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Orijinal araştırma (Original article)

The aquatic Coleoptera (Helophoridae and Hydrophilidae) species contributing the parasitism and phoresy, with main habitat characteristics in Erzurum and surroundings (East Anatolia)

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Summary

Cases of parasitism/phoresy were studied on the helophorid and hydrophilid (Coleoptera) material in East Anatolian Region (Erzurum and surroundings) for the first time. Five of 22 helophorid and three of 16 hydrophilid species were presented parasitism while two of 16 hydrophilid species were presented phoresy. Most cases of parasitism were observed in the hydrophilid species *Laccobius gracilis* Motschulsky. All aquatic mites were carried under the second wings. Main habitat characteristics, placed by the species showing parasitism/phoresy, were also briefly discussed.

Key words: Helophoridae, Hydrophilidae, water mites, parasitism, phoresy

Anahtar sözcükler: Helophoridae, Hydrophilidae, su akarları, parazitizm, forezi

Introduction

Larvae of most water mite species parasitize the immature or adult stages of aquatic insects. Thus, they can easily disperse and colonize on new water bodies (Bhonak et al., 2004).

Phoresy concerns mainly arthropods and water mites constitute an important part of the phoresy of freshwater habitats. Water mites attach to the various aquatic beetles for transportation only. Most papers are focused on

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adult insects (except parasitism of water mite larvae) (Mithcel, 1959, 1969; Conroy & Kuhn, 1977; Smith, 1978, 1986, 1988a, b; Baker et al., 1991; Zawal, 2002, 2003, 2004, 2006).

The aim of present work was to find out the relationships between two aquatic coleopteran families (Helophoridae and Hydrophilidae) species and the water mites in the research area.

Material and Methods

During the study, 38 aquatic coleopteran species (22 helophorid and 16 hydrophilid) were determined in the research area. Of these, 22 helophorid species belong to a single genus *Helophorus*. The hydrophilid species are belonging to genus: *Laccobius* (13), *Hydrophilus* (2) and *Hydrochara* (1).

The aquatic beetle samples were collected by means of a sieve, ladle and net with 1 mm pores, from shallow areas of various springs, streams, brackish water and ponds. The beetles were killed using ethyl acetate or 70% alcohol solution. All larval mites were collected directly from the bodies of parasitized hosts. Adult mites were also collected by the same method. Water mites removed from the aquatic beetles by using forceps. The photograph (Figure 1) was taken using a Nikon type SMZU-1500 microscope.

Figure 1. Water mites on the *Laccobius hauserianus* Kniz, 1914 (Coleoptera: Hydrophilidae: Hydrophilinae) (right wings are removed).

It is hardly possible to identify a lot of water mite taxa at species level considering immature stages only, and therefore some taxa are placed in here with the higher taxon name.

Results and Discussion

In the research area, cases of parasitism/phoresy were determined in the 5 helophorid and 4 hydrophilid species. Of these, two hydrophilid species (*Laccobius gracilis* Motschulsky and *Laccobius syriacus* Guillebeau) were presented phoresy (Table 1).

The water mite taxon Hydryphantidae was observed in the 5 helophorid and 1 hydrophilid species. On the other hand, the Pionidae was observed in the 1 helophorid and 4 hydrophilid; the Hygrobatidae was observed in the 2 helophorid and hydrophilid species. Most cases of parasitism were observed in the hydrophilid species *L. gracilis*. All aquatic mites were carried under the second wings as in Figure 1.

Immature water mites of different species attach to different aquatic Coleoptera species and the same part of their body are indicated.

According to Table 1, Hydryphantidae members prefer the male individuals for parasitism. In contrast, Hygrobatidae members prefer the female individuals. There is no good reason to explain the preference of mature/immature water mites for female/male adult helophorid and hydrophilid species.

Table 1. Cases of parasitisim/phoresy in Helophoridae and Hydrophilidae

Family/ Genus	Species	♂/♀	Date	Locality	Main locality characteristics	Carried mite number	Carried mite taxon name
Family: Helophoridae Genus: *Helophorus*	*Helophorus daedalus* d'Orchymont	♂	05.9.2000	Erzurum-İspir road 60 km	Small and slowly running permanent stream	1	Hydryphantidae
		♂	05.9.2000	Tuzluca village plateau, Çat, Erzurum	Pool, with muddy bottom, water surface covered with dense vegetation	2	Pionidae
	Helophorus discrepans Rey	♂	24.4.2000	Taşoluk village, Tortum, Erzurum	Pool, with muddy bottom, edges covered with dense vegetation	2	Hydryphantidae
	Helophorus ponticus Angus	♀	07.9.2001	Tortum, Yedigöller, Erzurum	Very high altitude (3000m), small natural lake, cold even in summer, pebbly bottom, no vegetation	2	Hygrobatidae (Atractides)
	Helophorus aquaticus Linnaeus	♂	19.9.2000	Tortum, Yedigöller, Erzurum	Very high altitude (3000m), small natural lake, cold even in summer, pebbly bottom, no vegetation.	1	Hydryphantidae
	Helophorus difficilis Angus	♂	19.9.2000	Tortum, Yedigöller, Erzurum	Very high altitude (3000m), small natural lake, cold even in summer, pebbly bottom, no vegetation	16	Hydryphantidae

Table 1 (continued)

Family: Hydrophilidae Genus: *Laccobius*	*Laccobius gracilis* Motschulsky	♂	05.3.2001	Baskil road, içme suyu, Elazığ	Small spring pool, muddy bottom, surroundings covered with vegetation	47	Hydryphantidae
		♂	07.9.2000	Çukurçeşme, Tekman, Erzurum	Slowly running permanent stream, with muddy bottom, moderately vegetated	2	Hydryphantidae
		♀	07.9.2000	Hasanağa, Tekman, Erzurum	Slowly running permanent stream, with pebbly bottom	4	*Hygrobates (Dekabates) quanaticola* Schwoerbel & Sepasgozarian, Hydrachnidia, Hygrobatidae adult, female
		♀	14.9.2000	Ayder (exit), stream, Rize	Quickly running permanent stream, with pebbly bottom, no vegetation	3	Pionidae
	Laccobius syriacus Guillebeau	♀	28.9.1999	Pehlivanlı, Tortum, Erzurum	Slowly running permanent stream, with muddy bottom, no vegetation	5	*Hygrobates (Dekabates) quanaticola* Schwoerbel & Sepasgozarian, Hydrachnidia, Hygrobatidae adult, female
		♂	05.9.2000	Tuzluca village plateau, Çat, Erzurum	Water surface covered with dense vegetation	2	Hydryphantidae (*Hydryphantes*)
	Laccobius hauserianus Kniz	♂	08.9.2001	Oltu stream, Erzurum	Quickly running permanent stream, with pebbly bottom, no vegetation	3	Pionidae *(Neumania)*
		♀	08.9.2001	Oltu stream, Erzurum	Quickly running permanent stream, with pebbly bottom, no vegetation	2	Pionidae *(Neumania)*
	Laccobius simulatrix d'Orchymont	♂	18.7.2000	Çat-Karlıova road 1 km, Erzurum	Slowly running water, with muddy bottom	8	Pionidae *(Neumania)*

Özet

Erzurum ve çevresinde (Doğu Anadolu) parazitizm ve foreziye katkıda bulunan Helophoridae ve Hydrophilidae (Coleoptera) türleri ile temel habitat özellikleri

Doğu Anadolu Bölgesi'ndeki (Erzurum ve çevresi) heloforid ve hidrofilid (Coleoptera) materyali üzerinde parazitizm ve forezi durumu ilk defa çalışılmıştır. 22 heloforid türünün beşinde ve 16 hidrofilid türünün üçünde parazitizm, 16 hidrofilid türünün ikisinde ise forezi durumu tespit edilmiştir. En çok parazitizm bir hidrofilid türü olan *Laccobius gracilis* Motschulsky'te gözlenmiştir. Bütün sucul akarların ikinci çift kanatların altında taşındığı görülmüştür. Parazitizm/forezi görülen türlerin yerleştiği habitatların temel özellikleri kısaca tartışılmıştır.

References

Baker, R. A., S. Brett & N. Morley, 1991. "Water mites larvae parasitic on insects - A study of larval structures and host relationships, 493-496". In: Modern Acaralogy (Eds.: Dushabek, F. & F. Bukva). Academia Prague and SPB Academic Publishing bv**,** The Haque.

Bhonak, A. J., B. P. Smith & M. Thornton, 2004. Distributional morphological and genetic consequences of dispersal for temporary pond water mites. **Freshwater Biology, 49**: 170-180.

Conroy, J. C. & J. L. Kuhn, 1977. New annotated records of donata from the province of Mannitoba eith notes on their parasitism by larvae of water mites. **Mannitoba Entomology, 11**: 27-40.

Mithcell, R., 1959. Life histories and larval behaviour of Arrenurid water mites parasitisizing Odonata. **Journal of New York Entomology Society, 67**: 1-2.

Mithcell, R., 1969. The use of parasitic mites to age Dragonflies. **American Naturalist, 103**: 331-346.

Smith, I. M., 1978. Descriptions and observations on host associations of larval Arrenuroidea (Prostigmata, Parasitengona), with comment on phylogeny in the superfamily. **Canadian Entomologist, 110**: 957-1001.

Smith, B. P., 1986. New species of *Hydrachna* (Acari: Hydrachnida) parasitic on Water Boatmen (Insecta: Hemiptera: Corixidae). **Canadian Journal of Zoology, 65**: 2630-2639.

Smith, B. P., 1988 a. Host-parasite interaction and impact of larval water mites on insects. **Annual Review of Entomology, 33**: 487-507.

Smith, B. P., 1988 b. Impact of parasitism by larval *Limnochares aquatica* (Acari: Hydrachnidia; Limnocharidae) on juvenile *Gerris comatus*, *Gerris alacris* and *Gerris buenoi* (Insecta: Hemiptera: Gerridae). **Canadian Journal of Zoology, 67**: 2238-2243.

Zawal, A., 2002. Parasitism of water mite larvae (Hydrachnellae) of the genus *Hydrachna* on water beetles in Poland. **Acarologia, 42**: 361-370.

Zawal, A., 2003. Parasitism of water mite larvae (Hydrachnellae) of the genus *Eylais* on water beetles in Poland. **Acarologia, 43**: 39-47.

Zawal, A., 2004. Parasitising of Dragon Flies by water mite larvae of the genus *Arrenurus* of the neighbourhood of Barlinek (NW Poland). **Zoologica Poloniae, 49**: 37-45.

Zawal, A., 2006. Phoresy and parasitism: water mite larvae of the genus *Arrenurus* (Acari: Hydrachnida) on Odonata from Lake Bnowskie (NW Poland). **Biological Letters, 43**: 257-276.

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