

# Parasitic halacarid mites (Acari, Halacaridae): survey on literature

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**Abstract** The article deals with a survey on literature of parasitic halacarid mites. Exact nature of relationship between mites and their invertebrate hosts is unknown for most of these associations, as live observations not found. Some species are assumed to be parasitic.

## Pasożytnicze wodopójki z rodziny Halacaridae: przegląd literatury

**Słowa kluczowe** pasożytnictwo, Halacaridae, wodopójki, gospodarz

**Streszczenie** Artukół zawiera przegląd literatury dotyczącej pasożytniczych wodopójek z rodziny Halacaridae. W większości przypadków pasożytniczych wodopójek i ich gospodarzy do dzisiaj nie jest znany dokładny charakter interakcji, ponieważ brak obserwacji osobników żywych. W przypadku części gatunków nie jest jasne nawet czy są pasożytami zwierząt bezkręgowych na których zostały znalezione.

## Introduction

Halacarid mites (Acari, Halacaridae) live in a variety of substrata – within tufts of algae, on large fronds, in and on colonies of sponges, hydrozoans, bryozoans, barnacles, mussels, polychaetes, crustaceans etc. to sediments, flocculent rock crevices and coarse and fine sands (Chatterjee, Sarma 1991; Bartsch, 2006a). Exact nature of relationship between mites and their invertebrate hosts is unknown for most of these associations, as live observation of living material has not been executed. Some species are assumed to be parasitic or commensals or may have been transported accidentally on their hosts (Bartsch, 1987). A brief survey of parasitic halacarid mites was made by Newell (1956) and Bartsch (1987; 1988). In present paper a survey on the literature was made to get an updated overview of parasitic halacarid mites.

## Methods

The present article is prepared based on records published by the end of June 2020. Different author's views about ecological nature of those species were also added.

## Results and Discussion

*Halixodes chitonis* (Bruker, 1897) was reported based on larvae and protonymphs attached to the gills of mollusc (Mollusca: Polyplacophora) *Cryptochonchus porosus* (= *Acanthochiton porosus*) from New Zealand (Brucker, 1897; 1899). Later a subspecies *Halixodes chitonis stoutae* was reported based on protonymphs in the mantle cavity of tidal gastropods *Sigapatella novaezealandiae* from New Zealand (Stout, Viets, 1959). Chilton (1883) reported *Halixodes truncipes* (Chilton, 1883) based on adults (females) collected between tide marks in New Zealand and found not attached to a host. It was assumed that further investigation may prove the *Halixodes chitonis chitonis*/ *Halixodes chitonis stoutae* to be juveniles of *Halixodes truncipes* (Newell, 1956; Bartsch, 1986). Bartsch (1986) reported *Halixodes novaezealandiae* Bartsch 1986 based on female and deutonymphs collected from crevice systems between gravel and colonies of barnacles and mussels (in *Chamaesipho columna* and *Crassostrea* encrustations), Northern Auckland, Newzealand. Two pairs of barbs found at the end of the rostrum in female and deutonymph. The first leg is not stronger; the leg segments are slender and cylindrical; the ventral setae are small and slender; not specialized to catch and hold prey with the first leg. On the other side, the mite is well equipped with the two pairs of barbs at the end of the rostrum to clasp tightly to host tissue (Bartsch, 1986). 'One might speculate that *Halixodes* feeds rarely, but very substantially. After feeding *Halixodes* might leave its host and moult, hidden in crevices' – Bartsch (1986).

*Astacopsiphagus parasiticus* Viets, 1931 was reported as parasite on the fresh water crayfish *Euastacus spinifer* (Heller) (= *Euastacus serratus*; = *Astacopsis serratus*) (Crustacea: Decapoda) from Moran's Creek, Roberts Plateau, MacPherson Range, Queensland National Park in Queensland, Australia, south of Brisbane based on nymphs attached to the gills of the host by the chelicerae (Viets, 1931). Womersley (1943) reported adult male and female which were collected by process of dissecting out the adult inside advanced nymphs found attached to the gill chambers of fresh water crayfish *Euastacus sulcatus* Clark from Lamington National Park, Queensland, Australia.

Viets (1938) reported an intestinal parasitic halacarid species *Enterohalacarus minutipalpis* Viets, 1938 found in the gut of a sea urchin, *Plesiodiadema indicum* at a depth of 430 m off the west coast of Halmahera Island, Strait of Molucca, Sulu Sea. The species is characterised by reduced palps.

Newell (1956) reported *Copidognathus matthewsi* Newell, 1956 on the gill chamber of decapods crustacean *Parribacus antarcticus* based on nymph and adults from Oahu, Hawaii islands, Kaneohe Bay (Tropical Eastern Pacific Ocean). The species apparently lives as a parasite on the gills of the host. The filaments of gills infested by the mite sometimes show necrotic spots apparently due to feeding activities of the mite (Newell, 1956).

Laubier (1960) reported *Parahalixodes travei* Laubier, 1960 in association with the nemertean *Cerebratulus hepaticus* from Mediterranean Sea. The species was supposed to be ectoparasite and the enlarged, pointed rostrum and chelicerae are apparently used for piercing the hosts (Laubier, 1960). Newell (1971) reported *Parahalixodes chilensis* Newell, 1971 based on a protonymph at

210 m depth off Robinson Crusoe Islands, Jaun Fernandez Islands, Chile. *Parhalixodes* is believed to be a parasitic genus (Bartsch, 2006).

Genera *Halixodes* and *Parhalixodes* have rostra with barbs at the tip; these barbs may enable the mite to stay fixed to the host.

Bartsch (1976) reported *Copidognathus stevcici* Bartsch, 1976 between the egg mass of crab *Maja squinado* from eastern North Atlantic and Mediterranean Sea and the species assumed as a parasitic. This species was reported walking on the eggs of *Maja squinado* collected at Plymoth, England, UK (Green, MacQuitty, 1987). Green & MacQuitty (1987) also reported that this species found in the 'Michael Collection at the British Museum Natural History' and collection containing label 'Portgwarra, spider crab'. This species was also found associated with adult females of the spider crabs *Maja brachydactyla* and *M. squinado* under laboratory conditions; mites were observed alive on their host for extended periods and direct evidence of feeding on crab's eggs was also provided (Guerao et al 2011).

*Copidognathus gasconi* (Gil, Garzón, 1979) (= *Velardoacarus gasconi*) was reported from gill chamber of a marine crab *Peltarion spinulosum* (White) (Crustacea: Decapoda) in Uruguayan coast (Gil, Garzón, 1979).

*Australacarus inexpectatus* Bartsch 1987 described from shallow water in Strait of Magellan, Chile, South Atlantic characterised by the stylet rostrum, dorsoventrally widened palpal segment forming a trough and the slender gnathosoma and assumed to be correlated with life as a parasite (Bartsch, 1987). After discovery of the genus *Australacarus*, another four species were described under this genus viz. *A. pustulatus* Bartsch, 1993, *A. longipalpus* Otto, 2000, *A. mesaktanus* Otto, 2000, *A. zagorskisae* Otto, 2000 from Australia among sand and sediments (Bartsch, 1993; Otto, 2000a). The genus is characterised by the palps forming a trough, enclosing the needle-like rostrum and chelicerae and is believed to be a temporary parasite (Bartsch, 2006a). Otto (2000a) commented that feeding has not been observed and a predatory or algivorous lifestyle cannot be ruled out.

*Thalassophthirus auster* Bartsch, 1988 was reported from sublittoral waters (13–34 m depth) off Staten Island, South Atlantic Ocean. The species is suspected of being parasitic in habit (Bartsch, 1988).

Bartsch (1989) reported *Copidognathus* sp. from northeast of Lifou, 1420 m depth and expected it might be ectoparasitic in habit.

*Colobocerasides koehleri* (Trouessart, 1896) was reported from 1410 m depth in Gulf of Gascogne, North Sea (Troessart, 1896). Bartsch (1998) redescribed this species and also reported a new species *C. auster* Bartsch 1998 associated with Polychaeta from Southern Atlantic and opined that both species are thought to be temporary ectoparasitic in habit.

Some halacarids were collected from sponges mentioned in early literature (eg. Trouessart, 1914; Viets, 1939; Andre, 1959; Newell, 1984). Majority of them are not only bound on sponges, but also found on other substrates. They are casuals or inhabitants on hydrozoans, bryozoans, algae and sediment contaminating the sponge sample (Bartsch, 1995).

Bartsch (1995) reported a halacarid *Halacarellus obsoletus* Bartsch, 1995 collected from hexactinellid sponges (*Rossella antarctica*, *R. nuda*, *R. racovitzae*, and *Scolopnastra joubini*) in eastern Weddell Sea, Antarctica. The mites were found within the sponge tissue only, and not found on the surface or in the central cavity of the sponges. Adult mites (males and females) and juveniles were extracted from the hexactinellids. *Halacarellus obsoletus* is thought to spend all its life within the sponge tissue. The halacarid mites may feed both on sponge tissue and on microfauna within the sponges (Bartsch, 1995).

*Halacarus spongiphilus* Kishida, 1927 reported from dictyonine sponges in Sagami Bay, Japan (Kishida, 1927; Abé, 2010). Nature of association, whether mite is a parasite on its sponge host, or just a commensal making use of the sponge for habitation are not clear (Abe, 2010).

Otto (2000b) described a new species *Spongihalacarus longiscutus* associated with ‘sponge weed’ (a symbiosis between red algae *Ceratodictyon spongiosum* and the sponge *Halicona cy-maeformis*) from Great Barrier Reef lagoon in Australia. This species is characterised by an almost complete reduction of the palps and possibly a parasitic halacarid (Otto, 2000b).

Caeres-Martinez et al (2000) reported *Copidognathus* sp. found associated with the mussel *Mytilus galloprovincialis* from Ensenada, Baja California, NW Mexico, Ensenada Bay. The species was found on the mantle and gills of the host. There was no reported damage to branches or gills resulting from the presence of this halacarid mite. This *Copidognathus* species was more abundant in the surrounding environment and was scarce inside the mussels. They also commented that this species may be considered as an occasional invader, which seems to be innocuous to their occasional host (Caeres-Martinez et al., 2000). Pepato, Santos, Tiago, (2005) reported two species *Copidognathus libiniensis* and *C. menippensis* associated with crabs. Pepato et al. (2005) commented that both mite species have chelicerae with broad movable digits that could be used to pierce the delicate exoskeleton present at the ventral side of the host abdomen of males of *Libinia spinosa* or the egg membrane of *Menippe nodifrons*. Pepato et al. (2005) also commented that no direct evidence of feeding on crabs or crab’s eggs was found in the study.

*Porolohmannella violacea* (Kramer, 1879) was found on variety of substrata, sand, flocculent ooze, vascular plants, mosses, algae etc from standing surface waters, swamps, ponds and lakes to high altitude water bodies and was also reported from gill chambers of crayfish *Astacus astacus*, *Astacus leptodactylus* (= *Potamobius leptodactylus*) and *Orconectes limosus* (Viets, 1927; Bartsch, 2006b; Wiszniewski, 1939; Zawal, 1998). This is an example of accidental or occasional invader of crayfish.

List of halacarid mites associated with decapods crustaceans has been provided in Norman et al (2013): majority of the association (from the list) are probably commensals or occasional invader in nature and only few species like *Astacopsiphagus parasiticus*, *Copidognathus gasconi* and *C. matthewsi* are assumed to be parasitic.

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