

UDC 593.176-191.2

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

© 2022 F. Durucan^{1,2} and I. Dovgal³

¹German Centre for Marine Biodiversity Research (DZMB), Senckenberg am Meer, Wilhelmshaven, Germany

²Department of Aquaculture, Isparta University of Applied Sciences, Isparta, Türkiye

³A. O. Kovalevsky Institute of Biology of the Southern Seas of RAS, Sevastopol, Russian Federation

E-mail: f_durucan@hotmail.com

Received by the Editor 16.10.2020; after reviewing 15.12.2020;
accepted for publication 19.08.2022; published online 13.09.2022.

Suctorian ciliates are common epibionts on marine and freshwater invertebrates. In the present study, three epibiont suctorian ciliate species, viz. *Praethecacinetia halacari* Schulz, 1933, *Thecacinetia calix* (Schroder, 1907), and *Thecacinetia 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 *Praethecacinetia 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, *Thecacinetia 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 *Thecacinetia 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).

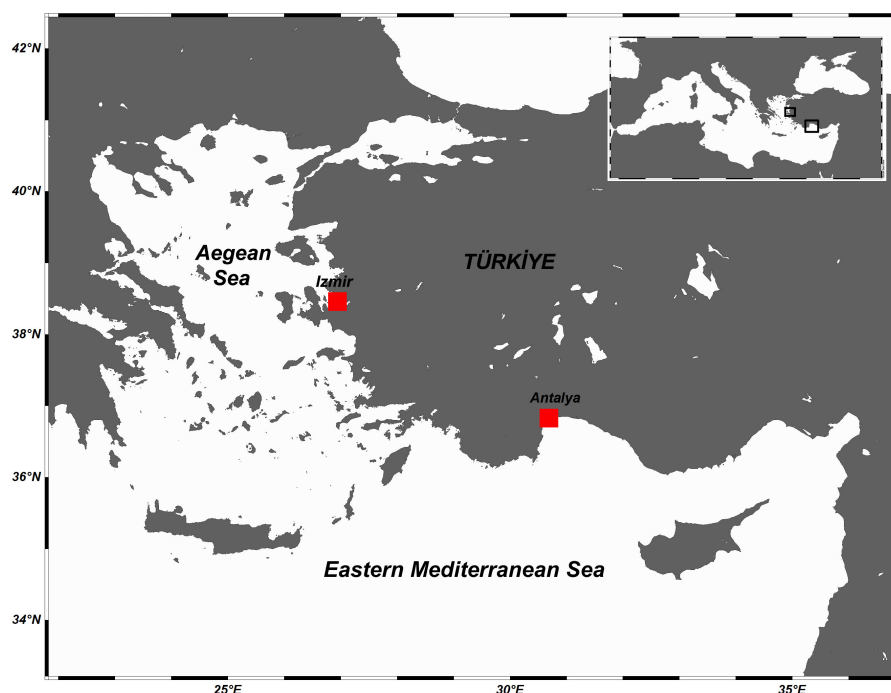


Fig. 1. Studied areas in Türkiye with the sampling stations indicated [source of the map is (Schlitzer, 2022)]

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).

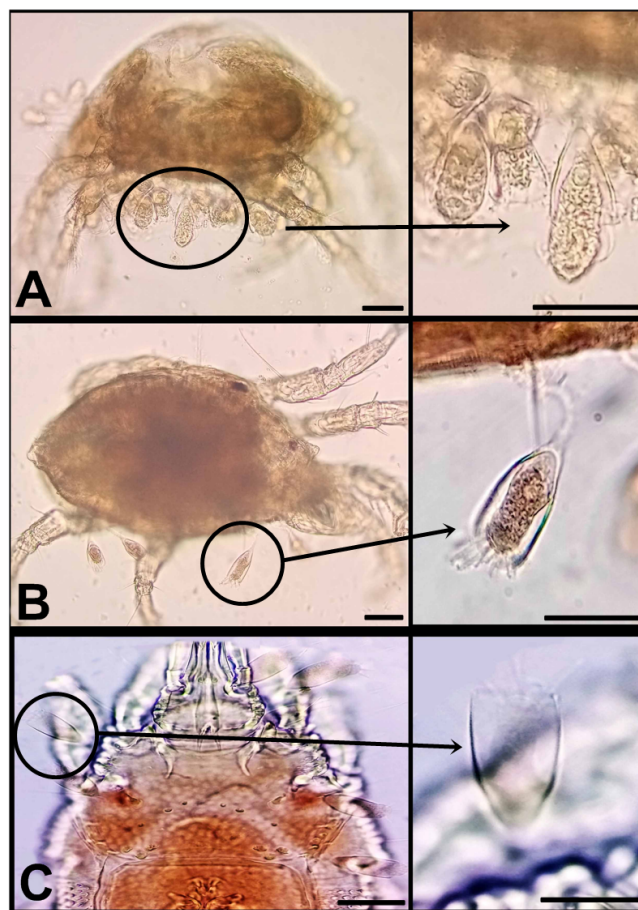


Fig. 2. Ventral views of three different *Copidognathus* specimens infected with *Praethecacineteta halacari*: A, B, *Copidognathus brachystomus*; C, *Copidognathus tabellio* (scale bars are 50 μ m)

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

Order Vermigemmmida Jankowski, 1973
Family Thecacinetidae Matthes, 1956
Genus *Thecacineteta* Collin, 1909
***Thecacineteta 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 μ m; width of lorica was 20–25 μ m.

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).

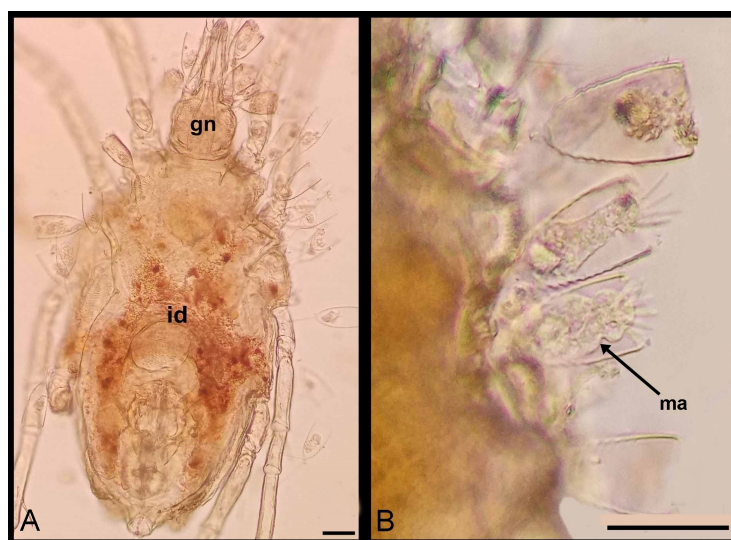


Fig. 3. Specimen of *Maracarus gracilipes* infected by *Thecacinetia calix*: A, total view; B, magnified view (gn, gnathosoma; id, idiosoma; ma, macronucleus) (scale bars are 50 μm)

Рис. 3. Вентральная поверхность *Maracarus gracilipes*, инфицированного *Thecacinetia calix*: А — общий вид; В — вид с большим увеличением (gn — гнатосома; id — идиосома; ма — макронуклеус) (масштабные линейки — 50 μm)

Thecacinetia 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).

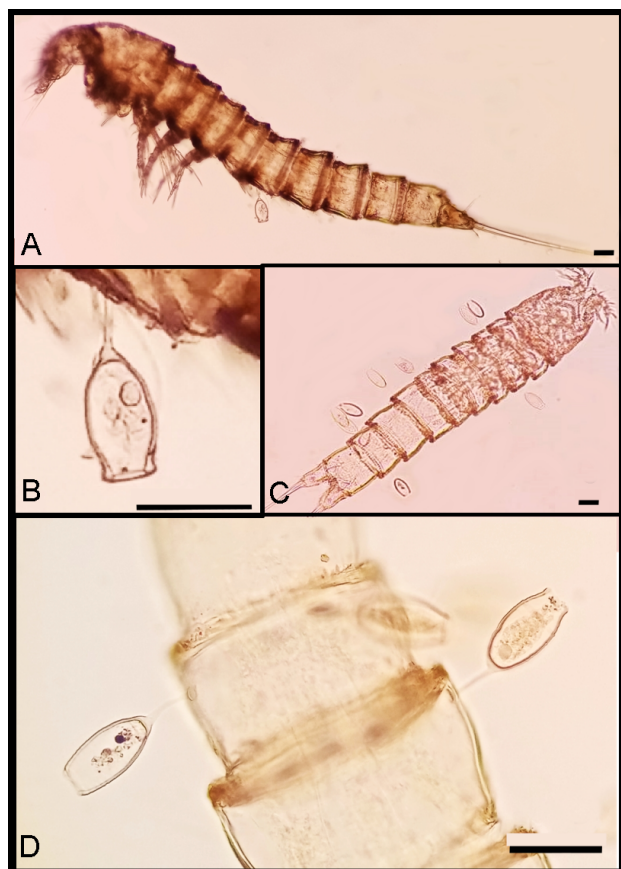


Fig. 4. Distribution of *Thecacineteta cothurnioides* on harpacticoid copepod body: A, B, lateral view; C, D, ventral view (scale bars are 50 µm)

Рис. 4. Распределение *Thecacineteta cothurnioides* на теле гарпактикоиды: А, В — вид сбоку; С, D — вид снизу (масштабные линейки — 50 µm)

Second author's (Igor Dovgal's) work was carried out within the framework of IBSS state research assignment "Fundamental studies of population biology of marine animals, their morphological and genetic diversity" (No. 121040500247-0).

Acknowledgement. The authors are very grateful to Dr. Selçuk Yiğitkurt (Ege University, Fisheries Faculty) for providing the halacarid materials from Izmir.

REFERENCES

1. Baldrighi E., Dovgal I., Zeppilli D., Abibulaeva A., Michelet C., Michaud E., Franzo A., Grassi E., Cesaroni L., Guidi L., Balsamo M., Sandulli R., Semprucci F. The cost for biodiversity: Records of ciliate–nematode epibiosis with the description of three new suctorian species. *Diversity*, 2020, vol. 12, iss. 6, art. no. 224 (25 p.). <https://doi.org/10.3390/d12060224>
2. Chatterjee T., Dovgal I., Pešić V., Zawal A. A checklist of epibiont suctorian and peritrich ciliates (Ciliophora) on halacarid and hydrachnid mites (Acari: Halacaridae & Hydrachnidia). *Zootaxa*, 2018, vol. 4457, no. 3, pp. 415–430. <https://doi.org/10.11646/zootaxa.4457.3.4>
3. Chatterjee T., Dovgal I., Fernandez-Leborans G. A checklist of suctorian epibiont ciliates (Ciliophora) found on meiobenthic marine nematodes. *Journal of Natural History*, 2019a, vol. 53, no. 33–34, pp. 2133–2143. <https://doi.org/10.1080/00222933.2019.1692085>
4. Chatterjee T., Nanajkar M., Dovgal I., Sergeeva N., Bhawe S. New records of epibiont *Thecacineteta calix* (Ciliophora: Suctorea) from the Caspian Sea and Angriya Bank, Arabian Sea. *Cahiers de Biologie Marine*, 2019b, vol. 60, no. 5, pp. 445–451. <https://doi.org/10.21411/CBM.A.C75BCBEA>
5. Chatterjee T., Dovgal I., Nanajkar M. Report of ciliate epibionts (Ciliophora, Suctorea) on meiobenthic invertebrates from the Indian coast near Karwar, Karnataka. *Protistology*, 2020a, vol. 14, no. 2, pp. 84–88. <https://doi.org/10.21685/1680-0826-2020-14-2-5>

6. Chatterjee T., Dovgal I., Schizas N. V. Report of epibiont ciliates (Ciliophora) on harpacticoid copepods from Caribbean mesophotic reefs. *Cahiers de Biologie Marine*, 2020b, vol. 61, no. 1, pp. 131–136. <https://doi.org/10.21411/CBM.A.E1C0E61>
7. Dovgal I. V., Chatterjee T., Subba Rao D. V., Chan B. K. K., De Troch M. New records of *Praethecacineta halacari* (Schulz) (Suctorea: Ciliophora) from Taiwan, Tanzania and Canada. *Marine Biodiversity Records*, 2009a, vol. 2, art. no. e136 (3 p.). <https://doi.org/10.1017/S175526720999056X>
8. Dovgal I., Chatterjee T., Ingole B. New records of *Thecacinetia cothurnioides* and *Trematosoma rotunda* (Ciliophora, Suctorea) as epibionts on nematodes from the Indian Ocean. *Protistology*, 2009b, vol. 6, no. 1, pp. 19–23.
9. Dovgal I. V. *Fauna of Ukraine* : in 40 vols. Vol. 36. *Ciliates – Ciliophora*. Issue 1. *Class Suctorea*. Kyiv : Naukova dumka, 2013, 267 p. (in Russ. with Eng. summary).
10. Durucan F., Artüz M. L., Dovgal I. V. The first record of *Paracineta irregularis* (Ciliophora, Suctorea) as epibiont on *Rhombognathus halacarid* mite (Acari, Halacaridae) from the Sea of Marmara, Turkey. *Protistology*, 2019, vol. 13, no. 2, pp. 67–70. <https://doi.org/10.21685/1680-0826-2019-13-2-4>
11. Durucan F., Boyacı Y. Ö. First record of *Praethecacineta halacari* (Suctorea: Ciliophora) from Antalya, Turkey. *Acta Aquatica Turcica*, 2019, vol. 15, iss. 2, pp. 135–138. <http://dx.doi.org/10.22392/actaqua.577448>
12. Durucan F. First record of *Thecacinetia calix* (Ciliophora: Suctoria) on harpacticoid copepod from Aegean Sea, Turkey. *Acta Biologica*, 2019, no. 26, pp. 31–34. <https://doi.org/10.18276/ab.2019.26-03>
13. Panigrahi S., Bindu V. K., Bramha S. N., Mohanty A. K., Satpathy K. K., Dovgal I. Report of *Thecacinetia calix* (Ciliophora: Suctoria) on nematode *Desmodora* from the intertidal sediments of Southwest Bay of Bengal. *Indian Journal of Geo-Marine Sciences*, 2015, vol. 43, no. 12, pp. 1840–1843.
14. Schlitzer R. *Ocean Data View* : [site]. 2022. URL: <https://odv.awi.de> [accessed: 13.08.2022].

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

Ф. Дурукан^{1,2}, И. Довгаль³

¹Немецкий научно-исследовательский центр морского разнообразия (DZMB),
Зекенберг-ам-Меер, Вильгельмсхафен, Германия

²Кафедра аквакультуры, Университет прикладных наук, Ыспарта, Турция

³ФГБУН ФИЦ «Институт биологии южных морей имени А. О. Ковалевского РАН»,
Севастополь, Российская Федерация
E-mail: f_durucan@hotmail.com

Суктории — широко распространённая группа эпипионтных инфузорий, обитающих на представителях многих таксонов морских и пресноводных беспозвоночных. В статье приведены данные о новых находках трёх видов эпипионтных 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). *Thecacinetia calix* (Schroder, 1907) отмечена на поверхности клеща *Maracarus gracilipes* (Trouessart, 1889) — нового хозяина для этой инфузории. *Thecacinetia cothurnioides* Collin, 1909 зарегистрирована на поверхности тела двух особей гарпактикоид. Это первая находка *T. cothurnioides* у побережья Турции. *T. calix* впервые отмечена в окрестностях Анталы, а *P. halacari* впервые зарегистрирована в окрестностях Измира. В статье приведены данные о распространении всех найденных видов.

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