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NEW REPORTS OF SUCTORIAN CILIATES (CILIOPHORA, SUCTOREA) EPIBIONT ON HALACARID MITES AND A HARPACTICOID COPEPOD FROM TÜRKIYE

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Suctorian ciliates are common epibionts on marine and freshwater invertebrates. In the present study, three epibiont suctorian ciliate species, viz. *Praethecacineta halacari* Schulz, 1933, *Thecacineta calix* (Schroder, 1907), and *Thecacineta cothurnioides* Collin, 1909, are reported. Hence, *P. halacari* was observed on the ventral side of the idiosoma and legs of halacarid mite *Copidognathus brachystomus* Viets, 1940 and ventral side of *Copidognathus tabellio* (Trouessart, 1894). *T. calix* was reported on halacarid mite *Maracarus gracilipes* (Trouessart, 1889) – a new host species for the ciliate. *T. cothurnioides* was found on two different harpacticoid copepod specimens. The species *T. cothurnioides* is recorded from Turkish coast for the first time. *T. calix* is reported from Antalya for the first time. Finding of *P. halacari* is the first record for Izmir area. The data on distribution of all registered suctorian species are provided as well.

Keywords: epibiont, suctorian ciliate, halacarid mite, harpacticoid copepod, host, Mediterranean Sea, Türkiye

Suctorian ciliates are common epibionts on marine and freshwater invertebrates such as copepods, cladocerans, nematodes, kinorhynchs, tanaids, and halacarid and hydrachnid mites (Dovgal et al., 2009a ; Durucan, 2019). In Türkiye, the first epibiont marine suctorian ciliate was reported by Durucan and Boyacı (2019) who registered *Praethecacineta halacari* Schulz, 1933 on *Copidognathus venustus* Bartsch, 1977 collected from Antalya. After that, Durucan *et al.* (2019) reported *Paracineta irregularis* Dons, 1927 on a halacarid mite (*Rhombognathus* sp.) from the Sea of Marmara. Recently, *Thecacineta calix* (Schroder, 1907) was recorded as epibiont on a harpacticoid copepod from the Aegean Sea of Türkiye (Fethiye-Muğla) for the first time from this country (Durucan, 2019).

The paper presents the first report of *Thecacineta cothurnioides* Collin, 1909 from Türkiye. *T. calix* is reported for the first time from a halacarid mite *Maracarus gracilipes* (Trouessart, 1889), and at the same time this record is the first for Antalya. Previously found *P. halacari* is reported here for different halacarid hosts – *Copidognathus brachystomus* Viets, 1940 and *Copidognathus tabellio* (Trouessart, 1894) – and location of Izmir.

MATERIAL AND METHODS

Sediment was sampled by snorkeling at locality from Antalya (Kundu) (36.848686°N, 30.831607°E) (fine sand, 2-m depth) (22 July, 2020) and Izmir (Urla–Karantina Island) (*Pinctada radiata* (Leach, 1814), 0–1-m depth) (Fig. 1). Then, sediment samples were sieved in 100 μm in the laboratory under a binocular microscope (Nikon SMZ-10). The light microscopy (Nikon Eclipse E400) micrographs were taken with a camera phone. Halacarid mites and harpacticoid specimens inhabited by ciliates were placed in Hoyer's medium and kept in the collection of the first author (F. Durucan).

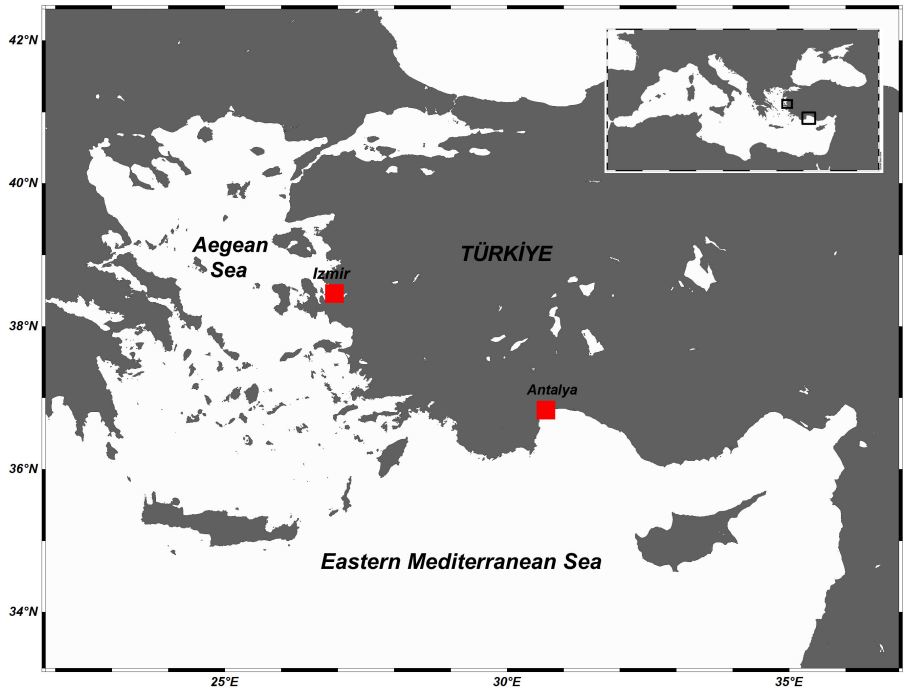

Fig. 1. Studied areas in Türkiye with the sampling stations indicated [source of the map is (Schlitzer, 2022)]

Рис. 1. Станции отбора проб в Турции [источник карты — (Schlitzer, 2022)]

RESULTS AND DISCUSSION

Class Suctorea Claparede & Lachmann, 1859
Subclass Exogenia Collin, 1912
Order Metacinetida Jankowski, 1978
Family Praethecacinetidae Dovgal, 1996
***Praethecacineta halacari* Schulz, 1933**

Material examined. Numerous epibiont ciliates were observed on *C. brachystomus*. Mostly, those were found as attached ventral side of the idiosoma and legs (Fig. 2A). Four ciliates were registered as attached ventral side of another *C. brachystomus* (Fig. 2B). More than ten *P. halacari* were observed on ventral side of *C. tabellio* (Fig. 2C). Length of *P. halacari* lorica was approximately 50–60 μm; width of lorica was 20–25 μm.

Distribution. *P. halacari* is widely distributed species, specific to halacarid mites. *P. halacari* was previously recorded from various species of halacarid mites and different areas worldwide (Chatterjee et al., 2018 ; Durucan & Boyacı, 2019). The species was firstly reported near the Norwegian coast (Tromsø, type locality) from unidentified halacarids. Subsequent finds were in the Atlantic coast

of Brazil, Caspian Sea, Pulau Bedukang (Brunei), Bulgaria, Nova Scotia (Canada), Norfolk (England), Tromsø (Norway), Kiel (Germany), Goa (India), Western Australia, He-Ping-Dao (Taiwan), Matemwe and Zanzibar (Tanzania), Gdańsk (Poland), Singapore, Albufeira (Portugal), Crimea (Russia) (Chatterjee et al., 2018 ; Dovgal et al., 2009a ; Dovgal, 2013), and Antalya and Izmir (Türkiye) (present report).

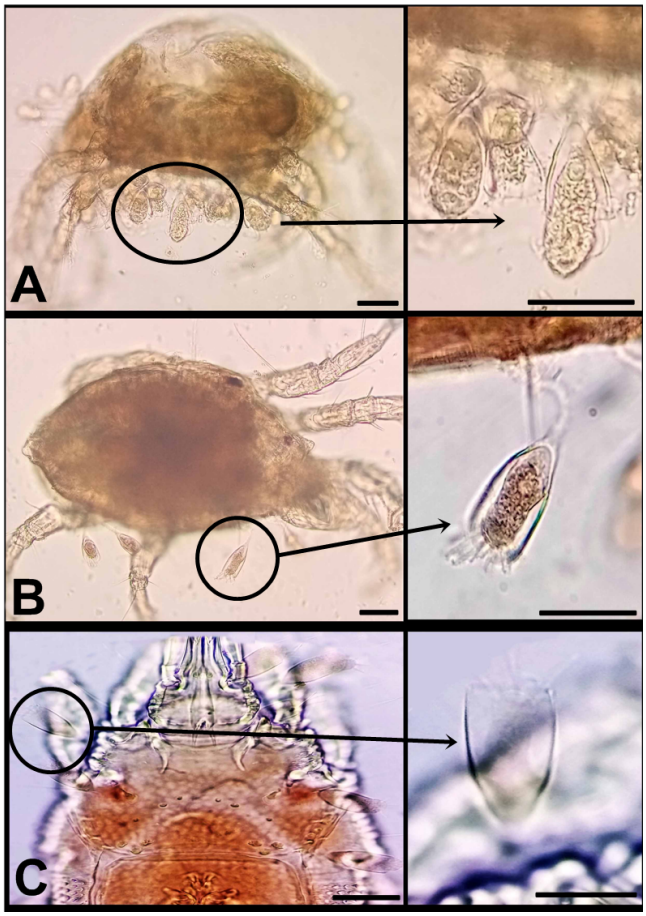

Fig. 2. Ventral views of three different *Copidognathus* specimens infected with *Praethecacineta halacari*: A, B, *Copidognathus brachystomus*; C, *Copidognathus tabellio* (scale bars are 50 μm)

Рис. 2. Вентральная поверхность трёх различных видов рода *Copidognathus*, инфицированных *Praethecacineta halacari*: A, B — *Copidognathus brachystomus*; C — *Copidognathus tabellio* (масштабные линейки — 50 μm)

Order Vermigemmida Jankowski, 1973
Family Thecacinetidae Matthes, 1956
Genus *Thecacineta* Collin, 1909
***Thecacineta calix* (Schroder, 1907)**

Material examined. In total, 27 halacarid specimens (14 females and 13 males) were identified as *M. gracilipes*. Out of them, 18 individuals (9 females and 9 males) were found as inhabited by numerous individuals of the species *T. calix* from the sampling area of Antalya. Those were attached to ventral side of idiosoma and gnathosoma. The ciliates were also attached to legs laterally and ventrally (Fig. 3). The suctorian lorica surface was covered with characteristic for the species annular ridges (7–8). Length of lorica was 50–60 μm; width of lorica was 20–25 μm.

Distribution. The worldwide distribution is characteristic for *T. calix* which is reported as an epibiont on nematodes, copepods, and halacarid mites from the Atlantic, Pacific, Antarctic, and Indian oceans, from the intertidal area to the deep sea (Chatterjee et al., 2019b). The species was firstly reported

on the coast of Kerguelen Islands and Island of Heard (Antarctica, type locality), Kiel Bay (Germany), Tarva (Norway), Koprino Harbor and Quatsino Sound (Pacific coast of Canada), Tierra Del Fuego, Falkland Islands, the Adriatic Sea, the Mediterranean Sea, Veracruz (Mexico), Odesa, Sevastopol (the Black Sea), Siladeu and Nias islands (Indonesia), North Sea, Hokkaido (Japan), Near Andaman & Nicobar Islands, He-Ping-Dao (Taiwan), Piran Bay (Slovenia), East Saint John (U. S. Virgin Islands), Caja de Muertos Island, Buoy, La Parguera (Puerto Rico), Pulau Bedukang (Brunei), Southwest Bay of Bengal, Tamil Nadu (India), Brittany (France), Suvadiva Atoll (Maldives), Northern Caspian Sea, Angria Bank, Arabian Sea (Chatterjee et al., 2019a, b, 2020a, b ; Dovgal, 2013 ; Panigrahi et al., 2015), Muğla (Türkiye) (Durucan, 2019), and Antalya (Türkiye) (present report).

Other hosts. *T. calix* was observed on many different halacarid mites. But in this study, we report for the first time the ciliate species on many specimens of *M. gracilipes*. The latter is a new host species for *T. calix*. The ciliate species were also reported from several species of nematodes, copepods, *etc.* (Chatterjee et al., 2019b, 2020a ; Dovgal, 2013).

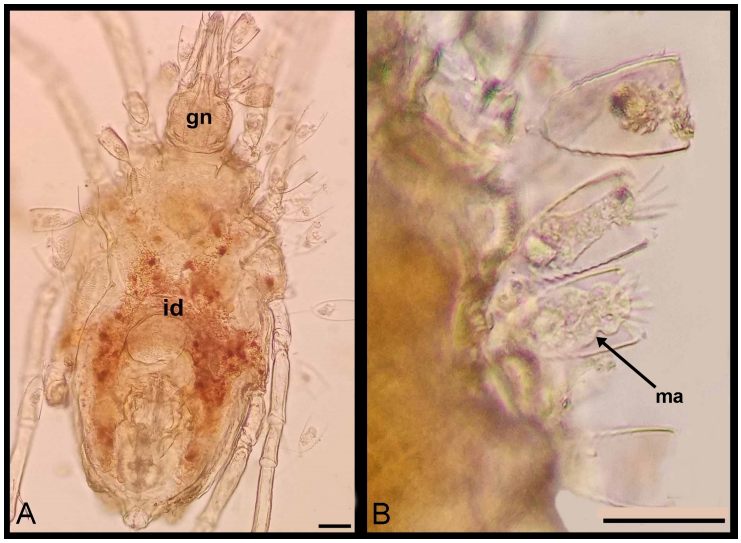

Fig. 3. Specimen of *Maracarus gracilipes* infected by *Thecacineta calix*: A, total view; B, magnificated view (gn, gnathosoma; id, idiosoma; ma, macronucleus) (scale bars are 50 μm)

Рис. 3. Вентральная поверхность *Maracarus gracilipes*, инфицированного *Thecacineta calix*: A — общий вид; B — вид с большим увеличением (gn — гнатосома; id — идиосома; ma — макронуклеус) (масштабные линейки — 50 μm)

Thecacineta cothurnioides Collin, 1909

Material examined. In total, two harpacticoid copepod specimens were observed inhabited by *T. cothurnioides* (Fig. 4A, B). Out of them, one was infected with single individual, while another one was inhabited with eleven individuals (Fig. 4C, D).

Distribution. The species was firstly reported on harpacticoid copepod from Banyuls-sur-Mer at the Mediterranean coast of France (type locality) (Dovgal et al., 2009b). Next, *T. cothurnioides* was reported on nematodes from Ratnagiri, Rushikulya, and Sundarbans (India) (Chatterjee et al., 2019a), as well as on nematodes from the Maldivian Archipelago (Baldrighi et al., 2020). Finally, it was registered in the Mediterranean Sea near Antalya (Türkiye) (present report).

Other hosts. Besides harpacticoid copepods [*Cletodes longicaudatus* (Boeck, 1872)], this species was reported from nematodes – *Tricoma* sp., *Chromaspirina* sp., *Chromaspirina parapontica* Luc & De Coninck, 1959, and *Paradesmodora* sp. (Baldrighi et al., 2020 ; Chatterjee et al., 2019a ; Dovgal et al., 2009a).

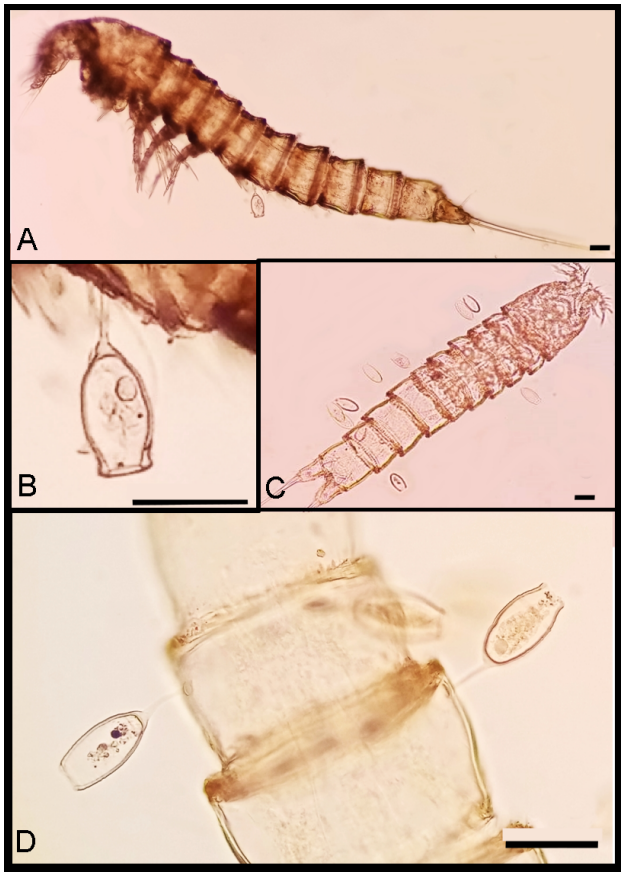

Fig. 4. Distribution of *Thecacineta cothurnioides* on harpacticoid copepod body: A, B, lateral view; C, D, ventral view (scale bars are 50 μm)

Рис. 4. Распределение *Thecacineta cothurnioides* на теле гарпактикоиды: A, B — вид сбоку; C, D — вид снизу (масштабные линейки — 50 μm)

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НОВЫЕ НАХОДКИ ЭПИБИОНТНЫХ СУКТОРИЙ (CILIOPHORA, SUCTOREA) НА КЛЕЩАХ-ГАЛАКАРИДАХ И ГАРПАКТИКОИДАХ С ТУРЕЦКОГО ПОБЕРЕЖЬЯ

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Суктории — широко распространённая группа эпибионтных инфузорий, обитающих на представителях многих таксонов морских и пресноводных беспозвоночных. В статье приведены данные о новых находках трёх видов эпибионтных сукторий. *Praethecacineta halacari* Schulz, 1933 обнаружена на вентральной поверхности идиосомы и на ногах галакаридного клеща *Copidognathus brachystomus* Viets, 1940, а также на вентральной стороне тела *Copidognathus tabellio* (Trouessart, 1894). *Thecacineta calix* (Schroder, 1907) отмечена на поверхности клеща *Maracarus gracilipes* (Trouessart, 1889) — нового хозяина для этой инфузории. *Thecacineta cothurnioides* Collin, 1909 зарегистрирована на поверхности тела двух особей гарпактикоид. Это первая находка *T. cothurnioides* у побережья Турции. *T. calix* впервые отмечена в окрестностях Антальи, а *P. halacari* впервые зарегистрирована в окрестностях Измира. В статье приведены данные о распространении всех найденных видов.

Ключевые слова: эпибионт, суктория, галакаридный клещ, гарпактикоида, хозяин, Средиземное море, Турция