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Two New Species of *Caloglyphus* Berlese, 1923 (Acari: Acaridae) from Soil in Egypt

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ABSTRACT

Two new mite species of the genus *Caloglyphus* Berlese, 1923 (Acari: Acaridae) are described and illustrated based on deutonymphal stages collected from mango orchards in Assiut, Upper Egypt. The new species, *C. mangiferus* sp. nov. and *C. similiares* sp. nov., were extracted from soil samples under the mango trees. The new species are characterized by having a pair of short peduncles globosely setae situated dorsosublaterally on the idiosoma.

INTRODUCTION

Mites of the family Acaridae Latreille, 1802 are cosmopolitan and worldwide in distribution. They are mainly considered as major pests of stored products and can also be found free-living in soil. Many species of the genus *Caloglyphus* Berlese, 1923, previously known as *Sancassania* Oudemans, 1916, have been previously described worldwide (Mahunka, 1973, 1974, 1978, 1979; Samšičák, 1980, 1988; Zou and Wang, 1989; Eraky, 1999, 2000; Klimov, 1996, 2000; O'Connor, 2003; Klimov and O'Connor, 2003; Sarwar and Ashfaq 2004, 2006, 2010, 2012; Negm, 2007; Eraky and Osman, 2008; Fakeer et al., 2014; Eraky et al., 2017). In Egypt, few species of *Caloglyphus* Berlese, 1923 have been described (*C. csibbii* Eraky, 1999; *C. ornatus* Eraky, 2000, *C. arafati* Eraky, 2000; *C. labiduratus* Negm, 2007; *C. subteraneousi* Fakeer et al., 2014; *C. citri* Eraky et al., 2017; *C. azzai* Eraky et al., 2020; *C. punicum* Eraky et al., 2020) from animal manure, termite nests, the soil under citrus trees and the soil under pomegranate trees. Therefore, the present study provides descriptions and illustrations of two new species of the genus *Caloglyphus* based on heteromorphic deutonymphs (hypopi) collected from the soil under mango trees in Egypt.

MATERIALS AND METHODS

The current study was carried out in mango orchards located in Sahel Salem district, Assiut Governorate, Egypt. Soil samples (10 cm³, n=8) from under mango trees were collected fortnightly during a year starting from November 2017. The collected materials yielded some species of mites. Of these two variable groups of deutonymphs of *Caloglyphus* proved to be new to science. The collected deutonymphs were cleared in lactic acid, mounted

in Hoyer's medium on glass slides, dried in an oven at 50-55°C, ringed with nail polish, then examined under a phase-contrast microscope (Optika-Vision-lite_ENG-rev01, Italy), provided with camera and system of calibration of a micrometric slide, a drawing tube was also used when necessary. The examination of the collected deutonymphs showed some interesting morphological characteristics unusual in the described *Caloglyphus* species. Measurements are given in micrometers (μm), each measurement shows the average for a number of individuals, followed (in parentheses) by a respective range. The deutonymphs of both new species were described and illustrated. Nomenclature of idiosomal chaetotaxy followed Griffiths *et al.* (1990) and Grandjean (1939) for the chaetotaxy of legs. For both species, the holotype and paratype deutonymphs were measured for gnathosoma, adhering plate, propodosoma, idiosoma, idiosomal chaetotaxy; however, holotypes were measured for legs, tarsi, and legs chaetotaxy.

RESULTS AND DISCUSSION

DESCRIPTION OF THE NEW SPECIES

Cohort Astigmatina (Astigmata) **Canestrini, 1891**

Superfamily Acaroidea **Latreille, 1802**

Acaridae **Latreille, 1802**

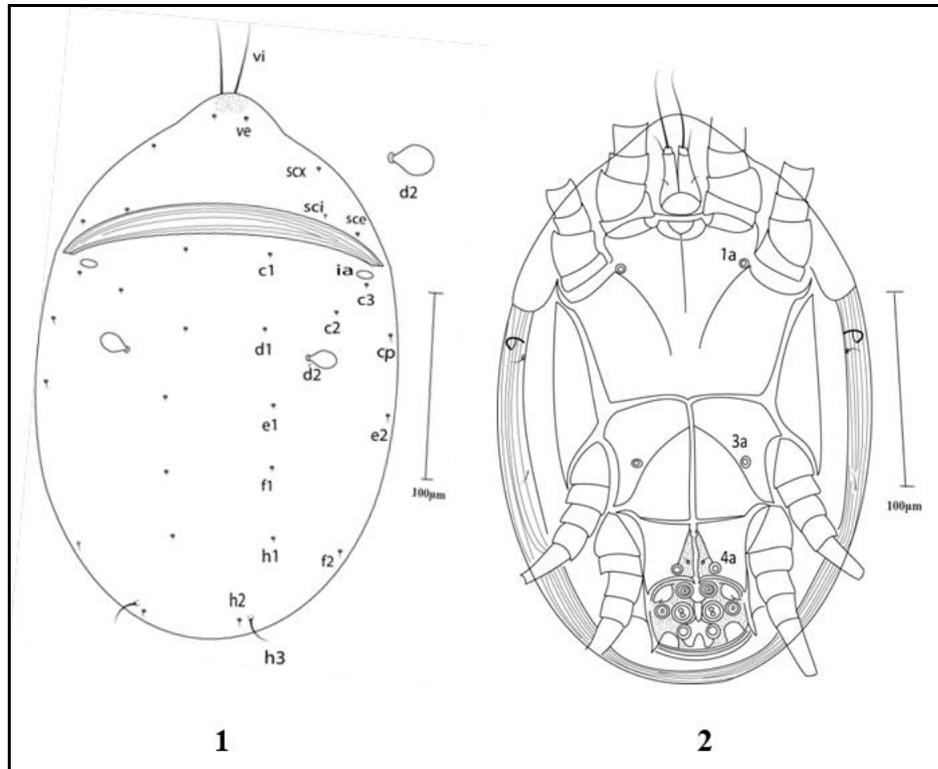
Caloglyphus **Berlese, 1923**

1. *Caloglyphus mangiferus* sp. nov.

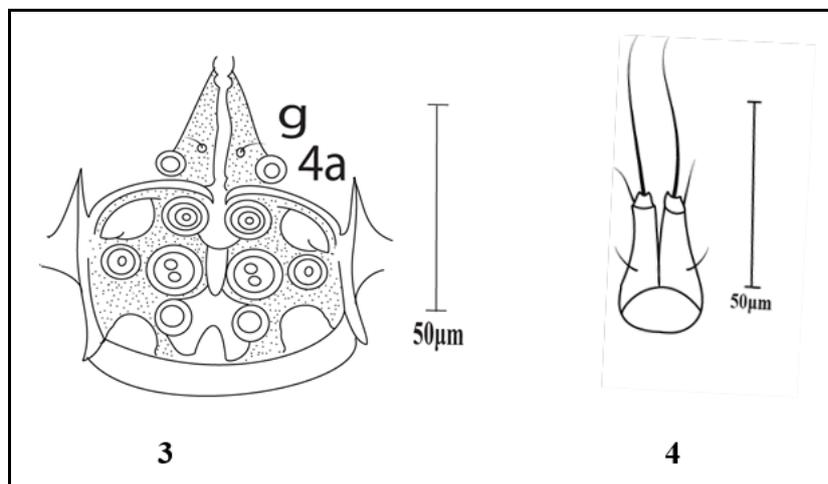
Dorsum (Fig. 1). Idiosoma 287 (280-294) long, 190 (185-195) wide. Body ovoid. Propodosoma and hysterosoma smooth, without any sculptures. Propodosoma medially elongated into a cone, posterior and lateral margins of propodosoma concaved, approximately triangular in outline. Propodosomal length: 57 (55-59) long, 155 (151-159) wide. Internal vertical setae *vi* 35 filiform, positioned anterior to propodosomal apex; external vertical setae *ve* 3 located posterior to *vi*; internal scapular setae *sci* and external scapular setae *sce*, positioned laterally, close to anterior margin of dorsosejugal region, internal setae originating in front of external ones; propodosomal setae *ve*, *scx*, *sci*, *sce*, minute, ranged 3-4. Dorsosejugal region well-developed, approximately narrow, ornamented with transversal lines. Hysterosoma with 13 pairs of minute, simple setae, ranged 3-4, except a pair of unusual, short peduncle globosely setae *d2* 11, situated posterior to setae *c2* (Fig. 1) and setae *h3* 10, filiform. A pair of oval cupules *ia* originating laterally, anterior to setae *c3*.

Venter (Fig. 2). Apodemes thin, but well-developed. Anterior apodemes of coxal field I broad, fused medially forming Y-shaped sternum, the latter short, ending free. Anterior apodemes of coxal fields II short, ending free, not fused medially with posterior ones, accordingly coxal fields I and II open. Apodemes of coxal fields III and IV long, each fused medially; posterior sternal apodeme well-developed extending from genital opening and fused medially with apodemes of coxal fields III and IV. Thus, coxal fields III, IV closed. All coxal fields of the ventral surface smooth without any sculpture. Lateral margins of ventral surface ornamented with longitudinal lines, posterior margin with transversal lines. Coxal fields I, III and IV with small rounded discs each (*1a*, *3a* and *4a*), slightly larger on coxal fields IV; genital setae (*g*) positioned anterior and medial to *4a*. Adhering plate (Fig. 3), 43 (41-45) long, 53 (50-56) wide, entirely filling a space between legs IV, situated close to posterior body margin. Anterior suckers rounded; median suckers slightly larger than anterior ones, consisting of broad sclerotized margin surrounding a pair of alveoli. Lateral and posterior suckers well-developed; a space between internal suckers of adhering plate, ornamented with punctulae.

Gnathosoma (Fig. 4). Infracapitulum of gnathosoma 32 (29-35) long, 22 (19-25) wide, approximately pear-shaped, wide basally and bifurcated anteriorly; palps short, but well separated 4 long, 4 wide; apical palpal solenidia (ω) 35, filiform; palpal supracoxal setae (*elcp*) 9 filiform, infracapitular setae (*m*) 7.



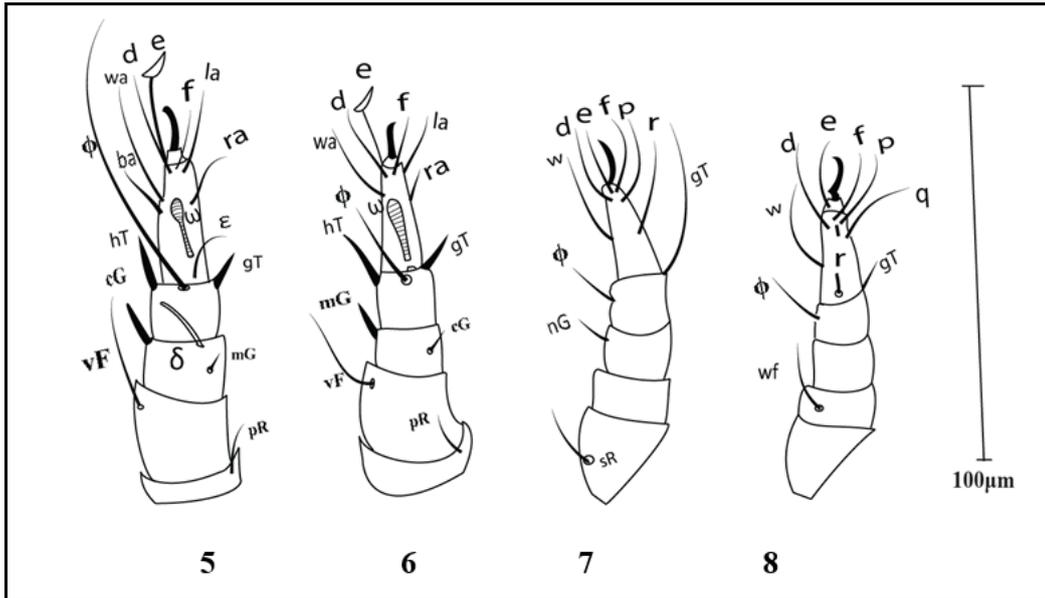
Figs. 1 & 2. *Caloglyphus mangiferus* sp. nov. (deutonymph): **1.** dorsal side; **2.** ventral side.



Figs. 3 & 4. *Caloglyphus mangiferus* sp. nov. (deutonymph): **3.** adhering plate; **4.** gnathosoma.

Legs (Figs. 5-8). All legs with well-developed hooked empodial claws, arising apically. Length of legs: legs I 94, legs II 97, legs III 84, legs IV 85; tarsi I 39, tarsi II 33, tarsi III 23, tarsi IV 25. Trochanter I, II, III each with filiform setae (*pR* I 9, *pR* II 10, *sR* 19). Femoral setation: 1-1-0-1; setae *vF* I 29, *vF* II 24, *wF* IV 16, each filiform. Genual setation: 2-2-1-0; setae *cG* I 14, *mG* II 9 spine-like, setae *mG* I 7, *cG* II 6 filiform, *nG* III 8 filiform. Tibial setation: 2-2-1-1; setae *gT* and *hT* I-II spine-like, *gT* III-IV filiform; *gT* I 12, *hT* I 15, *gT* II

11, *hT* II 19, *gT* III 18, *gT* IV 9. Tarsal setation: 7-6-6-7; all setae on tarsi I-IV filiform, except seta *r* (tarsus IV) cylindrical; setae *ba* 7 somewhat spine-like, setae *ra* 18, *wa* 28, *d* 14, *f* 16, *e* 30, *la* 19 (tarsi I); setae *e* on both tarsi I, II with a crescent-like apices; setae *ra* 18, *la* 17, *wa* 20, *d* 17, *f* 11, *e* 22 (tarsi II); setae *p* 15, *f* 11, *d* 12, *e* 13, *s* 18, *w* 22 (tarsi III); setae *r* 5, *f* 11, *w* 25, *q* 20, *e* 12, *d* 12, *p* 16 (tarsi IV). Group of solenidia consisting of following: ω on tarsi of legs I, II clavate, thicker on tarsi II; ω (tarsi I) positioned more distant from the tarsal base; ε of legs I thin and filiform, situated close to the tarsal base, absent on legs II; ϕ of tibiae I, II elongate, filiform, much longer on tibia I, ϕ of tibiae III, IV filiform, slightly short; σ of genua I cylindrical, absent on genua II. Length of solenidia: ω 22 (tarsi I), ω 20 (tarsi II); ϕ 66 (tibiae I), 23 (tibia II), 16 (tibiae III), 16 (tibiae IV); ε 14 (tarsi I); σ 15 (genua I),



Figs. 5-8. *Caloglyphus mangiferus* sp. nov. (deutonymph): **5.** leg I; **6.** leg II; **7.** leg III; **8.** leg IV.

Type Material:

Holotype and seven paratype deutonymphs; soil under mango trees; Sahel Salem (27°03'24"N, 31°19'59"E), Assiut, Upper Egypt; leg. F.A. Marei; 08 Jan. 2018; deposited in the Acari collection of Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut, Egypt.

Etymology:

The species epithet '*mangiferus*' refers to the host plant name where the mite was found nearby.

Remarks:

The new species can be well-characterized by the shape of propodosoma, dorsal chaetotaxy and by the presence of a pair of short peduncles globosely setae situated sub laterally on the idiosoma, in addition to the structure and chaetotaxy of legs. Based on the aforementioned characteristics, the new species is well distinguished from all the heretofore described species of the genus *Caloglyphus*.

Cohort Astigmatina (Astigmata) **Canestrini, 1891**

Superfamily Acaroidea **Latreille, 1802**

Acaridae **Latreille, 1802**

Caloglyphus **Berlese, 1923**

2. *Caloglyphus similares* sp. nov.

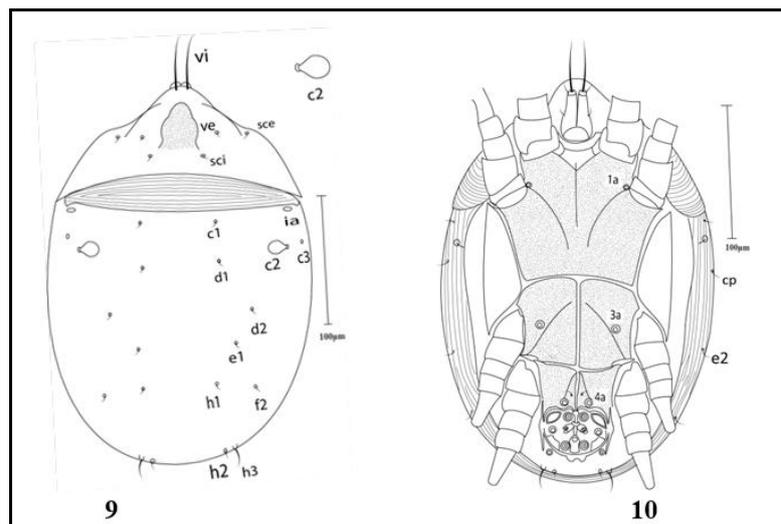
Dorsum (Fig. 9). Idiosoma 302 (295-309) long, 205 (200-210) wide. Body ovoid. Propodosoma and hysterosoma smooth, without any sculptures. Propodosoma medially

Two New Species of *Caloglyphus* Berlese, 1923 (Acari: Acaridae) from Soil in Egypt⁶⁹

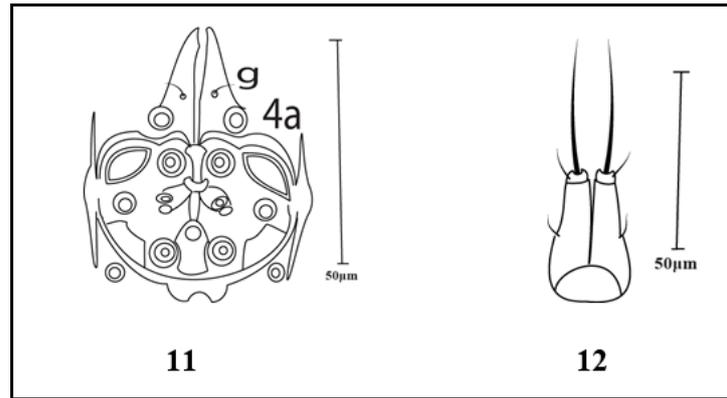
elongated into a cone, posterior and lateral margins of propodosoma concaved, approximately triangular in outline; horizontal concave bell-shaped structure, ornamented with punctulae located on the middle of propodosoma, posterior to propodosomal apex. Propodosomal length: 63 (59-67) long, 177 (173-181) wide. Internal vertical setae *vi* filiform, positioned anterior to propodosomal apex; external vertical setae *ve*, located on both sides of the bell-shaped structure; external scapular setae *sce*, positioned lateral to setae *ve*, at the same transversal line, internal scapular setae *sci*, positioned posterior and medial to setae *ve* and *sce*; all propodosomal setae very short, ranged of 6-7, except setae *vi* 41. Dorsosejugal region well-developed, approximately wide, ornamented with transversal lines. Hysterosoma with 12 pairs of filiform setae, ranged of 6-7, except a pair of unusual, short peduncle globosely setae *c2* 10; setae *h3* 14 filiform. A pair of oval cupules *ia* originated laterally, close to the posterior margin of dorsosejugal region.

Venter (Fig. 10). Apodemes thin, but well-developed. Anterior apodemes of coxal field I broad, fused medially in a Y-shaped forming a sternum, the latter short, ending free. Anterior apodemes of coxal fields II short, free medially, not fused with posterior ones, accordingly coxal fields I, II open, Apodemes of coxal fields III, IV long, fused medially; posterior sternal apodeme well-developed extending from genital opening and fused medially with apodemes of coxal fields III and IV. Thus, coxal fields III, IV closed. All coxal fields of ventral surface ornamented with punctulae. Lateral and posterior margins of ventral surface ornamented with longitudinal lines in lateral sides and transversal lines in posterior one. Coxal fields I, III, and IV each with rounded discs (*1a*, *3a*, and *4a*), slightly smaller on coxal fields I; genital setae (*g*) positioned anterior and medial to *4a*. Adhering plate (Fig. 11), well-developed, approximately large 38 (35-41) long, 50 (47-53) wide, entirely filling a space between legs IV, situated close to posterior body margin. Anterior and posterior suckers rounded, larger than medial and lateral ones; median suckers ovoid, consisting of sclerotized thin margin enlarged backward, ending with two small alveoli.

Gnathosoma (Fig.12). Infracapitulum of gnathosoma 31 (29-33) long, 23 (22-24) wide, approximately pear-shaped, wide basally and bifurcated in anteriorly; palps short, but well separated off 3 long, 5 wide; apical palpal solenidia (*ω*) 37, setiform; palpal supracoxal setae (*elcp*) 11, infracapitular setae (*m*) 9, both filiform.

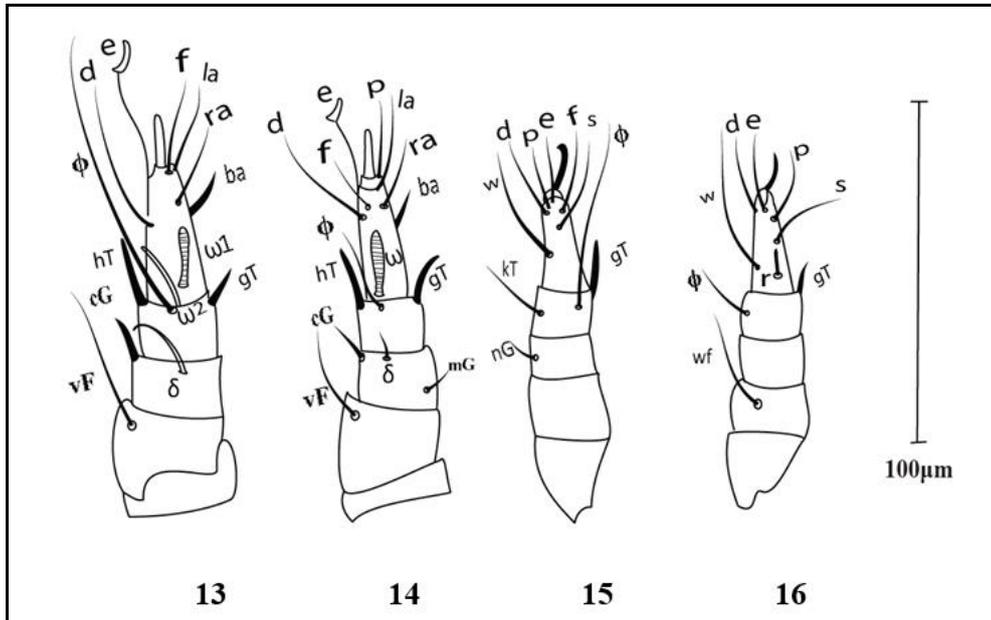


Figs. 9 & 10. *Caloglyphus similares* sp. nov. (deutonymph): **9.** dorsal side; **10.** ventral side.



Figs. 11 & 12. *Caloglyphus similares* sp. nov. (deutonymph): **11.** adhering plate; **12.** gnathosoma.

Legs (Figs. 13-16). All legs with well-developed broad claws, arising apically. Length of legs: legs I 101, legs II 99, legs III 90, legs IV 88; tarsi I 35, tarsi II 33, tarsi III 26, tarsi IV 28. Femoral setation: 1-1-0-1: setae *vF* I 30, *vF* II 16, *wF* IV 29, all filiform. Genual setation: 1-2-1-0; setae *cG* I 14, spine-like; setae *mG* II 8, *cG* II 10, filiform, *nG* III 12 filiform. Tibial setation: 2-2-2-1; setae *gT* I 13 and *hT* I 19, spine-like, *gT* II 13, *hT* II 17, spine-like; *gT* III 15, spine-like, *kT* III 17, filiform; *gT* IV 7, spine-like. Tarsal setation: 6-7-6-6; all setae on tarsi I-IV filiform, except seta *r* (tarsus IV) cylindrical, setae *ba* (9 tarsi I and 12 tarsi II), somewhat spine-like, setae *ra* 19, *d* 26, *f* 17, *e* 26, *la* 9 (tarsi I); setae *e* on both tarsi I, II with a crescent-like apex; on tarsus II, setae *ra* 14, *la* 27, *d* 24, *f* 12, *e* 24, *p* 17; on tarsus III, setae *w* 22, setae *f* 13, *d* 19, *e* 21, *s* 19; on tarsus IV, setae *r* 11 approximately cylindrical, *w* 30, *e* 24, *d* 13, *p* 15. Tibiotarsal group of solenidia consisting of following: on legs I, $\omega 1$ 14 clavate, located on more distant from the tarsal base, $\omega 2$ 15 cylindrical, positioned on the tarsal base, ϕ 82, filiform, σ 18 curved, tapering, ϵ absent; on legs II, ω 16, clavate, positioned on less distant from the tarsal base, σ 8 filiform; ϕ on legs III 40; 15 on legs IV, both filiform.



Figs. 13-16. *Caloglyphus similares* sp. nov. (deutonymph): **13.** leg I; **14.** leg II; **15.** leg III; **16.** leg IV.

Type Material:

Holotype and two paratype deutonymphs; soil under mango trees; Sahel Salem (27°03'24"N, 31°19'59"E), Assiut, Upper Egypt; leg. F.A. Marei; 12 October 2018; deposited in the Acari collection of Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut, Egypt.

Etymology:

The species epithet '*similares*' refers to the high similarity between the two species described herein.

Remarks:

The new species stands in many aspects close to *Caloglyphus mangiferus* sp. nov. in having a pair of short peduncles globosely setae on idiosoma but differs from it by the shape of propodosoma, dorsosejugal region, ornamentation on coxal fields, and the length of idiosomal chaetotaxy, in addition to the structure of adhering plate and legs chaetotaxy.

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