

Description of a new species of *Oodinychus* (Acari: Uropodina: Trematuridae) from Egypt, with a key to the species

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ABSTRACT

This paper reports on a collection of mites from the red palm weevil, *Rhynchophorus ferrugineus* (Oliver) (Coleoptera: Curculionidae) and its habitat in Ismailia governorate in Egypt. A new species *Oodinychus egypticus* n. sp. is described from adult females and males. This study continues work on possible biological control agents for the red palm weevil.

Keywords Taxonomy, morphology, Mesostigmata, soil dwelling mites

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Introduction

Soil-dwelling mites of the suborder Uropodina are distributed all over the world, but they have not been adequately studied. They usually inhabit soil, debris, litter, manure, beach wrack, and the nests of mammals, birds and insects, (Karg 1989; Wiśniewski & Hirschmann 1993; Maśán & Krištofik 1995; Błoszyk 1999; Maśán 2001). Their maximal diversity is found in tropical rain forests (Lindquist *et al.* 2009). Recently a review of 300 genus-group names in this suborder was provided by Halliday (2015). Only 12 species of Uropodina have been reported from Egypt. Afifi (1980) described two new species in two genera, Zaher (1986) listed five species in five genera, El-Beshlawy & Allam (2007) described the new genus *Aegyptus* in the family Trachyuropodidae, Abd El-Ghani (2009) reported three species belonging to two genera of the families Trachyuropodidae and Uropodidae, and Hassan *et al.* (2011) listed four species from three genera. The genus *Oodinychus* was first reported for the Egyptian fauna by Hassan *et al.* (2011) and a new species in that genus is diagnosed here. A dichotomous key for the identification of the species of the genus is presented.

Materials and methods

Mites were collected from the red palm weevil, *Rhynchophorus ferrugineus* (Oliver) (Coleoptera: Curculionidae) and their habitats from Ismailia governorate. Mites were mounted in Hoyer's medium on glass slides for later examination, and descriptions were done using a phase contrast (Olympus, BHA) microscope. Mites were identified using the world taxonomic literature; illustrations were done with the help of an eye-piece attached to the phase contrast microscope and measured with the use of a graded ocular. Pores and lyrifissures on the idiosoma are in accordance with Athias-Henriot (1969) and Krantz & Redmond (1987), and generally follow the notation of Johnston & Moraza (1991). Notation of body setae is based on

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Lindquist & Evans (1965), with the modifications proposed by Lindquist (1994). Notation of the legs follows Evans (1963, 1964, 1972). Measurements are given in micrometres for each structure. Coordinates provided are approximate, as they were not taken at the time the samples were collected.

Taxonomy

Family Trematuridae Berlese, 1917

Trematurini Berlese, 1917: 9.

Trematuridae Halliday, 2016: 357.

Diagnosis — Idiosoma pear-shaped, dorsal shield of adults often notched marginally; genital shield of females not rounded anteriorly, anterolateral angles pointed; internal malae of hypostome simple without marginal fimbriations or distal moustache like excrescences; corniculi enlarged, with lateral teeth; movable cheliceral digit with 2–5 teeth, hyaline membrane on movable digit missing or only slightly developed.

Genus *Oodinychus* Berlese, 1917

Urodinychus (*Oodinychus*) Berlese, 1917: 12.

Oodinychus Halliday, 2015: 123.

Diagnosis — Idiosoma without long setae, surface of idiosoma covered by pits or reticulate sculptural pattern; inner margin of marginal shield crenulated; subcapitulum with laciniae pilose; only *sc* setae serrate; shape of hypostomal setae similar in both sexes; chelicerae with sclerotised node, with digits approximately equal in length; genital shield scutiform with process on its anterior margin; leg I with pretarsus and claws, genu I with a pair of ventral setae; adults and nymphs with peritremes.

Description

Oodinychus egypticus n. sp. (Figs 1-4)

Oodinychus agepti Hassan *et al.*, 2011: 318 (*nomen nudum*).

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Diagnosis — Dorsal shield with 36 pairs of aciculate setae and 16 pairs of pilose setae in female (35 and 22 pairs respectively in the male); idiosoma with small round pits; all ventral setae aciculate and smooth, except *JV5*, *ZV4* and post-anal setae pilose (in addition to *ZV3* in the male); tritosternum with a pair of lateral dentate basal loops, laciniae with dentate base, divided into three smooth laciniae, median lacinia longer than laterals in both sexes; genital shield with curved anterior sharp-tipped projection, almost reaching the base of coxa I; opisthogaster with seven pairs of opisthogastric setae (*JV2*, *JV4*, *JV5*, *ZV1*–*ZV4*) in female (eight pairs in males, *JVI* present); anteromedian region of epistome convex, three-tined, the median tine longer with two lateral smooth denticles, and bifid median tine; fixed cheliceral digit with two teeth, movable digit with a tooth in both sexes; legs II–IV with thick and spine-like setae on telotarsus in both sexes.

Adult female (two specimens measured) (Figs 1-2)

Dorsum of idiosoma (Fig. 1A) — Dorsal shield oval, punctate and with small round pits, 533, 489 long and 402, 382 wide at widest level; with 36 pairs of aciculate setae, 16 pairs

of pilose setae and a pair of lyrifissures (*idl*). Most dorsal shield setae of uniform length and shorter than distance to the subsequent seta, and associated with a pore. Marginal shield narrow, inner margin crenulated, ornamented with deep depressions anteriorly and with a row of irregular smooth structures posteriorly, clearly demarcated from dorsal shield, fused with dorsal shield anteriorly at level of *z2*; with six pairs of aciculate setae and six pairs of pilose setae, most of uniform length and associated with a pore. Lengths of recognised dorsal setae: *j1* 27, 25; *j2* 16, 14; *z2* 13, 10; *J4* 26; *J5* 29; *Z5* 21; *S5* 14, 12.

Venter of idiosoma (Figs 1B, C) — All setae aciculate and smooth, except *JV5*, *ZV4* and post-anal setae pilose. Tritosternum base 10 long and 10 wide at mid-level, with a pair of lateral dentate basal loops, laciniae 42 long, with dentate base, divided to three smooth laciniae, median lacinia longer than laterals, free for about 63% of their total length (Fig. 1B). Sternal shield with anterior margin well delineated and dentate, medially convex, punctate, with four pairs of simple setae (*st1–st4*) and a pair of pores, *st1* shortest, inserted anterior to genital shield, accompanied by a pair of lyrifissures *iv1*, *st2–st4* lateral to genital shield, *st2* close to *st1*, *st3* accompanied by a pair of lyrifissures *iv2*. Endopodal plates between coxae I–II, II–III and III–IV fused to sternal shield. Genital shield tongue-shaped, punctate, 144, 143 long; with a long curved anterior sharp-tipped projection, 36 long, almost reaching the base of coxa I; posterior margin at level of coxae IV, straight, 66, 65 wide at posterior corners; shield located between coxae II–IV; genital seta *st5* behind the shield; distance between genital setae 49, 42; paragenital lyrifissures (*iv5*) on unsclerotised cuticle posterolaterad of *st5*. Opisthogaster punctate and with small round pits, with seven pairs of opisthogastric setae (*JV2*, *JV4*, *JV5*, *ZV1–ZV4*) in addition to circumanal setae, eight pairs of pores and a pair of lyrifissures; anal opening small, 36, 35 long including frame. With 12 pairs of submarginal ventral setae, short and aciculate, most of uniform length and associated with a pore. Exopodal plates between coxae II–III and III–IV free from endopodal plates (Fig. 1C). Lengths of setae: *st1* 13; *st2* 16, 14; *st3* 21, 18; *st4* 18, 17; *st5* 16; *JV2* 22, 18; *JV4* 29, 25; *JV5* 20, 18; *ZV1* 14, 13; *ZV2* 18, 16; *ZV3* 18, 16; *ZV4* 25, 23; para-anal 27, 26 and post-anal 22, 18.

Peritreme (Fig. 1C) — Peritrematic plate broadly fused with exopodal plate between coxae II–III; stigma located at level between coxae II–III, peritreme curved down anteriorly.

Gnathosoma (Figs 1D, E, F) — Anteromedian region of epistome convex, three-tined, the median tine longer with two lateral smooth denticles, and bifid median tine (Fig. 1D). Fixed cheliceral digit 25, 23 long, with two teeth; movable digit 21 long, with a tooth. Cheliceral antiaxial and dorsal lyrifissures and dorsal seta distinct, nodulus distinct (Fig. 1E). Deutosternum groove narrow and smooth. Corniculi parallel to each other, about 22, 21 long and 12, 11 wide at the base. Hypostomal setae *h1* long and smooth, *h2* shortest and stout, *h3* longest and smooth, *sc* short and pilose. Ventral setae on palp trochanter *av* long and smooth, *pv* short and pilose (Fig. 1F). Lengths of setae: *h1* 17; *h2* 9, 8; *h3* 21 and *sc* 17, 16; palp trochanter setae *av* 21, 18 and *pv* 9, 7.

Legs (Fig. 2) — Legs relatively short, distinctly shorter than dorsal shield. Pretarsi I–IV each with a pair of claws and pulvillus with three rounded lobules. Lengths of legs: I – 263, 244; II – 248, 230; III – 226, 222 and IV – 250, 247. Leg chaetotaxy – coxae: 2-2-2-1; trochanters: 4-4-4-4; femora: I – 9 (1, 2/1, 2/2, 1); II – 9 (2, 2/1, 2/1, 1); III – 6 (1, 2/1, 1/0, 1); IV – 7 (1, 2/1, 2/0, 1); genua: I – 7 (1, 2/1, 2/0, 1); II – 5 (1, 2/0, 1/0, 1); III – 4 (1, 2/0, 1/0, 0); IV – 4 (1, 2/0, 1/0, 0); tibiae: I – 7 (1, 1/1, 2/1, 1); II – 7 (1, 1/1, 2/1, 1); III – 7 (1, 1/1, 2/1, 1); IV – 6 (1, 1/1, 1/1, 1). Most leg setae aciculate, except *pv2* on trochanter I, pilose; *av* on trochanter II, pilose. Some dorsal and lateral setae on tarsus II–IV thick and spine-like.

Adult male (five specimens measured) (Figs 3-4)

Dorsum of idiosoma (Fig. 3A) — Dorsal shield oval, punctate and with small round pits, 485 (463 – 502) long and 363 (354 – 371) wide at widest level; with 35 pairs of aciculate setae, 22 pairs of pilose setae and a pair of lyrifissures (*idl*). Relative lengths of setae as in adult female, most dorsal shield setae associated with a pore. Marginal shield narrow, inner margin

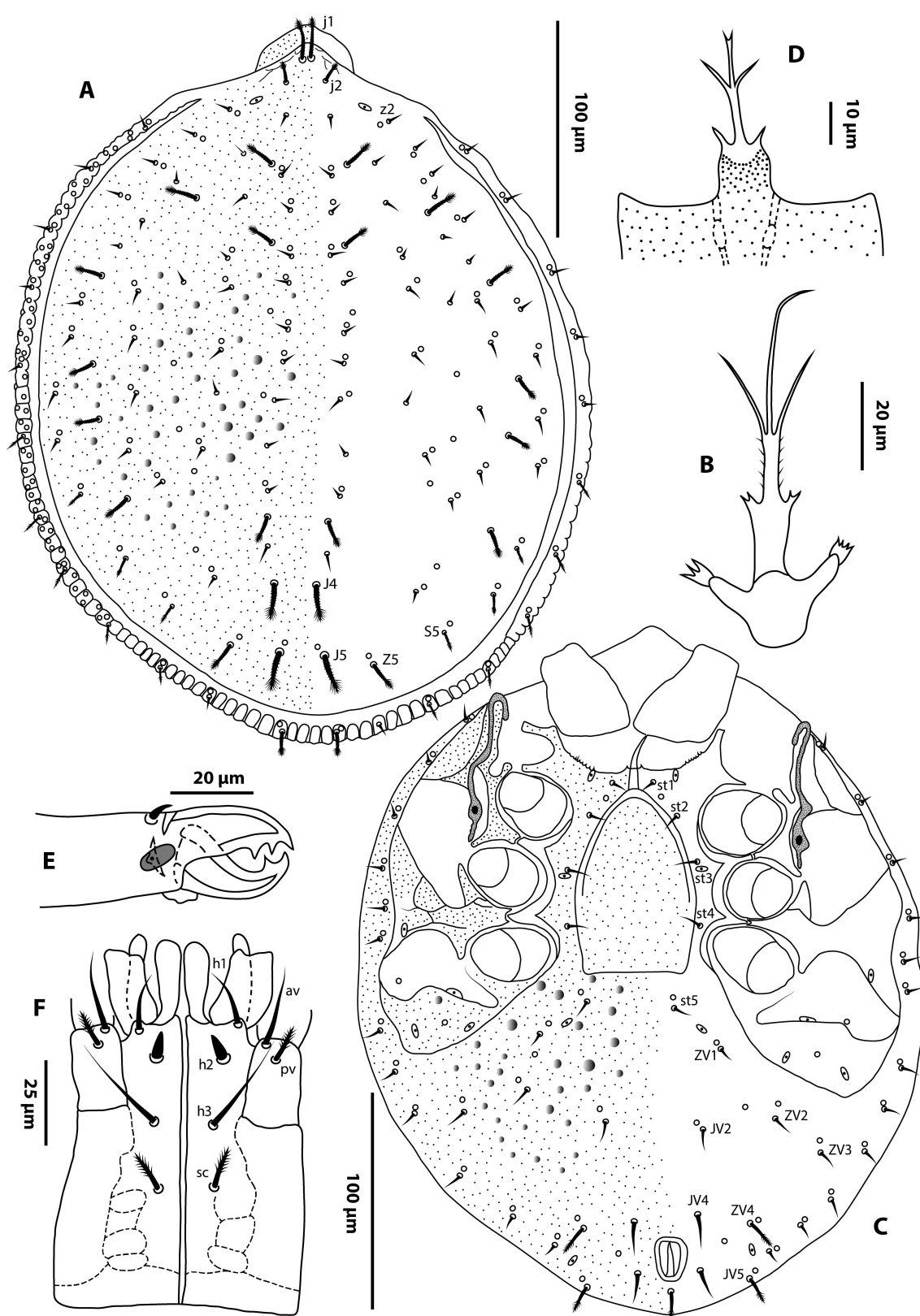


Figure 1 *Oodinychus egypticus* n. sp., holotype female: A – Dorsum of idiosoma; B – Tritosternum; C – Venter of idiosoma; D – Epistome; E – Chelicera; F – Hypostome.

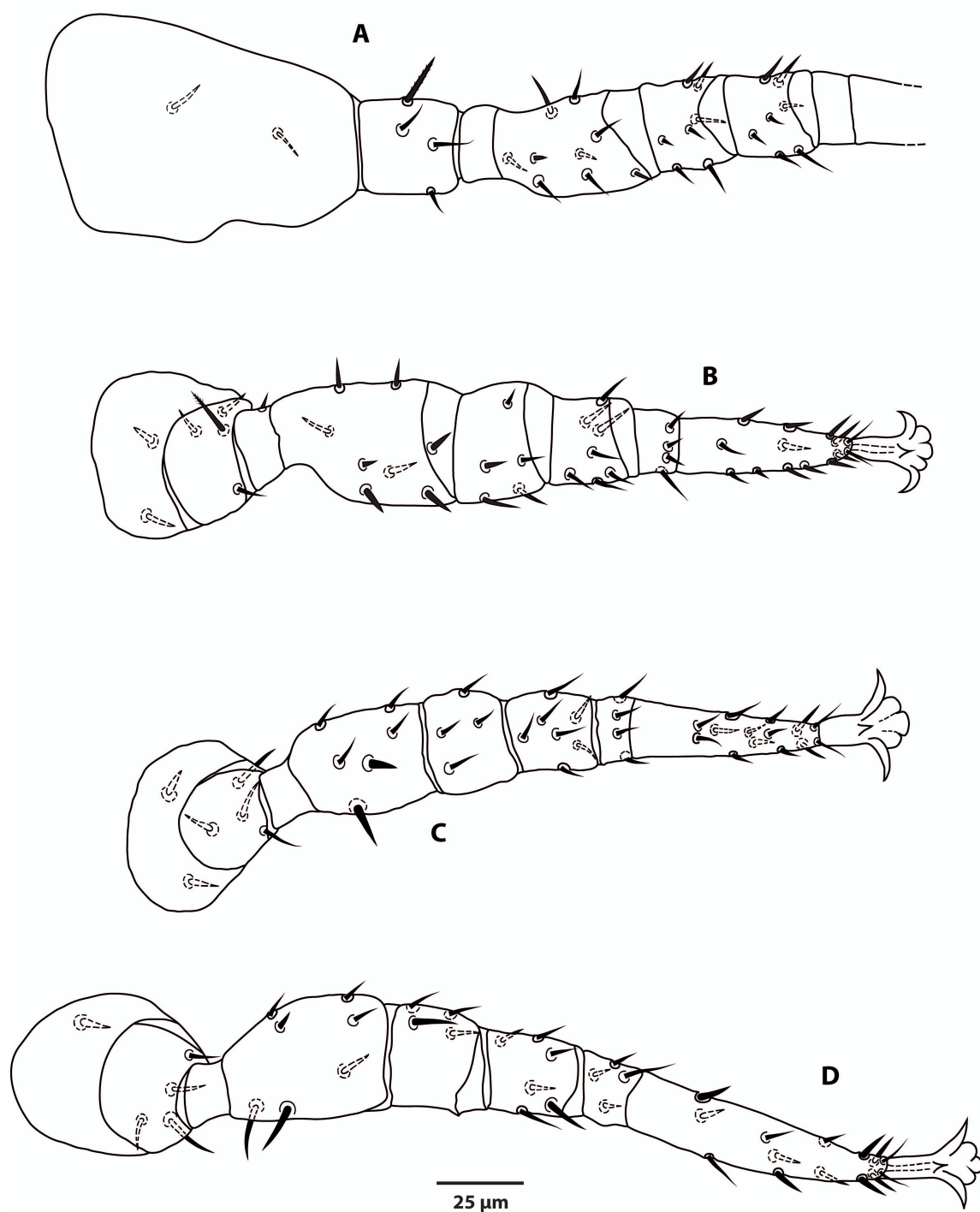


Figure 2 *Oodinychus egypticus* n. sp., holotype female: A – Coxa-tibia of leg I ventral view; B – Leg II ventral view; C – Leg III ventral view; D – Leg IV ventral view.

crenulated, ornamented with deep depressions anteriorly and with a row of irregular smooth structures posteriorly, clearly demarcated from dorsal shield, fused with dorsal shield anteriorly at level of *z2*. With four pairs of aciculate setae and eight pairs of pilose setae, most of uniform length and associated with a pore. Lengths of recognised dorsal setae: *j1* 29 (27 – 30), *j2* 16 (14 – 18), *z2* 15 (13 – 16), *J4* 25 (23 – 26), *J5* 26 (23 – 29), *Z5* 24 (23 – 25), *S5* 14 (13 – 16).

Venter of idiosoma (Figs 3B, C) — All setae aciculate and smooth, except *JV5*, *ZV3*, *ZV4* and post-anal seta pilose. Tritosternum base 12 long and 9 wide at mid-level, with a pair of lateral dentate basal loops, laciniae 48 long, with dentate base, divided to three smooth laciniae, median lacinia longer than laterals, free for about 59% of their total length (Fig. 3B). Sternal region with anterior margin well delineated and dentate, medially convex, fused with whole endopodal plates, punctate and with small round pits; with four pairs of simple setae (*st1*–*st4*) and a pair of pores, *st1*–*st3* anterior of genital opening, a pair of lyrifissures *iv1* anterior of *st1*, *st3* accompanied by a pair of lyrifissures *iv2*, *st4* posterolaterad of genital opening. Genital opening oval, punctate, 47 (46 – 49) long and 36 (34 – 39) wide, displaced at level of coxae IV; genital seta *st5* behind genital opening; distance between genital setae 55 (49 – 60); paragenital lyrifissures (*iv5*) on unsclerotised cuticle posterolaterad of *st5*. Opisthogaster punctate and with small round pits, with eight pairs of opisthogastric setae (*JV1*, *JV2*, *JV4*, *JV5*, *ZV1*–*ZV4*) in addition to circumanal setae, ten pairs of pores and a pair of lyrifissures; anal opening small, 38 (36 – 38) long including frame; intercoxal region 398 (386 – 411) long and 326 (315 – 335) wide at widest level. With 12 pairs of submarginal ventral setae, short and aciculate, most of uniform length and associated with a pore. Exopodoal plates between coxae II–III and III–IV free from endopodal plates (Fig. 3C). Lengths of setae: *st1* 13, *st2* 13 (12 – 13), *st3* 13 (12 – 13), *st4* 17 (16 – 18), *st5* 14, *JV1* 16 (13 – 18), *JV2* 20 (18 – 21), *JV4* 27 (26 – 27), *JV5* 23 (20 – 26), *ZV1* 13 (12 – 14), *ZV2* 17 (16 – 18), *ZV3* 18 (17 – 20), *ZV4* 26 (25 – 27), para-anal 25 (23 – 27) and post-anal 22 (21 – 23).

Peritreme (Fig. 3C) — Peritrematic plate broadly fused with exopodal plate between coxae II–III; stigma located at level between coxae II–III, peritreme curved down anteriorly.

Gnathosoma (Figs 3D, E, F) — Anteromedian region of epistome convex, three-tined, the median tine longer with two lateral smooth denticles, and bifid median tine (Fig. 3D). Fixed cheliceral digit 24 (23 – 26) long, with two teeth; movable digit 22 (21 – 23) long, with a tooth. Cheliceral antiaxial and dorsal lyrifissures as well as dorsal seta distinct, nodulus distinct (Fig. 3E). Deutosternum grove narrow and smooth. Corniculi parallel to each other, about 19 (18 – 21) long and 12 (11 – 13) wide at the base. Hypostomal setae *h1* long and smooth, *h2* shortest and stout, *h3* longest and smooth, *sc* short and pilose. Ventral setae on palp trochanter *av* long and smooth, *pv* short and pilose (Fig. 3F). Lengths of setae: *h1* 17 (16 – 17), *h2* 12 (12 – 13), *h3* 28 (26 – 30) and *sc* 17 (16 – 18); palp trochanter setae *av* 18 (17 – 18) and *pv* 10 (8 – 12).

Legs (Fig. 4) — Legs similar to those of adult female. Lengths of legs: I – 258 (250 – 265), II – 237 (228 – 248), III – 226 (221 – 238) and IV – 250 (241 – 264). Leg chaetotaxy as in adult female. Most leg setae aciculate, except *pv2* on trochanter I, pilose; *av* on trochanter II, pilose. Some dorsal and lateral setae on tarsus II–IV thick and spine-like.

Type specimens — Holotype female, paratype female and five paratype males were collected from the red palm weevil, *R. ferrugineus*, October 2009 at Ismailia governorate (32°27'E, 30°58'N); deposited in the mite reference collection of Zoology and Agricultural Nematology Department, the Faculty of Agriculture, Cairo University, Giza governorate, all collected by R.A. Mahmoud.

Etymology — The name *egypticus* is derived from Egypt, the country where the type specimens were collected.

Remarks — This new species is most similar to *Oodinychus venezolanus* Sellnick, 1963 and *Oodinychus granulatus* Sellnick, 1963. The former differs from the new species by having the inner margin of the marginal dorsal shield ornamented with two rows of irregular punctate

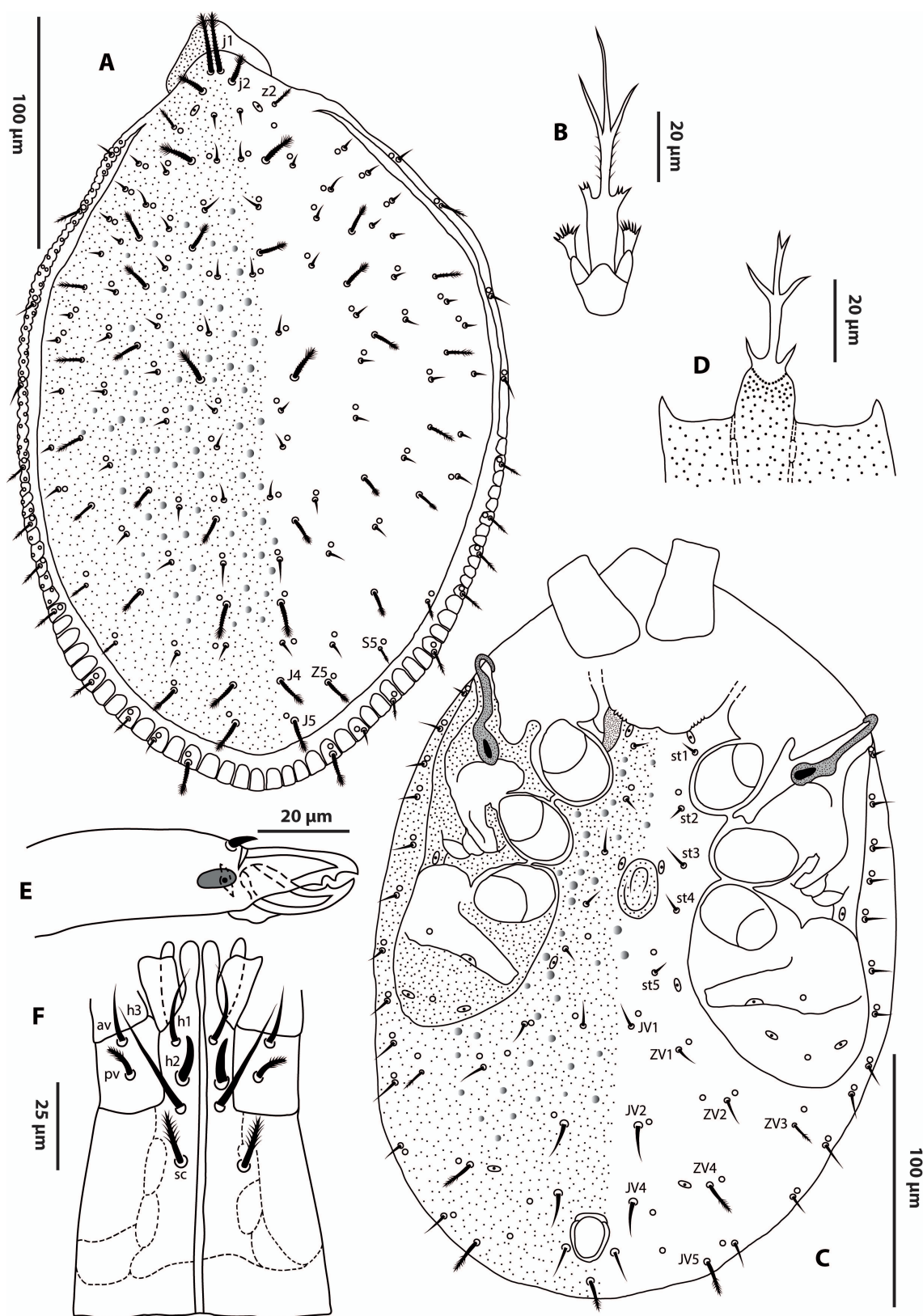


Figure 3 *Oodinychus egypticus* n. sp., paratype male: A – Dorsum of idiosoma; B – Tritosternum; C – Venter of idiosoma; D – Epistome; E – Chelicera; F – Hypostome.

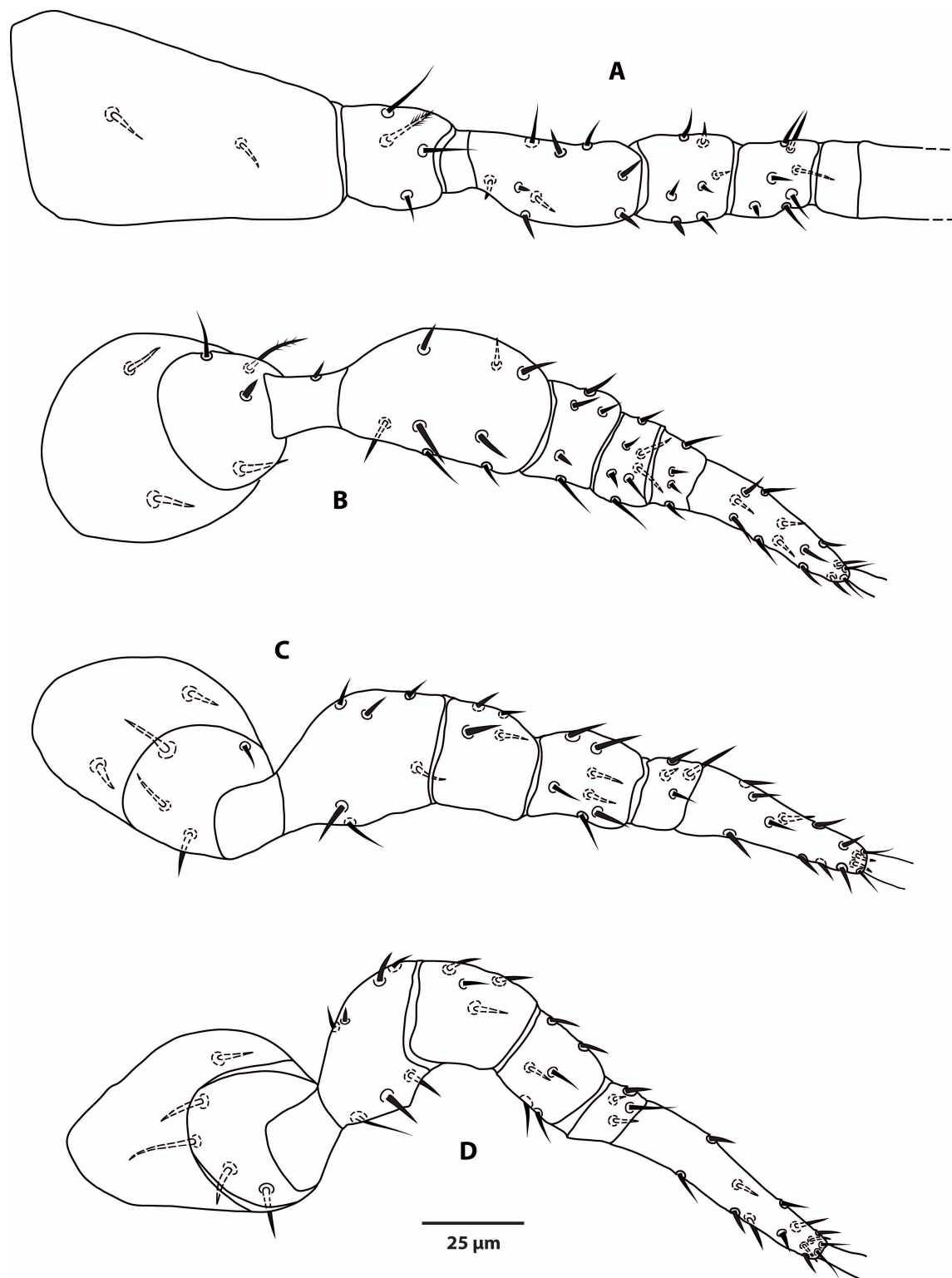


Figure 4 *Oodinychus egypticus* n. sp., paratype male: A – Coxa-tibia of leg I ventral view; B – Leg II ventral view; C – Leg III ventral view; D – Leg IV ventral view.

structures posteriorly, tritosternum with a single pilose lacinia, genital shield with small rounded pits, anterior projection of genital shield looped, all submarginal ventral setae pilose, anteromedian region of epistome acuminate and denticulate. The latter differs by having most dorsal shield setae minute, genital shield with small rounded pits, and the anterior projection of the genital shield bifurcate. In contrast with Evans (1972), the leg chaetotaxy of described species, setae *av* are present on genu I (1, 2/1, 2/0, 1); setae *pd2* are missing on genu II (1, 2/0, 1/0, 1); setae *pd2* and *pl* are missing on genu III (1, 2/0, 1/0, 0); and setae *pd2* are missing on tibia IV (1, 1/1, 1/1, 1).

Dichotomous key for the separation of *Oodinychus* species based on adult females.

Oodinychus margaritaensis Sellnick, 1963 was not included in the following key because the original description of this species depended on only males.

1. Genital shield with anterior projection, dorsal shield setae serrate or not serrate 2
 — Genital shield without anterior projection, but anterior margin bifurcate, dorsal shield setae not serrate *Oodinychus jurassicus* Schweizer, 1961
2. Anterior projection of genital shield with short tip, almost reaching anterior margin of sternal shield 5
 — Anterior projection of genital shield with long tip, extending the anterior margin of sternal shield 3
3. Tip of anterior projection of genital shield bifurcate, most dorsal shield setae are minute *Oodinychus granulatus* Sellnick, 1963
 — Tip of anterior projection of genital shield not bifurcate, dorsal shield setae not as above 4
4. Anterior projection of genital shield curved and almost reaching the base of coxa I, all submarginal ventral setae, short and aciculate *Oodinychus egypticus* n. sp.
 — Anterior projection of genital shield looped, all submarginal ventral setae, pilose *Oodinychus venezolanus* Sellnick, 1963
5. Anterior projection of genital shield round-tipped, exopodal region heavily reticulate *Oodinychus obscurasimilis* Hirschmann & Zirngiebl-Nicol, 1961
 — Anterior projection of genital shield sharp-tipped, exopodal region reticulate or punctate 6
6. Dorsal shield setae spatulate, exopodal region reticulate *Oodinychus spatulifera* (Moniez, 1892)
 — Dorsal shield setae serrate or aciculate, exopodal region reticulate or punctate 7
7. Dorsal shield setae serrate, exopodal region punctate *Oodinychus janeti* (Berlese, 1904)
 — Dorsal shield setae aciculate, exopodal region reticulate 8
8. Idiosoma covered by oval pits *Oodinychus ovalis* (C.L. Koch, 1839)
 — Idiosoma covered by irregular pits *Oodinychus karawaiewi* (Berlese, 1904)

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