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An overview of Suctorian ciliates (Ciliophora, Suctorea) as epibionts of halacarid mites (Acari, Halacaridae)

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Abstract

Scant information is available regarding the prevalence and distribution of suctorian ciliates on halacarid mites. However, using this limited information and data from our laboratory on the systematics, biology, ecology and distribution of suctorian ciliates that are epibionts of halacarid mites, we redescribed four suctorian species: *Limnoricus ceter* (Jankowski), *Praethecacineta halacari* (Schulz), *Thecacineta calix* (Schroder) and *Acineta sulcata* Dons. We also recognized *Lissacineta allgeni* Jankowski and *Thecacineta allgeni* (Jankowski) as synonyms of *Praethecacineta halacari* (Schluz), and *Thecacineta laophontis* Jankowski and *Paracineta moebiusi* Kahl as synonyms of *Thecacineta calix* (Schroder). Many suctorians have been reported, but not properly identified in the halacarid literature. So, we have attempted to identify those suctorians to species level. Lastly, the interactions between the suctorians and their hosts are also discussed and *Praethecacineta halacari* is also reported for the first time from the Indian coast.

Key words: Ciliophora, Suctorea, Halacaridae, epibionts

Introduction

Representatives of several groups of freshwater and marine aquatic mites have been identified as hosts of suctorian ciliates (Suctorea) (Precht 1935; Matthes 1956; Matthes & Stiebler 1970; Matthes *et al*. 1988; Dovgal 1996; Gelmboldt & Dovgal 2005; Dovgal & Pesic 2007). There are extensive literature, along with figures and photomicrographs, on the halacarid mites, on which the suctorians occur (Abé 1997; Grimaldi 1965; Bartsch 1989, 1994, 1998, 2001, 2003; Chatterjee *et al.* 2004, 2006; Pepato & Tiago 2005). However, very little information is available regarding the distribution and prevalence of suctorian ciliates on these mites. Moreover, several species have been insufficiently described and documented in the old literature, and many nomenclatural problems were not addressed. In some cases, the suctorian species were not identified to species or even genus level. As a result, we have tried to identify some species of suctorians from figures and photomicrographs in the halacarid literature (Bartsch 1989, 1998, 2001, 2003; Abé 1997; Bartsch & Panesar 2000; Pepato & Tiago 2005). In addition, several suctorian-infested halacarid mites were recently collected from Goa (West coast of India, Arabian Sea) for examination. This paper presents an analysis of pertinent literature and data on the systematics, biology, ecology and distribution of suctorian epibionts of halacarid mites.

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Material and methods

Halacarid mites were collected from two rocky intertidal beaches of Goa; *viz.* Anjuna (Lat. 15° 34' 58" N; Long. 73° 44' 28.54" E) and Vagatoor (Lat. 15° 35' 33" N; Long. 73° 44' 67" E), along the west (Arabian Sea) coast of India. Collections were made from the intertidal to subtidal zone in May 2007. In addition, samples that were collected from the sandy coast of Ukraine, along the Black Sea, between 2003-2004, were reexamined. Original identifications of the Black Sea suctorians from halacarids were published in Boshko and Dovgal (2004), and Gelmbolt and Dovgal (2005). In the present study, measurements were made using the computer program ScopePhoto 2.0 for processing of digital images. Permanent slides of infested halacarids were deposited in the collections of the Department of Fauna and Systematics of invertebrate animals of Schmalhausen Institute of Zoology, National Academy of Sciences, Ukraine.

Results and discussion

The systematic position (according to Dovgal's 2002 system), diagnoses, redescriptions and remarks on the nomenclature of suctorians from halacarid mites, along with their distribution and host preference are discussed below.

Class Suctorea Claparède & Lachmann

Subclass Exogenia Collin

Order Metacinetida Jankowski

Family Paracinetidae Jankowski

Limnoricus ceter Jankowski, 1981
(Fig. 1–3)

Diagnosis: Marine commensal, loricate, suctorian ciliate with stalk delimited from posterior margin of lorica. Both lorica and cell body sharply flattened laterally. Top of lorica orbed. The apical aperture of lorica surrounded by collar-like borders. Stalk long, straight and somewhat enlarged near junction with lorica. Cell body attached to margin of lorica aperture. Macronucleus ellipsoidal, located medially. Contractile vacuole not observed. Specimens from halacarid mites have short and convoluted stalk. Lorica dimensions: 65–74 µm long x 36–44 µm wide. Stalk length up to 160 µm.

Distribution and host prevalence: *Limnoricus ceter* was described from marine isopods from the Sakhalin and Kunashyr Islands (Jankowski 1981). It was also found on halacarid mites from Barents Sea (Jankowski 1981). Since the specimens from halacarids differ from the individuals from isopods based upon the form of the stalk, Jankowski (1981) proposed that halacarid forms are possibly restricted to a particular/single species.

Family Praethecacinetidae Dovgal

Praethecacineta halacari (Schulz, 1933), charact. emend
(Fig. 4, 5, 9–11)

=*Thecacineta halacari* Schulz, 1933

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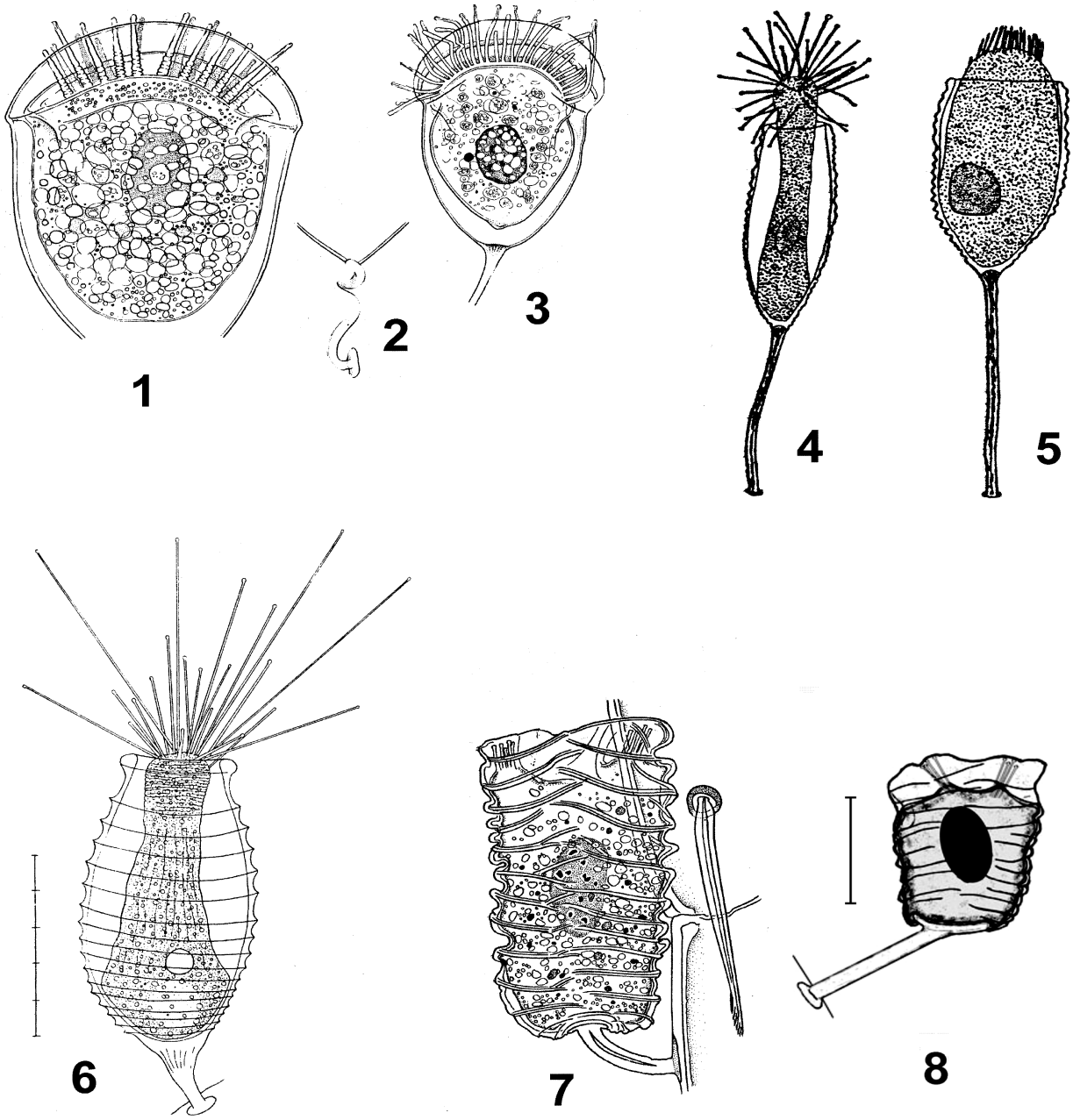
=*Lissacineta allgeni* Jankowski, 1981, syn. n.
=*Thecacineta allgeni* (Jankowski, 1981), syn. n.

Diagnosis: Marine suctorians with stylotheca. Cell body, slightly, laterally flattened, entirely filling the lorica and attached to its posterior margin**.** Apical part of the body narrowed.



FIGSURES 1–2. *Limnoricus ceter* Jankowski, 1981 from halacarid mite (2—stalk) (after Jankowski 1981).
FIGURE 3. *Limnoricus ceter* from isopode crustacean (after Jankowski 1981).
FIGURES 4–5. *Praethecacineta halacari* (Schulz, 1933) (after Schulz 1933).
FIGURE 6. *Thecacineta calix* (Schroder, 1907) (after Matthes 1956). Scale bar 50 µm.
FIGURE 7. *Acineta sulcata* Dons, 1927 from Barents Sea halacarid mites (after Jankowski 1981).
FIGURE 8. *Acineta sulcata* Dons, 1927 from freshwater halacarid mite found in Unava river (orig.). Scale bar 10 µm.

Tentacles placed at upper cell surface. Macronucleus spherical, posteriorly located. Contractile vacuole single. Stylotheca smooth, without ribbing. Body dimensions: lorica length 31–38 µm (85–110 µm after

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Schulz 1933), lorica width 18–21 µm (35–55 µm after Schulz 1933), stalk length 3–26 µm (50–110 µm after Schulz 1933). Reproduction by semi-circumvaginative exogemmic budding with formation of laterally placed ciliary swarmers (Fig. 10). Original measurements of *Pra. halacari* were made using specimens from Goa, India.

Remarks on the systematics and nomenclature: *Pra. halacari* was described from marine halacarid mites from interstitial sand (Schulz 1933) and classified with the genus *Thecacineta* Collin, 1909. However, except for *Pra. halacari*, formation of unciliated swarmers is characteristic for all species of the genus. It was for this reason that Matthes (1956) assigned *Pra. halacari* to the current genus *Praethecacineta* Matthes, 1956 and placed it together with the genus *Thecacineta* in a new family, Thecacinetidae. Finally, in the keys for identification of suctorians of Ukraine (Dovgal 1996), *Praethecacineta* was placed into the subclass *Exogenia* Collin, 1912 in the new family Praethecacinetidae Dovgal, 1996, based on the type of budding.

Jankowski (1981) noted that the species identified by Batisse (1965) as *Pra. halacari* was wrongly identified and proposed the new species name *Lissacineta allgeni*. The generic name was later synonymyzed by Dovgal (2002) with *Thecacineta*, and *Lis. allgeni* was transferred into the genus. However, the absence of lorica ribbing warranted new species erection by Jankowski (1981), while a smooth and slightly folded lorica is characteristic for *Pra. halacari*. Thus, Jankowski's species is considered a junior synonym of *Pra. halacari*.

Distribution and host prevalence: The species was previously observed near the Norwegian coast (Tromsø) and in the Kiel Bay (Schulz 1933) on unidentified halacarids. Precht (1935) later identified *Pra. halacari* on *Copidognathus* spp in the latter locality. Rare instances of the species are also known from the Bulgarian coast of the Black Sea (Detcheva 1992).

Praethecacineta halacari was found on the legs and body surface (both ventrally and dorsally) of *Copidognathus brachystomus* Viets from the Black Sea near Karadag Natural Reserve (Kurortnoye, Crimea region, Ukraine; Boshko & Dovgal 2004). It was also recorded in interstitial sand at Cape Martian Reserve near the village of Nikita in the Yalta region (Crimea), from an unidentified halacarid mite (Gelmboldt & Dovgal 2005).

Among the suctorians observed by Bartsch (1989, 1998, 2001, 2003), we identified several individuals of *Pra. halacari* on the idiosomas of the following halacarid mites: *Cop. brachystomus* Viets (Bartsch 2001), *Cop. magnipalpus* (Police), and *Caspihalacarus hyrcanus* Viets (Bartsch 1998) from Black Sea soft sediment; *Cas. hyrcanus* from the Caspian Sea (Bartsch 1998); *Cop. brifacius* Bartsch from sandy deposits from the North Sea (Bartsch 1989); and on the idiosoma and gnathosoma of *Cop. meridianus* Bartsch off the coast of Western Australia (Bartsch 2003). Furthermore, from the figure in Pepato & Tiago (2005), we have also identified *Pra. halacari* on the idiosoma of *Cop. tupinamborum* Pepato & Tiago from the Atlantic coast of Brazil.

In the present study, we have also found *Pra. halacari* on *Cop. arabicus* Chatterjee & Chang collected from Goa on the west coast of India (Arabian Sea) (Figs. 9–11). Seven of the 33 mites were infested by suctorians. We observed that *Pra. halacari* was found on *Cop. arabicus*, but not on species of the co-occurring genera *Rhombognathus* and *Agauopsis*. Furthermore, *Pra. halacari* is reported here for first time from India.

Subclass Vermigenia Jankowski

Order Spelaeophryida Jankowski

Family Thecacinetidae Matthes

***Thecacineta calix* (Schroder, 1907)**
(Fig. 6, 12)

= *Acineta calix* Schroder, 1907
= *Thecacineta desmodorae* Schulz

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= *Thecacineta subantarctica* Allgen
= *Thecacineta donsi* Allgen
= *Thecacineta paradesmodorae* Allgen
= *Thecacineta laophontis* Jankowski, 1981, syn. n.
= *Paracineta moebiusi* Kahl, 1934, syn. n.

Diagnosis: Type species of the genus. Marine loricate, suctorian. Cell body entirely fills the lorica and attached to their bottom. Lorica totally ribbed transversely. Apical part of body protrudes beyond lorica aperture. Up to 30 clavate tentacles with length about 90 µm arise from upper body surface. Macronucleus large, oviform, located at the bottom of the cell body. With large contractile vacuole placed in basal body part usually near macronucleus. Body dimensions: lorica high 73–113 µm (75–105 µm after Matthes 1956), width 25–28 µm (39–53 µm after Matthes 1956), body length 73–140 µm, body width 16–21 µm, diameter of lorica aperture (after Matthes 1956) 18–30 µm, macronucleus dimensions 7–16 x 6–7 µm, stalk length 9–39 µm (10–33 µm after Matthes 1956), stalk diameter 1.6–2 µm. Reproduction by vermigemmy with formation of single larval stage (swarmer), devoid of ciliature and crawling over the substrate.

Remarks on the systematics and nomenclature: *Thecacineta calix*, a marine, loricate, suctorian ciliate with a single apical fascicle of tentacles, was described from marine nematodes (Schroder 1907). Subsequently, Collin (1909) combined all known species that had a similar morphology into the genus, *Thecacineta* Collin, 1909. In 1912, in a monograph on suctorian ciliates, Collin redescribed the genus and named *T. calix* as a type species. *T. calix* was investigated in detail by Matthes (1956), in his revision of thecacinetid suctorians. Several species found on the interstitial marine nematodes and harpacticoid copepods were synonymyzed with *T. calix*: *T. desmodorae* Schulz, *T. subantarctica* Allgen, *T. donsi* Allgen and *T. paradesmodorae* Allgen.

Jankowski (1981) proposed a new specific name, *T. laophontis*, for *T. calix* found by Matthes (1956) on copepod crustaceans. The basis for his conclusion was the presence of some morphological differences between forms from crustaceans and nematodes. However, Jankowski (1981) did not present any arguments to support his conclusions. We believe that the name proposed by Jankowski (1981) is a junior synonym of *T. calix*.

A species of *Paracineta* was identified by Moebius (1888), cited after Kahl, (1934) from the Kiel Bay of the North Sea from "*Holocarus* sp." under the name *Acineta crenata* (Fraipont 1878). According to Kahl's (1934) opinion, the identification of *Par. crenata* by Moebius (1888) was erroneous, and Kahl (1934) described it as a new species, *Par. moebiusi*.

Both Kahl (1934) and Curds (1987) have indicated the host name for Kahl's (1934) species as *Holocarus* sp. Kahl (1934) did not mention the systematic position of the host, whereas Curds (1987) noted that it was a crustacean. However, it is likely that this was a mistake, and that the host was a species of the mite genus *Halacarus*, family Halacaridae. We feel that *Par. moebiusi* is similar enough to *T. calix* to warrant making it a junior synonym of *T. calix*.

Distribution and host prevalence: *T. calix* was observed on halacarid mites by Gelmboldt & Dovgal (2005). It has been found on the idiosoma and legs of *Halacarellus* sp. in Odessa gulf of the Black Sea near biological station of the Odessa National University in the interstitial at a depth of 5–20 cm.

Among the suctorians observed by Bartsch (1989, 1998) and Abé (1997), we identified *T. calix* from the Black Sea near Sevastopol on the idiosoma of *Halacarellus micropectinatus* Bartsch; the North Sea on *Cop. fabricii* (Lohmann) (Bartsch 1989, Fig. 19; Bartsch 1998, Fig. 90); and from the northwest Pacific Ocean off Hokkaido, Japan, on the posterodorsal plate of *Actacarus octosetus* Abé (Abé 1997, figs. 5G, F). As previously mentioned, *T. calix* has also been described from nematodes and copepods. Its presence on marine mites testifies to its wider distribution and host spectrum.

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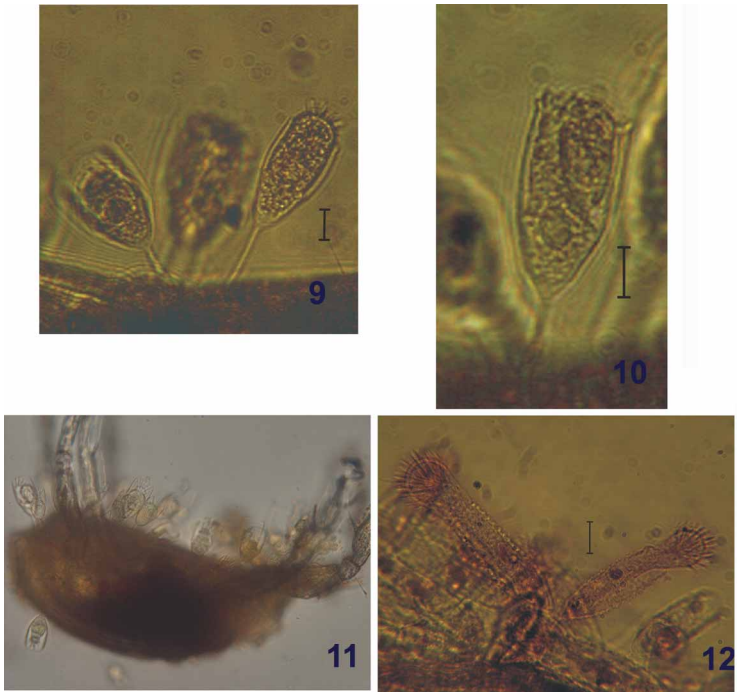

FIGURE 9. *Praethecacineta halacari* (Schulz 1933) (orig.). Scale bar 10 µm.
FIGURE 10. Budding of *Praethecacineta halacari* (Schulz 1933) (orig.). Scale bar 10 µm.
FIGURE 11. The settlement of *Praethecacineta halacari* on the halacarid mite from India (orig.).
FIGURE 12. *Thecacineta calix* (Schroder 1907) found in the Black Sea (orig.). Scale bar 20 µm.

Thecacineta spp.

Grimaldi (1965) reported *Thecacineta* sp. on *Act. pygmaeus* Schulz from Sardinia. Furthermore, the unidentified suctorian species observed (Bartsch 1994) on *Halacarellus auzendei* (Bartsch) from a deep sea (3500 m) Atlantic Ocean sample probably belonged to the genus *Thecacineta*. However, Bartsch's (1994) illustration was insufficient for species identification. It is possible that it represents a new suctorian species.

Figures of a suctorian in an SEM photomicrograph of *Cop. laevisetosus* Chatterjee, Lee & Chang (Chatterjee *et al.* 2004) suggest that it is a species belonging to the genus *Thecacineta*.

Subclass Endogenia Collin

Order Acinetida Raabe

Family Acinetidae Ehrenberg

Acineta sulcata Dons, 1927, charact. emend
(Fig. 7–8)

= *Acineta benesaepta* Schulz
= *Donsia sulcata* (Dons)
= *Plicophrya sulcata* (Dons)

Diagnosis: Marine, commensal, suctorian ciliate, with stalk and lorica. Both lorica and cell body laterally compressed. Lorica heavily ridged transversely. With a wide flattened lorica base that is characteristic for the

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species. Apical aperture of the lorica dumb-bell shaped. Short, straight, stalk. Cell body shape varying from triangular to rectangular, attached to the aperture border of the lorica. Macronucleus ovoid, centrally located. Clavate tentacles arranged in two fascicles and placed at the two actinophores. Body dimensions: lorica length 16 µm (35.2 µm after Schulz 1933), lorica width 13 µm (26.4 µm after Schulz 1933), body length 13 µm (33–55 µm after Curds 1985), body width 11 µm, stalk length 14 µm (22 µm after Schulz 1933). Macronucleus dimensions 8x5 µm. Reproduction by endogenous monogemmic budding. The original measurements of *Aci. sulcata* were made using material collected in river Unava.

Acineta sulcata differs from *Aci. tuberosa* Ehrenberg, and other relatives, in that the lorica attaches to the apical aperture rather than at the bottom of the lorica, and by the wide flattened base of the lorica. However, the most characteristic difference is the presence of the pattern of transverse ridges (not folds as in some acinetids) on the lorica (Jankowski 2007).

Remarks on the systematics and nomenclature: The synonymy of *Aci. benesaepta* Schulz, 1933 with *Aci. sulcata* was established by Kahl (1934). In Curds' (1985) review, the genus, *Plicophrya* Jankowski was also synonymized with *Acineta* Ehrenberg. Mention of *Aci. benesaepta* as a valid name in Dovgal's (2002) work was an error.

Distribution and host prevalence: *Aci. sulcata* was found on halacarids from the northern Norwegian coast. Suctorian ciliates were later observed by Schulz (1933) on halacarid mites from Kiel Bay and named *Aci. benesaepta*. Precht (1935) later found *Aci. benesaepta* in Kiel Bay on a species of *Copidognathus*. Kahl (1934) also reported *Aci. sulcata* from seed shrimps. Jankowski (1981, 2007) noted numerous finds of this species on halacarid mites from the coast of Barents Sea.

Bartsch and Panesar (2000) recorded *Acineta* sp. on the idiosoma and legs of *Cas. hyrcanus* Viets from the Danube River near Vienna, Austria, and commented that this suctorian probably was *Aci. tuberosa* Ehrenberg. After observing the figures of that species (Bartsch & Panesar 2000 Fig. 1), we believe that it probably is *Aci. sulcata*. The same species (Fig. 8) was also found by Dovgal on the legs of an unidentified freshwater halacarid mite from the Unava River (Fastov region, Kiev Province, Ukraine) (Dovgal & Pesic 2007). In that paper, the mite host was indicated erroneously as an oribatid.

General remarks: Bartsch (2003) surveyed the interactions between halacarid mites and their symbionts, and pointed out that the first report of these ciliates from a halacarid mite, *Thalassarachna hasten* (Johnston), was mentioned in Gosse's (1855) paper. Subsequently, suctorians were regularly observed on psammobiont halacarids, often in high numbers (>60 ciliates per host).

Bartsch (2003) also stated that suctorians lived predominantly on halacarid adults and deutonymphs, and rarely on protonymphs and larvae because of short life span in protonymph and larva stages. Analysis of the literature and our own data have shown that only four suctorian species observed to date on halacarids, that can be identified with certainty are *Lim. ceter, Pra. halacari, Thecacineta calix* and *Aci. sulcata*. Two of these species, *Pra. halacari* and *Aci. sulcata*, are most likely specific on their halacarid hosts. The other two species, *Lim. ceter* and *T. calix*, can be found on different benthic invertebrate animals. All of the above mentioned ciliate species are found on marine or brackish water hosts. *Acineta sulcata* can also inhabit freshwater if their hosts are euryhaline.

Suctorian species from halacarids generally attach in the idiosomatic region, but are not restricted there. They also may occur on the gnathosoma and legs. Under conditions of high infestation levels, suctorians may occupy sites anywhere on the body of the host.

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References

Abé, H. (1997) Halacarid mites of the genus Actacarus (Acari: Halacaridae) from Hokkaido, Northern Japan. *Species Diversity*, 2, 31–42.

Bartsch, I. (1989) *Copidognathus brifacius* n. sp. (Halacaridae, Acari) und Bemerkungen zu weiteren Bewohners des Seeigels *Spatangus purpureus* (Echinoidea). *Mitteilungen aus dem Hamburgischen zoologischen Museum Institut*, 86, 315–328.

Bartsch, I. (1994) Halacarid mites (Acari) from hydrothermal deep-sea sites. New records. *Cahiers de Biologie Marine*, 35, 479–490.

Bartsch, I. (1998) Halacarinae (Acari: Halacaroidea) from the northwestern Black Sea: A review. *Mitteilungen aus dem hamburgischen zoologischen Museum und Institut*, 95, 143–178.

Bartsch, I. (2001) Black Sea Copidognathinae (Arachnida: Acari: Halacaridae): A review. *Mitteilungen aus dem Museum für Naturkunde in Berlin, Zoologische Reiche*, 77, 247–275.

Bartsch, I. (2003) A new arenicolous *Copidognathus* (Halacaridae: Acari) from Dampier, Western Australia. In: Wells, F.E., Walker, DL. & Jones, D.S. (Eds.). T*he Marine Flora and Fauna of Dampier, Western Australia*. Western Australian Museum, Perth. pp. 282–290.

Bartsch, I. & Panesar, A.R. (2000) Die Meeresmilbe Caspihalacarus hyrcanus in der Donau bei wien, ein ponto-kaspisches Relikt. *Natur und Museum*, 130, 258–263.

Boshko, E.G. & Dovgal, I.V. (2004) Sessile ciliates (Ciliophora). In: Karadag. *Hydrobiological observations (Scientific works dedicated to 90th anniversary of T. I. Vyazemsky Karadag Scientific Station and 25th anniversary of Karadag Natural Reserve of Ukrainian National Academy of Sciences). Book 2*. Simferopol: Sonat. pp. 313–316. (In Russian).

Chatterjee, T., De Troch, M. & Chang, C.Y. (2006) Three Halacarid Mites of the Genus *Copidognathus* (Acari, Halacaridae) from Zanzibar, Tanzania. *Cahiers de Biologie marine*. 47, 177–187.

Chatterjee, T., Lee, J.M. & Chang, C.Y. (2004) Two *Copidognathus* halacarids (Acari : Halacaridae) from Korea. *The Korean Journal of Systematic Zoology*, 20, 45–54.

Collin, B. (1909) Diagnoses preliminaires d'Acinetiens nouveaux ou mal connus. *Comptes rendus hebdomadaires des séances de L'Académie des Sciences.* Paris, 149, 1094–1095.

Collin, B. (1912) Etudes monographiques sur les Acinetiens. II.Morphologie, physiologie, systematique. *Archives de Zoologie Expérimentale et Générale*, 51, 1–457.

Curds, C.R. (1985) A revision of Suctoria (Ciliophora, Kinetofragminofora) 1.*Acineta* and its morphological relatives. *Bulletin of the British Museum (Natural History), Zoology series*, 48, 75–129.

Curds, C.R. (1987) A revision of Suctoria (Ciliophora, Kinetofragminofora) 5.The *Paracineta* and *Corynophrya* problem. A. R. *Bulletin of the British Museum (Natural History), Zoology series*, 52, 71–106.

Detcheva, R. (1992) Catalogi faunae Bulgaricae. 1. Protozoa, Ciliophora. *In: Aedibus Academiae Scientiarum Bulgaricae*. Sofia, 134 pp.

Dons, C. (1927) Neue und wenig bekannte Protozoen. *Det Kongelige Norske Videnskabers Selskabs Skrifter*, 7, pp. 1–17.

Dovgal, I.V. (1996) Keys for identification of tentaculous infusoria (Ciliophora,Suctoria) of the Ukrainian fauna. *Vestnik Zoologii*, Suppl., N2, 1–42. (In Russian).

Dovgal, I.V. (2002) Evolution, phylogeny and classification of Suctorea Claparède et Lachmann, 1858. *Protistology*, 2, 194–270.

Dovgal, I.V. & Pesic, V. (2007) *Acineta persiensis* sp. n. (Ciliophora, Suctorea) - a new freshwater suctorian species from the water mites of genus *Protzia* (Acari, Hydrachnidia). *Vestnik Zoologii*, 41, 165–167.

Fraipont, J. (1878) Recherches sur les Acinetiens de la cote d'Ostende. *Bulletin de l'Academie (r.) des sciences des lettres et des beaux arte de Belgique*, 45, 247–299.

Gosse, P. (1855) Notes on some new and little-known marine animals. *Annals and Magazine of Natural History, London*, 16, 306–313.

Gelmboldt, M.V. & Dovgal, I.V. (2005) The new finds of suctorian ciliates (Ciliophora, Suctorea) at the halacarid mites (Acari, Halacaridae) from the Ukrainian coast of the Black Sea. *Vestnik Zoologii*, Supplement N19, 85–86. (In Russian with English summary).

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Grimaldi, P. (1965) Osservazioni su alcuni elementi del mesopsammon della Sardegna. *Monitore Zoologico Italiano*, 73, 61–65.

Jankowski, A.V. (1981) New species, genera and families of tentacled infusoria (class Suctoria). *Proceedings of the Zoologica lInstitute*, 107, 80–115. (In Russian with English summary).

Jankowski, A.V. (2007) Review of taxa Phylum Ciliophora Doflein, 1901: In: Alimov A.F (Ed.): Protista: Handbook on Zoology. St. Petersburg: Nauka. Pt. 2, 415–993.

Kahl, A. (1934) Suctoria. *In*: Grimpe, G. & Wagler, E (Eds.). *Die Tierwelt der Nord- und Ostsee*. Lief 26, 11, pp. 184–226.

Matthes, D. (1956) Suktorienstudien VIII. *Thecacineta calix* (Schroder, 1907) (Thecacinetidae nov. fam.) und ihre Fortpflanzung durch Vermoid-Schwarmer. *Archiv für Protistenkunde*, 101, 477–528.

Matthes, D. & Stiebler, G. (1970) Susswassersuktorien auf Arachniden. *Archiv für Protistenkunde*, 112, 65–70.

Matthes, D., Guhl, W. & Haider, G. (1988) Suctoria und Urceolaridae. In: Protozoenfauna. Band 7/1. Stuttgart, etc.: Gustav Fisher Verlag. 309 pp.

Pepato, A.R. & Tiago, C.G. (2005) New species and new occurences of *Copidognathus* (Acari, Halacaridae) from the northern littoral zone of Sao Paulo State (Brazil). *Zootaxa*, 1083, 1–35.

Precht, H. (1935) Epizoen der Kielr Bucht. *Nova Acta Leopoldina Halle*, N.F. 3, 405–474.

Schroder, O. (1907) Die Infusorien der deutschen sudpolar – Expedition. *Ergebn. d. D. Sudpolar Expedition* 1901–1903, 9, 349–360.

Schultz, E. (1933) Beitrage zur Kenntnis marinen Suctorien. V. *Zoologischer Anzeiger*, 103, 327–329.

Schultz, E. (1938) Beitrage zur Kenntnis marinen Suctorien. VIII. *Kieler Meeresforschungen*, 2, 354–355.