

Confirmed record of *Clavellotis fallax* (Heller) (Siphonostomatoida; Lernaepodidae) from *Dentex dentex* (Linnaeus) with morphological characters in Turkey

AHMET ÖKTENER^{1,✉}, ALI ALAŞ², DILEK TÜRKER³

¹Department of Fisheries, Sheep Research Station. Çanakkele Street 7km.,10200, Bandırma, Balıkesir, Turkey. Tel.: +90-5072397983, ✉email: ahmetoktener@yahoo.com

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

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

Manuscript received: 6 June 2017. Revision accepted: 25 June 2017.

Abstract. Öktener A, Alaş A, Türker D. 2017. Confirmed record of *Clavellotis fallax* (Heller) (Siphonostomatoida; Lernaepodidae) from *Dentex dentex* (Linnaeus) with morphological characters in Turkey. *Bonorowo Wetlands* 7: 4-7. *Clavellotis fallax* (Heller, 1865) (Copepoda, Siphonostomatoida; Lernaepodidae) was reported for the first time on *Dentex dentex* (Linnaeus, 1758) from the North Aegean Sea Coasts. This species was reported from different sparid species in Turkey but not *Dentex dentex*. This paper aims to present some morphological characters with photographs and drawings of *Clavellotis fallax* from Turkey.

Keywords: *Clavellotis*, *Dentex*, *Copepoda*, Lernaepodidae, Turkey

INTRODUCTION

Lernaepodidae is a diverse and large family of highly specialized parasitic copepods, currently comprising 48 genera (Boxshall and Halsey 2004). Lernaepodids are found everywhere in the world's oceans on teleosts and chondrichthyans. As a group, they may infect all external surfaces of the host's body, including the gills, spiracles, and olfactory sacs (Benz 1993). The pathology associated with lernaepodid copepods depends on the tissue infected, the parasite species, its size, and the type of bulla (Lester and Hayward 2006). *Salmincola edwardsii* in brook trout caused a severe diffuse exuberant proliferation of gill epithelium, resulting in severe lamellar fusion and aneurysms (Duston and Cusack 2002).

Fifteen species of the Lernaepodidae family are reported from Turkish waters, namely *Clavellotis fallax* (Heller, 1865), *Clavellotis briani* Benmansour, Ben Hassine, Diebakate & Raibaut, 2001; *Clavellotis strumosa* (Brian, 1906), *Clavella alata* Brian, 1909; *Clavellisa scombri* (Kurz, 1877), *Lernaepoda galei* Krøyer, 1837, *Thysanote impudica* (Nordmann, 1832), *Parabrachiella bispinosa* (Nordmann, 1832), *Parabrachiella exigua* (Brian, 1906), *Parabrachiella insidiosa* (Heller, 1865), *Parabrachiella hostilis* (Heller, 1868), *Tracheliastes polycolpus* Nordmann, 1832, *Naobranchia cygniformis* Hesse, 1863, *Pseudotracheliastes stellifer* (Kollar, 1835) (Alaş et al. 2014).

The morphological characters in the study obtain a possibility to compare the other countries' findings next time. This study aims to confirm the occurrence of *C. fallax* with the morphological characters especially including mouthparts from Turkey. It also aims to present the host

preferences according to family characteristics, habitat selections, feeding habits for *C. fallax*.

MATERIAL AND METHODS

The host was obtained with the local fishing gears in North Aegean Sea in 2014. The collected parasites were fixed in 70% ethanol. Parasites were dissected using a Wild M5 stereo microscope. The dissected parts were mounted on slides in a glycerin-gelatine mounting medium. The appendages were drawn with the aid of a camera lucida (Olympus BH-DA). The photos were taken with the assistance of the Canon EOS 1100D camera attached to the microscope. The measurements were taken in millimeters (mm) with a micrometric program (Pro-way). The scientific names synonyms of parasite and host were checked with the WoRMS Editorial Board (2015). The information of feeding habits habitat characteristics of the host was prepared according to Froese and Pauly (2015). *C. fallax* (MNHN-IU-2013-18739) was deposited in the collections of the Muséum National d'Histoire Naturelle (MNHN), Paris, France.

RESULTS AND DISCUSSION

Clavellotis fallax (Heller, 1865) (Figure 1, 2, 3)

Host: *D. dentex* (Linnaeus, 1758) (Pisces; Sparidae) (the common dentex); **Locality:** Babakale Port; **Total parasite:** 14; **Dissected parasite:** 10.

All parasites were firmly attached to the gill rakers of the host. The prevalence means the intensity of parasites was 40.

Description-female: Body length varies from 4 to 5 mm. The cephalothorax is longer than the trunk. The trunk is ovate or pyriform, with a truncated posterior margin. Ovisac is stout, cylindrical, apically rounded. Second maxillae shorter than trunk and cephalothorax. Second maxillae short, about one-third of cephalothorax length, fused at tip; bulla small, mushroom-shaped. First antenna 4-segmented; basal segment unarmed; third segment armed with seta whip on anterior margin; the apical segment with terminal armature consisting of one tubercle, two short setae, three long setae. Second antenna typical biramous, bulbous exopod more prominent and longer than endopod, covered with robust spinules on the rounded tip. Endopod two-segmented, armed apically with two setae, one tubercle. Exopod with 6-9 spines and much more spinules. First maxilla biramous with small endopod and prominent tripartite exopod. Endopod is composed of a short digitiform process surmounted with one long, short setae. Exopod tripartite with two big and one short setae. Mandible with dental formula P1, S1, P1, S1, P1, S1, B5. Maxilliped with a strong corpus, moderately elongated, with 1 with a strong terminal spine in its m area. subchela bearing a spine on its side. A sturdy barb reaches close to the middle of the claw.



Figure 1. *Clavellotis fallax* ♀ (Bar = 1 mm)

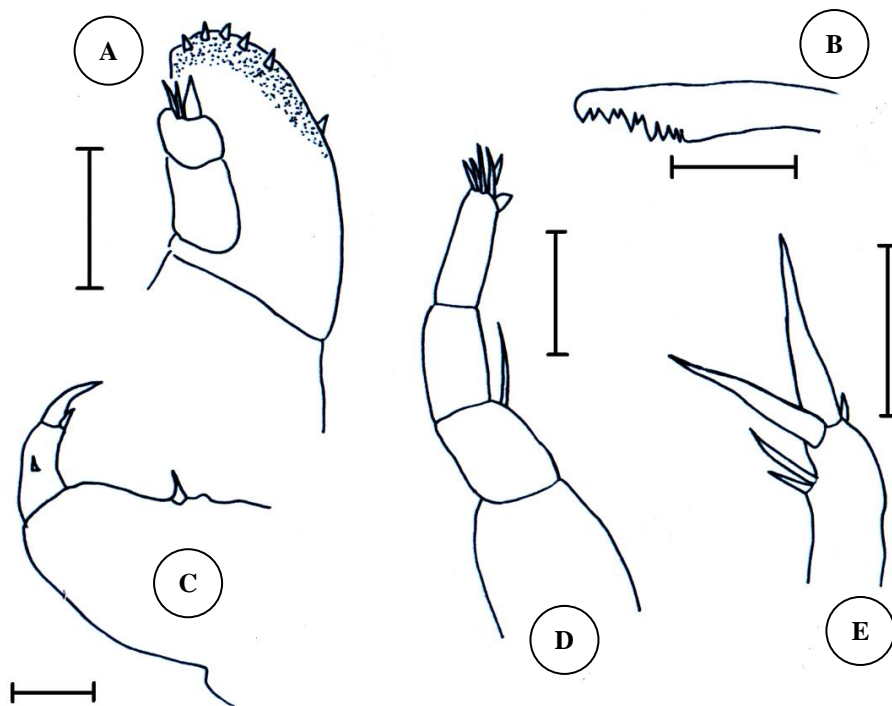


Figure 3. *Clavellotis fallax* ♀. A. Second antenna (Bar = 0.05mm), B. Mandible (Bar = 0.03mm), C. Maxilliped (Bar = 0.06mm), D. First antenna (Bar = 0.03mm), E. First maxilla (Bar = 0.05mm)

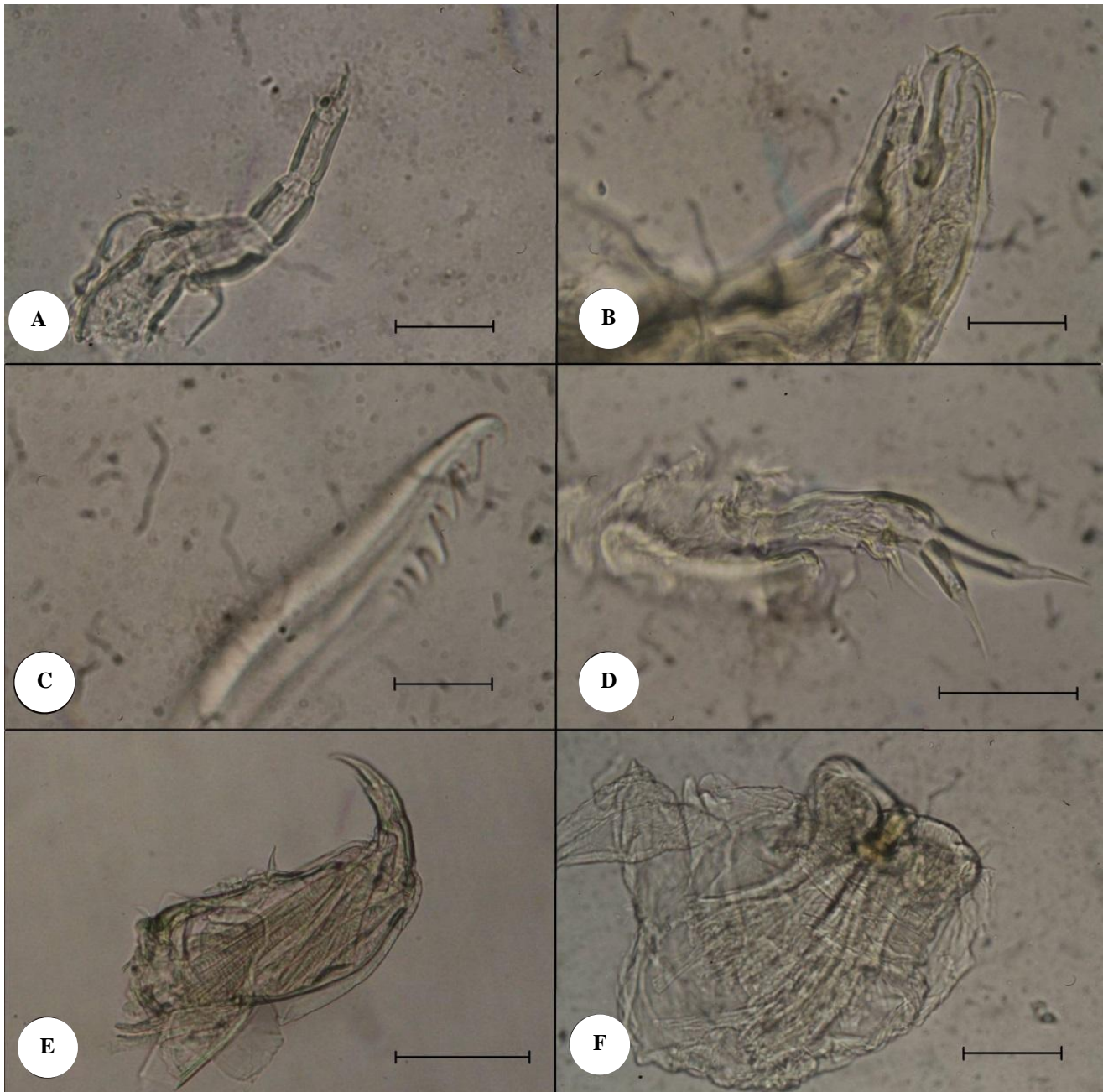


Figure 2. *Clavellotis fallax* ♀. A. First antenna (Bar = 0.03mm), B. Second antenna (Bar = 0.05mm), C. Mandible (Bar = 0.015mm), D. First maxilla (Bar = 0.05mm), E. Maxilliped (Bar = 0.06mm), F. Bulla (Bar = 0.15mm).

Discussion

Clavellotis fallax has been reported from North Atlantic Ocean, Mediterranean Sea, Adriatic Sea (Radujkovic and Raibaut, 1989). It was reported on *D. dentex* (Brian 1906; Raibaut et al. 1971; Papoutsoglou 1976; Ben Hassine et al. 1978; Essafi et al. 1984; Radujkovic and Raibaut 1989; Benmansour and Ben Hassine 1997; Raibaut et al. 1998; Benkirane et al. 1999; Gonzalez et al. 2004; Martorell 2004), *Dentex gibbosus* (Brian 1924), *Lithognathus lithognathus*, *Cymatoceps nasutus* (Barnard 1955), *Lithognathus mormyrus* (Ben Hassine et al. 1978; Raibaut et al. 1998; Martorell 2004), *Sparus aurata* (Ben Hassine et al. 1978; Essafi et al. 1984; Benmansour and Ben Hassine

1997; Raibaut et al. 1998; Martorell 2004; Souidenne 2010), *Spondyliosoma cantharus* (Ben Hassine et al. 1978; Essafi et al. 1984; Benmansour and Ben Hassine 1997; Raibaut et al. 1998; Martorell 2004; Boualleg et al. 2010), and *Pagellus erythrinus* (Essafi et al. 1984)

The host parasitism with *C. fallax* was examined according to family characteristics; all 8 hosts belong to the Sparidae family. The host parasitism with *C. fallax* was examined according to habitat selections of host fish; 5 of 8 host species are benthopelagic; 3 are demersal. The host parasitism with *C. fallax* according to feeding habits of host fish; 6 of 8 host species are carnivorous, 2 are omnivorous. It may say that this parasite selects fishes with carnivorous

and benthopelagic character. *D. dentex* examined in this study is carnivorous and benthopelagic character fish. It is fit as preferring host for *C. fallax*.

The cephalothorax, trunk, second maxilla proportions; the segment number on the first antenna; the status exopod/endopod on the second antenna, first maxilla; the myxal area, barb, spine on maxilliped of *C. fallax* agree with findings of Barnard (1955), Ben Hassine et al. (1978), Brian (1924), Martorell (2004).

C. fallax was reported on the gill rakers of *Sarpa salpa*, *Diplodus sargus*, *Spondylisoma cantharus*, *Pagellus erythrinus* from the Aegean Sea by Akmirza (2000). A parasitic copepod belonging to *Clavellotis* at the genus level was reported on *D. dentex* by Çilli (2012). This study confirms the occurrence of *Clavellotis fallax* on *Dentex dentex* in Turkey.

REFERENCES

- Akmirza A. 2000. The seasonal distribution of parasites was detected in fish belonging to the Sparidae family near Gökçeada. *Turk J Parasitol* 24 (1): 435-441.
- Alaş A, Ökten A, Alaş A, Türker Çakır D. 2015. Review of parasitic copepods recorded in fish from Turkey. *Transylvanian Rev Syst Ecol Res* 17 (1): 39-62. DOI: 10.1515/trser-2015-0047.
- Barnard KH. 1955. South African parasitic Copepoda. *Ann South Afr Mus* 41: 223-312.
- Ben Hassine OK, Essafi K, Raibaut A. 1978. Les Lernaeopodidés, copépodes de Sparidés de Tunisie. *Archives de l'Institut Pasteur de Tunis* 55 (4): 431-454.
- Benkirane OF, Coste F, Raibaut A. 1999. On the morphological variability of the attachment organ of Lernaeopodidae (Copepoda: Siphonostomatoida). *Folia Parasitologica* 46 (1): 67-75.
- Benmansour B, Ben Hassine OK. 1997. Première mention en Tunisie de certains caligidés et lernaeopodidés (Copepoda) parasites de poissons téléostéens. *Ichthyophysiologica Acta* 20: 157-175.
- Benz GW. 1993. Evolutionary Biology of Siphonostomatoida (Copepoda) Parasitic on Vertebrates. [Dissertation]. University of British Columbia, Vancouver, Canada.
- Boualleg C, Serid M, Kaouachi N, Quilquini Y, Bensouilah M. 2010. Les Copépodes parasites des poissons téléostéens du littoral Est-algérien. *Bulletin de l'Institut Scientifique, Rabat, section Sciences de la Vie* 32 (2): 65-72.
- Boxshall GA, Halsey SH. 2004. An Introduction to Copepod Diversity. Ray Society Series 166. 2 Parts [Vols]. The Ray Society, London, UK.
- Brian A. 1906. Copepodi Parassiti dei Pesci d'Italia. *Stab. Tipografico R. Istituto Sordomuti, Genova*. DOI: 10.5962/bhl.title.58642.
- Brian A. 1924. Arthropoda (1er partie) Copepoda. Copépodes commensaux et parasites des côtes mauritaniennes. *Bulletin du Comité Etudes Historiques et Scientifiques de l'Afrique Occidentale Française* 7: 365-427.
- Çilli E. 2008. The Parasites of Cultured Common Dentex (*Dentex dentex* L.). [Thesis]. Ege University, Science Institute, Izmir, Turkey.
- Duston J, Cusack RR. 2002. Emamectin benzoate: an effective in-feed treatment against the gill parasite *Salmincola edwardsii* on brook trout. *Aquaculture* 207 (1-2): 1-9. DOI: 10.1016/S0044-8486(01)00734-7.
- Essafi K, Cabral P, Raibaut R. 1984. Copepode parasites of fish from the Kerkennah Islands (Southern Tunisia). *Archives de l'Institut Pasteur de Tunis* 61 (4): 475-523.
- Froese R, Pauly D. 2015. FishBase World and Wide Web electronic publication. www.fishbase.org, version (10/2015).
- Gonzalez P, Sanchez MI, Chirivella J, Carbonell E, Riera F, Grau A. 2004. A preliminary study on gill metazoan parasites of *Dentex dentex* (Pisces: Sparidae) from the western Mediterranean Sea (Balearic Islands). *J Appl Ichthyol* 20 (4): 276-281. DOI: 10.1111/j.1439-0426.2004.00548.x.
- Lester RJG, Hayward CJ. 2006. Phylum Arthropoda. In: Woo PTK (ed) *Fish Diseases and Disorders: 1. Protozoan and Metazoan Infections*. CAB International, Wallingford, UK. DOI: 10.1079/9780851990156.0466.
- Martorell JC. 2004. Parasitismo Branquial de Peces Esparados (Pisces: Sparidae) del Mar Mediterraneo. [Ph.D.]. Universitat de Valencia, Spain.
- Papoutsoglou SE. 1976. Metazoan parasites of fishes from Saronic Gulf, Athens, Greece. *Thalassographica* 1 (1): 69-91.
- Radujkovic BM, Raibaut A. 1989. Parasites des poissons marins des côtes du Monténégro: Copépodes. *Acta Adriatica* 28: 237-278.
- Raibaut A, Ben Hassine OK, Maamouri K. 1971. Copépodes Parasites des Poissons de Tunisie (première Série). *Bulletin de l'Institut National Scientifique et Technique d'Océanographie et de Pêche de Salammbô* 2 (2): 169-197. DOI: 10.1016/S0924-7963(97)00079-1.
- Raibaut A, Combes C, Benoit F. 1998. Analysis of the parasitic copepod species richness among Mediterranean fish. *J Mar Syst* 15: 185-206.
- Souidenne D. 2010. Etude de la Copepodofaune des Poissons Téléostéens du Golfe de Hammamet. [Thesis]. Université de Tunis El Manar, Tunis, Tunisia.
- WoRMS Editorial Board. 2016. World register of marine species. <http://www.marinespecies.org>.