



Taxonomic studies of common genera and species of family Pseudococcidae (Hemiptera: Coccoidea) with a taxonomic key for the species in Egypt

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Abstract:

Mealybugs (Hemiptera: Coccoidea: Pseudococcidae) are phloem –sucking insects, most of them are important and serious agricultural pests in Egypt. This study revealed the presence of seven mealybug species (*Dysmicoccus brevipes* (Cockerell), *Ferrisia virgata* Cockerell, *Planococcus citri* (Risso), *Planococcus ficus* (Signoret), *Phenacoccus parvus* Morrison, *Phenacoccus solenopsis* Tinsley and *Saccharicoccus sacchari* Ferris) infested different host plants at different Governorates in Egypt. The present work included the identification based on (light and scanning) microscope as well as synonyms, host plants and geographical distributions of these species. Also, a taxonomic key for these species was provided.

Introduction

Mealybugs (Hemiptera: Coccoidea: Pseudococcidae) are speciose group of plant sap-sucking insects. It is considered the second largest family of scale insects, with approximately 2,012 described species in more than 273 genera worldwide (Ben-Dov *et al.*, 2015). This family is more common in the tropical, subtropical and temperate regions (Ben-Dov, 1994). It is represented in Egypt by 50 species belonging to 29 genera (Abd-Rabou *et al.*, 2010).

Pseudococcids have negative economic impacts on a wide range of economic crops as vegetables, orchids trees, ornamental plants and green house crops. They feed by sucking – sap from the small phloem on different parts of plants including trunk, roots, leaves, rachis, buds and fruits.

Pseudococcids cause direct and indirect damages, depending on the species and the site used for feeding (Mani and Shivaraju, 2016). Recently, Pseudococcidae are considered and identified as vectors of virus diseases (Herrbach *et al.* (2016).

Two primary clades of Pseudococcidae were recovered and classified into two subfamilies, Phenacoccinae and Pseudococcinae. (Hardy *et al.* 2008). The taxonomic characters of this family are summarized: 1. have eight-segmented antennae. 2. Denticles are present on the tarsal claws. sclerotised spiracles without pores inside the atria. 3. Sclerotised spiracles without pores inside the atria. 4. Ostioles are characteristic of mealybugs, and occur as an anterior and a posterior pair, and consist of groups of large setae. 5. Anal ring is located

between the two anal lobes (Cox, 1987). The aim of this work is to identify and redescribe the most common Egyptian species of family Pseudococcidae based on the taxonomic morphological characters.

Materials and methods

Specimens of mealybug were collected from different Governorates of Egypt during 2015 to 2017 from the aerial parts of the economic crops and different ornamental plant species. The specimens and parts of the infested plants were collected and placed in labeled plastic bags. In laboratory the

specimens were picked off from the host plants individually with a very fine paint brush wetted with 70% alcohol and preserved in 70% alcohol for slide and scanning electron microscopy preparation. Each specimen was labeled by the recorded information of the host plant and collecting date. The methods of preparation the specimens for light microscopic was carried out according to Ezz, (1982). The study of scanning electron microscopic was carried out according to (Sirisena *et al.*, 2015).

Results and discussion

Key to the investigated species of Family Pseudococcidae

- 1- Tarsal digitules setose; claw with denticle; quinquelocular pores present; antennae nine segmented; anal ring with dome-shaped; dorsal setae as spine**Phenacocinae...2**
- Tarsal digitules knobbed; claw without denticle; quinquelocular pores absent; antennae less than nine segmented; anal ring with setose-like spinules; dorsal setae like-hair..... **Pseudococcinae...3**
- 2.Quinquelocular pores present; legs with translucent pores on hind tibia only; discoidal pores absent; circulus small.....**Phenacoccus parvus** Morrision, 1924
- Quinquelocular pores absent; legs with translucent pores on meta femur and meta tibia; discoidal pores present; circulus large**Phenacoccus solenopsis** Tinsly, 1898
- 3.Antennae 7- segments; circulus large as hourglass – shaped; last four abdominal segments with one long seta on lateral margins.....**Saccharicoccus sacchari** (Cockerell, 1895)
- Antennae 8 segments,circulus small, last four abdominal segments without setae on lateral margins.....4
- 4.Cerarii body absent; dorsal tubular ducts large with orifices around sclerotized area, with one or more setae arise.....**Ferrisia virgate** (Cockerell, 1893)
- Cerarii body present, dorsal tubular ducts normally without orifices5
- 5.Cerarii body with 17 pairs; cerarius with stout conical setae; anal lobes with irregular sclerotized area.....**Dysmicoccus brevipes** (Ferris, 1950)
- Cerarii body with 18 pairs, cerarius with conical setae, anal lobes with regular sclerotized area.....6
- 6.Dorsal setae stout; circulus quadrate shaped; translucent pores on hind coxa and tibia; ventral oral collar tubular ducts between antennae more five.....**Planococcus citri** (Risso, 1813)
- Dorsal setae slender; circulus broad shaped; translucent pores on hind coxa, femur and tibia; ventral oral collar tubular ducts between antennae less five...**Planococcus ficus** (Signoret, 1875)

Subfamily Pseudococcinae Cockerell; Silvestri, 1911: 132

Genus: *Ferrisia* Fullaway, 1923

Description

Body oval elongate; legs normally; claw without dentical; circulus present in all species; with one pair of cerarii on anal lobes only; oral collar tubular duct with orifices

each surrounded by sclerotized area from which one or more setae arise. This genus represented in Egypt by one species, *Ferrisia virgate*.

***Ferrisia virgate* (Cockerell, 1893) (Figures, 1-2)**

Synonyms:

***Dactylopius segregatus* Cockerell, 1893: 254.**

- Dactylopius virgatus* Cockerell, 1893: 178.
Dactylopius virgatus farinosus Cockerell, 1893: 178.
Dactylopius virgatus humilis Cockerell, 1893: 179.
Dactylopius ceriferus Newstead, 1894: 24.
Dactylopius talini Green, 1896: 7.
Dactylopius setosus Hempel, 1900: 386.
Pseudococcus virgatus; Kirkaldy, 1902: 103.
Dactylopius magnolicida King, 1902a: 616.
Pseudococcus magnolicida; Cockerell, 1902: 252.
Pseudococcus virgatus farinosus; Cockerell, 1902: 252.
Pseudococcus segregatus; Fernald, 1903: 109.
Pseudococcus virgatus humilis; Fernald, 1903: 111.
Dactylopius virgatus madagascariensis Newstead, 1908: 7.
Pseudococcus marchali Vayssiere, 1912: 366.
Pseudococcus virgatus madagascariensis; Lindinger, 1913: 68.
Pseudococcus bicaudatus Keuchenius, 1915: 49.
Ferrisia virgata; Fullaway, 1923: 308.
Ferrisiana virgata; Takahashi, 1929: 429.
Heliococcus malvastrus McDaniel, 1962: 323.
Ferrisiana setosus; Ali, 1970a: 108.
Ferrisia neovirgata Khalid & Shafee, 1988: 71.
Dactylopius cerciferus; Tao, 1999: 14.

Description

Adult female body shaped oval elongate, greyish-yellow, length 4.5 mm and width 2.51 mm, with one pair of anal lobes cerarii only; (Figure 1d). Antennae 8-segmented, measurements; in microns as follows: I (62.5); II (70.8); III (92.5); IV (55); V (64.2); VI (63.3); VII (60.8) and VIII (126.7). (Figure 1a – 2a). Legs normally developed, measurements of hind leg, in microns, as follows: coxae (153.2); trochanter (96); femur (285.3); tibia (295); tarsus (108.5) and claw (24.8) without denticle (Figure 1b-2C), circulus moderately large, oral collar duct that continues into sclerotized area which surrounds the opening of the duct, this orifice is variable in size but is usually approximately circular, flat and associated with 1-5 short slender

setae. (Figure 1,c), two pairs of ostioles clearly developed. (Figure 2D)

Host plants: It was found on henna plant, *Lawsonia inermis*, Fam. Lythraceae, tickberry, *Lantana camara*, Fam. Verbenaceae and rushfoil, *Croton* sp., Fam. Euphorbiaceae.

Distribution

Egypt: Cairo, Giza, Assiout, Qena, Ismailiya, Port-said, and Suez.

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearctic

Genus: *Dysmicoccus* Ferris, 1950

Description

Body oval to circular, legs developed, claw without denticle, tarsal claws elongate sometimes, hind legs with translucent pores; Circulus present or absent; Cerarii 4-17 pairs, each cerarius with two or more conical setae, provided with few auxiliary setae and trilocular pores; Multilocular pores present or absent dorso-venterally.

Dysmicoccus brevipes (Cockerell, 1893) (Figure, 3)

Synonyms:

- Dactylopius bromeliae*; Signoret, 1875: 310.
Pseudococcus brevipes; Fernald, 1903: 98.
Pseudococcus bromeliae; Fernald, 1903: 98.
Dactylopius (Pseudococcus) ananassae Kuwana, 1909: 162.
Pseudococcus missionum Cockerell, 1910: 113.
Pseudococcus bromeliae; Hempel, 1912: 24.
Pseudococcus palauensis Kanda, 1933: 135.
Pseudococcus longirostralis James, 1936: 207.
Pseudococcus defluiteri Betrem, 1937: 43.
Pseudococcus pseudobrevipes Mamet, 1941b: 58
Dysmicoccus brevipes; Moghaddam, 2009: 34.

Description

Adult female Body oval circular, dark orange, length 5.4 mm and width 3.9 mm, dorsum covered with thin layer of white wax, body margins with 17 pairs of cerarii, each cerarius with two large conical setae and cluster of trilocular pores (Figure 3d), antennae 8-segmented, measurements in microns, as follows: I (55.8); II (50); III (40);

IV (30); V (32.5); VI (34.2); VII (37.5) and VIII (76.7). (Figure 3b). Legs normally small, measurements of hind leg, in microns, as follows: coxae (97.5); trochanter (75); femur (197.5); tibia (161.7); tarsus (80.8) and claw (27.5) without "denticle" (Figure 3 c), Hind coxae and tibia with translucent pores. Abdominal segmented 4 and 5 with large oval circulus and divided by intersegmental line (Figure 3e). Anal ring normally small and circular.

Host plant: it was found on date palm tree, *Phoenix dactylifera*, Fam. Arecaceae.

Distribution

Egypt: Cairo, Giza, Alexandria, Fayoum, and North Sina

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental, Nearctic and Neotropical.

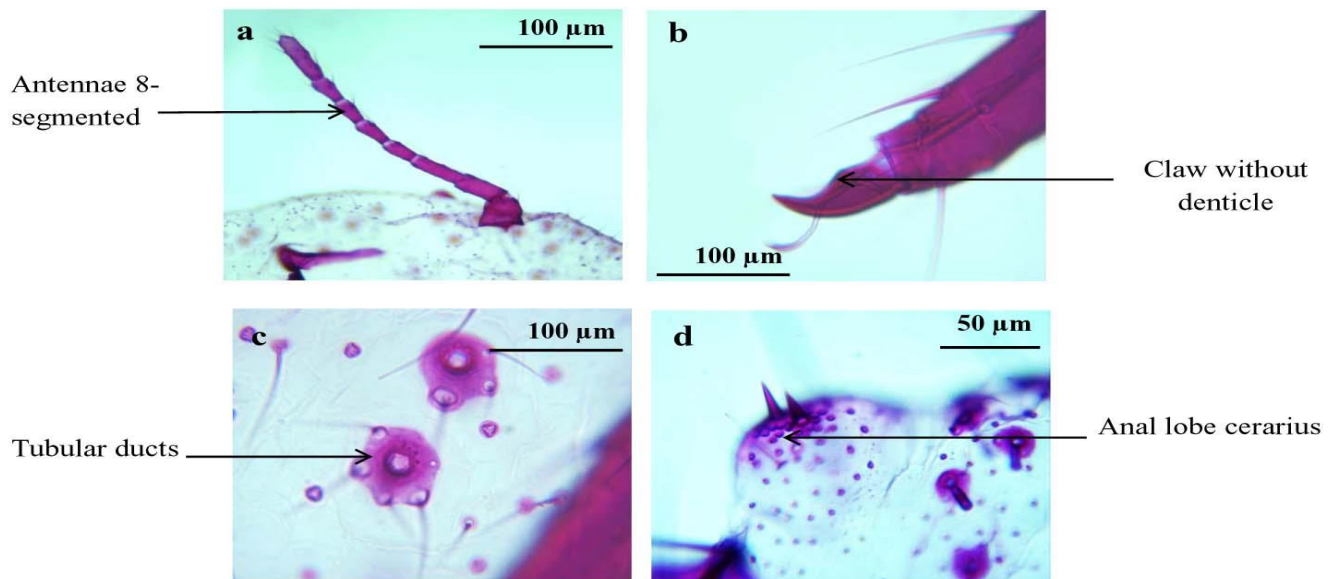


Figure (1): Morphological characters of *Ferrisia virgate*, a: Antennae segmented, b: Claw, c: tubular ducts, d: Cerarius.

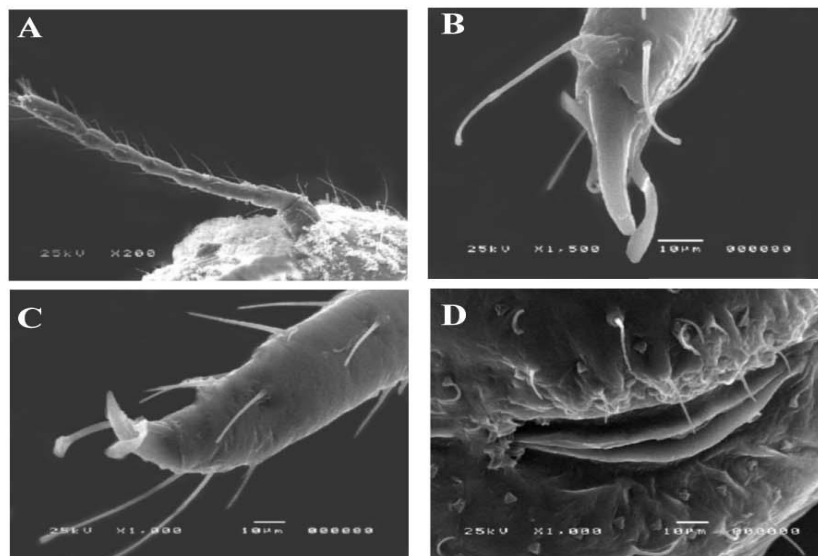


Figure (2) Scanning electron micrographs of *Ferrisia virgate*, showing A: Antennae, B: Tarsal digitules, C: Claw, D: Ositoles.

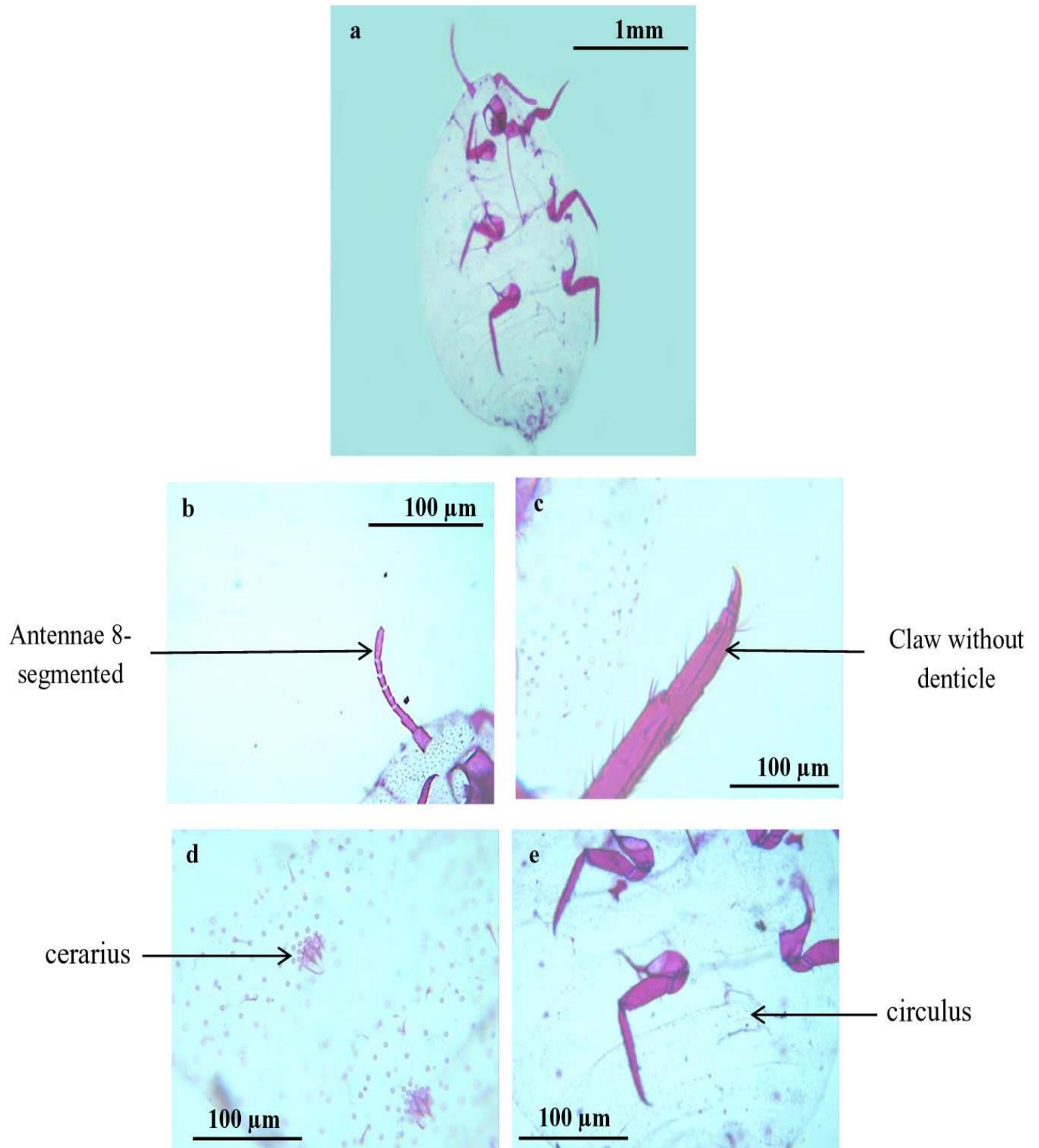


Figure (3): Morphological characters of *Dysmicoccus brevipes*, a: Adult female, b: Antennae segmented, c: Claw, d: Cerarius, e: Circulus.

Genus: *Planococcus* Ferris, 1950

Description

Body oval shaped, marginal provided with 18 pairs of cerarii, anal lobes cerarii with auxiliary setae, antennae 8 segmented, claws without denticles, hind legs with translucent pores on coxa and tibiae sometimes on hind femora, circulus quadrate shaped, multilocular disc pores and trilocular disc pores present dorso-ventrally, quinquelocular disc pores and oral rim tubular ducts absent, ventrally oral collar tubular ducts present. This genus is represented in Egypt by two species

***Planococcus citri* (Risso, 1813) (Figure, 4).**

Synonyms:

- Dorthesia citri* Risso, 1813: 416.
Coccus tuliparum Bouche, 1844: 301.
Coccus citri; Boisduval, 1867: 348.
Coccus citry; Alfonso, 1875: 428.
Dactylopius alaterni Signoret, 1875: 309.
Dactylopius ceratoniae Signoret, 1875: 311.
Dactylopius citri; Signoret, 1875: 312.
Dactylopius citri; Signoret, 1875: 312.
Dactylopius cyperi Signoret, 1875: 314.
Dactylopius robiniae Signoret, 1875: 322.
Dactylopius tuliparum; Signoret, 1875: 323.
Lecanium phyllococcus Ashmead, 1879: 160.
Coccus citry; Targioni Tozzetti, 1881: 134.
Dactylopius brevispinus Targioni Tozzetti, 1881: 137.
Dactylopius destructor Comstock, 1881: 342.
Dactylopius farinosus; Cockerell, 1898: 109.
Dactylopius secretus Hempel, 1900: 387.
Phenacoccus spiriferus Hempel, 1900: 389.
Phenacoccus spiniferus; Hempel, 1901: 110.
Pseudococcus citri; Cockerell, 1902: 252.
Pseudococcus cyperi; Fernald, 1903: 101.
Pseudococcus robiniae; Fernald, 1903: 108.
Pseudococcus tuliparum; Fernald, 1903: 111.
Pseudococcus alaterni; Fernald, 1903: 97.
Pseudococcus ceratoniae; Fernald, 1903: 99.
Pseudococcus citri coleorum Marchal, 1908: 236.
Dactylopius (Trechocorys) citri; Newstead, 1908: 9.
Pseudococcus citri phenacocciformis Brain, 1915: 116.
Planococcus citri; Ferris, 1950: 165.
Planococcoides cubanensis Ezzat & McConnell, 1956: 53.
Planococcus citricus Ezzat & McConnell, 1956: 69.

***Planococcus cucurbitae* Ezzat & McConnell, 1956: 71.**

Description

Adult female body oval shaped, body pink or orange brown in color, length 2.63mm and width 1.6 mm, dorsum covered with powdery white wax except central longitudinal stripe, body margins with 18 pairs of distinct cerarii, , anal lobe cerarii with auxiliary setae (Figure 4C), antennae 8-segmented, measurements in microns, as follows: I (50.83); II (54.2); III (50.8); IV (35); V (36.6); VI (34.2); VII (39.2) and VIII (86.7). (Figure 4A). Legs normally developed, measurements of hind leg, in microns, as follows: coxae (87.5); trochanter (84.2); femur (178.3); tibia (183.3); tarsus (85.8) and claw (26.6) without denticle, hind coxae and tibia with translucent pores. (Figure 4B). circulus large and quadrate shaped. (Figure 4E). ostioles distinct (Figure 4D). Oral collar-tubular duct in two sizes ventrally, the smaller ducts distributed in rows over median area of abdominal segments (from 3 to 8), larger ducts distributed in groups on marginal body, and sparsely between antennae and middle coxa of lateral margins.

Host plant: It was found on sand croton plant, *Croton glandulosus*, Fam. Euphorbiaceae, bitter orange tree, *Citrus aurantium*, Fam. Rutaceae, king orange tree, *Citrus nobilis*, Fam. Rutaceae, and grape vine plant, *Vitis vinifera*, Fam. Vitaceae.

Distribution

Egypt: Alexandria, Cairo, Beheira, Benisuef, Dakahhliya, El wadi el guided, Fayoum, Gharbiya, Gize, Ismailiya, Qena, Minya, Port-said, Qalyubiyah and Sharqiya.

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearctic

***Planococcus ficus* (Signoret, 1875) (Figure, 5)**

Synonyms:

- Coccus vitis*; Nedzilskii, 1869: 19.
Dactylopius vitis; Lichtenstein, 1870: L.
Dactylopius ficus Signoret, 1875: 315.

- Dactylopius vitis* Signoret, 1875: 324.
Dactylopius subterraneus Hempel, 1900: 388.
Pseudococcus ficus; Fernald, 1903: 101.
Pseudococcus vitis Fernald, 1903: 112.
Coccus vitis; Lindinger, 1912: 365.
Pseudococcus vitis Leonardi, 1920: 408.
Pseudococcus citrioides Ferris, 1922: 208.
Pseudococcus vitis Bodenheimer, 1924: 84.
Pseudococcus citri; Balachowsky & Mesnil, 1935: 729.
Coccus vitis Borchsenius, 1949: 132.
Dactylopius ficus; Borchsenius, 1949: 132.
Planococcus citrioides; Ferris, 1950: 164.
Planococcus vitis Ezzat & McConnell, 1956: 103.
Planococcus ficus; Ezzat & McConnell, 1956: 79.
Pseudococcus praetermissus Ezzat, 1962: 165.
Planococcus vitis Matile-Ferrero, 1984: 227.
Planococcus ficus; Moghaddam, 2009: 34.

Common name: Grapevine mealybug.

Description

Adult female body oval shaped and concave in lateral view, Body pink or orange brown in color, length 2.74 mm and width 1.5mm, body dorsum covered with powdery white wax except central longitudinal stripe down not as on *Planococcus citri*, body marginal provided with 18 pairs of distinct cerarii, usually each cerarius with two short conical setae and few number of trilocular pores, except cerarius on head and thorax which provided with long and slender setae, anal lobe cerarii with auxiliary setae.(Figure 5d). Antennae 8- segmented; measurements, in microns, as follows: I (36.7); II (41.7); III (43.3); IV (29.2); V (30); VI (32.5); VII (47.5) and VIII (90.3). (Figure5a). Legs normally developed, measurements of hind leg, in microns, as follows: coxae (55.8); trochanter (43.4); femur (125); tibia (111.7); tarsus (75); and claw (25.8) without "denticle"(Figur 5c), hind coxae, femur and tibiae with translucent pores usually. (Figure 5e). Abdominal segmented 4th & 5th with large circulus and broad in shaped. Anal ring normally small circular and with 3 pairs of long setae. (Figure5f).

Host plant it was found on grape vine plant, *Vitis vinifera*, Fam. Vitaceae.

Distribution

Egypt: Cairo, Fayoum, and Gize

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearcti

Genus: Saccharicoccus Ferris, 1950

Description

Body elongate and oval shaped, marginal without cerarii, anal lobes cerarii present, antennae 7 segmented, legs normal and short, claws without denticles, dorsally with two pairs of ostioles, circulus: hour- glass shaped and large, anal ring normally, multilocular disc pores present dorso-ventrally, tubular ducts present ventrally. This genus is represented in Egypt by one species *Saccharicoccus sacchari*.

Saccharicoccus sacchari (Cockerell, 1895)(Figures, 6-7)

Synonyms:

- Dactylopius sacchari* Cockerell, 1895a: 195.
Pseudococcus sacchari; Cockerell, 1902: 252.
Dactylopius sacchari brasiliensis van Gorkum, 1913: 29.
Trionymus calceolariae; Fullaway, 1923: 308.
Trionymus sacchari; Fullaway, 1923: 308.
Erium sacchari; Lindinger, 1935: 122.
Trionymus praegrans James, 1936: 200.
Trionymus sacchari; Zimmerman, 1948: 266.
Saccharicoccus sacchari; Ferris, 1950: 217.
Soccharicoccus sacchari; Tang, 2001: 3.

Common name: Pink sugar cane mealybug

Description

Adult female Body pink elongate and broadly oval; length 6.3 mm, width 3.75 mm; body cerarii absent, anal lobe cerarius associated with two small conical setae, two pairs of clearly developed ostioles, antennae normally, 7- segmented,(Figure 6a-7A) measurements in microns, as follows: I (56.7); II (52.7); III (45.8); IV (55.8); V (32.5); VI (42.5); and VII (79.2).Legs relatively small, measurements of hind leg, in

microns, as follows: coxae (117.3); trochanter (70.8); femur (204.1); tibia (146.7); tarsus (85); and claw(27.5), combined tibia and tarsus are shorter than combined trochanter and femur, claw without "denticle ", hind leg with translucent pores. (Figure 6 b-7B) Abdominal segmented 4th & 5th with circular as hour- glass shaped, (Figure 6d-7D) last four abdominal segmented provided with long setae laterally, and equal in size at segments 7th & 8th, but smaller on segment 6th, (Figure 6c-7C).

Host plant: it was found on sugar cane plant, *Saccharum officinarum*, Fam. Poaceae.

Distribution

Egypt: Beni Suef, Qena, and Minya.

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearcti

Subfamily Phenacoccinae šulc, 1944: 152

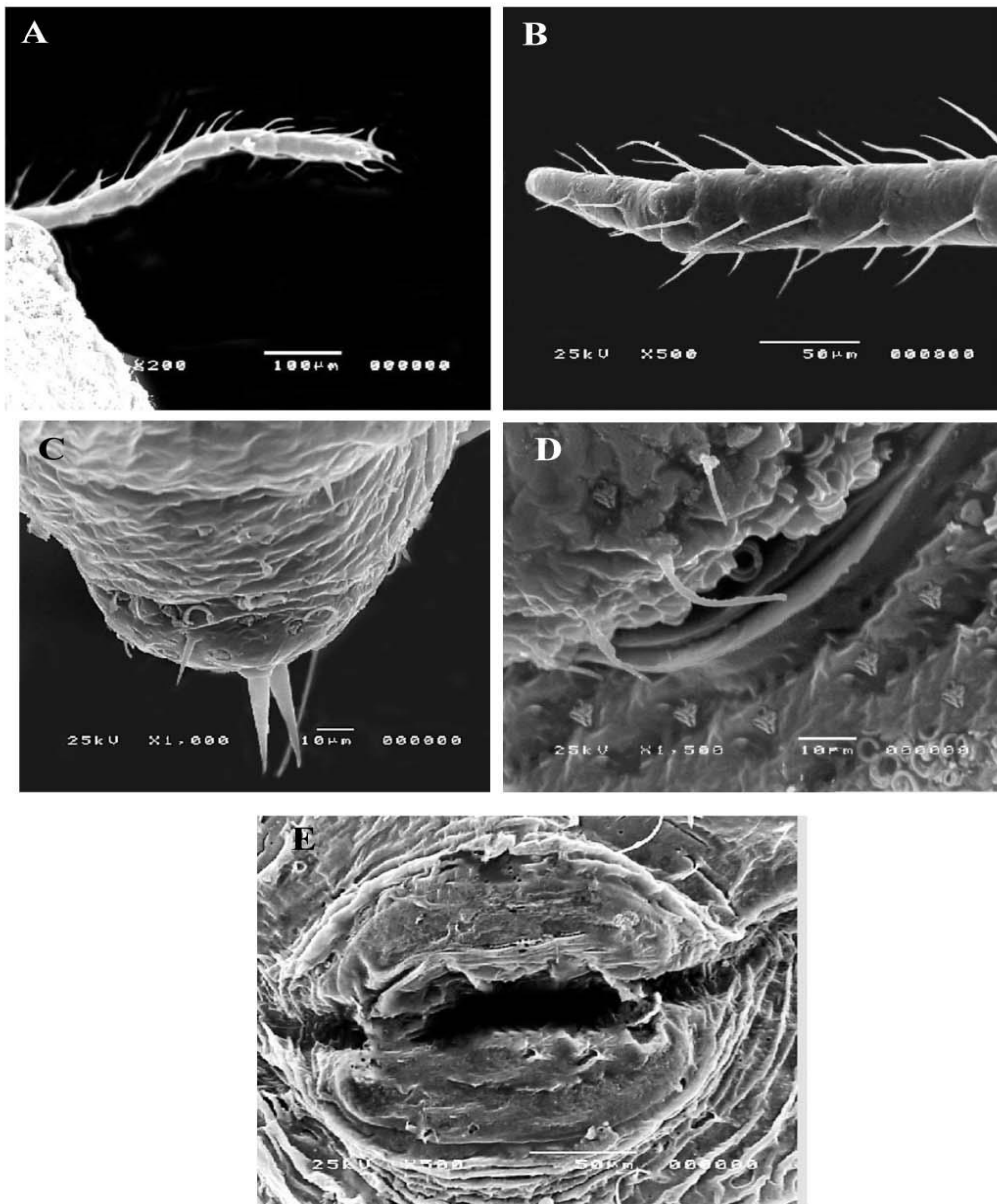


Figure (4): Scanning electron micrographs of *Planococcus citri*, showing A: Antennae, B: Claw, C: Cerarius, D: Ositoles, E: Circulus.

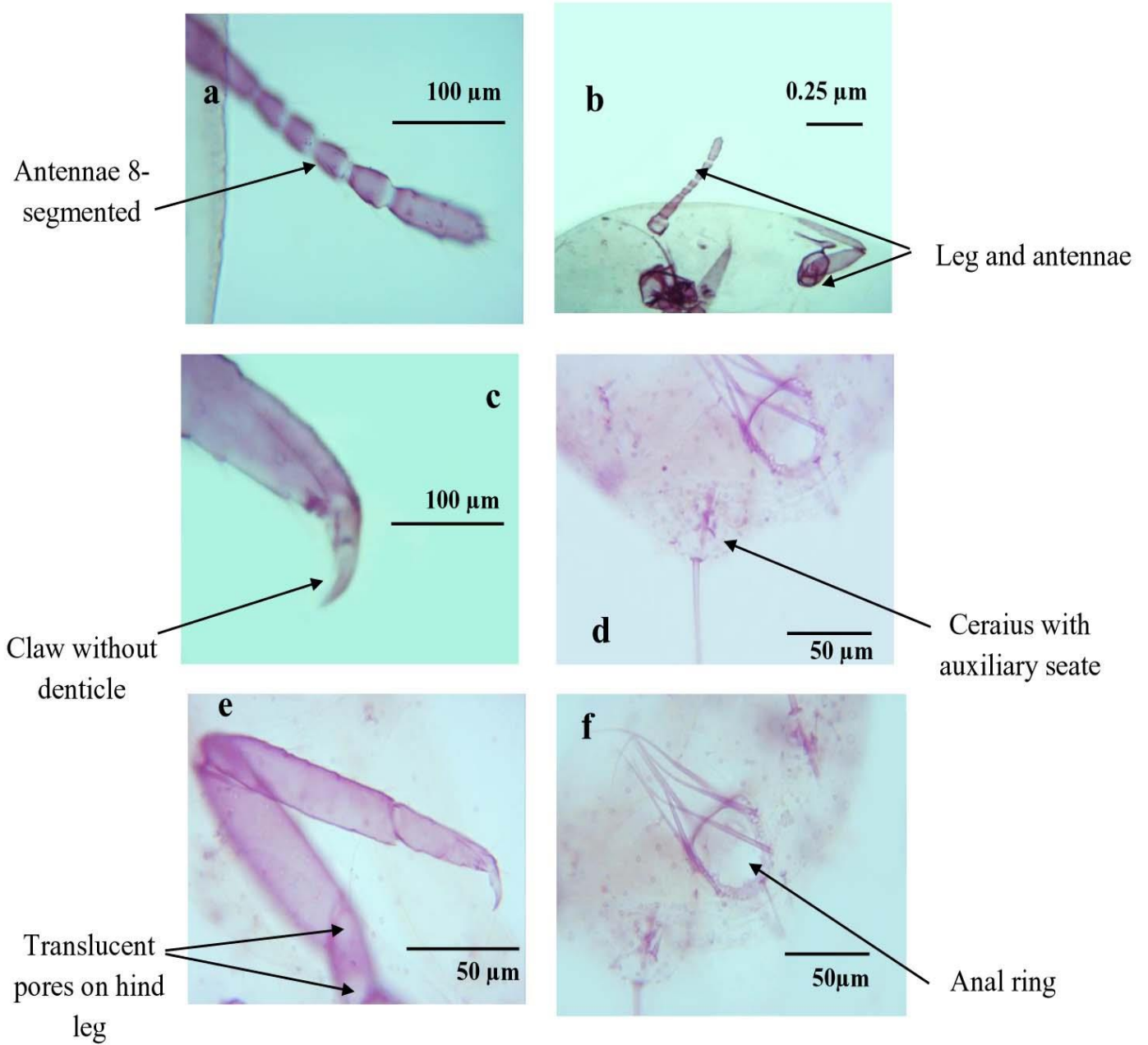


Figure (5): Morphological characters of *Planococcus ficus*, a: Antennae segmented, b: Leg and antennae, c: Claw without denticle, d: Ceraius with auxiliary seate, e: Translucent pores on hind leg, f: Anal ring.

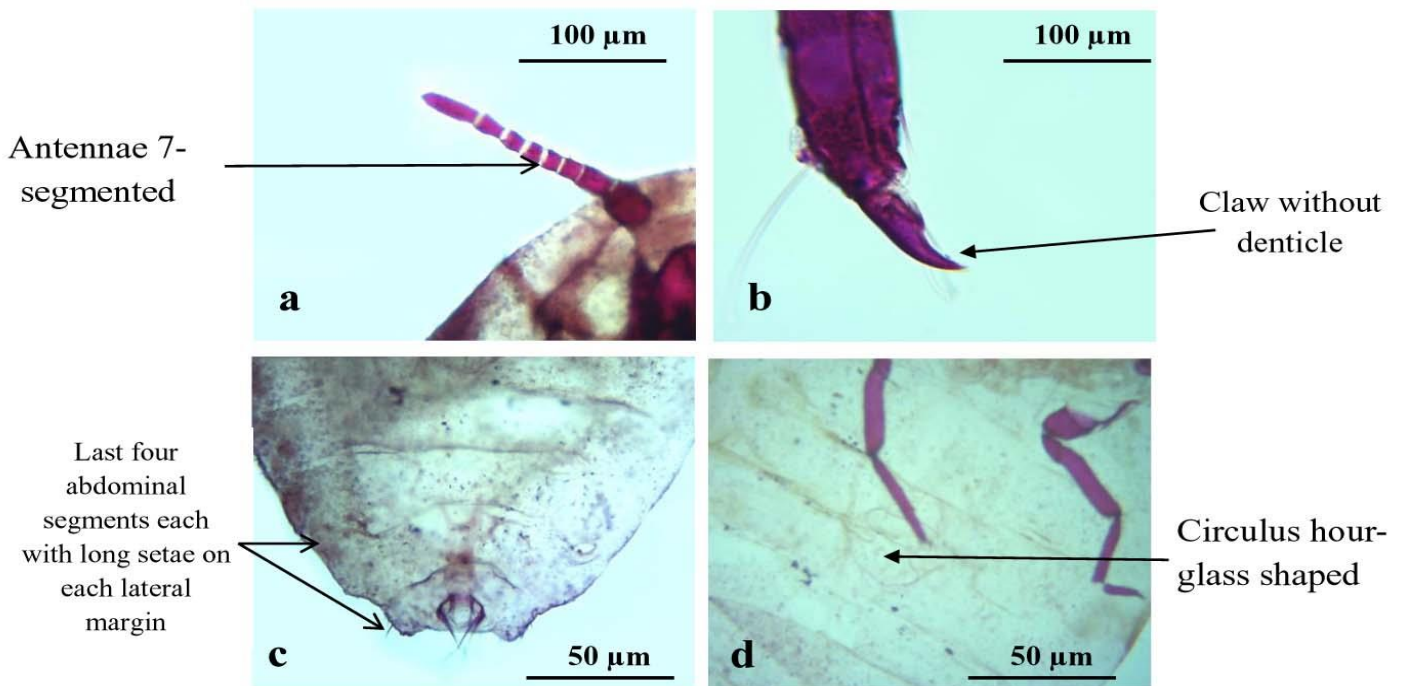


Figure (6): Morphological characters of *Saccharicoccus sacchari*, a: Antennae segmented, b: Claw, c: Last four abdominal segments each with long setae on each lateral margin, d: Circulus as hour-glass shaped.

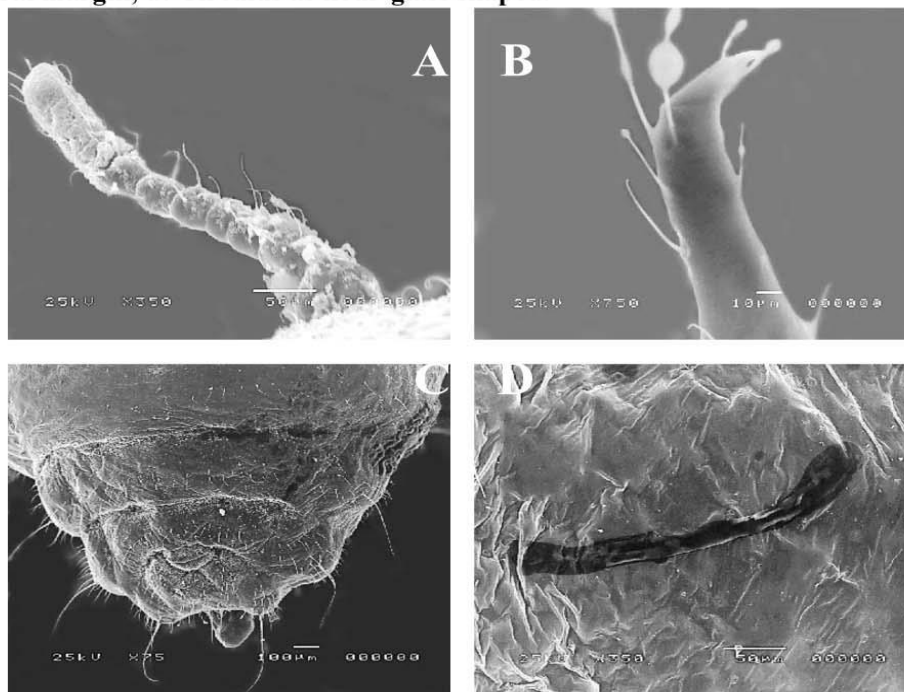


Figure (7): Scanning electron micrographs of *Saccharicoccus sacchari*, showing A: Antennae, B: Claw, C: Last four abdominal segments each with long setae on each lateral margin, D: Circulus.

Genus: *Phenacoccus* Cockerell, 1893**Description**

Body oval and globular shape, marginal provided with 8-18 pairs of cerarii, each cerarius with two conical setae, anal lobes cerarii with auxiliary setae, antennae 9 segmented, legs normally, claw with denticle, hind legs with translucent pores, dorsally two pairs of ostioles, circulus absent or present with different shapes and size, anal lobe bars absent, anal ring normal, multilocular disc pores present ventrally, present or absent on dorsally, quinquelocular pores and trilocular disc pores present ventrally, discoidal pores sometimes apparent, oral rim tubular ducts absent, oral collar tubular duct present dorso-ventrally, body setae different type (flagellate on venter and small and lanceolate on dorsal). This genus is represented in this studied by two species *Phenacoccus solenopsis*, *Phenacoccus parvus*, and for first time these taxa described in Egypt.

***Phenacoccus solenopsis* Tinsley, 1898 (Figures, 8-9)**

Phenacoccus solenopsis Tinsley, 1898: 47.

Phenacoccus cevalliae Cockerell, 1902a: 315.

Phenacoccus gossypiphilous Abbas, Arif & Saeed, 2005: 83.

Phenacoccus gossypiphilous Arif, Abbas & Saeed, 2007: 3.

Phenacoccus gossypiphilous Abbas, Arif, Saeed & Karar, 2008: 103.

Description

Adult female large species, body generally oval shaped and membranous, (Figure 9A) .length 3.025 mm, width 2.03 mm, dark green, almost black, body dorsum covered with thin powdery secretion, and dark spots on segments of thorax and abdomen, body marginal with 18 pairs of cerarii, each cerarius with two small conical setae (Figure 9F), and associated by few trilocular pores, dorsal body setae small and lanceolate, quinquelocular pores absent. antennae 9 segmented; the measurements in microns; as follows: I (56.8); II (90.8); III (63.3); IV (58.3); V (63.3); VI (55); VII (50.8); VIII (40.8); and IX (75). (Figure 8a-9B) Legs

normally developed, measurements of hind leg, in microns, as follows: coxae (237.5); trochanter (129.2); femur (285); tibia (290); tarsus (115); and claw (30.8) with "denticle", (Figure 8b-9C,D) apex of meta femur and meta tibia with translucent pores. Segments 4th & 5th with more oval and larger circulus. (Figure 8d-9G), Anal ring normally circular with 3 pairs of long setae, (Figure 8,c). multilocular pores present only ventrally in groups around vulva, (Figure 8e-9H), ostioles developed and represent dorsally. (Figure 9E).

Host plants: it was found on okra plant, *Abelmoschus esculentus*, Fam. Malvaceae, extra-long staple cotton plant, *Gossypium barbadense*, Fam. Malvaceae, corn plant, *Zea mays*, Fam. Poaceae, eggplant, *Solanum melongena*, Fam. Solanaceae.

Distribution

Egypt: Alexandria, Beheira, Cairo, Giza, and Qalyubiya.

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearctic

Phenacoccus parvus* Morrison, 1924 (Figure, 10)*Synonyms:**

Phenacoccus parvus Morrison 1924: 147.

Phenacoccus surinamensis Green 1933: 51.

Common name: Lantana mealybug

Description

Adult female Large species generally; body oval shaped, often flattened dorso-ventrally and membranous, light yellow in color, body dorsum covered with thin powdery secretion, Body length 3.36 mm, and width 2.2 mm, Body with 18 pairs of cerarii, around margins, each cerarius with two small conical setae, and associated with few trilocular pores, body setae short and stout. Antennae 9-segmented; measurements in microns; as follows: I (62.1); II (92.3); III (62.4); IV (59.3); V (64.9); VI (55.06); VII (51.5); VIII (41.4); IX and (76.8). (Figure 10a). Legs normally developed; measurements of hind leg, in microns, as

follows: coxea (231.5); trochanter (122.6); femur (273.4); tibia (288.7); tarsus (116.1) and claw (25.2) with minute tooth on plantar surface of the claw "denticle", (Figure 10 b), hind tibia with translucent pores; quinquelocular pores present ventrally. (Figure 10e). Abdominal segments 4th & 5th with oval and small circular (Figure 10 c).

Host plants: it was found on tick berry plant, *Lantana camara*, Fam. Verbenaceae

Distribution

Egypt: Cairo, Giza.

World: this species is distributed in the following zoogeographic regions: Palaearctic, Afrotropical, Australasian, Oriental and Nearcti

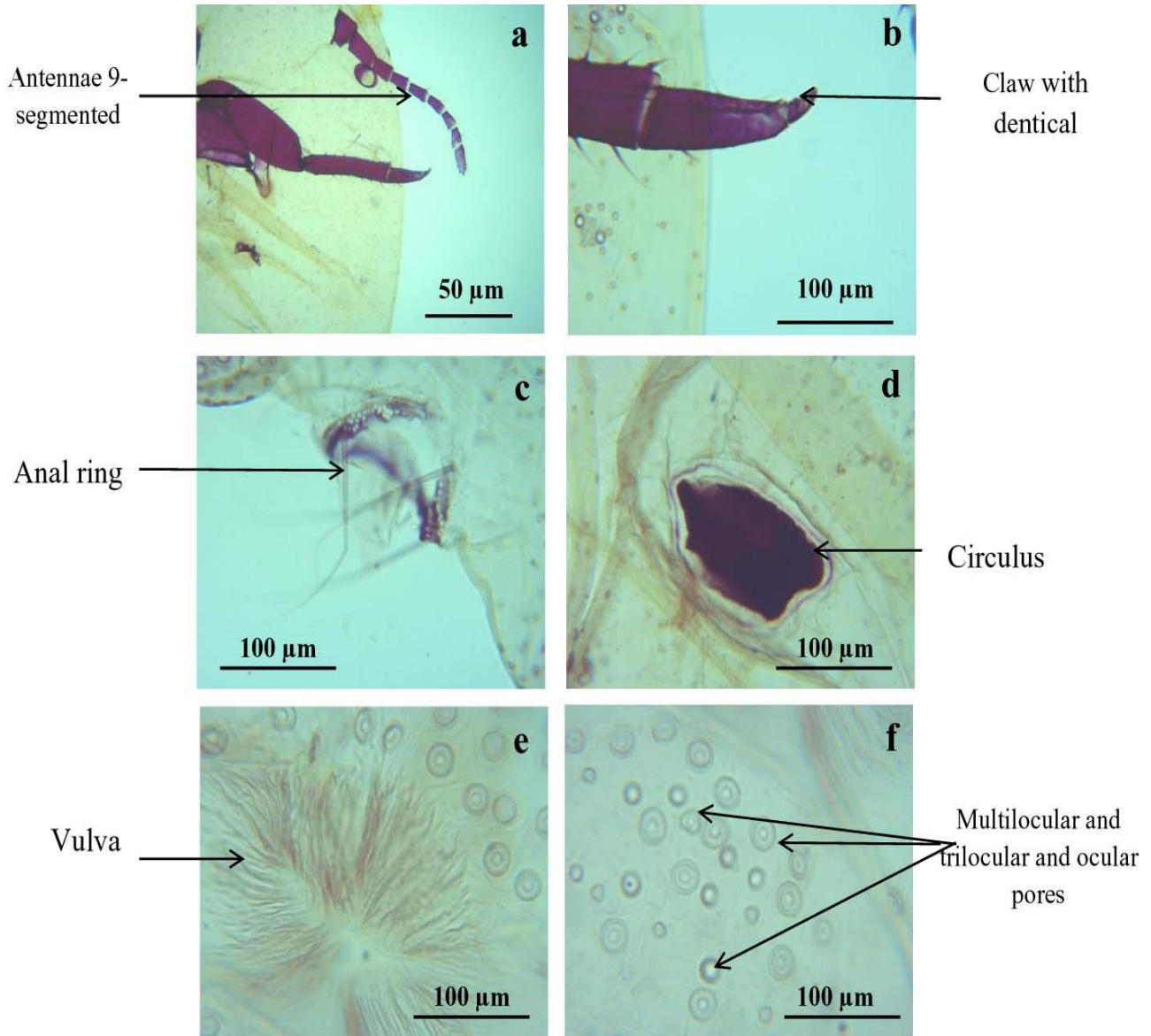


Figure (8): Morphological characters of *Phenacoccus solenopsis*, a: Antennae segmented, b: Claw, c: Anal ring, d: Circulus, e: Vulva, f: Multilocular and trilocular and ocular pores.

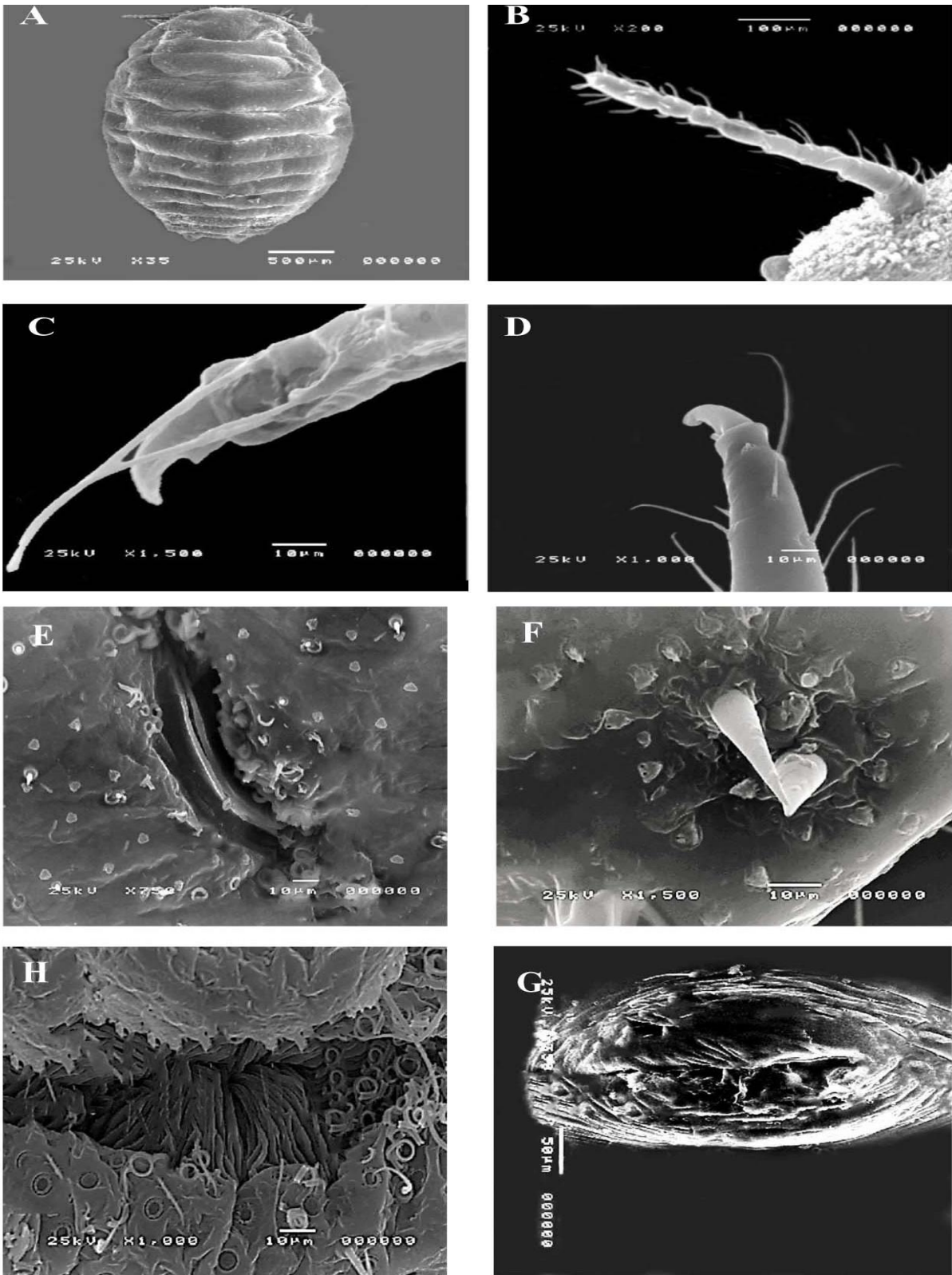


Figure (9): Scanning electron micrographs of *Phenacoccus solenopsis*, showing, **A:** Adult female, **B:** Antennae, **C:** Claw, **D:** Tarsal digitules, **E:** Ostioles. **F:** Cerarius with two conical setae and trilobular pores, **G:** Circulus, **H:** Vulva.

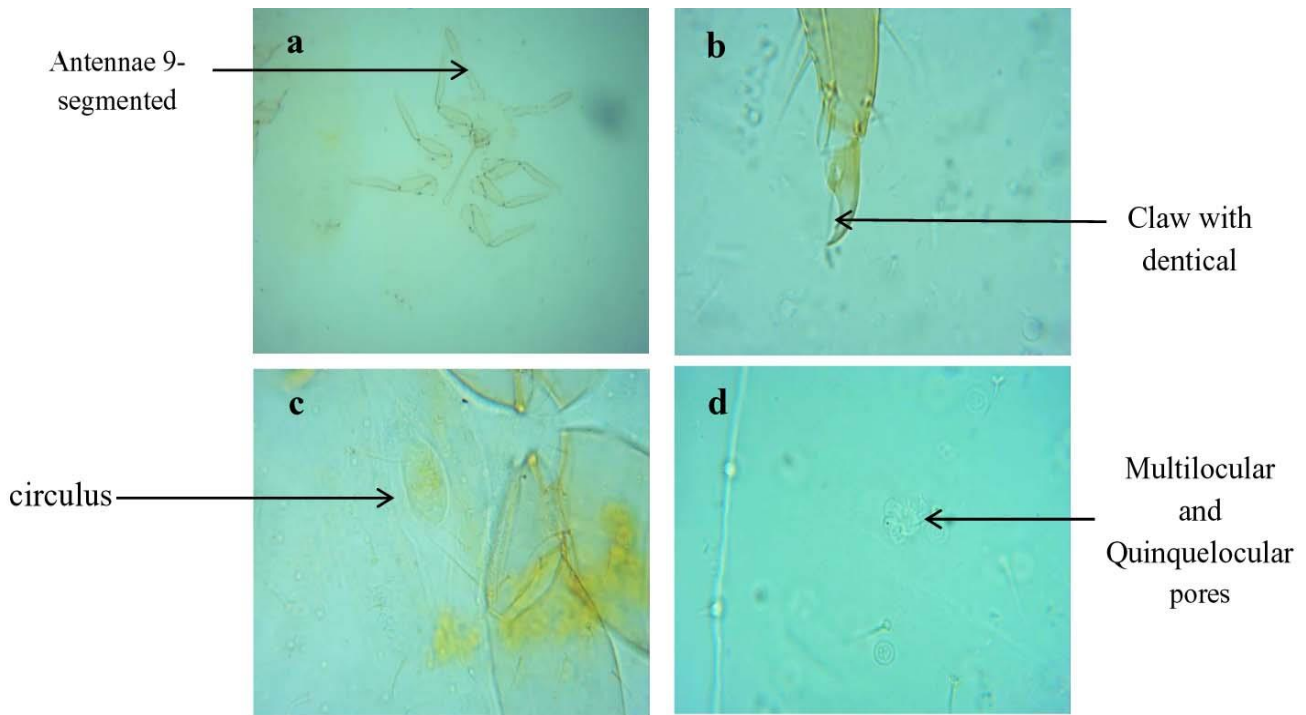


Figure (10): Morphological characters of *Phenacoccus parvus*, a: Antennae segmented, b: Claw, c: Circulus, e: Multilocular & quinquelocular pores.

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