

**Morphology of the first instar of *Parlatoria ziziphi* (LUCAS)
(Hemiptera: Coccinea: Diaspididae)**

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ABSTRACT. The first instar of *Parlatoria ziziphi* (LUCAS) is described and illustrated. It has 5-segmented antennae, 1 trilocular disc pore associated with anterior spiracle, 2nd and 3rd lobes well-developed, broad and fringed plates present in interlobular spaces and anterior to lobe 3. It is distinguished by the lack of dorsal submedian setae on abdominal segments 4-7, and by the presence of ventral submedian setae on meso- and metathorax, and on abdominal segments 2-7. Sexual dimorphism in the first instar is exhibited through two characteristics: a campaniform sensillum present at the bases of the tarsi in male nymph, but absent in female nymph, and a pair of dorsal submedian setae on the 1st abdominal segment present in male nymph, but absent in female nymph.

KEY WORDS: Hemiptera, Coccinea, Diaspididae, *Parlatoria ziziphi* (LUCAS), first instar, morphology, sexual dimorphism.

INTRODUCTION

Parlatoria ziziphi (LUCAS) - the black parlatoria scale is a specialized pest of citrus plants and is considered one of their major pests in certain areas. The insect causes dieback of twigs, premature drop of fruits and leaves, and deformation of fruit. It is usually so firmly attached to the fruit that cannot be removed, causing a severe infestation. This reduces commercial value of fruits and may render them unfit for human consumption (BLACKBURG & MILLER 1984). *P. ziziphi* was recorded in Poland on citrus fruits imported from Mediterranean countries (KOMOSIŃSKA-CZWARTACKA 1964).

Immatures of *P. ziziphi* have not been hitherto described. This posed difficulties to identification the species in larval stages, the more so as another species of *Parlatoria* genus, most often *P. pergandii* COMSTOCK, also occurs on citrus plants. *P. pergandii* was found in Poland on citrus fruits imported from Mediterranean countries, China and Cuba (KOMOSIŃSKA-CZWARTACKA 1964) and on many plant species in greenhouses (DZIEDZICKA 1989).

In the present paper the first instar of *P. ziziphi* is described and sexual dimorphism is noted.

MATERIALS AND METHODS

First instar larvae (crawlers) were collected on *Citrus aurantium* L. from Green Mountain (Libya, 27 Aug. 2003). Slide mounts were made from 14 male specimens and 12 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

Male first instar nymph

(Fig. 1)

Body oval. Size of slide mounted specimens given in Table 1. Body membranous except for appendages and pygidial areas. Eyes (a) rounded, prominent, visible as projections from the body surface.

Pygidial appendages. Lobes 2 and 3 well developed, unilobed and sclerotized. L_2 large, notched on both sides, rounded apically. L_3 smaller, triangular in shape, pointed at apex. Broad fringed plates (b) present on segments 6-8 in number 2, 2, 1.

Dorsal surface. Head, pro- and mesothorax not clearly defined; metathorax and abdominal segments 1-5 separated by intersegmental furrows; the following segments fused to compose a pygidium.

Marginal setae. Marginal setae 4 on head, 1 on prothorax, 2 on each meso- and metathorax, and 1 on each of abdominal segments 1-8. Marginal minute seta of the apparent abdominal segment 9 is placed anteriorly to seta of segment 8. Mesolateral setae: 1 on each meso- and metathorax. Submedian setae: 3 on head, 1 on each meso- and metathorax and 1 on each of abdominal segments 1-3.

Marginal ducts (c) 1 on head, 1 on each meso- and metathorax and 1 on each of abdominal segments 1-8. Mesolateral duct: 1 on head. Submedian ducts: 1 on each thoracic segment and on abdominal segment 2.

Occasionally marginal setae or ducts of cephalothorax change their position on margin of either dorsal or ventral surface. Nevertheless, they are described and illustrated here as structures of the dorsal side.

Anal opening (d) nearly circular, av. $6.0 \times 7.3 \mu\text{m}$, located dorsomedially at a distance of a little greater than its diameter from the posterior margin.

Ventral surface. Segmentation less distinct than on dorsal surface; head, pro-, meso- and metathorax nearly fused; prepygidial abdominal segments defined by intersegmental furrows, the following ones fused.

Antennae 5-segmented, the fifth segment being the longest. Dimensions in Table 1. Segment I with 1 short basal, 1 medial subbasal and 1 long slender seta, II with 1 slender seta and an apical sensorium, III with 1 slender seta, IV with 1 stout seta, V annulated (e), with 5 stout, 2 invaginated and 2 elongate terminal setae. Invaginated minute setae are located between apical projections and near the middle of segment V.

Clypeolabral shield 60.0 (52.5-65.0) long, 31.8 (30.0-35.0) wide. Labium one segmented, 25.7 (22.5-30.0) long, 27.7 (27.5-28.5) wide, with 2 setae detectable.

Legs well developed, slightly increasing in size from anterior to posterior pair. Dimensions in Table 1. Coxa I with 1 seta on dorsal and 2 on ventral side. Coxa II and III with 1 seta on dorsal and 1 on ventral side. Trochanter with 2 sensilla on each side and 1 elongate seta. Femur without setae. Tibia and tarsus fused (f), with no detectable septum. Tarsus with a campaniform sensillum near its base, 1 subapical seta and 2 knobbed apical digitules longer than claw. Presumed tibia-tarsal ratio of 1:2. Claw without denticle but with 2 knobbed digitules exceeding its length.

Spiracles located on pro- and metathorax. Anterior spiracle with 1 trilocular disc pore (g) associated, posterior spiracle without associated disc pores.

Marginal setae: 3 on head and 1 on each of abdominal segments 2-9. Marginal seta of 8th abdominal segment, the so-called "apical seta", up to $130 \mu\text{m}$ long. Submarginal setae: 1 on prothorax and 1 on each of abdominal segments 1-8. Submedian setae: 3 on head above clypeolabral shield, 1 on each meso- and metathorax and 1 on each of abdominal segments 2-7.

Ducts: 1 submarginal duct on head located anterior to antennae and 1 on prothorax anterolaterad to anterior spiracle.

Female first instar nymph

(Fig. 2)

Similar to male, but differs from it by lacking campaniform sensilla on the tibio-tarsi and by lacking a dorsal submedian seta on the 1st abdominal segment. Measurements of body, antennae and legs are given in Table 1.

Notes

HOWELL and TIPPINS (1977) described the first instar of the type-species of *Parlatoria* genus, *P. proteus* (CURTIS) from orchids and palms. Based on the above, the first instar of *P. ziziphi* differs from that of *P. proteus* by: (1) the presence of ventral submedian seta on

each meso- and metathorax and on each of abdominal segments 2-3, (2) the presence of trilocular disc pore associated with anterior spiracle, (3) different shape of lobes 3 which on illustration of *P. proteus* by HOWELL and TIPPINS (1977) are rounded apically, but in *P. ziziphi* they are pointed at apex.

STICKNEY (1934) noticed, in the first instar of *Parlatoria blanchardi* (TARGIONI-TOZZETTI), a small sclerite located laterad to metacoxa. HOWELL and TIPPINS (1977) described the same structure in *P. proteus*. This also has been found in *P. ziziphi* (Fig. 1h), but in some specimens it was not detected.

Table 1. Measurements (in μm) of the body size, antennae and legs in newly hatched first instar nymphs of *Parlatoria ziziphi* (LUCAS).

Character	Male first instar	Female first instar
Body size:		
length	273.1 (250-290)	267.9 (260-280)
width	166.4 (150-185)	164.9 (157-180)
Antenna: total length	54.1 (52.5-55.0)	54.2 (52.5-56.0)
length of 1 st segment	12.4 (12.0-12.5)	12.0 (11.0-12.5)
length of 2 nd segment	5.4 (5.0-6.0)	5.5 (5.0-6.0)
length of 3 rd segment	8.1 (7.5-10.0)	7.8 (7.5-9.5)
length of 4 th segment	4.6 (4.0-5.0)	4.3 (4.0-5.0)
length of 5 th segment	23.5 (22.5-25.0)	24.5 (22.5-26.0)
Leg I: total length	70.0 (65.0-72.5)	74.7 (73.5-76.0)
length of coxa	12.0 (11.0-12.5)	12.1 (11.0-12.5)
length of trochanter + femur	30.4 (27.5-32.5)	33.2 (32.5-35.0)
length of tibio-tarsus	20.5 (17.5-22.5)	22.5 (22.5-23.0)
length of claw	7.0 (6.0-7.5)	6.7 (6.0-7.5)
Leg II: total length	74.9 (72.5-77.5)	78.1 (75.0-82.0)
length of coxa	12.2 (11.0-12.5)	12.5 (12.5)
length of trochanter + femur	32.5 (30.0-35.0)	34.3 (32.5-37.5)
length of tibio-tarsus	22.6 (22.5-23.5)	23.9 (22.5-25.0)
length of claw	7.5 (7.5)	7.4 (7.0-7.5)
Leg III: total length	82.0 (76.0-85.0)	86.1 (82.5-91.0)
length of coxa	12.5 (12.5)	12.7 (12.5-14.0)
length of trochanter + femur	35.1 (31.0-37.5)	37.8 (35.0-40.0)
length of tibio-tarsus	26.6 (25.0-27.5)	27.9 (27.5-30.0)
length of claw	7.7 (7.5-9.0)	7.6 (7.5-8.5)

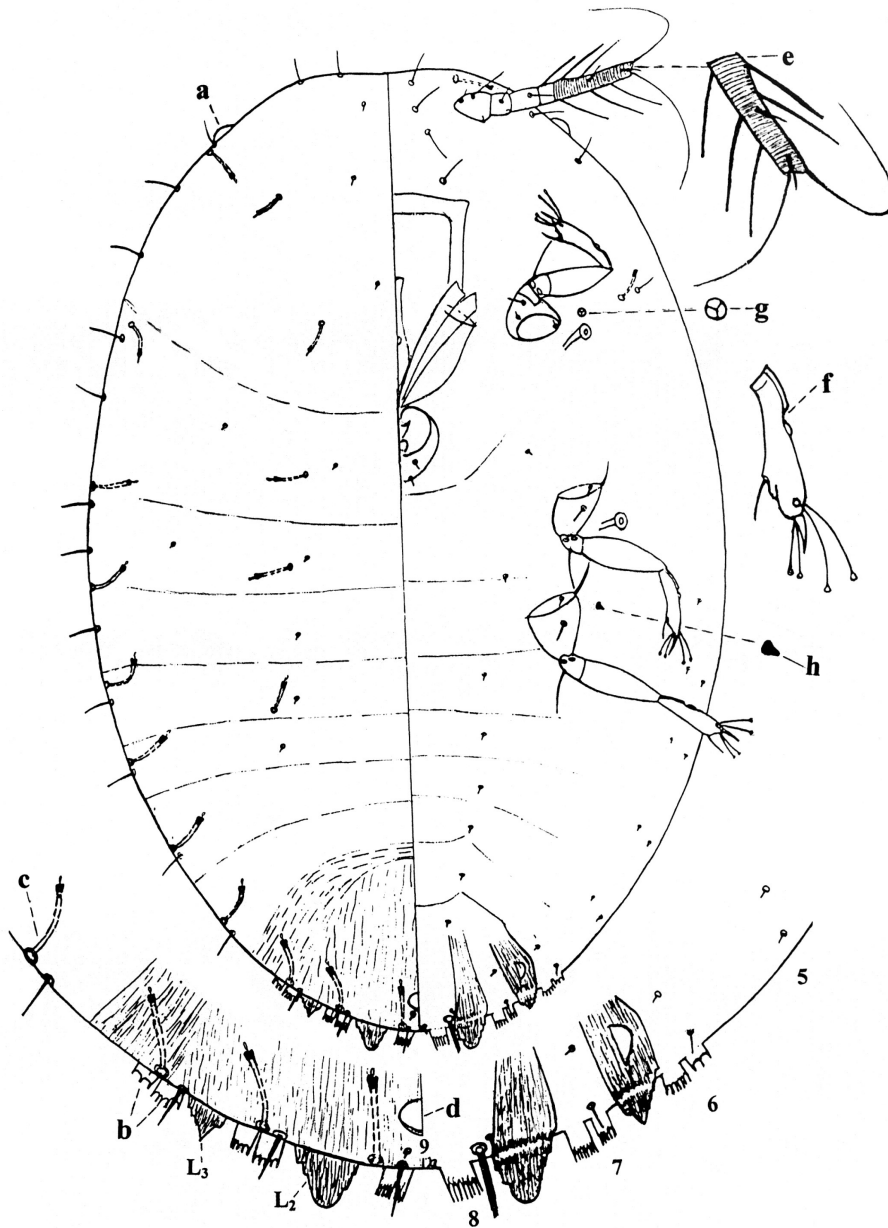


Fig. 1. Male first instar nymph of *Parlatoria ziziphi* (LUCAS).

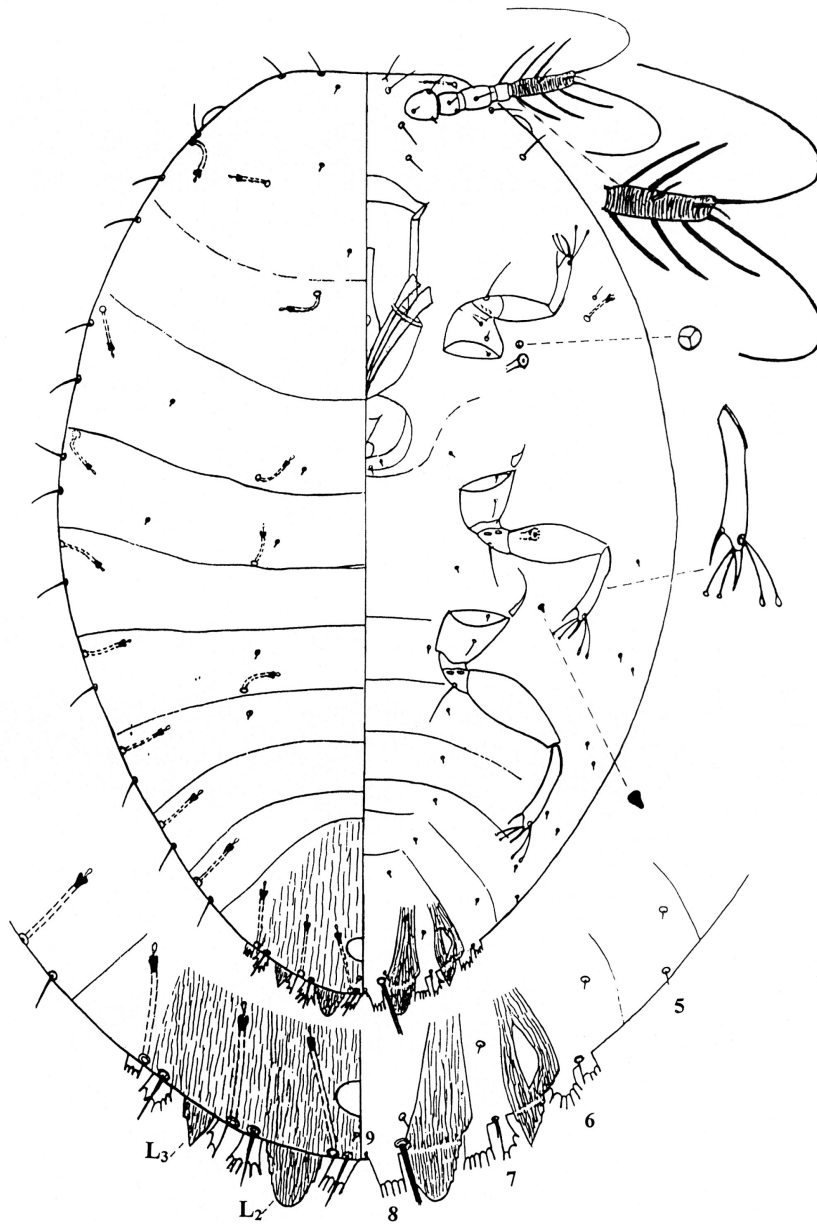


Fig. 2. Female first instar nymph of *Parlatoria ziziphi* (LUCAS). (Designations the same as in Fig.1).

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