

A new species of the genus *Paracoccus* (Hem.: Coccoomorpha: Pseudococcidae) from Iran

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Abstract

The new mealybug species, *Paracoccus ficus* Moghaddam **sp. n.**, collected on *Ficus carica* (Moraceae) in Iran, is described and illustrated based on the adult female. An identification key is presented to distinguish this new species from other mealybug species, reported on *Ficus* spp., in Iran.

Key words: *Paracoccus ficus*, Coccoomorpha, Pseudococcidae, key, *Ficus carica*, Iran, new species

چکیده

معرفی یک گونه جدید از جنس *Paracoccus* (Hem.: Sternorrhyncha: Coccoomorpha: Pseudococcidae) از ایران

معصومه مقدم و مهدی اسفندیاری

گونه جدیدی از شپشک‌های آردآلود، *Paracoccus ficus* Moghaddam **sp. n.** که از روی درخت انجیر، *Ficus carica*

(Moraceae)، در ایران جمع‌آوری شده است، براساس حشره ماده کامل توصیف و ترسیم می‌شود. کلید شناسایی تشخیص این گونه

جدید از سایر شپشک‌های آردآلود که روی گیاهان *Ficus* spp. در ایران فعالیت دارند، ارائه شده است.

واژگان کلیدی: *Paracoccus ficus*, Coccoomorpha, Pseudococcidae, کلید، *Ficus carica*, ایران، گونه جدید

Introduction

The mealybug genus *Paracoccus* Ezzat & McConnell has a wide distribution in temperate and tropical areas of the world including Australasian, Afrotropical, Nearctic, Neotropical and Oriental regions with 36, 21, 17, 8 and 10 species, respectively (Ben-Dov *et al.*, 2014). Prior to the current study, the three species *Paracoccus tuaregensis* (Balachowsky), *P. leucadendri* Mazzeo & Franco and *P. burnerae* (Brain) had been known from the Palaearctic region, of which the latter species was recently recorded from Iran (Mazzeo *et al.*, 2009; Moghaddam, 2013a). The presence of anal lobe bars distinguishes *Paracoccus* from the genera *Chorizococcus* McKenzie and *Spilococcus* Ferris. Furthermore, *Paracoccus* differs from *Crisicoccus* Ferris and *Planococcus* Ferris in possessing oral rim tubular ducts. *Paracoccus marginatus* Williams & Granara de Willink is an invasive pest in the Caribbean and Afrotropical, Australasian, Nearctic, Neotropical and Oriental regions damaging a number of economically important crops (Ben-Dov *et al.*, 2014). The species *P. burnerae* is known as a serious pest of citrus in South Africa (Hattingh, 1993).

To date 54 mealybug species in 28 genera are known from Iran, of which the six species, *Ferrisia*

virgata (Cockerell), *Maconellicoccus hirsutus* (Green), *Nipaecoccus viridis* (Newstead), *Planococcus citri* (Risso), *Pl. ficus* (Signoret) and *Pseudococcus viburni* (Signoret) have been reported on *Ficus* spp. (Moghaddam, 2013b). Although none of them have been reported as a pest on fig trees, *Pl. ficus* is reportedly causes damage to *Ficus carica* in Fars province.

The adult female of the new *Paracoccus* species is described and its illustration along with an identification key is provided for separating it from the Iranian mealybugs, which are associated with *Ficus* species.

Material and methods

The description is based on 18 slide-mounted specimens prepared according to the method of Williams & Granara de Willink (1992). The figure shows a central enlargement of the entire body with the dorsum on the left and the venter on the right. The figure has one or more vignettes around the central figure showing the detailed structure of particular elements (not drawn to the same scale). The body measurements are given in millimeters (mm) and those of the rest of the structures are in microns (μ). The morphological terminology follows that of Williams

(2004). Drawing of external morphology of the holotype was prepared using the drawing tube attached to Carl Zeiss microscope (Phase Contrast).

Specimen depositories

HMIM – Hayk Mirzayans Insect Museum, Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection, P.O. Box 1454, Tehran 19395, Iran.

IMCA – Insect and Mite Collection of Shahid Chamran University of Ahvaz, Ahvaz, Iran.

Genus *Paracoccus* Ezzat & McConnell

Paracoccus Ezzat & McConnell, 1956: 37. Type species: *Pseudococcus burnerae* Brain, by original designation.

Gossypina Salazar, 1972: 293. Type species: *Gossypina glauca* Salazar, by monotypy and original designation. Synonymized by Williams & Granara de Willink, 1992: 292.

Paracoccus ficus Moghaddam sp. n.

(Figs. 1-2)

Description – Live and preserved specimens in alcohol and also in KOH appeared colorless.

Mounted material. Adult female oval to broadly oval, 2.24–3.15 mm long and 1.72–2.00 mm wide; anal lobes moderately developed, each ventral surface with an apical seta 163–170 μ long and anal lobe bar 44–49 μ long; antenna about 220 μ long with 8 segments; legs well developed, hind trochanter + femur 256–298 μ long, hind tibia + tarsus 280–344 μ long, claw 36–40 μ long, ratio of lengths of hind tibia + tarsus to hind trochanter + femur about 1.09–1.16, ratio of lengths of hind tibia to tarsus 1.85–2.6; translucent pores present on anterior surfaces of hind coxa and on posterior surfaces of hind femur and tibia; circulus present, 136–144 μ wide, divided by intersegmental line; ostioles well developed, each lip with 2 or 3 setae and about 10 trilobular pores; anal ring about 80 μ long and about 70 μ wide, bearing 6 setae, each 104–120 μ long; cerarii numbering 18 pairs; each anal lobe cerarius lightly

sclerotized, with 2 conical setae, each 16–20 μ long and about 6 μ wide at base, plus 2 auxiliary setae and a compact group of trilobular pores; anterior cerarii distinct, each containing 2 setae, about 15–22 μ long and with normally 5–9 trilobular pores, except for C₃, each often with 3 conical setae; all without auxiliary setae.

Dorsal surface with slender, long and stiff setae, each mostly about 42 μ long, present across all segments, plus some minute setae, each about 15 μ ; multilobular disc pores absent; trilobular pores evenly dispersed; discoidal pores minute, scattered; oral rim tubular ducts, each about 6 μ long and with rim about 4 μ in diameter, present singly near most abdominal cerarii, except anal lobe cerarius; others distributed singly in submedial areas of meso-metathoracic segments.

Ventral surface with normal flagellate setae; multilobular disc pores, each about 6 μ in diameter, abundant on abdomen, present in double rows at posterior edges of abdominal segments IV–VIII + IX, reaching margins; others occurring at anterior edges of abdominal segments V–VII; singly across medial of abdominal segment III and on margins of abdominal segments II and III; a few multilobular disc pores also present next to anterior and posterior spiracles; trilobular pores present, evenly distributed; discoidal pores sparse; oral rim tubular ducts absent; oral collar tubular ducts of 2 sizes present: (1) a large type, each about 8 μ long, located mainly at posterior edges of posterior abdominal segments, singly on margins of thorax and also on margin of anterior abdominal segments, apparently absent from head; (2) a minute type of duct distributed across middle of most abdominal segments, often to margins or submargins, 1 or 2 also located medially on thorax.

Material examined – Holotype, adult ♀, IRAN, Fars province: Neyriz, Palangan Valley, N 29°07'23", E 54°22'21", x.2013, ex: *Ficus carica* (Moraceae), leg. M. Esfandiari, (HMIM).

Paratypes, IRAN, Fars province: same data as holotype, 5 adult ♀♀ (HMIM), 2 adult ♀♀ (IMCA);

Estahban, x.2013, ex: *F. carica*, leg. K. Zibaii, 10 adult ♀♀ (HMIM).

Etymology – The name is based on the Latin name of the host plant, *Ficus*, and is a noun in apposition.

Comments – *Paracoccus ficus* sp. n. is close to *P. cognatus* Williams for (i) presence of circulus, (ii) general distribution of oral rim tubular ducts on the dorsum, and (iii) distribution of oral collar tubular ducts on the venter. However, the new species differs from *P. cognatus* by the following characters (characters of *P. cognatus* in brackets): (i) adult female body pink (blue-black), (ii) dorsal setae long and stiff (slender and flagellate), (iii) all cerarii are completely distinct (not distinct), (iv) marginal ducts are sparse on prothorax (grouped), (v) multilocular disc pores present near of anterior and posterior spiracles (on medial areas of the head and thorax). *Paracoccus ficus* sp. n. is also similar to the injurious species *P. marginatus* in possessing marginal oral rim tubular ducts but differs in possessing some extra dorsal oral rim tubular ducts and translucent pores on the hind tibiae.

Paracoccus ficus sp. n. (fig. 2) is believed to be a pest of *F. carica* in Neyriz and Estahban in the south of Iran, where the crop is one of the chief exports of the Fars province to the neighboring countries.

Key to the mealybug species reported on *Ficus* spp. in Iran:

1. Dorsal tubular ducts enlarged, each with orifice surrounded by a flat sclerotized area containing 1 or more setae situated either within border or adjacent to rim and with generally minute simple pores within border or adjacent to rim *Ferrisia virgata* (Cockerell)
- Dorsal tubular ducts, if present, not above 2
2. Oral rim tubular ducts present, each with well-developed rim 3
- Oral rim tubular ducts entirely absent 5

3. Cerarii numbering no more than 6 pairs, present on abdomen only, occasionally present on frontal cerarii *Maconellicoccus hirsutus* (Green)
- Cerarii numbering more than 6 pairs 4
4. Venter of each anal lobe with an anal lobe bar; ocular cerarii (C₂) sometimes present *Paracoccus ficus* Moghaddam sp. n.
- Venter of each anal lobe without an anal lobe bar; ocular cerarii (C₂) always absent *Pseudococcus viburni* (Signoret)
5. Anal lobe bars present (*Planococcus* Ferris) 6
- Anal lobe bars absent *Nipaeococcus viridis* (Newstead)
6. Venter of head and thorax with 0–4 oral collar ducts; translucent pores present on hind coxae and tibiae, sometimes present on hind femur; cerarian setae on head and thorax often long and slender; some dorsal setae on medial area of abdominal segments VI and VII 40–50 μ long *Planococcus ficus* (Signoret)
- Venter of head and thorax with 0–35 oral collar ducts; translucent pores present on hind coxae and tibia, never present on hind femur; cerarian setae on head and thorax always conical; longest dorsal setae on medial area of abdominal segments VI and VII 25–33 μ long *Planococcus citri* (Risso)

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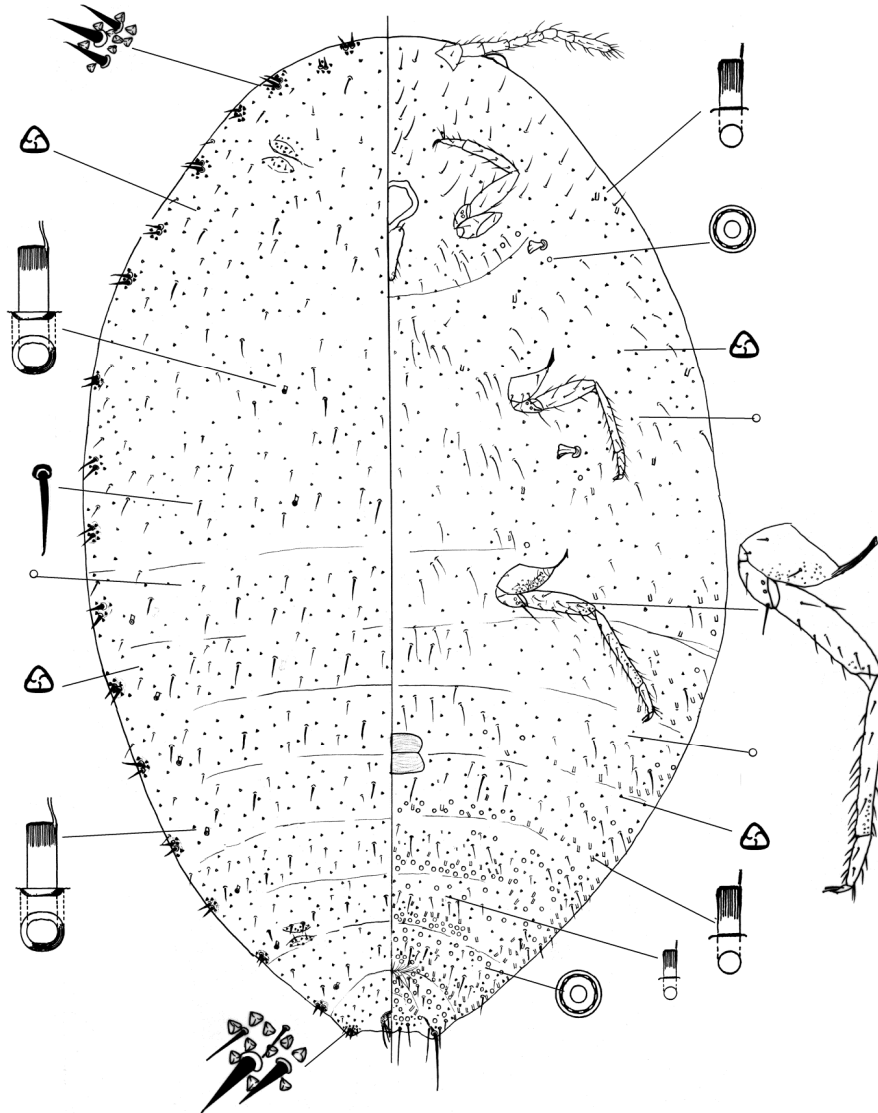


Fig. 1. Adult female of *Paracoccus ficus* sp. n.



Fig. 2. *Paracoccus ficus* sp. n. in the fracture of bark of *Ficus carica* (Photo by M. Esfandiari).

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