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Pyemotes johnmoseri (Khaustov) (Acari: Pyemotidae)
as a Parasitoid of Xylophagous Insects from Aydin, Turkey

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Abstract: Pyemotes johnmoseri (Khaustov) (Acari: Pyemotidae) was collected from
Hypoborus ficus (Erichson) and Hesperophanes griseus Fab. (Col.: Cerambycidae) in fig
(Ficus carica cv Calymmina) orchards in Aydin, Turkey during 2003-2004. We describe and
illustrate the male and female of P. johnmoseri as a new record for the Turkish fauna.

Key words: Acari, Pyemotidae, Pyemotes johnmoseri, Hypoborus ficus, Hesperophanes
griseus, Ficus carica Turkey

Introduction

Mites of the genus Pyemotes are important as: 1) predators of various insects, 2) have
medical importance to man and 3) have unusual life histories and morphologies (Cross and Moser,
1975). Two species groups of Pyemotes are recognized a) scolyti group, including P. scolyti
(Oudemans), P. parviscolyti Cross and Moser and P. dimorphus Cross and Moser b) ventricosus
group; containing the rest of the species (Cross et al., 1981).

Most members of both groups have wide-spread geographic distributions and many species of
both groups are cosmopolitan. Some species of the ventricosus group are documented to possess
venom, attack many host species, but are recorded most frequently with stored grain insects, or in
laboratory insect cultures (Cross and Moser, 1975). In contrast, members of the scolyti group are only
associated with various bark beetle species. No species of the scolyti group are known to attack adults;
whereas at least some species of the ventricosus group do so regularly. For this reason, phoretic adult
females of scolyti called phoretomorphs, ride their host beetles without harming them. The
phoretomorphic female is a specialized stage designed for phoresy in pyemotids and some related
families. The phoretomorph claw on leg 1 is very large and their body form is much more compact and
sclerotized than the normal form (Cross and Moser, 1975).

Pyemotes of the ventricosus group, such as Pyemotes herfsi (Oudemans) (P. zwolferi Kuczal) and
Pyemotes tritici (Lagrange-Fossat and Montane) (P. ventricosus (Newport) are not known to be phoretic
and do not possess phoretomorphs. Both of these species are common in Turkey. Pyemotes
herfsi was reported to prey on young larvae of Euproctis chrysorrhoea L. (Lep.:
Lymantriidae) on fruit trees in Aegean Region (Turkey) (Öncüer et al., 1977) Pyemotes tritici was
found on parasitoid of Callosobruchus maculatus L. (Col.: Bruchidae) in stored products in
Southeast Anatolia Regions (Ozer and Yucel, 1989) and on Pectinophora gossypiella Saunders

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Materials and Methods

The mite samples were preserved in 70% ethyl alcohol. After cleaning the mite samples in lactophenol solutions, they were mounted in Hoyer's medium. Identification was done by A.A. Khaustov (Department of Agroecology, Nikita Botanical Gardens National Scientific Center, Yalta 98648, Crimea, Ukraine). All measurements are given in micrometers (μm). The terminology used in the description follows that of Lindquist (1986). The samples have been deposited in the collection of the senior author in University of Adnan Menderes, Plant Protection Department, Aydin.

Results

Pyemotidae Berlese

Pyemotes (Amerling, 1982)

Pyemotes females are parasitoids of all developmental stages of holometabolous insects, especially on those of subcuticular beetles and stored product insects. When the female sucks the haemolymph of the host, her posterior opisthosoma becomes greatly swollen due to developing eggs (physogastric female) (Fig. 1) (Moser et al., 1987). The distended opisthosoma of the physogastric female may produce over 200 offspring, most of which are females; males remain in the vicinity to fertilize emerging females (Hoschele and Tanigoshi, 1993). Eggs hatch within the female. Males are born first, sequentially piercing the swollen opisthosoma of their mother with their mouthparts for sustenance and then remain situated above the opening of the birth canal. Here they use their modified legs 4 to assist with the birth of the females, copulating with each as they emerge. Copulation triggers searching behavior in females, which immediately leave the area to attack a suitable host (Moser et al., 1978).

Pyemotes johnmoseri (Khaustov, 2004)

Synonyms: Pyemotes moseri (Khaustov, 1998)

Pyemotes moseri was described by Khaustov (1998) associated with Hypoborus ficus (Col.: Scolytidae) from Ukraine. The name was preoccupied by Pyemotes moseri (Yu and Liang, 1996). Therefore, according to article 52 of the International Code of Zoological Nomenclature (Anonymous, 1999), Khaustov (Khaustov, 2004) proposed a new replacement name for Pyemotes moseri (Khaustov, 1998) as Pyemotes johnmoseri (Khaustov, 2004).

Female

Body: Length 281 (238-350); width 76 (63-100) (Fig. 2).
Gnathosoma: Length 28 (25-33); width 25 (23-28).

Dorsum

Propodosoma longer than width and with four pairs of setae; sc, oval and a cup-shaped pseudosigma; sc1 longest and plumose; v longer than v2. Hysterosoma includes four dorsal plates.
Fig. 1: Physogastric females of *Pyemotes johnmoserii*

Fig. 2: Female of *Pyemotes johnmoserii*

Fig. 3: *Pyemotes johnmoserii*: male; a) ventral view, b) solenidion tibia I, c) without solenidion tibia IV

Fig. 4: a) Egg of *Hypoborus ficus* killed by *Pyemotes johnmoseri* b) Undamaged egg

![Image of egg and larva]

Fig. 5: Larva of *Hesperophanes griseus* killed by *Pyemotes johnmoseri*

Setae e, slightly longer than c, and placed on plate C. Plate D, includes one pair of setae (d) and one pair of cupules (ia). Plates EF, with two pairs of setae (ef) and one pair of cupules (im); setae e about 1/5 as long as setae f. The tip of setae f longer posterior margin of hysterosoma. Plate II with two pairs of setae; setae h, almost twice length h, Lengths of dorsal setae; v, 9 (6-11), v, 7 (6-8), v, 18 (15-20), s, 61 (53-66), e, 25 (21-27), e, 26 (20-35), d, 19 (15-22), e, 10 (8-12), f, 52 (42-65), h, 20 (15-25), h, 10 (7-13).

Ventral: Apode I-II obvious and connecting with anterior sternal apodeme. Apode III-IV obvious. Setae 3a longer than 3b. The length of ventral setae: 1a 7 (4-9), 1b 6 (4-8), 2a 9 (6-13), 2b 9 (6-12), 3a 17 (10-22), 3b 9 (6-12), 3c 11 (8-12), 4a 12 (6-15), 4b 15 (12-20).

Legs: Leg I 91 (85-100) long, sturdy and with one strong claw. Tarsus I with a solenidion. Tibia I with two solenidia. Leg II 60 (55-65), III 82 (65-85) and IV 90 (79-105) long, each with a pair of small claws and a long median empodium.

**Male**

Body: Length 139 (128-153); width 106 (89-125) (Fig. 3a).

Gnathosoma: Length 21 (18-23); width 25 (23-30).

Dorsum: Propodosoma almost square shaped, with four pairs of setae. Setae v, and v, very short. Setae se, almost reach the margin of propodosoma. Hysterosoma dorsally with three plates. Plate CD separate and distinct. Setae e, longer than setae e, and setae e, longest. Plates EF small with two pairs of setae. Lengths of dorsal setae; e, 17 (12-20), e, 14 (7-17), d, 127 (100-180), e, 135 (81-180), f, 104 (70-150).

Ventrum: Apode I-V obvious. Apode I and II connecting with anterior sternal apodeme. Lengths of ventral setae; 1a 6 (2-10), 1e 4 (2-6), 2a 14 (12-17), 2e 7 (4-14), 3a 14 (4-4), 3b 10 (6-12), 3c 15 (12-17), 4a 14 (7-25), 4b 7 (3-14).

Legs: Leg I 59 (45-75), II 63 (55-70), III 118 (100-155) and IV 127 (108-170) have very strong hook-shaped claw. Tibia I with a solenidion (Fig. 3b). Tibia IV without a solenidion (Fig. 3c).
Material Examined
    Incirliova-Aydın, 22.02.2003 (5♀, 2♂) 27.06.2003 (15♀, 5♂), 23.09.2003 (2♀, 3♂), 06.10.2003 (7♀, 2♂), 20.02.2004 (6♀, 2♂), 18.06.2004 (5♀, 1♂), 17.07.2004 (20♀, 6♂), 18.08.2004 (10♀, 4♂), 15.09.2004 (12♀, 5♂) on Hypoborus ficus and 12.06.2004 (2♀, 5♂) Hesperophanes griseus in fig trees.

    In Aydın, we observed that P. johnmoseri was widespread in fig trees during 2003-2004 and that it fed on eggs (Fig. 4), larvae and pupae of H. ficus. In subsequent surveys, it was also found on fig trees as a parasitoid of a few larvae of Hesperophanes griseus (Col.: Cerambycidae) (Fig. 5). Some members of the scolyti group are specific to flying adults of a single species, whereas others, such as Pyrometes scolyti are specific to flying adults within a single genus. It is important to note here that specific refers only to the phoretic host range and not to the range of insects that Pyrometes females will attack, which often is quite large. At this time the phoretic host range of P. johnmoseri is unknown except for that of flying adults of H. ficus (Cross et al., 1981; Moser et al., 1978). Hence, at this writing it is unknown if P. johnmoseri is truly phoretic on H. griseus, or if the mite accidentally happened to crawl from galleries of H. ficus, into the galleries of H. griseus, where the parasitoids attacked and developed on the brood of H. griseus.

Distribution
    Ukraine (Khaustov, 1998).

Discussion
    Pyrometes johnmoseri is very similar to P. scolyti. P. johnmoseri differs from P. scolyti in that P. johnmoseri lacks a solenidia on the male tibia IV (Khaustov, 1998). P. johnmoseri was first collected in the Ukraine associated with Hypoborus ficus. All of Khostov’s measurements are in agreement with our material from Turkey.

    Most of Pyrometes species have high reproductive capacity, short life-cycle and, due to all the development stages that occur within the mother’s ophiostosomal sac, they don’t need any intermediate hosts or alternate food source. All offspring are born as sexually mature adults. Only females are parasitoids and represent about 90-95% of the mite progeny. Females mate immediately at birth, begin host-seeking activity and their populations are easily reared in the laboratory condition (Bruce, 1989). For this reason, their potential for biological control on insects has recently been investigated. Although pyeomot mites of the ventricosus group can cause severe dermatitis on people, some species eg. Pyrometes tritici belonging to the ventricosus group, have shown potential as a biological control agent for a number of different insects (Bruce and Wrensch, 1990). However, P. johnmoseri, which belongs to the scolyti group, has no such toxic effects. The phoretic mite guild associated with the various fig beetles should be investigated in further studies by trapping of flying beetles in fig orchards.

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