

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/285334192>

First record of *Bomolochus bellones* Burmeister, 1833 (Copepoda : Bomolochidae) from Turkish marine habitats

Article in *Vie et Milieu* · November 2015

CITATIONS

0

READS

155

3 authors, including:



Ali Alaş

Necmettin Erbakan Üniversitesi

53 PUBLICATIONS 193 CITATIONS

[SEE PROFILE](#)



Dilek Türker

Balikesir University

40 PUBLICATIONS 156 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Identification of Early Development Stage of Bony Fishes Using Mitochondrial DNA (mtDNA) Barcoding in Erdek Bay. [View project](#)

FIRST RECORD OF *BOMOLOCHUS BELLONES* BURMEISTER, 1833 (COPEPODA: BOMOLOCHIDAE) FROM TURKISH MARINE HABITATS[‡]

A. ÖKTENER^{1*}, A. ALAŞ², D. TÜRKER³

¹ Department of Fisheries, Sheep Research Institute, Çanakkele Street 7km., Bandırma, Balıkesir, Turkey

² Department of Biology, A. K. Education Faculty, Necmettin Erbakan University, B Block, 42090, Meram, Konya, Turkey

³ Department of Biology, Science Faculty, Balıkesir University, Çağış Campus, 10300, Balıkesir, Turkey

* Corresponding author: ahmetoktener@yahoo.com

[‡] This paper is part of a PhD thesis in progress

BOMOLOCHUS BELLONES
BELONE BELONE
AEGEAN SEA
TURKEY
PARASITIC COPEPOD

ABSTRACT. – In this study, *Bomolochus bellones* Burmeister, 1833 (Copepoda: Bomolochidae) is reported for the first time on gill filaments and inside the operculum of *Belone belone* (Linnaeus, 1761) (Pisces: Belonidae) from Turkey. Also, some morphological characters of this parasitic species are figured using photographs and drawings.

INTRODUCTION

In the Bomolochidae, the antennules and the first swimming legs are flattened and armed with swollen setae, and they function as part of the sucker rim that forms the seal against the mucous-covered skin of the host (Boxshall 2005). The family Bomolochidae includes 23 genera and there are now 20 valid species of the genus *Bomolochus* according to WoRMS (2015).

Bomolochus soleae and *Bomolochus bellones* were the most commonly-reported bomolochid species in the Mediterranean (Richiardi 1880, Brian 1906, Rose & Vaissière 1952, Delamare Deboutteville & Nunes-Ruivo 1958, Radujkovic & Raibaut 1989, Benmansour & Ben Hassine 1997, Raibaut *et al.* 1998, Ramdane & Trilles 2007).

According to Bilecenoğlu *et al.* (2014), two species (*Belone belone*, *Belone svetovidovi*) of garfish of the genus *Belone* are known from Turkey.

In this paper, *Bomolochus bellones* with some of its morphological characters is presented for the first time for Turkish parasitic copepod fauna.

MATERIAL AND METHODS

A total of 55 garfish, *Belone belone* (Linnaeus, 1761) were collected using local gears from Edremit Bay (39°32'37"N; 26°38'57"E) in 2014. The collected parasites were fixed in 70 % ethanol. The appendages were dissected out and cleared with lactic acid. The drawings were done with the aid of a camera Lucida (Olympus U-DA). The photos were taken using a Canon EOS 1100D camera connected to the microscope. Measurements were taken in millimeters (mm), with a micrometric programme (Pro-way). The identification, scientific names, synonyms of parasite and host were checked with Vervoort (1962), Cressey & Collette (1970), Kabata (1979), Ho *et al.* (1983)

and WoRMS (2015). Parasite (MNHN-IU-2013-18730) was deposited in the collections of the Muséum national d'Histoire naturelle (MNHN), Paris, France.

RESULTS

Bomolochus bellones Burmeister, 1833 (Copepoda, Poecilostomatoida, Bomolochidae) (Fig. 1).

Infestation values: Prevalence: 43.6 %; mean intensity: 2; range of intensity: 1-7; parasite number: 48.

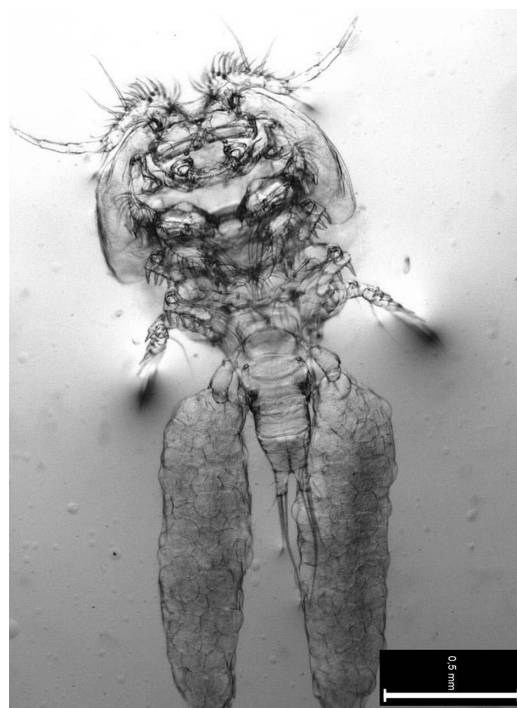


Fig. 1. – *Bomolochus bellones* Burmeister, 1833 (scale 0.5 mm).

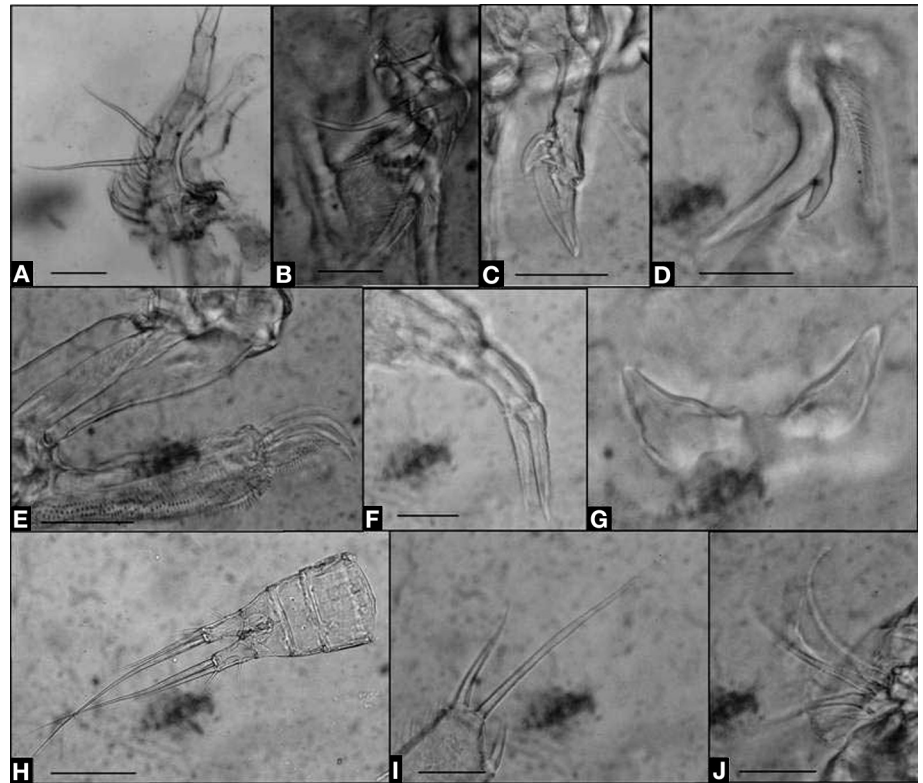


Fig. 2. – A: Antennule (0.10 mm); B: Maxillule (0.05 mm); C: Mandible (0.05 mm); D: Maxilliped (0.10 mm); E: Antenna (0.05 mm); F: Maxilla (0.03 mm); G: Tines; H: Caudal rami (0.20 mm); I: Tip of leg 5 (0.025 mm); J: Leg 6 (0.0125 mm) (scale indicated in parentheses).

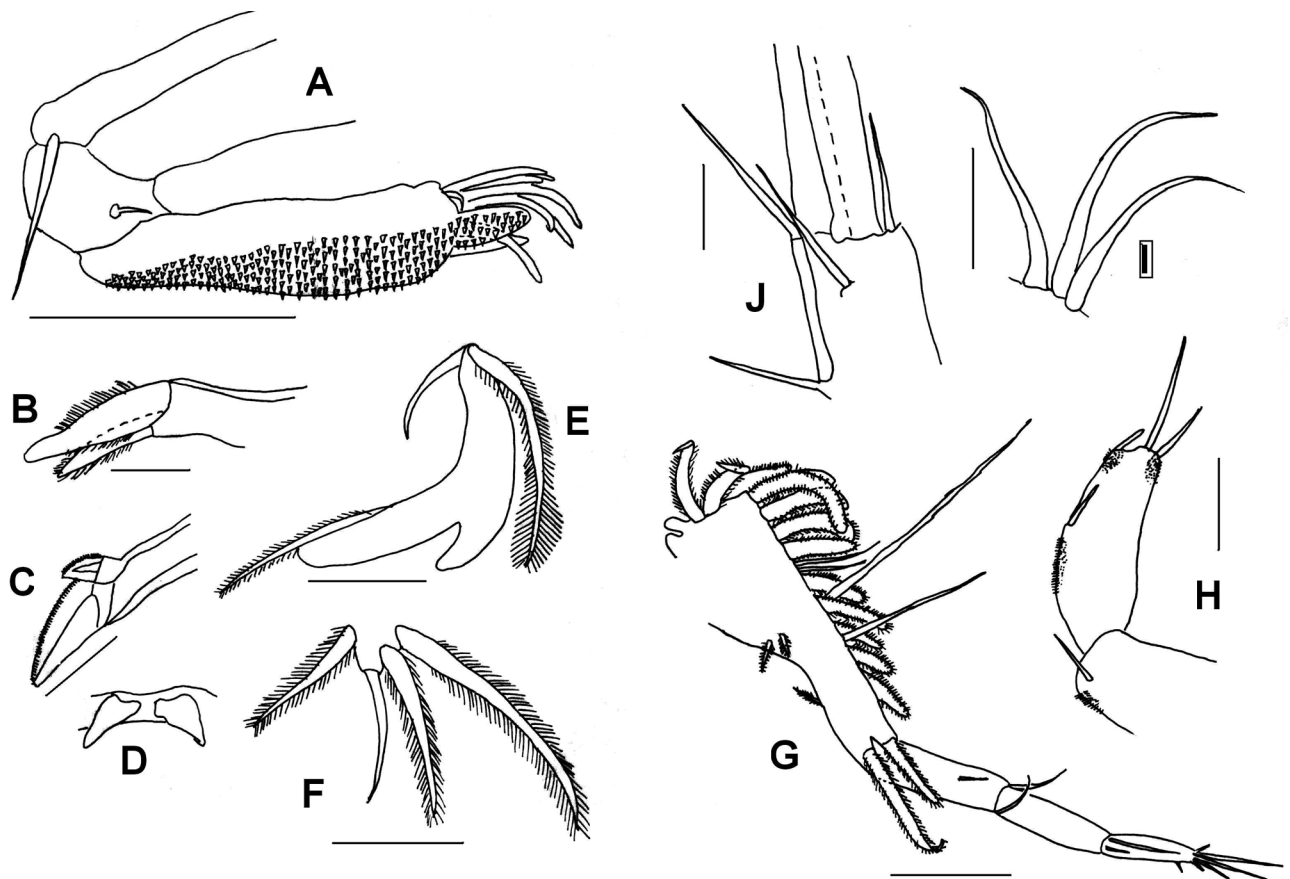


Fig. 3. – A: Antenna (0.10 mm); B: Maxilla (0.03 mm); C: Mandible (0.03 mm); D: Tines; E: Maxilliped (0.05 mm); F: Maxillule (0.05 mm); G: Antennule (0.05 mm); H: Leg 5 (0.10 mm); I: Leg 6 (0.05 mm); J: Caudal rami (0.025 mm) (scale indicated in parentheses).

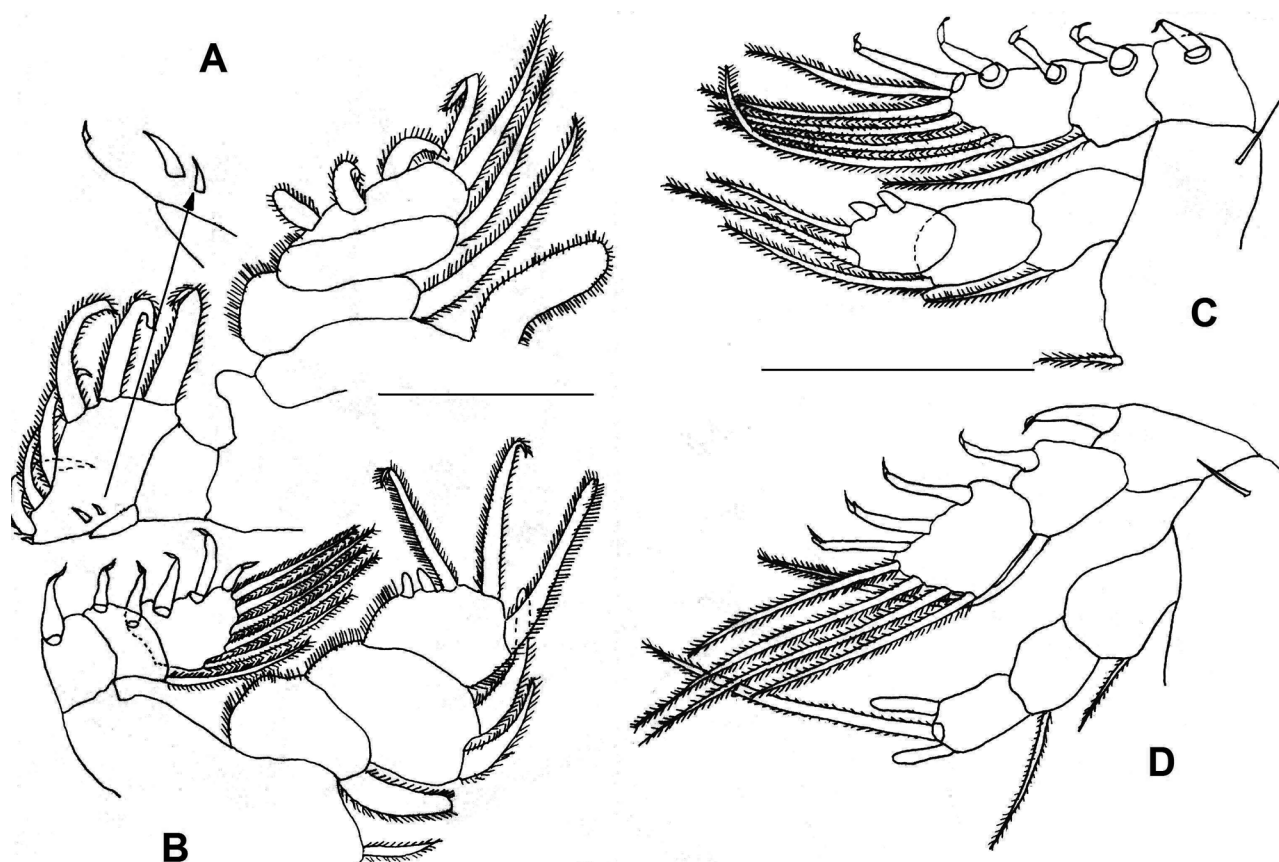


Fig. 4. – A: First leg; B: Second leg; C: Third leg; D: Fourth leg (scale bar 0.15 mm in A and B; 0.25 mm in C and D).

Measurements: Total length (including egg sacs): 1.95-2.30; width: 0.84-0.90; egg sac length: 0.83-1.19.

Description of the female: Basal part of antennule bearing 14 stout plumose setae, two short and two very long setae on dorsal surface; three small plumose setae on the ventral surface. First segment of the 3-segmented distal part with three setae; second segment with two setae; third segment with six setae (one lateral and five apical) (Fig. 2A, 3G). Antenna composed of three segments. The first segment carries long naked outer seta at tip; second segment smallest, with a single seta. Third segment with five or seven rows of small curved hooks on the ventral inner surface. Third segment protruded into large blunt, cylindrical process and armed with four curved claws, four naked setae and one pectinate process (Fig. 2E, 3A). Apex of mandible (Fig. 2C, 3C) with two unequal blades. Maxillule (Fig. 2B, 3F) carrying one long seta, two equal medium plumose setae and one naked stout seta. Distal part of the two-segmented maxilla with almost equal thickness and a patch of spinules (Fig. 2F, 3B). Maxilliped two-segmented, highly chitinized (Fig. 2D, 3E), like a sigmoid claw; first segment with a very long and a medium plumose setae; distal claw bearing a hooklet on lateral surface and a plumose seta in the proximal part. Leg 5, two-segmented, both segments with patches of spinules; proximal segment with a lateral distal seta and

Table I. – Setal (Arabic numerals) and spinal (Roman numerals) formulae of the legs.

	Endopod	Exopod
First leg (Fig. 4A)	1-0; 1-0; 5	0-I; 6,III
Second leg (Fig. 4B)	1-0; 2-0; 3, II	0-I; 1-I; 5,IV
Third leg (Fig. 4C)	1-0; 1-0; 2,II	0-I; 1-I; 5,III
Fourth leg (Fig. 4D)	1-0; 1-0; I, 1, I	0-I; 1-I; 4, III

the distal segment with two outer spines and two unequal apical setae (Fig. 2I, 3H). Leg 6 with three equal setae (Fig. 2J, 3I). Caudal ramus with six setae (Fig. 2H, 2J). Rostral area with sharp-tipped tines (2G, 3D).

Setal and spinal formulae of legs 1 to 4 (Fig. 4A-E) recorded in Table I.

DISCUSSION

Bomolochus bellones is widely distributed in the Mediterranean and Adriatic Seas. Also, it has been recorded in North and South Atlantic, Pacific and Indian Oceans. The species was reported parasitizing several fishes including *Ablennes hians*, *Belone belone*, *B. svetovidoi*, *Hyporhamphus regularis*, *H. melanochir*, *Platybelone argalus*,

Strongylura anastomella, *S. leiura*, *S. incisa*, *S. marina*, *S. notata*, *S. senegalensis*, *S. strongylura*, *S. timucu*, *S. urvilli*, *Tylosurus acus*, *T. crocodilus*, *T. gaviatoides* (Vervoort 1962, Cressey & Collette 1970, Kabata 1979, Aneesh *et al.* 2014).

Although there are very little differences, the number and status of setae on the basal and distal parts of the antennule in the present samples are in agreement with the drawings given by Vervoort (1962), Kabata (1979) and Ho *et al.* (1983).

Furthermore, the general morphology, the segment number, the rows of curved hooks of the antenna, the blades of mandible, the number of setae of the maxillule, the segment number and spinulation of the maxilla, the sigmoid claw and setae of maxilliped, the number of segments and setae of the leg 5 and the seta number of the leg 6 agree with the results already reported by Vervoort (1962), Cressey & Collette (1970), Kabata (1979) and Ho *et al.* (1983).

Setal and spinal formulae of the legs 1 to 4 are the same as those already reported in the previous studies except concerning the number of lateral spines on the leg 1 exopod. Ho *et al.* (1983) pointed the chaotic description of the lateral spines on the leg 1 exopod in the literature. They were numbered as 5, 3, 4 by Kabata (1979), Vervoort (1962) and Ho *et al.* (1983), respectively. In the present study, it was observed only three spines on the exopod of leg 1. We think that some various ecological conditions induce such differences. In *Bomolochus bellones*, the length of setae are also variable geographically rather than according to the host species (Cressey & Collette 1970).

Aneesh *et al.* (2014) reported that the isopod *Cymothoa frontalis* and the copepods *Bomolochus bellones* and *Dermoergasilus coleus* are sometimes observed parasitizing the same host *Strongylura strongylura* and that they are highly site specific. Until now, such multi-infestations were not observed from Turkish belonid fishes.

B. bellones was found to penetrate the inner side of operculum and gill filaments in the present study. A comprehensive study of the pathology of the infestation was not performed in the present work. Important mucous secretion was only observed on the gills and branchial cavity.

B. bellones was reported from several countries in the Mediterranean. There are some reports about the order Poecilostomatoida in Turkey. *B. bellones* is the first record from Turkey coasts. Consequently, the report of this species is very useful for an updating of the parasitic copepod fauna of Turkey and the geographical distribution of *Bomolochus bellones* in the Mediterranean.

REFERENCES

- Aneesh PT, Sudha K, Helna AK, Anilkumar G, Trilles JP 2014. Multiple parasitic crustacean infestation on belonid fish *Strongylura strongylura*. In Wehrmann IS, Bauer RT (eds), Proceedings of the Summer Meeting of the Crustacean Society and the Latin American Association of Carcinology, Costa Rica, July 2013. *ZooKeys* 457: 339-353.
- Bilecenoğlu M, Kaya M, Cihangir B, Çiçek E 2014. An updated checklist of marine fishes of Turkey. *Turkish J Zool* 38: 901-929.
- Benmansour B, Ben Hassine OK 1997. Preliminary analysis of parasitic copepod species richness among coastal fishes of Tunisia. *Italian J Zool* 65: 341-344.
- Boxshall G 2005. Copepoda (Chapter 4 Crustacean parasites), Rohde K. (ed), Marine Parasitology. CSIRO: 123-138.
- Delamare Deboutteville C, Nunes-Ruvio LP 1958. Copépodes parasites des Poissons méditerranéens (4^e sér). *Vie Milieu* 9: 215-235.
- Brian A 1906. Copepodi parassiti dei Pesci d'Italia. Stab. Tipografico R. Istituto Sordomuti, Genova : 187 p, figs 1-4, pls 1-21.
- Cressey RF, Collette RB 1970. Copepods and needle fishes. A study in host-parasite relationships. *Fish Bull* 68: 337-432.
- Ho JS, Do TT, Kasahara S 1983. Copepods of the family Bomolochidae Parasitic on Fishes of Kojima Bay, Okayama Prefecture. *J Fac Appl Biol Sci Hiroshima Univ* 22: 1-41.
- Kabata Z. 1979. Parasitic Copepoda of British Fishes. Ray Society Publications, The British Museum, London, 152: 468 p.
- Richiardi S 1880. Catalogo sistematico dei crostacei che vivono sul corpo degli animali acquatici. *Catalogo Sez. Ital Expo Int Pesca, Berlino*: 147-152.
- Rose M, Vaisseiere R 1952. Catalogue préliminaire des Copépodes de l'Afrique du Nord ("Catalogue préliminaire des Copépodes d'Algérie" : Table of contents, p. 226). *Bull Soc Hist Nat Afr Nord* 43: 164-176.
- Radujkovic B, Raibaut A 1989. Parasites des poissons marins des côtes du Monténégro: Copépodes. *Acta Adriat* 28: 237-278.
- Raibaut A, Combes C, Benoit F 1998. Analysis of the parasitic copepod species richness among Mediterranean fish. *J Mar Syst* 15: 185-206.
- Ramdane Z, Trilles JP 2007. Parasitic copepods (Crustacea: Copepoda) from Algerian marine fishes. *Zootaxa* 1574: 49-68.
- Vervoort W 1962. A Review of the Genera and Species of the Bomolochidae (Crustacea, Copepoda), Including the Description of Some Old and New Species. *Zool Verhand* 56: 1-111.
- WORMS Editorial Board. 2015. World Register of Marine Species. Available from <http://www.marinespecies.org> at VLIZ. Accessed 24/3/2015.

Received on October 17, 2014

Accepted on March 24, 2015

Associate editor: A Chenuil