂, 4♀), st. 10 (2♂, 3♀), st. 11 (1♂, 2♀), st. 12 (2♂, 2♀), st. 13 (1♂, 1♀), st. 15 (1♂, 1♀)

Specimens of *B. squillarum* were obtained from *P. oceanica*, *P. pavonica*, *Cystoseira* spp., and *Laurencia* sp. facieses during benthic sampling conducted at depths 0.5-60 m, as well as from gill cavities of two decapod crustacean species, *Palaemon serratus* and *P. elegans*.

Distribution: The species occurs along the western European coasts of the Atlantic (24) and the Mediterranean coasts of France (8). Along the Turkish coastline, records are available from the Sea of Marmara (10) and Aegean Sea (11).

***Pleurocrypta* Hesse, 1865**

***Pleurocrypta microbranchiata* Sars, 1898**

Material: 4♂, 7♀: st. 8 (3♂, 6♀), st. 10 (1♂, 1♀)

Specimens of *P. microbranchiata* were collected during benthic samplings from *Valonia* sp. and muddy biotopes at depths ranging 20 to 40 m, and also from gill cavity of *Galathea intermedia*.

Distribution: The species was reported from the Atlantic coasts of western Africa, Norway, Britain, Denmark and Mediterranean coasts of France (7, 14). Along Turkish coasts, it is only known from the Aegean Sea (11).

***Pleurocrypta longibranchiata* (Bate & Westwood, 1868)**

Material: 2♂, 3♀: st. 7 (1♀), st. 8 (1♂, 1♀), st. 12 (1♂, 1♀)

The species is known as a gill cavity parasite. Specimens were collected during benthic samplings carried out at muddy substrates from depths ranging 20 to 35 m. Previous studies indicate that, *P. longibranchiata* was observed at gill cavities of *Galathea nexa* (7, 11, 24).

Distribution: It distributes along the western European coasts of the Atlantic Ocean, British coasts and the Mediterranean coasts of France (7, 24). A single record is available from the Turkish Aegean Sea coasts (11).

***Pleurocrypta porcellanea* (Hesse, 1865)**

Material: 6♂, 7♀: st. 4 (1♂, 1♀), st. 8 (4♂, 5♀), st. 9 (1♂, 1♀)

Specimens were mainly collected from *Cystoseira* and *Posidonia oceanica* facieses, and also from the gill cavities of *Pisidia* sp. that were obtained from *Pinna sp*. and sponge species at depths ranging 0.5 m to 30 m. In previous studies, *P. porcellanea* was reported from gill cavities of *Pisidia longicornis* (24) and *Pisidia cf. bluteli* (11).

Distribution: The species was reported from the northern American coasts of Atlantic Ocean, southern Britain coasts (24), French coasts of the Mediterranean (7) and Aegean Sea coasts of Turkey (11).

DISCUSSION

As a result of this study, parasitic isopods were determined from six fish species and four decapod crustacean species. All of the parasitic species determined both hinders the growth of their host, and may cause death due to blood suction. Previous studies pointed out that, infection of commercial aquaculture fish by parasitic isopods cause a great economical loss (26).

According to Trilles (36), Cymothoid isopods can be observed at %20 of the juvenile fishes, which clearly indicates the potential harm of parasitic isopods to cultured fish species.

The Cymothoid isopod species *Livoneca sinuata* can also be observed as a parasite at cephalopods, i.e. the mantle cavity of *Loligo vulgaris* (37). This fact proves that parasitic isopods maybe encountered at different organisms other than fishes and decapods.

From a total of 10 parasitic isopods determined in the study, *C. capri* and *P. formica* are new records for the Turkish fauna

REFERENCES

1. **Akmırza A,** 1998**.** Parasites in bogue (*Boops boops* L., 1758). *J Ege Univ Aquatic Sci*, 15 (3-4): 183-198.
2. **Akmırza A,** 2000a. Metazoon parasites of red mullet (*Mullus surmuletus*) caught near Gökçeada. *J St Univ Vet Fac*, 26(1): 129-140.
3. **Akmırza A,** 2000b**.** Seasonal distribution of parasites detected in fish belonging to the Sparidae family found near Gökçeada. *J Parasitol,* 24(1): 435-441.
4. **Akmırza A,** 2001**.** The samples from metazoon parasites detected in fish around Gökçeada. Congress of national Aegean Islands, 7, p. 85-96.
5. **Balcells ER,** 1953**.** Sur des Isopodes parasites de poissons, *Vie et Milieu*, 4(3): 548-551.
6. **Bariche M, Trilles JP,** 2005**.** Preliminary check-list of Cymothoids (Crustacea:Isopoda) parasitic on marine fishes from Lebanon, *Zoology in the Middle East*, (34): 53-60.

7. **Bourdon R,** 1964**.** Notes sur la Biologie de (*Dynamene bidentata*) Adams (Isopode, Sphaeromatidae), Extrait du Bulletin de l' <Academie et Societe Lorranies des Sciences> 4(1): 155-162.
8. **Bourdon R,** 1965**.** Remarques au sujet de la nouvelle espèce "Pseudione convergens" Stock, 1960 (Epicaride de la famille des Bopyridae), *Chairers de Biologie Marine*, 6: 173-179.
9. **Brusca RC,** 1981**.** A monograph of the Isopode Cymothoidae (Crustacea) of the eastern Pacific. *Zool Journal of the Linnean Society*, 73: 117-199.
10. **Demir M**, 1952. *The benthic Invertebrates of the Bosphorus and Islands Coasts*. İ.Ü. Fen Fakültesi Hidrobioloji Araştırma Enstitüsü Yayınları, İ.Ü. Basımevi, Sayı: 3(A): 362-363. [in Turkish].
11. **Geldiay R, Kocatas A**, 1972. Isopods collected in Izmir Bay, Aegean Sea. *Crustaceana*, 3 (Studies on Peracarida): 19-30.
12. **Giordani-Soika A,** 1950**.** Tanaidacei egli Isopodi marini della laguna di Venezia, Archiv. Oceanogr. *Limnologia*, 72(2-3): 213-238.
13. **Gourret MP,** 1891**.** Les Lemodipodes et les Isopodes du Golfe de Marseille, annales du mus. D'hist. Natu. De Marseille, zoologie, tome IV, Travaux scientifiques mémoire, 1: 1.44.
14. **Holthuis LB,** 1956. Isopoda and Tanaidacea (KV). In: H. Boschma (ed.), *Fauna van Nederland*, 16, p.280**.**
15. **Holthuis LB,** 1972**.** De Isopode *Anilocra physodes* (Linnaeus, 1753) voor de Nederlandse kust Gevonden. *Zoologische Bijdragen*, 13: 21-23.
16. **Horton T,** 2000**.** *Ceratothoa steindachneri* (Isopoda: Cymothoidae) new to British waters with a key to North-east Atlantic and Mediterranean *Ceratothoa*. *J Mar Biol Ass,* U.K., 80: 1041-1052.
17. **Horton T, Akamura B,** 2001**.** Cymothoid isopod parasites in aquaculture: a review and case study of a turkish sea bass (*Dicentrarchus labrax*) and sea bream (*Sparus aurata*) farm. *Dis Aquat Org*, 46: 181-188.
18. **Horton T, Akamura B,** 2003**.** Poast-haemorragic anameia in sea bass, *Dicentrarchus labrax* (L.), caused by blood feeding of *Ceratothoa oestroides* (Isopoda: Cymothoidae). *J Fish Dis*, 26: 401-406.
19. **Kussakin OG (Ed),** 1969. Isopoda. In: *Bestimmungsbuch der fauna des Schwarzen und Asowchen Meeres*, Brill Press. Netherlands, 2, p.408-440.
20. **Lombardo CA,** 1975**.** Morfologia del dermascheletro del capo di *Anilocra physodes* L. (Crustacea, Isopoda, Cymothodiae). *Cahiers de Biologie Marine*, 16: 301-306.
21. **Mladineo I,** 2003**.** Prevalence of *Ceratothoa oestroides* (Risso, 1826), a cymothoid isopode parasite, in cultured sea bass *Dicentrarchus labrax* L. On two farms in Middle Adriatic Sea. *Acta Adriat*, 43(1): 97-102.
22. **Moller H, Anders K,** 1986**.** *Diseases and parasites of Marine fishes*. Kiel: Moller. p.365.
23. **Monod T,** 1931. Crustacés de Syrie. In: *Les états de Syrie. Richesses marines et fluviales. Exploitation actuelle et avenir* (ed. A. Gruvel), Bibliothèque de la faune des colonies françaises, société d'editions géographiques, maritimes et coloniales, France, pp. 397-435
24. **Naylor E**, 1972. *British Marine Isopods, A new series Synopses of the British Fauna*. London: Academic Press., 3, p.1-86.
25. **Öktener A, Sezgin M,** 2000**.** *Mothocya epimerica* Costa, 1851 (Flabellifera: Cymothoidae), an isopod parasite in the branchial cavities of the Black Sea Silverfish *Atherina boyeri* Risso, 1810 (Perciformes, Atherinidae). *Turkish J Marine Sciences*, 6(1): 23-29.
26. **Paperna I, Por FD,** 1976**.** Preliminary data on the Gnathidae (Isopoda) of the Northern Red-Sea, the bitter lakes and the eastern Mediterranean and the Biology of *Gnathia piscivora* nb. Sp., Constribution to the XXV Congress of I.C.S.E.M., Split: 1-5.
27. **Papoutsoglou SE,** 1976**.** Metazoan parasites of fishes from Saronicus Gulf, Athens-Greece, *Thalassographica*, 1(1): 69-102.
28. **Perrier R,** 1930**.** *Faune de la France* (Arthropoda, Ordre 7 Isopodes). p.153-167.
29. **Sarusic G,** 1999**.** Preliminary report of infestation by isopod *Ceratothoa oestroides* (Risso, 1826), in marine cultured fish. *Bull Eur Assoc Fish Pathologists*, 19: 110-112.
30. **Tokşen E,** 1999**.** Metazoon Gill Parasites of Culture gilthead Sea bream (*Sparus aurata* L.) and Sea bass (*Dicentrarchus labrax* L.) in Aegean Sea coast and their Treatment. Thesis, Ege univ. Science Institute, Izmir, p.153.
31. **Trilles JP,** 1964**.** Un nouveau Cymothoadien, *Meinertia capri* n sp. (Isopoda), parasite de capros aper Lacépéde, 1803 (Téléostéens, Caproidae) en Mediterranée. *Crustaceana*, 7(3): 188-198.
32. **Trilles JP,** 1968**.** Recherches sur les Isopodes Cymothoidae des cotes Françaises, Systematique et faunistique, Universite de Montpeiller Faculte des Sciences, Thése le Doktorat: p.1-181.
33. **Trilles JP,** 1969. Recherches sur les Isopodes Cymothoidae des côtes Françaises. Aperçu général et comparatif sur la bionomie et la sexualité de ces crustacés, *Bull Soc Zool,* Fr., 94(3): 433-445.
34. **Trilles JP,** 1977**.** Les Cymohoidae (Isopoda, Flabellifera) parasites des poissons du Rijksmuseum van Natuurlijke Historie de leiden. Méditerranée et Atlantique Nord-Oriental. *Zoologische Mededelingen*, Leiden, 52 (2): 7-17.
35. **Trilles JP,** 1986**.** Les Cymothoidae (Crustacea, Isopoda, Flabellifera) D'Afrique, *Bull Mus National Hist Nat*, 8(3): 617-636.
36. **Trilles JP,** 1994**.** Les Cymothoidae (Crustacea, Isopoda) du monde (prodrome pour une faune). *Studia Marina*, 21/22 (1-2): 1-288.
37. **Trilles JP, Öktener A,** 2004**.** Report on Cymothoids (Crustacea, Isopoda) collected from marine fishes in Turkey. *Acta Adriat*, 45(2): 145-154.
38. **Upton NPD,** 1987**.** Gregarious larval settlement within a restricted interdial zone in the polygynous saltmarsh Isopod *Paragnathia formica* (Crustacea, Isopoda). *J Mar Biol Assoc, U.K.* 67: 663-678.
39. **Yeler S,** 1998**.** Investigation of the parasites of Sea Bass (*Dicentrarchus labrax* L.) under culture conditions in Bodrum. Master Thesis, Ankara Univ. Science Inst., p.46.