

Identification Key for some Acarid Mites (Acari: Acaridae) Extracted from Termite Nests with Description of Two New Species

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Abstract:

The study herein presents brief characterizations and an identification key for some acarid mites collected from the nests of sand termite, *Psammotermes hypostoma* Desneux (Isoptera), in addition to the description of two Acaridae species. Samples (termite nests) were collected monthly from western desert (30 km North of El- Kharga city/ New Valley Governorate/ Egypt). Mites inhabiting termite nests were isolated and identified. The identification key for the Acaridae species is simple and easy to understand and the diagnosis is in most cases based on genera and species. The results of taxonomic examination concerning the Acaridae mites living in termite nests are given. Two new acarid mite species are described and illustrated hereunder.

Keywords: Acari, Acaridae, Identification, Termite, Egypt.

Received on: 5/2/2014

Accepted for publication on: 2/3/2014

Referees: Prof. Hassan M. Hassan

Prof. Taha Y. A. M. Helal

Introduction:

The Acaridae mites are among the most successful arthropods to exploit spatial and temporally restricted habitats (Eraky and Osman, 2008). Dispersal between habitat patches is affected by phoretic association between the specialized deutonymphs of the Acarididae mites and the host which may be either another arthropod or vertebrate (OC'onnor, 1982 and Houch and OC'onnor, 1991). An accumulated knowledge concerning the Acarididae fauna in Egypt is extremely scarce as compared with the other groups of mites. Many points concerning the Acarididae mite are questionable. However, many species were recorded in Upper Egypt by Eraky (1993, 1994 a & b, 1997, 1998, 1999 a, b & c and 2000 a & b); Eraky and Shoker (1993 a & b and 1994); Negm, 2007; Eraky and Osman, 2008 and Eraky *et al.*, 2010. On the other side, members of the family Acaridae, commonly referred to as house dust mites, are of considerable medical importance in being the causative agents of topic asthma and rhinitis, the allergens being present in their fecal pellets. The majority of acarid species are living as saprophytic and fungivores in soil, litter, debris and organic manure. Others can be found on different economical plants, causing injury to plant directly by feeding, or by transmitting various disease agents (Zakhvatkin, 1941; Baker and Wharton, 1952; Scheucher, 1959; Hughes & Jackson, 1958 and Hughes, 1961 & 1976). Hypopus in the Acarididae group is a succeeding stage both in dispersal and behavior, highly resistant to environmental stress. Some are adapted for dispersal by

phoresy, in most cases phoretic on insect such as termite individuals, by having attachment organs in the form of sucker-plate (Griffiths 1966 and 1977; Houch & OC'onnor, 1991; OC'onnor, 1994 and Kettle, 1995). Study on the Acarididae has received the attention of several authors (viz., Samsinak, 1957, 1960, 1962 a & b, 1966 and 1972 in Czech Republic; Griffiths, 1960, 1964, 1966 and 1977 in England ; Mahunka, 1961 a & b, 1962 a & b, 1963 a & b, 1964, 1967, 1968, 1969 a & b, 1972, 1973 a, b, c & d, 1979, 1981, and 1982 a & b and Mahunka and Eraky, 1987 in Hungary; Woodring, 1963, 1969 & 1973 and OC'onnor, 1982, 1984 a & b, 1989, 1990, 1991, 1993 and 1997 in USA; Fain, 1967 to 1984 in Belgium; Eraky, 1993 to 2000, Eraky and Shoker, 1993 and 1994; Abdel-Sater and Eraky, 2002; Negm, 2007; Eraky and Osman, 2008 and Eraky *et al.*, 2010 in Egypt.

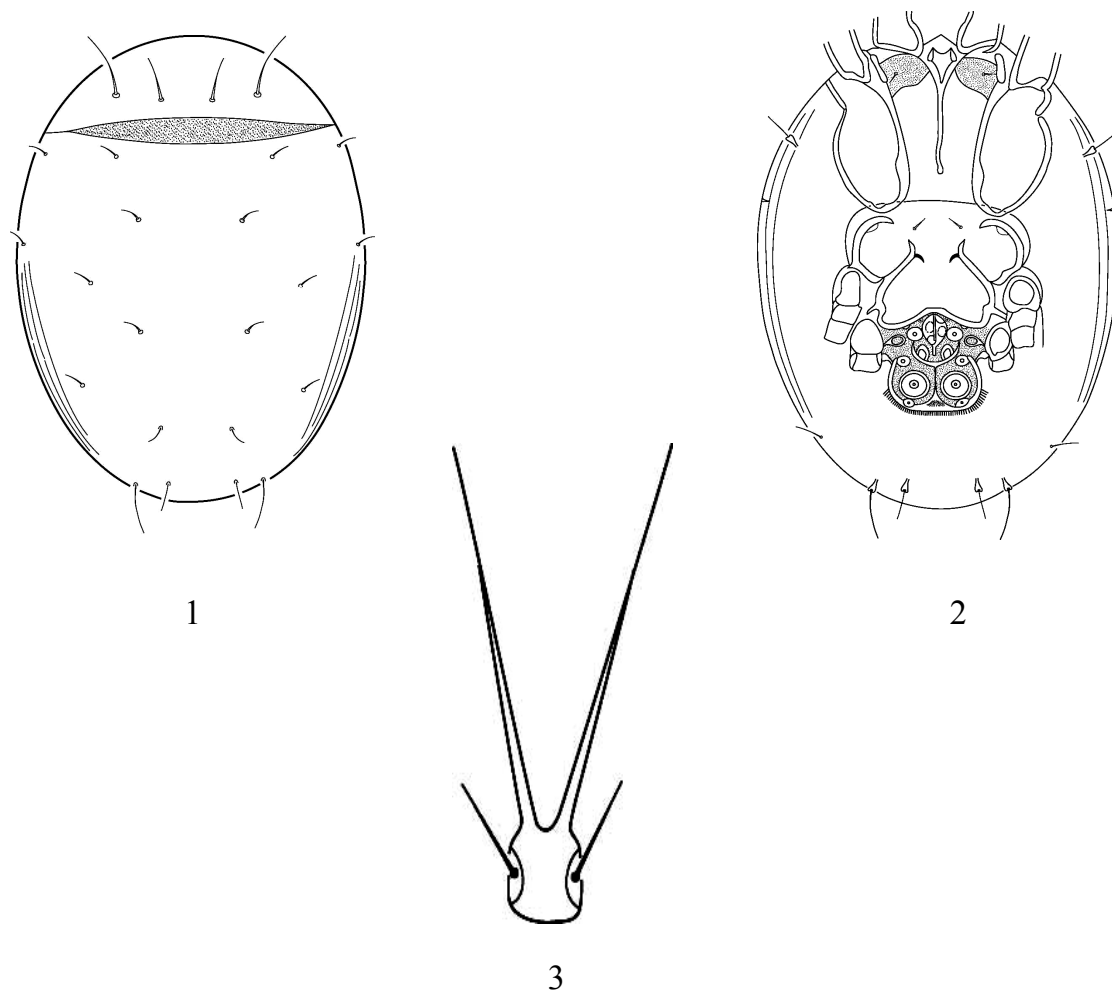
Description of the new species:

1-*Acotyledon termesi* n. sp.

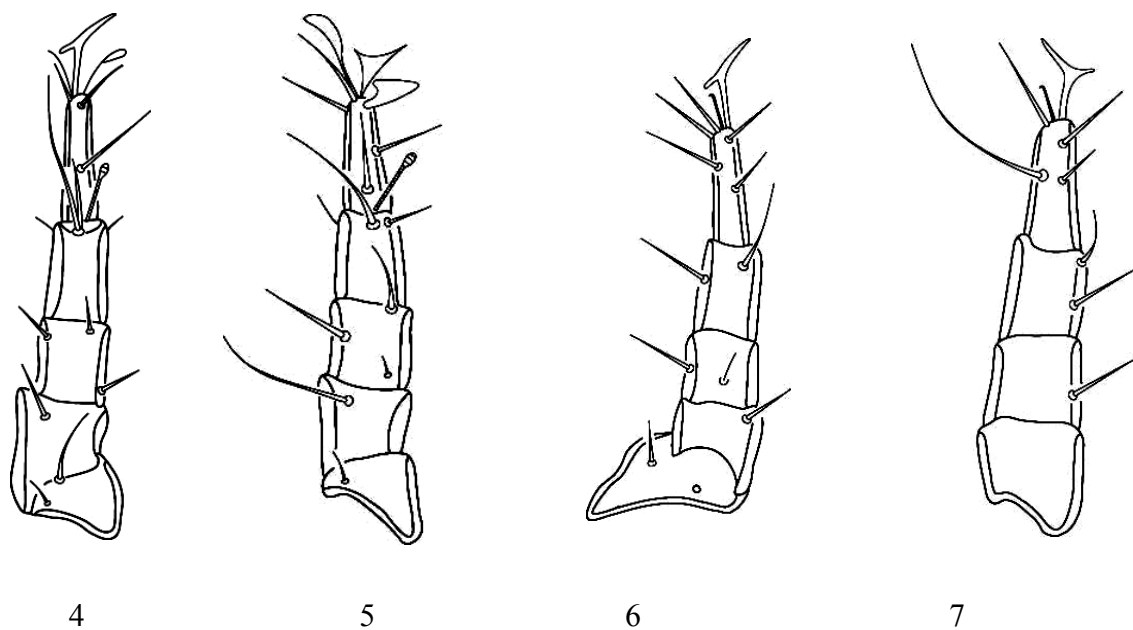
(Figs. 1-7)

Measurements. Length: 320-367 µm, Width: 194-262 µm.

Dorsal side (Fig.1). Body approximately ovoid in outline, anteriorly and posteriorly rounded. Propodosoma comparatively wide and its surface smooth. Inner pair of prodorsal setae (Sci) shorter and thinner than the outer one (Sce). The former standing somewhat posteriorly to the outer pair. Dorsosejugal region wide, ornamented with heavy punctulae. Hysterosomatic surface also smooth. Notogasteral setae simple and short, but well observable.



Figs.(1-3): *Acotyledon termesi* n. sp. (Deutonymph) 1: dorsal side, 2: ventral side, 3: gnathosoma.



Figs.(4-7): *Acotyledon termesi* n. sp. (Deutonymph) 4: legI, 5: legII, 6: legIII, 7: legIV.

Ventral side (Fig.2) infracapitulum of gnathosoma (Fig.3) approximately short, hardly longer than wide. Palpi not differentiated, solenidia long, much longer than the infracapitulum. Infracapitular setae thin and short, but well-developed. Apodemes on anterior sternal plate thick and long, except ap. sa. ending freely, Just in front with sejugal apodemes, apodemes 2 fused posteriorly with sejugal ones. On posterior sternal plate, ap.4 short, but well-chitinized, posterior sternal apodeme missing, thus epimeres on posterior sternal plate open. Epimeres I and III with a minute setae each, standing near the base of legs, epimeres IV with a suction disks. Adhering plate comparatively large, removed from the posterior margin of the body. Disks Ds of adhering plate reduced, except Ds₁. Disk D1 standing anteriorly to a very large D2.

Legs (Figs. 4- 7). Tarsi of legs I and II with thin, short and straight claws each, those of legs III and IV shorter and falcate-shaped. Legs I and II with 2 spoon – shaped setae on tarsi of both legs, tarsi of legs III and IV with one spoon-shaped seta each. Tarsi of legs I and II with solenidia ϕ_1 very long, longer than entire tarsi of both legs, much longer on leg I. Solenidia ω_1 of tarsi of legs I and II thicker than ω_3 approximately at the same length. Legs III and IV with majority of simple and thin setae each.

Material examined: Holotype: El- Kharga, New Valley, Egypt: Termite nests. Leg. M. Fakeer. 15-03-2012. 7 paratypes from the same locality. Holotype and 5 paratypes deposited in Plant Protection Depart-

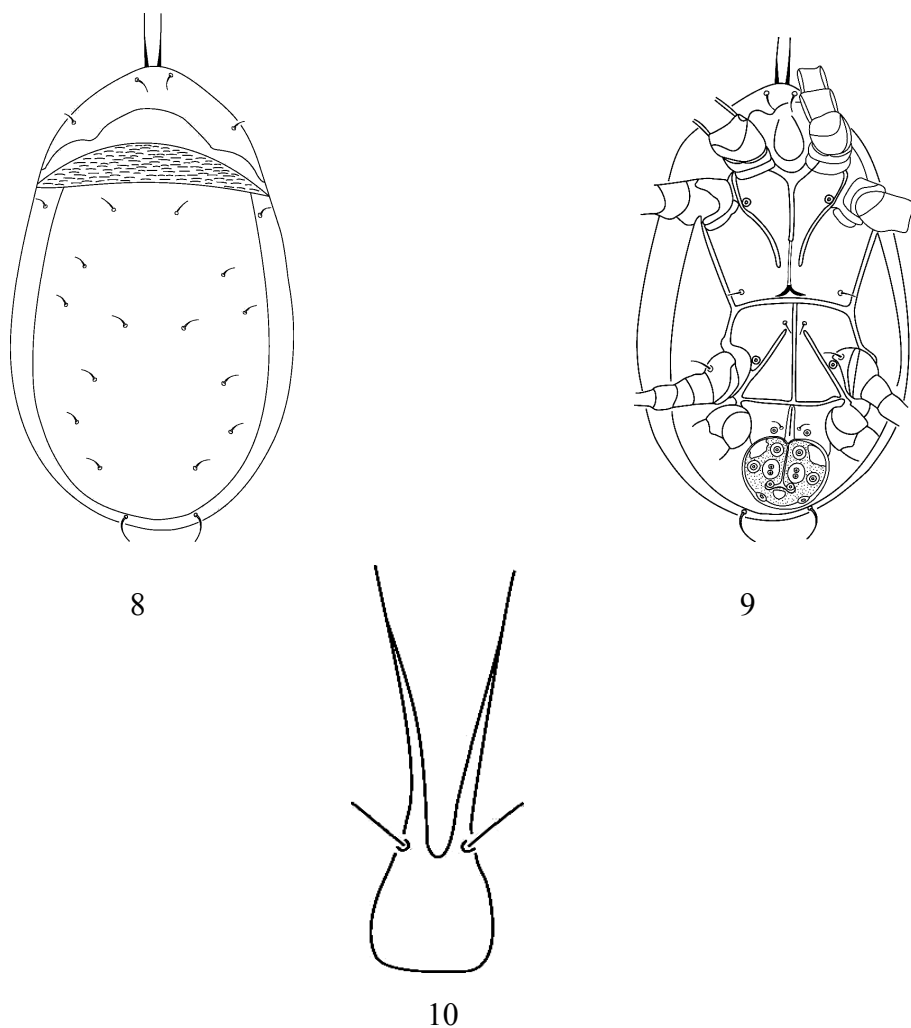
ment, Faculty of Agriculture, Assiut University, Egypt. Two paratypes are deposited in the Arachnoidea collection of the Hungarian Natural History Museum, Budapest, Hungary.

Remarks: The new species stands very near to the *Acotyledon lamiai* Eraky, 1998 collected from termite nests, New Valley, Egypt and the *Acotyledon longsetoses* Eraky, 1999 collected from termite nests, Aswan, Egypt, but the new species can easily be separated from the two related congeners of *Acotyledon oudemans*, 1903, by the short dorsal setae as compared with a very long and thick ones in both *Acotyledon* species mentioned above, in addition to the ornamentation on dorsosejugal region and the unique structure of adhering plate.

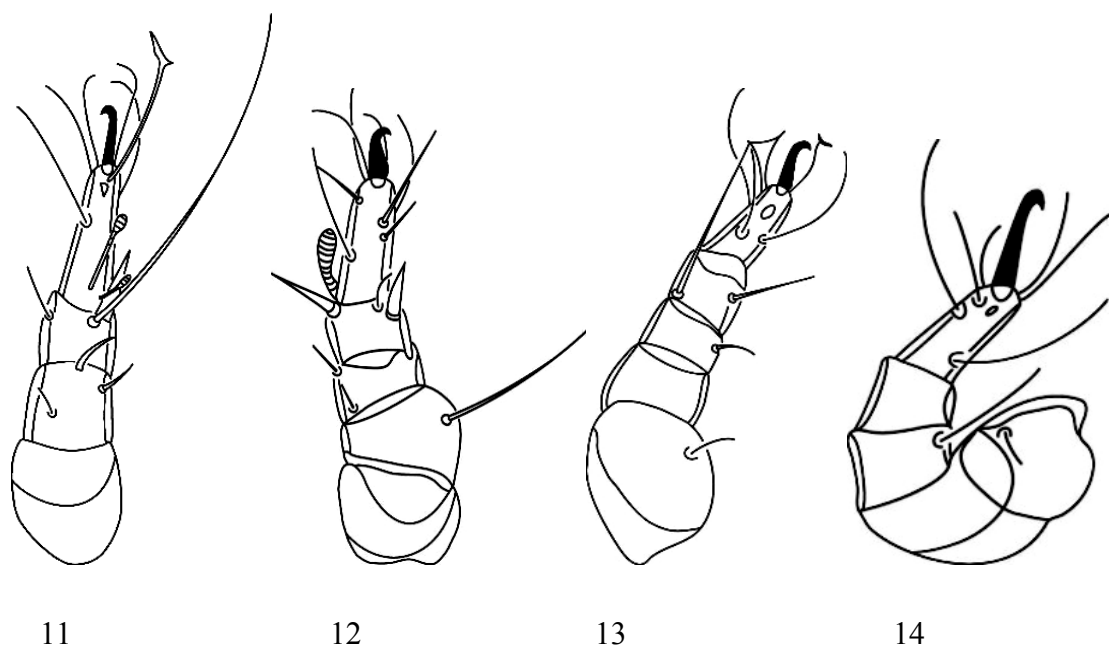
2- *Caloglyphus subterraneousi* n. sp. (Figs. 8- 14)

Measurements. Length: 253-272 μ m, width: 154- 176 μ m

Dorsal side (Fig. 8). Propodosoma nearly triangular in its outline, rostrum evenly rounded, an extremely long and thin vi setae projected forward from tip of propodosoma. Inner pair of propodosomatic setae (Sci) short and thin, but hardly longer than the outer one (Sce), originating far anteriorly of them, near the apical margin of propodosoma. Prodorsal surface smooth, anteriorly and laterally with a well observable convexly concaved line decurrent parallel with the body surface, above the dorsosejugal region. Dorsosejugal region ornamented with striations. Hysterosomal, surface smooth, all setae of hysterosoma simple and short, but well observable.



Figs.(8-10): *Caloglyphus subterraneousi* n. sp. (Deutonymph) 8: dorsal side, 9: ventral side, 10: gnathosoma.



Figs.(11-14): *Caloglyphus subterraneousi* n. sp. (Deutonymph) 11: legI, 12: legII, 13: legIII, 14: legIV.

Ventral side (Fig. 8). Infracapitulum of gnathosom (Fig. 10) normal-developed, Palpi not separated off, solinidia comparatively long and thick. Infracapitular setae short and thin, situated behind solenidia. Apodemes (Fig 9) well-developed, On anterior sternal plate ap. sa long, bifurcated posteriorly, situated very near to ap. 3. Ap. 2 short, ending free. Apodemes 3 and sejugal one well separable. Posterior sternal plate with ap. 4 and ap. sp. well-developed, ap. sp fused anteriorly with sejugal apodeme, ap. 4 ending anteriorly with short setae. Epimeres I, III and IV bear normal suction disks each. A pair of well discernible setae standing beside primordium of genital opening. Adhening plate (Fig. 9) normal-developed, originating adjacent to the posterior body margin. Disks D and Ds normal-developed.

Legs (Figs. 11-14). Legs generally well-developed, tarsi of all legs with large, sickle-shaped claws

each. Solenidia φ of tarsus of leg I very long, much longer than entire tarsus. Solenidia ω_1 on tarsus of leg I longer and thicker than Solenidia ω_2 . On leg II, solenidia ω_1 very thick, solenidia φ_1 thinner and longer than ω_1 . The famulus of both legs, thin and short, but well-developed.

Material examined: Holotype and 2 paratypes are extracted from the nests of sand termite. *Psammodermes hypostoma* Desneux (Isop-tera), New Valley, Egypt. Leg. M. Fakeer. 12. 05. 2012. Holotype and one paratype are deposited in the Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut/ Egypt. One paratype is deposited in the Arachnoidea Collec-tion of the Hungarian Natural His-tory Museum, Budapest, Hungary.

Remarks: the new species stands very near to *Caloglyphus or-natus* Eraky, 2000 and may be dis-tinguished from it by the following characters:

| C. ornatus Eraky, 2000 | C. subterraneusi n. sp. |
|---|---|
| The anterior part of propodosoma orna-mented with heavy granulae | The anterior part of propodosoma smooth. |
| Gnathosomal palpi well recognizable | Gnathosomal palpi not separated off |
| Ap. 4 fused anteriorly with ap. sp. | Ap. 4 standing far anteriorly from ap. sp. |
| Ap. sa short, ending free, far from ap. Sejugal | Ap. sa long, ending with bifurcate-shaped posteriorly, very near to ap. Sejugal |
| Suctorial plate originating far anteriorly from the posterior body margin | Suctorial plate originating very near to the posterior margin of the body |

Identification key for some Acarididia mites:

The present study includes an identification key for 17 acarid mites (Table. 1) (Acari:Acaridae) pertaining to 9 genera, based on the morphological characters of the hypopial stages (heteromorphic deutonymphs). All species are collected from termite nests of four locations in Upper Egypt (Assiut, Qena, Aswan and New Valley Governorates).

(Original drawing of all species are presented in Eraky 1997, 1998, 1999 a, b & c, and 2000 a & b; Negm, 2007; Eraky and Osman, 2008 and Eraky *et al.*, 2010).

1(39) All legs with well-developed claws, dorsal surface smooth, without any sculpture.

2(12) Dorsosejugal region approximately wide, suctorial plate small, removed from the posterior body margin by a distance longer than its length.

3(13) Propodosoma narrow, approximately sinuous anteriorly, its surface smooth.

4(10) Tarsi of legs III and IV long and thin, normally forming a right angle with the rest of the legs, infracapitulum of gnathosoma normal-developed, longer than wide, its surface smooth.

5(8) Tarsi of legs I to IV with 2 spoon-shaped setae each, infracapitulum of gnathosoma short, hardly longer than wide.

6(15) Dorsal setae very long and thick except the marginal ones, inner pair of prodorsal setae much longer the outer one.

Acotyledon ahmadi Eraky and Osmen, 2008.

7(9) Epimeres I and III with alveoli each, epimeres IV with normal disc, anterior and posterior ster-

nal plates standing not far from each other.

Acotyledon lamiai. Eraky, 1998.

8(5) Tarsi of legs I to IV with 3 large calyciform setae each, infracapitulum of gnathosoma long, much longer than wide.

9(7) No any structures on epimere I, setae on epimere III and normal disks on epimere IV, anterior and posterior sternal plates standing far from each other by a long distance.

Acotyledon longsetoses Eraky, 1999.

10(4) Tarsi of legs III and IV short and stout, infracapitulum of gnathosoma piriform, surface ornamented with punctulae.

11(4) Hysterosomatic setae long and thick, each with two lateral branches, the marginal ones very short and simple, outer pair of scapular setae much longer than the inner one

Cosmoglyphus barbisetus Eraky, 1999.

12(2) Dorsosejugal region approximately narrow, suctorial plate large, situated, not far from the posterior margin of the body.

13(3) Propodosoma wide, nearly triangular in its outline, its surface with sculpture.

14(11) Hysterosomatic setae approximately short and thin, without lateral branches, scapular setae also thin, the outer pair hardly longer than the inner one.

Caloglyphus manuri Negm, 2007.

15(6) Dorsal setae short and simple, inner pair of scapular setae much shorter than the outer one.

Acotyledon termesi n. sp.

16(17) Body very long, nearly equally rounded anteriorly and

- posteriorly, propodosoma ornamented with foveolae in its anterior part, its posterior part, membranous inner pair of scapular setae standing behind the outer one.
- Caloglyphus ornatus* Eraky, 2000.
- 17(16) Body approximately oblong, propodosomal surface smooth, inner pair of scapular setae standing in front of the outer one.
- Caloglyphus subterraneousi* n. sp.
- 18(19) Adhering plate very large, occupied entire body surface behind and partly between legs IV, all apodemes short, ending free, thus epimeres of anterior and posterior plates open.
- Caloglyphus problematica* Eraky et al., 2010.
- 19(18) Adhering plate normal-developed, standing approximately far from the body end, apodemes long, fused medially, thus all epimeres closed.
- 20(45) All apodemes long, thus all epimeres closed, entire surface of epimeres ornamented with punctulae.
- 21(22) Dorsosejugal region ornamented with heavy punctulae, infracapitulum of gnathosoma small, but, rounded.
- Forcellinia egyptiaca* Eraky, 1998.
- 22(21) Dorsosejugal region smooth, without any sculpture, infracapitulum of gnathosoma normal-developed, longer than wide.
- Forcellinia assiuti* Eraky et al., 2010.
- 23(34) Dorsal setae scarce and minute, epimeres I, III and –IV with normal-developed suction disks each.
- 24(29) Dorsosejugal region wide, ornamented with transversal lines, scapular setae short, inner pair much shorter than the outer one.
- 25(27) Propodosomal margin convexity rounded, laterally with denticulate body margin, infracapitulum of gnathosoma wide, approximately trapezoid.
- Mahunkallinia serratus* Eraky, 1999.
- 26(30) Epimere I with a minute, epimere III with a very small suction disks, epimere IV with a pair of setae standing near primordial of genital opening, tarsi of legs I and II with large straight claws each, those on legs III and IV falcate-shaped.
- 27(25) Propodosomal margin rounded, gnathosoma developed as a convexity labular projection, bears only two pairs of setae, inner one short.
- 28(31) All apodemes short, ending free in a granulate halo in the middle of the entire body surface, legs I and II with large lanceolate setae each, absent on both hind legs.
- 29(24) Dorsosejugal region narrow, ornamented with scarce punctulae, outer pair of scapular setae long and thick, much longer than the inner one.
- Mahunkaglyphus solimani* Eraky, 1998.
- 30(26) Epimeres I, III and IV without any sculpture, legs I and II with normal claws each, legs III and IV with very thin claws each.
- 31(28) Apodemes of anterior sternal plate short, ending free, no granulate halo present, all apodemes on posterior sternal plate missing, the lanceolate setae on legs I and II absent.

- 32(37) Dorsosejugal region present only as a band, prodorsal setae approximately long, both pairs at the same length.
- 33(38) Gnathosoma rounded, bears only a pair of thin and short setae, suctorial plate large, standing close to the posterior body margin.
- 34(23) Dorsal setae comparatively long, no any structure on epimeres I, III and IV.
Acarus solimani Eraky, 1999.
- 35(40) Leg I with very long setiform and feebly bent claws, leg II with bottle-shaped ones, legs III and IV with long and thick claws each, all apodemes long, except posterior sternal apodeme missing, thus epimeres, I, II, III closed, epimere IV open.
- 36(41) Epimeres I, III and IV with normal suction disks each, propodosoma narrow, encircling hysterosoma like a narrow strip.
- 37(32) Dorsosejugal region narrow, without any sculpture, propodosomal setae differ in length.
- 38(33) Gnathosoma modified, long with thickened base, suctorial plate normal-developed, originating not far from the margin of the body end.
Froriepiea negmi Eraky, 1999.
- 39(1) All legs with normal claws each, except legs III and IV clawless, dorsal surface with heavy sculpture.
- 40(35) legs I to III with very short claws each, legs IV clawless apodemes of anterior sternal plate short, ending free, on posterior sternal plate, all apodemes long.
- 41(36) Epimeres I and III with or without alveoli, epimere IV with small suction disks, propodosoma enlarged anteriorly, nearly triangular, longer than the half length of hysterosoma.
- 42(44) Dorsal surface ornamented with longitudinal, arcuate and irregular lines, Dorsosejugal region smooth, without any sculpture.
- 43(46) Epimeres I and III without any sculpture, epimeres IV with normal suction disks and a pair of setae, ap. 4 standing far from ap. sp. The latter not reaching primordial of genital opening.
...*Calvolia zaheri* Eraky, 1998.
- 44(42) Dorsal surface ornamented with punctulae, longitudinal and arcuate lines, propodosoma with punctulae and transversal lines medially, dorsosejugal region ornamented with heavy transversal lines.
- 45(20) All apodemes short, thus all epimeres open, entire surface of epimeres smooth.
- 46(43) Epimeres I with alveoli, epimeres III without any sculpture, epimeres IV with a pair of long setae adjacent to primordial of genital opening.....
Calvolia solimani Eraky, 1999.

Table (1): Distribution of some Acarididia (Acari: Acaridae) phoretic on termites in Upper Egypt.

| No. | Mite species | Study area |
|-----|--|------------|
| 1 | <i>Acarus solimani</i> Eraky, 1999 | Aswan |
| 2 | <i>Acotyledon ahmadi</i> Eraky and Osman, 2008 | Qena |
| 3 | <i>Acotyledon lamiai</i> Eraky, 1998 | New Valley |
| 4 | <i>Acotyledon longsetoses</i> Eraky, 1999 | Aswan |
| 5 | <i>Acotyledon termesi</i> n. sp. | New Valley |
| 6 | <i>Caloglyphus manuri</i> Negm, 2007 | Assiut |
| 7 | <i>Caloglyphus ornatus</i> Eraky, 2000 | Aswan |
| 8 | <i>Caloglyphus problematica</i> Eraky et al., 2010 | Assiut |
| 9 | <i>Caloglyphus subterraneousi</i> n. sp. | New Valley |
| 10 | <i>Calvolia solimani</i> Erkey, 1999 | Aswan |
| 11 | <i>Calvolia zaheri</i> Eraky, 1998 | New Valley |
| 12 | <i>Cosmoglyphus barbisetus</i> Eraky, 1999 | Aswan |
| 13 | <i>Forcellinia assiuti</i> Eraky et al., 2010 | Assiut |
| 14 | <i>Forcellinia egyptiaca</i> Eraky, 1998 | New Valley |
| 15 | <i>Froriepiea negmi</i> Eraky, 1999 | Aswan |
| 16 | <i>Mahunkaglyphus solimani</i> Eraky, 1998 | New valley |
| 17 | <i>Mahunkallinia serratus</i> Eraky, 1999 | Aswan |

All types established herein are deposited in the Acari Collection of the Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut/ Egypt and the Arachnoidea Collection of the Hungarian Natural History Musium, Budapest/ Hungary.

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مفتاح تصنيف لبعض أنواع الحلم من فصيلة اكاريدي مستخرجة من عشوش النمل الأبيض مع وصف نوعان جديان

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الملخص:

أستهدفت الدراسة الحالية حصر لأنواع الحلم المنتمية لفصيلة الاكاريدي Acari: Acaridae والمستخرجه من عشوش النمل الأبيض التحت أرضى فى ٤ محافظات فى صعيد مصر (أسيوط - قنا - أسوان - الوادى الجديد) وعددهم ١٧ نوعا منتميه إلى ٩ اجناس قد سجلت من قبل بواسطة:

Eraky (1998, 1999, 2000); Negm (2007), Eraky and Osman (2008); Eraky *et al.* (2010).

هذا بالإضافة للنوعان الجديان والتي تضمنت هذه الدراسة الوصف المورفولوجى الدقيق لهما.

هذا ولقد أشتملت الدراسة الحالية على الموضوعات التالية:

١- إنشاء مفتاحاً تقسيمياً لكل الأنواع التابعة لفصيلة الأكاريدي والتي تم أستخراجها فقط من عشوش النمل الأبيض التحت أرضى فى صعيد مصر خلال الفترة من ١٩٩٨م حتى ٢٠١٤م.

٢- إجراء وصفاً تفصيلياً دقيقاً لطور الحورية الثانية لكل من النوعان الجديان والمستخرجه من عشوش النمل الأبيض التحت ارضى بمدينة الخارجة الوادي الجديد.

٣- اجراء بعض المقارنات لتوضيح أهم الإختلافات المورفولوجية بين النوعان الجديان والانواع قريبة الشبة منها لإظهار أهم تلك الاختلافات المورفولوجية والتي على اساسها تم فصل هذين النوعين عن غيرهما من الأنواع المعروفة وهذان النوعان الجديان هما:

1-*Acotyledon termesi* n. sp.

2-*Caloglyphus subterraneousi* n. sp.

وتفيد هذه الدراسة فى معرفة الأنواع الاكاروسية من فصيلة أكاريدى، والتي تصاحب النمل الأبيض التحت أرضى فى مختلف محافظات صعيد مصر حيث ان دراسة هذه الأنواع فى مصر لم تحظى باهتمام الدارسين مثل باقي الانواع نباتية التغذية او غيرها من الانواع المفترسة.