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MORPHOLOGY AND BIOLOGY OF *EUSEIUS METWALLYI* N. SP.  
(ACARI: GAMASIDA: PHYTOSEIIDAE)

By Abdel-Aziz E. Basha 1, Abdel-Tawab A. Yousef 2 & El-Sayed M. Mostafa 1  
(Accepté Octobre 2000)

**Summary:** A detailed description of the different developmental stages of *Euseius metwallyi* n. sp. was done. The duration of the mite developmental stages, feeding capacity and fecundity were measured when fed crawlers of *Bemisia tabaci* at 27.1 ± 0.21°C and 80.2 ± 1.4% R.H.

**Introduction**

The biological activities of mites of the family Phytoseiidae attracted attention of different authors engaged in describing and rearing several species of various parts of the world. In Egypt, morphological, taxonomical and biological researches on this family has been reported by EL-BADRY (1968); ZAHER & SHEHATA (1971); YOUSEF (1981); FOULY & EL-LAITHY (1992); NAWAR & EL-SHERIF (1993). The phytoseiid *Euseius metwallyi* n.sp. is commonly found in guava orchards at Zagazig district, Egypt. Its life span, feeding capacity, fecundity were evaluated under laboratory conditions.

**Material and methods**

Individuals were collected from guava trees *Psidium guajava* L. at Zagazig district, Egypt. Adult females were transferred to rearing substrate and left for 24 hours and the deposited eggs were used for the, biological studies. Leaflets of *Phaseolus vulgaris* L. were placed singly upside down on a layer of cottonwool placed in a Petri dish 10 cm diameter each. Suitable moisture was maintained by adding few drops of water daily. Eggs were transferred singly to the rearing leaflets and the newly hatched larvae were supplied during the whole life span with sufficient known numbers of crawlers of *Bemisia tabaci* (Gennadius) obtained from infested castor bean *Ricinus communis* L. leaves. Replacement of the prey was carried out daily and records of development, reproduction and prey consumption were recorded twice a day. The experiments were carried out under laboratory conditions at 27.1 ± 0.2°C and 80.2 ± 1.4% R.H. Eggs and postembryonic developmental stages were mounted in HOYER's medium to be identified according to concepts and publications of CHANT (1959, 1965), SCHUSTER & Pritchard (1963), MUMA & DENMARK (1970), Yoshida-Shaul & CHANT.
setae and a pair of crescentic shaped pores. Four pairs of setae surrounding ventrianal shield, with setae JV5 on stout tubercles. Peritreme and peritremal shield extending forward approaching the mid-distance between setae z2 and z4. Cheliceral fixed digit with 2 teeth and a pilus dentilis, movable digit with a single distinct tooth (Fig. 1, B). Spermathecal cervix long (30 μm), with a distal narrow portion, minor duct tiny (Fig. 1, D).

Legs with chaetotaxic formulae of femora, genua and tibiae as follows (Fig. 1, E, I-IV): 12-10-6-6, 10-7-7-6 + one macroseta of 55 μm, 10-7-7-5 + one macroseta of 44 μm, in addition to another macroseta on basitarsus IV of 70 μm.

MALE (Fig. 1, F & G): Smaller than female, with a dorsal shield 249 μm long and 163 μm wide. Sterno-genital shield smooth 128 μm long and 64 wide, bearing 5 pairs of short simple setae and two pairs of circular pores, genital aperture bulb shaped located near the anterior margin of the sternogenital shield. Ventrianal shield triangular, 132 μm long and 94 μm wide, with 3 pairs of simple setae and a pair of crescentic pore (Fig. 1, F). Spermatodactyl with a nearly triangular shank and short foot. Cheliceral fixed digit with two distinct teeth and a pilus dentilis, movable digit with a single tooth (Fig. 1, G).

EGG (Fig. 2, A): The newly deposited egg is oval, 205 μm long and 162 wide translucent white. The egg shell is ornamented with irregular striae which almost meet with each other.

LARVA (Fig. 2, B - E): The newly emerged larva whitish. Dorsal shield distinct, divided into an anterior podonotal and a posterior opisthonomonal region. Podonotal shield nearly elliptical, smooth, 126 μm long and broadest width of 139 pt; with 9 pairs of setae; s4 59 μm arising on stout tubercles (Fig. 2, B). Setae j1, j3, j4, j5, j6, z2, z4 and z5 measuring 12, 11, 7, 8, 26, 12, 18 and 7 μm respectively. Opisthonomonal shield nearly subconical, smooth, 52 μm long and 139 μm wide, bearing only the whip-like setae Z4 which is 177 μm long and arises on stout tubercles.

Idiosomal venter smooth, bearing 8 pairs of setae in addition to the postanal setae (Fig. 2, D). Setae St1, St2, St3, JVI, JV2, JV5, S5, para and post-anal setae...
Pores (Two pairs of pores are circular and one is podonotal area and 8 pairs of setae and 3 pairs of 9 pairs of setae and 2 pairs of circular pores on the white yellowish, darker than protonymph. Dorsal shield smooth 239 seventeen pairs of setae and 5 pairs of pores, of which 4 + one macro seta of 41 basitarsus seta of 33 tibiae as follows (FIG. 3, D, I-IV): 10-7-5, 8-6-6 + one macroseta of 29 \( \mu m \), 8-7-6 + one macroseta of 39 \( \mu m \).

Protonymph (FIG. 3, A - D): Protonymph white yellowish. Dorsal shield, smooth, 216 \( \mu m \) long, and 156 \( \mu m \) wide, bearing 3 pairs of pores. Nine pairs of setae and a pair of circular pores, occurring on the pronotal region; while 8 pairs of setae in addition to a pair of circular and another crescentic pores located on the opisthonotal area. Setae j1, j3, j4, j5, j6, z2, z4, z5, s4, j2, j5, z1, S2, S4, S5, Z4 and Z5 measuring 22, 20, 13, 12, 18, 21, 32, 10, 70, 20, 7, 105, 225, 15, 185 21 and 37 \( \mu m \) respectively. Setae s4 arise on stout tubercles. Setae S4, S55 Z4 and Z5 arising on distinct tubercles, Z5 seems to be finely serrate (FIG. 3, A). Both setae r3 and R1 first appear during this stage and measure 14 and 12 \( \mu m \) respectively.

Venter of the body is smooth, bearing 8 pairs of setae of which 3 pairs occurring in the podonotal area and 5 pairs on the opisthosomal region (Fig. 3, C). Setae ST1, ST2, ST3, JV1, JV2, ZV2, JV5, para and post-anal measuring 17, 18, 195, 185, 16, 14, 205, 7 and \( \mu m \) long respectively. A pair of small circular pores behind JV2. Stig mata, peritreme and peritremal shield arise during the protonymphal stage; the latter two elements do not surpass coxae III. Cheliceral fixed digit with two distinct teeth and a pilus dentilis; movable digit with a minute tooth (Fig. 2, C).

Legs chaetotaxic formulae of femora, genua and tibiae as follows (Fig. 2, 1-111) 10-7-5, 8-6-5 + one macroseta of 41 \( \mu m \), 8-7-6 + one macroseta of 55 \( \mu m \).

Deutonymph (FIG. 4, A-D): The deutonymph is white yellowish, darker than protonymph. Dorsal shield smooth 239 \( \mu m \) long and 166 \( \mu m \) wide, with seventeen pairs of setae and 5 pairs of pores, of which 9 pairs of setae and 2 pairs of circular pores on the podonotal area and 8 pairs of setae and 3 pairs of pores (Two pairs of pores are circular and one is crescentic) on the opisthosotal region. Setae j1, j3, j4, j5, j6, z2, z4, s4, z5, j2, j5, Z1, S2, S4, S5, Z4 and Z5 measuring 30, 33, 12, 10, 21, 29, 40, 55, 10, 26, 6, 19, 28, 21, 25, 26 and 50 \( \mu m \) respectively. Setae r3 and R1, 18 and 15 \( \mu m \) respectively. Setae s4, S4, S5, Z4 and Z5 arise on distinct tubercles; Z5 seems finely serrate (Fig. 4, A).

Ventrally (FIG. 4, C), the body seems smooth and bears 13 pairs of setae in addition to post-anal seta. The podonotal chaetotaxy comprise setae ST1, ST2, ST3, ST4, and ST5 which measuring 19, 19, 18, 18, and 19 \( \mu m \) respectively. The opisthosomal setae, JV1, JV2, ZVI, ZV2, ZV3, JV4. JV5, para and post-anal measuring 18, 17, 16, 12, 11, 6, 31, 9 and 7 \( \mu m \) respectively. One circular pair of pores lie mesod posterioiy to JV2. Peritreme and peritremal shield extending forwardly to level between setae z2 and z4 (Fig. 4, A). Cheliceral fixed digit with two teeth and a pilus dentilis, movable digit with a single tooth (Fig. 4, B).

Legs chaetotaxic formulae of femora, genua and tibiae as follows (Fig. 4, D, I-IV): 12-10-6-6, 10-7-7-6 + one macroseta of 53 pt, 10-7-7-5 + one macroseta of 40 pt, in addition to another macroseta on basitarsus IV measuring 60 \( \mu m \).

Type material: Holotype: A female was collected from Guava trees *Psidium guajava* L. associated with sweetpotato whitefly *B. tabaci* at Zagazig district, Sharkia Governorate, Egypt at 15 September 1997. One egg, one individual of larva, protonymph and deutonymph were mounted from the rearing culture in laboratory, Faculty of Agriculture at Zagazig University, Egypt.

Paratypes: Four females, 3 males, 4 eggs, 3 larvae, 4 protonymphs and 3 deutonymphs were collected with the same data and date of holotype.

Allotype: A male was collected with the same data. All of the types were kept in the collection of Plant Protection Department, Faculty of Agriculture, Zagazig University, Egypt.

Biology of *Euseius metwallyi* n. sp.

Rearing of *E. metwallyi* on crawlers of the sweetpotato whitefly *B. tabaci* (Gennadius) under laboratory conditions at 27.08 ± 0.2 °C and
Fig. 3. — *Euseius metwalyi* n.sp., Protonymph. — A. — Dorsal view. B. — Chelicera. C. — Ventral view. D. — Legs I, II, III, IV.
TABLE 1: Durations of Euseius metwallyi n.sp. when fed on crawlers of Bemisia tabaci at 27.08 ± 0.21°C and 80.20 ± 1.41% R.H.

<table>
<thead>
<tr>
<th>IMMATURES</th>
<th>Incubation period</th>
<th>Larvae</th>
<th>Protonymphs</th>
<th>Deutonymphs</th>
<th>Duration of immatures stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.93 ± 0.06</td>
<td>1.45 ± 0.04</td>
<td>1.64 ± 0.03</td>
<td>2.32 ± 0.03</td>
<td>7.34 ± 0.08</td>
</tr>
<tr>
<td>Male</td>
<td>1.28 ± 0.03</td>
<td>0.99 ± 0.23</td>
<td>1.30 ± 0.03</td>
<td>1.91 ± 0.05</td>
<td>5.48 ± 0.06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADULTS</th>
<th>Pre oviposition period</th>
<th>Oviposition Period</th>
<th>Post oviposition period</th>
<th>Adult longevity</th>
<th>Life span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.72 ± 0.09</td>
<td>13.40 ± 0.30</td>
<td>2.83 ± 0.34</td>
<td>17.95 ± 0.25</td>
<td>25.30 ± 0.28</td>
</tr>
<tr>
<td>Male</td>
<td>8.24 ± 0.00</td>
<td>13.72 ± 0.28</td>
<td></td>
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</tbody>
</table>

Table 2: Efficiency of Euseius metwallyi n.sp. in attacking crawlers of Bemisia tabaci at 27.08 ± 0.21°C and 80.20 ± 1.41% R.H.

80.20 ± 1.4% R.H., the egg period, larval, protonymphal, deutonymphal stages averaged 1.93 ± 0.06 & 1.28 ± 0.03, 1.45 ± 0.04 & 0.99 ± 0.23, 1.64 ± 0.03 & 1.30 ± 0.03, 2.32 ± 0.03 & 1.91 ± 0.05 days for female and male respectively (Table 1). The development from eggs to adults lasted for an average 7.34 ± 0.08 (=females) & 5.48 ± 0.06 days (=males) (Table 1). The adult periods averaged 1.72 ± 0.09 (=females) and 9.06 ± 0.11 days (=males). These results agree with the data from Amblyseius swirskii (Athias-Henriot) reared on crawlers of B. tabaci (IBRAHIM, 1993). The adult female and male lived for an average of 17.95 ± 0.25 and 8.24 ± 0.28 days respectively (Table 1). Similar results were obtained by Nawar & EL-SHERIF (1993) when they reared Neoseiulus cucumeris (Oudemans) on the eggs, first and second instar larvae of B. tabaci. The adult female continued ovipositing eggs for a period averaging 13.4 ± 0.30 days and laid a total average and a daily mean of 14.00 ± 0.33 and 1.05 ± 0.04 eggs respectively, the results agree with Ibrahim (1993), but differ in the great number of eggs laid by female. The oviposition period agree with Nawar & EL-SHERIF (1993).

Meyerdirk & Coutris (1986) showed that the oviposition period of E. scutalis did not extend beyond 16.6 days. The female and male life span lasted for an average 25.30 ± 0.08 and 13.72 ± 0.28 days respectively (Table 1).

**Efficiency of Euseius metwallyi n.sp. in attacking crawlers of B. tabaci**

The larval stage of both sexes did not feed on any of introduced preys. The predator protonymphal, deutonymphal and immature stages of female and male attacked 13.26 ± 0.56 & 9.33 ± 0.36, 23.00 ± 0.72 & 16.02 ± 0.92 and 69.85 ± 2.63 & 43.91 ± 1.04 prey individuals respectively (Table 2). During the pre-oviposition, oviposition, post-oviposition periods and adult longevity, the female consumed 23.86 ± 1.51, 249.20 ± 9.03, 48.57 ± 4.49 and 280.02 ± 9.38 prey individuals respectively. Food consumption during the pre-oviposition period nearly agree with results obtained by IBRAHIM (1993). The adult male attacked 126.10 ± 6.37 preys (Table 2). Gameel (1971) found that the predators Ambly-
seius aleyrodis and Typhlodromus sudanicus consumed 10.4 and 6.72 larvae of B. tabaci per day. During the life span, the predator female and male attacked an average of 322.95 ± 10.20 and 159.38 ± 4.90 prey individuals respectively (Table 2).

REFERENCES


