

## Morphology of the second-instar males of *Parlatoria ziziphi* (Lucas) (Hemiptera: Diaspididae)

E Podsiadlo<sup>1</sup> & AAA Bugila<sup>2</sup>

<sup>1</sup>Depart. of Zoology, Agricultural University of Warsaw, Ciszewskiego 8, 02-786 Warsaw, Poland; <sup>2</sup>Sebha University, P.O. Box 18758 Sebha, Libyan Arab Jamahiriya, Faculty of Science, Part of Zoology, Libya.

**Abstract.** The second-instar male of *Parlatoria ziziphi* (Lucas) is described and illustrated. Sexual differences are noted. The main characters of this instar are: three pairs of well developed lobes, similar in shape and size, longer than wide, constricted basally, rounded apically, faintly notched on both sides, each lobe with a basal sclerosis; median lobes well separated from each other. Plates short and wide, most with fimbriated apex, occurring on all abdominal segments. Macroducts arranged in marginal, submarginal and submedian rows; total 28-34 macroducts on each half of the body. Gland tubercles present in four submarginal groups: prespiracular, prothoracic, mesothoracic and metathoracic; total 13-15 gland tubercles on each half of the body mingled with 4-6 macroducts. Anterior spiracle with 1 to 2 disc pores. Each antenna with one strong seta. Sexual dimorphic characteristics in male are: well developed glandular system, presence of pair of dorsal submedian setae on the 1<sup>st</sup> abdominal segment and presence of three pairs of setae between antennae and anterior margin of clypeolabral shield.

**Key words:** Coccinea, Diaspididae, *Parlatoria ziziphi*, black parlatoria, sexual dimorphism.

### Introduction

*Parlatoria ziziphi* (Lucas) is a widely distributed parasite of citrus plants (Kozár, 1998). Diagnostic characteristics of adult females are sufficiently described in the literature (for example Komosińska-Czwartacka, 1964; Takagi, 1969; Danzig, 1993) while immatures have been unknown so far. Only recently did Podsiadlo & Bugila (2007) described the first instar of this species and noted sexual dimorphic characteristics in this stage.

In this paper, the second instar male of *P. ziziphi* is described for the first time and the sexual differences are discussed.

### Materials and methods

Second-instar nymphs were collected on *Citrus aurantium* L. from Green Mountain (Libya, 27 Aug. 2003). Slide mounts were made from 7 male specimens and 3 female specimens. The number of setae and other structures is given for one body half. Measurements (in micrometers) are presented as averages followed by ranges in parentheses. Drawings were made by using a microscope drawing tube attached to a Zeiss microscope.

### Description of the second-instar male (Fig.1)

Body oval to broadly oval in outline. Slide mounted specimens 472.8 (380-600) long and 340.7 (290-390) wide. Derm membranous except for the pygidium. The eyes very inconspicuous, visible as a pair of small marginal spots.

**Pygidium:** rounded, composed of 6-8 abdominal segments. Three pairs of well developed lobes, similar in shape and size, longer than wide, constricted basally, rounded apically, faintly notched on both sides, each lobe with a basal sclerosis; median lobes well separated from each other. Plates short and wide, most with fimbriated apex, occurring on all abdominal segments.

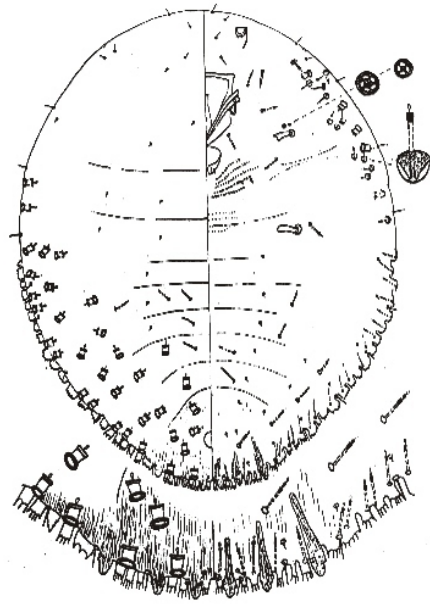


Figure 1. Second-stage male of *Parlatoria ziziphi* (Lucas).

**Dorsal surface:** Head and prothorax nearly fused, mesothorax, metathorax and abdominal segments 1-5 fairly well marked by intersegmental furrows. The following segments fused.

Anal opening nearly circular, avg. 10.0 x 12.5 in diameter, located dorsomedially at a distance of about 3 times its length from the posterior margin.

Marginal setae: 1-3 on head, 1 on each thoracic segment, and one on each of abdominal segments 1-8. Marginal minute seta of abdominal segment 9 is placed anteriomedially to seta of segment 8. Submarginal setae: 0-2 on head and 1 on prothorax. Mesolateral setae: 1 short on each meso- and metathorax. Submedian setae: 4 on head, 1 short on each thoracic segment and 1 short on each of abdominal segments 1-3.

Macroducts arranged in marginal, submarginal and submedian rows. Marginal macroducts, the greatest in size, present on the abdominal and thoracic segments; submarginal macroducts in irregular double row extending anteriorly to the metathorax. Submedian macroducts in a row reaching anteriorly the fifth or fourth abdominal segment. Total 28-34 macroducts on each half of the body.

Microducts present on 2-4 abdominal segments positioned submedially or mesolaterally.

**Ventral surface:** Segmentation less distinct than on dorsal side. Antennae reduced to small tubercles with a long stout seta at base.

Clypeolabral shield 87.0 (85.0-87.5) long, 70.0 (67.5-75.0) wide. Labium one segmented, 35.0 (32.5-40.0) long, 39.5 (35.0-42.5) wide, with 2 setae detectable. Peribuccal granulations, i.e. granulations of the derm situated just posterolaterally to the mouth parts, present. Legs absent.

Spiracles located on pro- and metathorax. Anterior spiracle with 1-2 disc pores: one 5-locular, and the second (if present) 3-, 4- or 5-locular.

Setae. Marginal: 1-3 on head, 1 on each thoracic segment, and 1 on each of abdominal segments 2-8; marginal thoracic setae of ventral and dorsal sides form three fairly well isolated pairs on thoracic segments. Submarginal: 0-2 on head, 1 on prothorax, 1 on

metathorax, and 1 short on each of abdominal segments 1-8. Mesolateral: 1 short on each of abdominal segments 4-7. Submedian: 3 on head above clypeolabral shield, 2 short on mesothorax, 1 short on metathorax, and 1 short on each of abdominal segments 2-7.

Gland tubercles present in four submarginal groups: prespiracular group situated anteriorly to the level of the anterior spiracle, the prothoracic opposite the anterior spiracle, the mesothoracic and the metathoracic; total 13-15 gland tubercles, mingled with 4-6 macroducts.

Microducts: 4 peripheral to the mouthparts and 1 near each spiracle. A series of ducts along abdominal margin associated with plates. In submarginal area, a row of ducts extending from 4 to 7 abdominal segments; 1 duct on each abdominal segment 2 and 3 positioned mesolaterally; 1 duct on each abdominal segment 4 and 5 positioned submedially.

## Discussion

Sexual dimorphism in the second-instar diaspidids has been shown by few workers. Boratyński (1953) noticed that the second-instar males had better-developed glandular system than the second-instar females. Stoetzel & Davidson (1974) discovered a setal pattern that distinguished the sex in all stages of Aspidiotini: males had a pair of dorsal submedian setae on the 1<sup>st</sup> abdominal segment, while females did not possess these setae. Podsiadło (2000) noticed a sexual difference in the distribution of setae on the ventral side of the head in the second-instar of *Quadraspidiotus zonatus* (Frauenfeld): males had three pairs of setae between antennae and anterior margin of clypeolabral shield, but females did not possess these setae.

Based on the above, the sex of examined immatures of *P. ziziphi* was established. The second-instar males had a well-developed glandular system, a pair of dorsal submedian setae on the 1<sup>st</sup> abdominal segment and three pairs of setae between antennae and anterior margin of clypeolabral shield. Second-instar females differed from the second-instar males in less developed glandular system, lack of dorsal submedian setae on the 1<sup>st</sup> abdominal segment and lack of ventral setae between antennae and anterior margin of clypeolabral shield. The insufficient material (only 3 specimens) made detailed description of this stage impossible.

## References

- Boratyński, K. 1953. Sexual dimorphism in the second-instar of some Diaspididae (Homoptera: Coccoidea). Transactions of the Royal Entomological Society of London, 104:451-479.
- Danzig, E.M. 1993. Fauna of Russia and neighbouring countries. X, Scale Insects (Coccinea), Families Phoenicococcidae and Diaspididae, St. Petersburg, "Nauka", 453 pp. [in Russian].
- Komosińska-Czwartacka, H. 1964. Armored Scale-Insects (Homoptera, Coccoidea, Diaspididae) of Citrus-Fruits imported to Poland. Fragmenta Faunistica, 11:207-231. [in Polish].
- Kozár, F. 1998. Catalogue of Palearctic Coccoidea. Plant Protection Institute, Hungarian Academy of Sciences, Budapest, 526 pp.
- Podsiadło, E. 2000. Morphology of the second-instar larva of *Quadraspidiotus zonatus* (Hemiptera: Coccinea: Diaspididae). Polish Journal of Entomology, 69:397-404.
- Podsiadło, E. & Bugila, A.A.A. 2007. Morphology of the first-instar of *Parlatoria ziziphi* (Lucas) (Hemiptera: Coccinea: Diaspididae). Polish Journal of Entomology, 76:333-339.
- Stoetzel, M.B. & Davidson, J.A. 1974. Sexual Dimorphism in all Stages of the Aspidiotini (Homoptera: Diaspididae). Annals of the Entomological Society of America, 67:138-140.
- Takagi, S. 1969. Diaspididae of Taiwan based on material collected in connection with the Japan-U.S. co-operative science programme, 1965 (Homoptera: Coccoidea). Insecta Matsumurana, 32 (part 1):1-110.