

# A New Host of *Clavella alata* Brian, 1909 (Siphonostomatoida; Lernaepodidae) from Turkish Seas

Ali Alaş<sup>1\*</sup>,

Ahmet Öktener<sup>2</sup>,

Dilek Türker<sup>3</sup>

<sup>1</sup> Department of Biology, A.K. Education Faculty,  
Necmettin Erbakan University, 42090, Konya, Turkey

<sup>2</sup> Department of Fisheries, Bandırma Sheep  
Research Institute, 10200, Balıkesir, Turkey

<sup>3</sup> Department of Biology, Science Faculty, Balıkesir  
University, 10300, Balıkesir, Turkey

*Clavella alata* Brian, 1909 (Siphonostomatoida; Lernaepodidae) was reported on *Phycis blennoides* (Brünnich, 1768) in Turkey. *Phycis blennoides* (Gadiformes; Phycidae) is a new host for *Clavella alata* in Turkey. Also, some of the morphological characteristics of this parasitic copepod are given in photographs and drawings.

**Keywords:** *Clavella*, *Phycis*, parasitic copepod, Turkey

## INTRODUCTION

Lernaepodidae is a large and diverse family of highly specialized parasitic copepods, currently comprising 48 genera (Boxshall, Halsey, 2004). Lernaepodidae comprise more than 260 species which mainly parasitize both elasmobranchs and teleosts. The female frequently presents a characteristic attachment organ, the bulla, which is unique among parasitic copepods and is held by the second maxillae. The small male lives in temporary association, often on the body of its partner (Benkirane et al., 1999; WoRMS, 2016).

Raubaut et al. (1998) reviewed the occurrence of 226 parasitic copepod species distributed in 88 genera and 20 families from fishes of the Mediterranean Sea.

This paper presents a new host for *Clavella alata* from Turkey.

## MATERIALS AND METHODS

Seventy of *Phycis blennoides* (Brünnich, 1768) (Gadiformes; Phycidae) were collected by local gears from North Aegean Sea of Turkey in 2014. The parasites collected were fixed in 70% ethanol. Some of specimens were later cleared in lactic acid before dissection of the appendages of copepods. The drawings of the appendages were carried out with the aid of camera lucida (Olympus BH-DA). The photos were taken with the aid of Canon EOS 1100D connected to a microscope. Measurements were taken in millimetres (mm), with a micrometric programme (Pro-way). Scientific names and the synonyms for the parasite and the host were checked with WoRMS (2016), Froese and Pauly Editors (2016). Kabata (1979) was consulted for terminology. *Clavella alata* (MNHN-IU-2013-18740) was deposited in the collections of the Museum National d'Histoire Naturelle (MNHN), Paris, France.

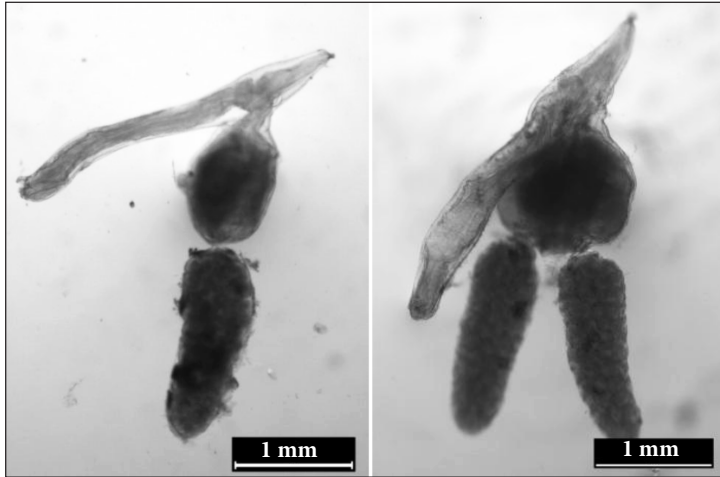
\* Corresponding author. E-mail: alasali@hotmail.com

## RESULTS

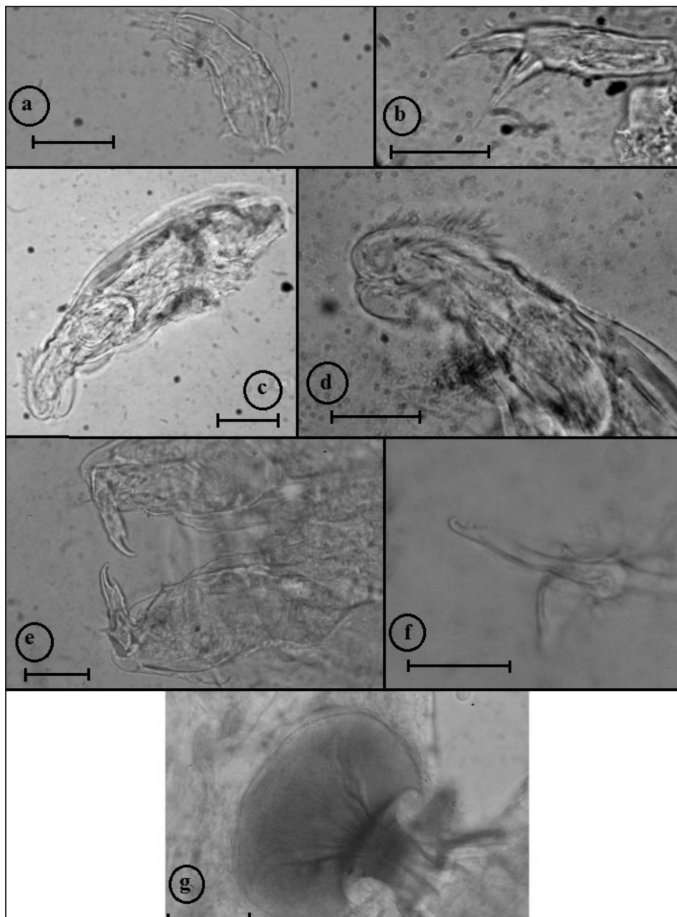
***Clavella alata* Brian, 1909 (Copepoda; Siphonostomatoida; Lernaepodidae) (Figures 1–3)**

All parasites were firmly attached to the gill filaments. The prevalence of parasite was 42.8%. The mean intensity of the parasite was 1.3.

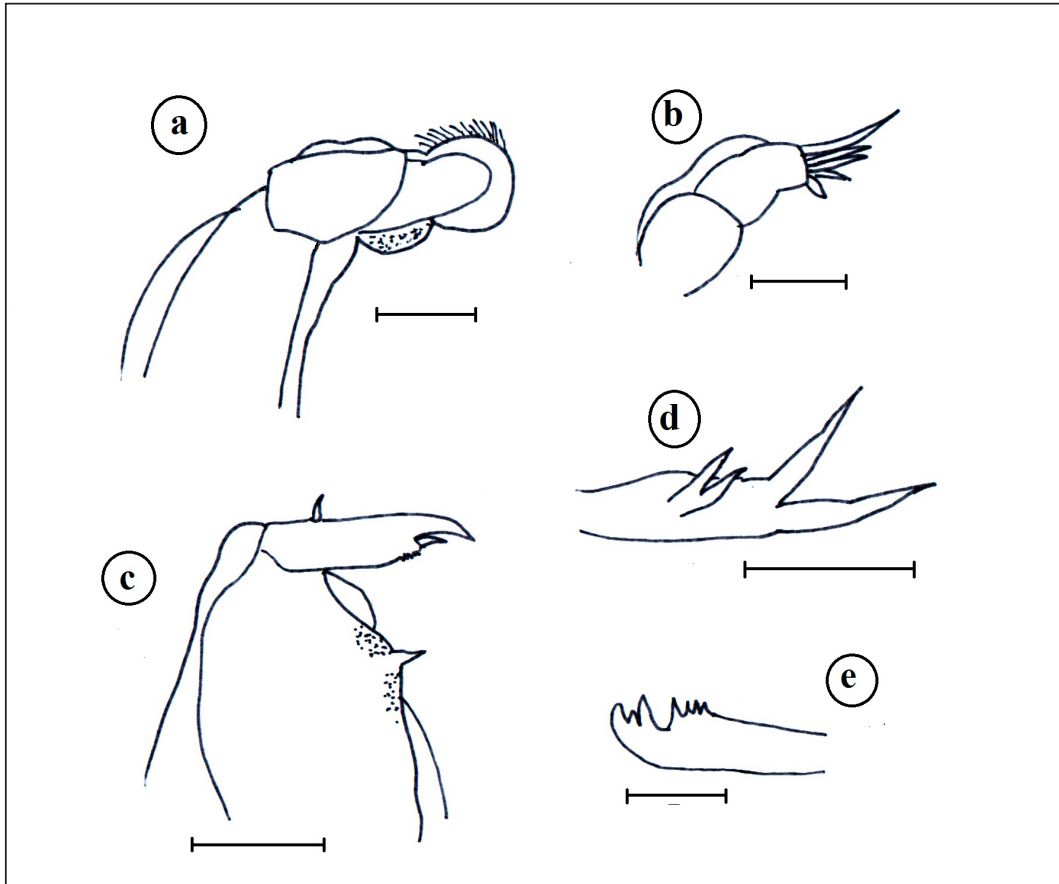
The total number of parasites was 40. Body length varies from 3 to 4.5 mm. The cephalothorax is subcylindrical, longer than the trunk and the second maxilla. The trunk is ovate or pyriform, with truncated posterior margin. The length of the second maxilla seldom reaches half length of the trunk; it is slender and tapering. The first maxilla (Fig. 2b, 3d) exopod from



**Fig. 1.** *Clavella alata* ♀. habitus, lateral, front (Scale 1 mm)



**Fig. 2.** *Clavella alata* ♀. a - the first antenna (0.03mm), b - the first maxilla (0.025 mm), c - the second antenna (0.07 mm), d - the exopod of the second antenna (0.07 mm), e - the maxilliped (0.025 mm), f - the mandible (0.02 mm), g - bulla (0.07 mm)



**Fig. 3.** *Clavella alata* ♀. a – the second antenna (0.07 mm), b – the first antenna (0.03 mm), c – the maxilliped (0.5mm), d – the first maxilla (0.025 mm), e – the mandible (0.02 mm)

ventral to lateral armed with two short subapical setae; the endopod with two digitiform papillae, each bears apical long seta. The first antenna (Fig. 2a, 3b) is distinctly two-segmented. Distal armature includes 5 visible elements: one tubercule, one short seta, two equal setae and one long slender seta. The second antenna (Fig. 2c, 3a) with sympod-endopod long axis; the exopod is displaced from the main axis of appendage, relatively smaller than endopod, one-segmented and armed with long denticles; the endopod is covered with fine denticles in medial. The maxilliped has a robust corpus, myxa with a denticulated patch and one short seta at about mid-length; the subchela is cylindrical, with basal seta; a sturdy barb reaches close to the tip of the claw; the claw is sturdy (Fig. 2e, 3c). The mandible has the dental formula P1S1P1...B4 (Fig. 2f, 3e). The bulla is mushroom-shaped (Fig. 2g).

## DISCUSSION

*Clavella alata* has been reported from the North Sea and British waters, from the southern coast of Spain, the Algerian coast, and the Mediterranean. It was reported only on *Phycis* genus such as *Phycis blennoides* (Brian, 1906; Scott, Scott, 1913; Papoutsoglou, 1976; Kabata, 1979; Raibaut et al., 1998) and *Phycis phycis* (Nunes-Ruivo, 1953; Kabata, 1963; Ramdane, Trilles, 2010).

The hosts parasitising with *Clavella alata* were examined according to family characteristics: two host species belong to Phycidae. The hosts parasitising with *Clavella alata* were examined according to habitat selections; two host fish species are benthopelagic. The hosts parasitising with *Clavella alata* were examined according to their feeding habits; two host fish species are carnivorous.

Nine species of the family Lernaeopodidae are reported from marine habitats in Turkey (Alaş et al., 2015): *Clavellotis fallax* (Heller, 1865), *Clavellisa scombri* (Kurz, 1877), *Clavellotis strumosa* (Brian, 1906), *Lernaeopoda galei* Kroyer, 1837, *Thysanote impudica* (von Nordmann, 1832), *Parabrachiella bispinosa* (von Nordmann, 1832), *Parabrachiella exigua* (Brian, 1906), *Clavella alata* Brian, 1909, *Parabrachiella hostilis* (Heller, 1868).

*Clavella alata* was presented from Turkey by Öktener et al. (2010), so it was published only as an abstract. Thus this is the second report on a new host in Turkey. The drawings of general morphology and dissected extremities (first maxilla, first antenna, second antenna, maxilliped, mandible) of *Clavella alata* in this study were very similar to the findings of Brian, 1906; Scott, Scott, 1913; Wilson, 1915; Nunes-Ruivo, 1953; Kabata, 1963; Kabata, 1979; Ho, 1993.

This study contributes to research into the distribution and host preference of *Clavella alata* in Turkey.

Received 3 August 2016

Accepted 20 September 2016

## References

- Öktener A, Alaş A, Türker D. First record of *Parabrachiella hostilis* (Heller, 1868) (Copepoda: Lernaeopodidae) from *Umbrina cirrosa* (Linnaeus, 1758) (Pisces: Sciaenidae) in Turkey. Bull Eur Ass Fish Pathol. 2015; 35(4): 131–7.
- Benkirane OF, Coste F, Raibaut A. On the morphological variability of the attachment organ of Lernaeopodidae (Copepoda: Siphonostomatoida). Folia Parasitol. 1999; 46: 67–75.
- Boxshall GA, Halsey SA. An introduction to copepod diversity. London: The Ray Society; 2004. 1–2: 966 p.
- Brian A. Copepodi parassiti dei Pesci d'Italia. Genova: Stab. Tipo-Litografico R. Istituto Sordomuti; 1906. 187 p. Italian.
- Froese R, Paul D. Editors [Internet]. FishBase. World Wide Web electronic publication. www.fishbase.org, version (01/2016).
- Ho JS. New Species of *Clavella* (Copepoda: Lernaeopodidae) Parasitic on Japanese Rat-tails (Pisces: Macrouridae). Publ Seto Mar Biol Lab. 1993; 36(3): 107–18.
- Kabata Z. The Second Antenna in the Taxonomy of Clavellinae (Copepoda, Lernaeopodidae). Crustaceana. 1963; 6(1): 5–14.
- Kabata Z. Parasitic Copepoda of British Fishes. London: Ray Society Publications, The British Museum; 1979. 152, 468 p.
- Nunes-Ruivo L. Copepodes parasites des poissons. Resultats des campagnes du "Pr. Lacaze Duthiers". Vie et Milieu. 1953; 3: 115–38.
- Öktener A, Torcu Koç H, Alaş A, Erdoğan Z. Three Copepods from Marine Fishes of Aegean Sea Coasts of Turkey. 9th International Congress on Biology of Fish; 2010 July 5–9; Barcelona, Spain.
- Papoutsoglou SE. Metazoan Parasites of Fished from Saronicos Gulf Athens, Greece. Thalassographica. 1976; 1(1): 69–102.
- Raibaut A, Combes C, Benoit F. Analysis of the parasitic copepod species richness among Mediterranean fish. J Marin System. 1998; 15: 185–206.
- Ramdane Z, Trilles JP. New Algerian parasitic copepods. Bull Eur Ass Fish Pathol. 2010; 30(2): 41–7.
- Scott T, Scott A. British Parasitic Copepoda. London: Ray Society; 1913. 1–2, 252 p.
- Wilson CB. North American Parasitic Copepods Belonging to the Lernaeopodidae, with a revision of the entire Family. Proceed US Nat Mus. 1915; 47 (2063): 565–729.
- WoRMS [Internet]. World Register of Marine Species. Available from <http://www.marine-species.org> at VLIZ. Accessed 28.12.2015.

Ali Alaş, Ahmet Öktener, Dilek Türker

NAUJAS *CLAVELLA ALATA* BRIAN, 1909 (SIPHONOSTOMATOIDA, LERNAEPODIDAE)  
ŠEIMININKAS TURKIJOS JŪROSE

*Santrauka*

Lernaepodidae yra didelė ir įvairi parazitinių irklakojų šeima, kurią šiuo metu sudaro 48 gentys ir daugiau nei 260 rūšių. Dažniausiai šie irklakojai parazituoja selachijas (Elasmobranchii) ir kaulingąsias žuvis (Teleostei). *Clavella alata* Brian, 1909 rūšis aptinkama Šiaurės jūroje, Didžiosios Britanijos vandenyse, į pietus iki Ispanijos ir Alžyro krantų bei Viduržemio jūroje. Šios rūšies šeimininku buvo žinoma tik siūlapekių vėgėlių (Phycidae) šeima, pavyzdžiui, *Phycis blennoides* ir *Phycis phycis*. Šiame straipsnyje pristatomas Turkijoje aptiktas naujas *Clavella alata* rūšies šeimininkas. Tyrimo metu 2014 m. Šiaurės Egėjo jūroje, Turkijoje, buvo sugauta 70 *Phycis blennoides* (Brünnich, 1768) (Gadiformes; Phycidae) rūšies vėgėlių. Iš viso aptikta 40 *Clavella alata* rūšies parazitų. Nustatytas paplitimas ir vidutinis intensyvumas sudarė atitinkamai 42,8 % ir 1,3. Tyrimo rezultatai patvirtina *Clavella alata* rūšies pasiskirstymą ir šeimininko pirmenybę Turkijoje.

**Raktažodžiai:** *Clavella*, Phycidae, parazitinis, irklakojai, Turkija