

## First Record of the Genus *Echinacrus* Keifer, 1966 (Acari: Eriophyidae) on *Acacia* from Egypt, with Description of a New Species

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### ABSTRACT

The genus *Echinacrus* Keifer, 1966 is reported for the first time from Egypt. A new species *Echinacrus halawanii* sp. nov. from *Acacia arabica* var. *nilotica* (L.) (Fabaceae) has been reported. Adult and nymph stages were described and illustrated. A checklist and Key to all species of the genus are provided. This mite is vagrant on acacia lower leaf surface and pods.

**Key Words:** Eriophyidae, *Echinacrus halawani* sp. nov., *Acacia*, Egypt.

### INTRODUCTION

The genus *Echinacrus* was established by Keifer, 1966 based on *Callyntrotus schlectendali* Nal., 1894, but that species has the dorsal tubercles set ahead of the rear shield margin and the rows of abdominal spines come from smaller bases. The name *Pentamerus* was initially introduced by Sowerby, 1813 as a generic name. Ozdikmen (2008) noted that *Pentamerus* Roivainen, 1951 was a junior homonym of the genus *Pentamerus* Sowerby, 1813 (still used as a type genus of the family Pentameridae). However, Amrine *et al.* (2003) synonymized *Echinacrus* Keifer, 1966 with *Pentamerus* Roivainen, 1951. Thus, *Echinacrus* Keifer, 1966 is the available name to use.

The genus *Echinacrus* is characterized by body fusiform; rostrum comparatively large; with shield form oral stylet; shield with prominent anterior lobe over rostrum; dorsal tubercles on rear shield margin directing seta to rear; stemites distinctly more numerous than tergites; opisthosoma with five longitudinal rows of wax, one mid-dorsal ridge, two lateral ridges and two sub-lateral ridges.

In 2003, the genus *Echinacrus* (= *Pentamerus*) consisted of five species (Amrine *et al.* 2003). In China (Wei & Chen, 2004) recorded the new species *Pentamerus litseae* (*E. litseae*), nov. comb. (= *Dipentamerus litseae* Wei & Chen, 2004), which is characterized by scapular tubercles on rear shield margin and scapular setae directed posterolaterally, Aarsal empodium entire (Roivainen, 1951). However, *D. litseae* tarsal empodium divided, scapular tubercles placed ahead of rear shield margin and scapular setae directed up and medially and obviously differentiated from *Pentamerus* (Wei *et al.*, 2009).

Up to now, five species in the genera *Echinacrus* were known to occur all over the world according to the on-line computer data base of eriophyid mites of

the world (Amrine & de Lillo 2003; de Lillo pers. comm. 2008).

In Egypt, there are three species of eriophyid mites recorded on acacia. They are *Aceria arabicae* Meyer, 1990 (= *Aceria acaciae* Sayed, 1946); *Aculops acaciae* and *Tetra acaciae* Abou-Awad & Elsawi, 1993. The present study aimed to describe the new sp., checklist of the genus *Echinacrus* and Key provided.

### MATERIALS AND METHODS

Specimens were initially collected directly from the plant material by examination under a binocular microscope at 10 to 40X magnification. Additional specimens were collected by soaking the plant material in 70% ethanol for at least one hour and then filtering the solution through black filter paper in a funnel. The filter paper was then examined under the low power microscope and the mites were collected. Initial studies were made on specimens directly cleared into Keifer solution (A) about one hour then placed on a heating block at 70°C until clear. Slides were mounted according to Keifer's method (Jeppson *et al.* 1975). Camera Lucida drawings were prepared using a built in draw tube type prism camera Lucida attached to the microscope. Identification to genus was made using a published key to the world genera of the eriophyoidea (Amrine *et al.* 2003). Measurements were taken at (10 \* 100X) magnification and strictly under phase contrast using an ocular micrometer. All measurements are given in micrometers (µm). They are lengths unless otherwise specified. Lindquist (1996) terminology and setal notation of the morphological details has been adopted in the descriptions. Type specimens of the new species have been deposited in the reference collection of the fruit Acarology Department, PPRI collection, ARC, Egypt, and the Para type specimens are deposited in the National Collection of Arachnida,

ARC-PPRI, Biosystematics, Pretoria South Africa  
(Eddie Uckermann). Under No.(AcY:13/365)

## RESULTS AND DISCUSSION

During 2011 - 2012, field survey was conducted in Qalubia and Gharbia governorates, Egypt. One new species was found *E. halawanii* sp. nov. on *Acacia arabica* var. *nilotica* (L.).

Key to the world species of *Echinacrus* Keifer, 1966:

- 1- Dorsal tubercles long and digitiform, ridges topped with broad base spines, coxae ornamented ..... 2
  - Dorsal tubercles of normal length and shape ..... 3
- 2- Empodium with 6-7 rays, female genitalia coverflap with about 11 longitudinal marking, seta *3a* about 70fl, sternal line forked posteriorly ..... *E. acaciae* (Meyer, 1989).
  - Empodium with 9 rays, female genitalia coverflap with about 14-16 longitudinal marking, seta *3a* about 40fl, sternal line simple ..... *E. halawanii* sp. nov.
- 3- Dorsal annuli smooth, forming 5 longitudinal ridges ..... 4
  - Dorsal annuli with 5 ridges topped with broad base spines ..... 5
- 4- Prodorsal shield with two double longitudinal lines, empodium 7-rayed, tarsal solenidion tapered, genital coverflap with few transversal indistinct striae ..... *E. psophocarpi* (Chandrapatya, 1992).
  - Prodorsal shield with a cross line in joining submedian and admedian line, empodium 4-rayed, tarsal solenidion knobbed, genital coverflap with 12 longitudinal ridges... *E. meliae* (Kuang, 1998).
- 5- Coxae ornamented with short curved lines, empodium 5-rayed, genital coverflap with about 17 distinct longitudinal markings, seta *d* about 40fl ..... *E. rhamnicroceae* Keifer, 1966.
  - Coxae smooth, empodium 4-rayed, genital coverflap with indistinct longitudinal markings ..... *E. septemcarinatus* (Liro, 1941).

Family: Eriophyidae Nalepa, 1898.

Sub family: Phyllocoptinae Nalepa, 1892

Tribe: Anthocoptini Newkirk & Keifer, 1975.

Genus *Echinacrus* Keifer, 1966.

=*Pentamerus* Roivainen, 1951. 52-54

Type species. *Echinacrus rhamnicroceae* Keifer, 1966: 1-2.

### *Echinacrus halawanii* sp. nov.

#### Description:

**Female:** Fig. (1) (n = 10) Body fusiform, 192 (180-205) long, 65 (60-70) wide, 55 thick; creamy yellow. Gnathosoma 30 (28-32) long, projecting obliquely down, basal setae (ep) 4 (4-5), antapical setae (d) 7 (6-8), chelicerae 23 (22-24). Prodorsal shield 48 (46-51) long, 58 (56-65) wide; prodorsal shield sub-triangular with a prominent anterior lobe over rostrum, frontal lobe 12 (11-13) long, median line absent, admedian lines connected at base making u-shaped figure at median of dorsal; admedian lines from anterior shield lobe running parallel meeting cross line at about quarter of shield, thereafter forming a central hexagonal cell, then recurves anterior of dorsal tubercles; lateral shield area with granules; submedian line short present between recurves, admedian line at half dorsal. Dorsal tubercles on rear shield margin, 32 (30-33) apart, scapular setae (*sc*) 25 (24-26) long, projecting posteriorly. Sternal line present 5 (4-6) long. Coxal area with dashes and lines; anterolateral setae on coxisternum I (*Ib*) 8 (7-8) long, 14 (12-15) apart; proximal setae on coxisternum I (*Ia*) 17 (15-18) long, 10 (10-11) apart; proximal setae on coxisternum II (*2a*) 27 (26-28) long, 28 (28-29) apart. Leg I 35 (33-37) long, femur 10 (10-11), basiventral femoral setae (*bv*) 8 (8-9) long; genu 7.5 (7-8) long, antaxial genua!setae (*g'*) 21 (20-23) long; tibia 9 (8-9.5), paraxial tibial setae (*t'*) 4.5 (4-5) long, setae located 1/4 from dorsal base; tarsus 6 (6-7) long; tarsal empodium simple 10 (10-11) long, 9-rayed, tarsal solenidion tapered, dorsal setae (*jt'*) 24 (24-27) long, lateral setae (*jt''*) 26 (25-28) long, tarsal seta (*u'*) 4 (4-5). Leg II 32 (30-32) long, femur 9 (9-11) long, basiventral femoral setae (*bv*) 8 (8-9) long; genu 5.5 (5-6) long, antaxial genua!setae (*g''*) 8 (8-9) long; tibia 8 (8-9); tarsus 6 (6-7) long; tarsal empodium simple 9 (8-9) long, 9-rayed, tarsal solenidion tapered, dorsal setae (*jt''*) 9 (8-10) long, lateral setae (*jt'''*) 27 (25-29) long, tarsal seta (*u'*) 4 (4-5). Opisthosoma dorsally with 44 (42-45) tergites, tergites with five dorsal longitudinal wax spines bearing ridges with broad base: median ridge started behind rear shield margin, spines absent from 25th to 29th tergites, but spines present from 30th tergite onwards; two admedian ridges running immediately medad of dorsal to the 30th tergite, then connected with median line; two submedian ridges running from laterad of dorsal tubercles to posterior end of opisthosoma; the fourth rear annuli of dorsal opisthosoma pointed; sternites with rounded microtubercles small, beadlike touching ring margins; ventral

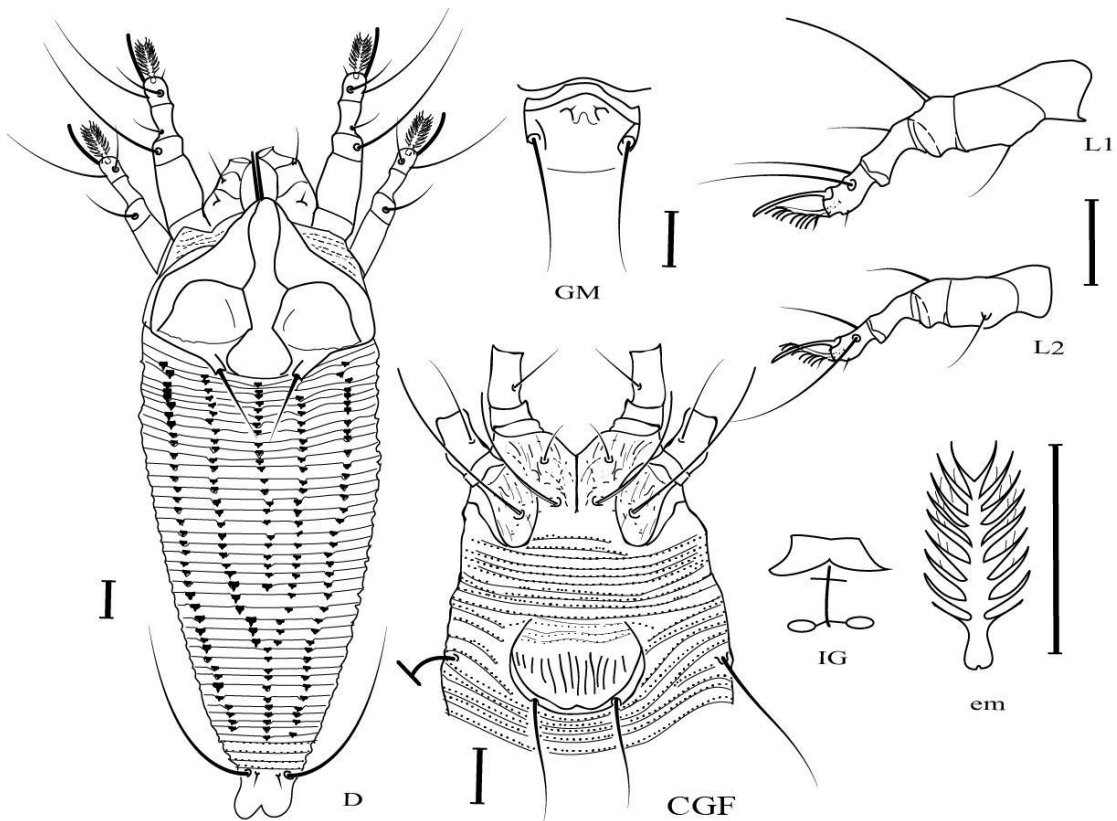


Fig.(1): *Echinacrus halawanii* sp. nov., D. Dorsal view; GM. Genital male; CGF. Female coxigental region; IG. Internal female genitalia; em. Empodium; L1 . Leg I and L2. Leg II. Scale bar 10 $\mu$ m.

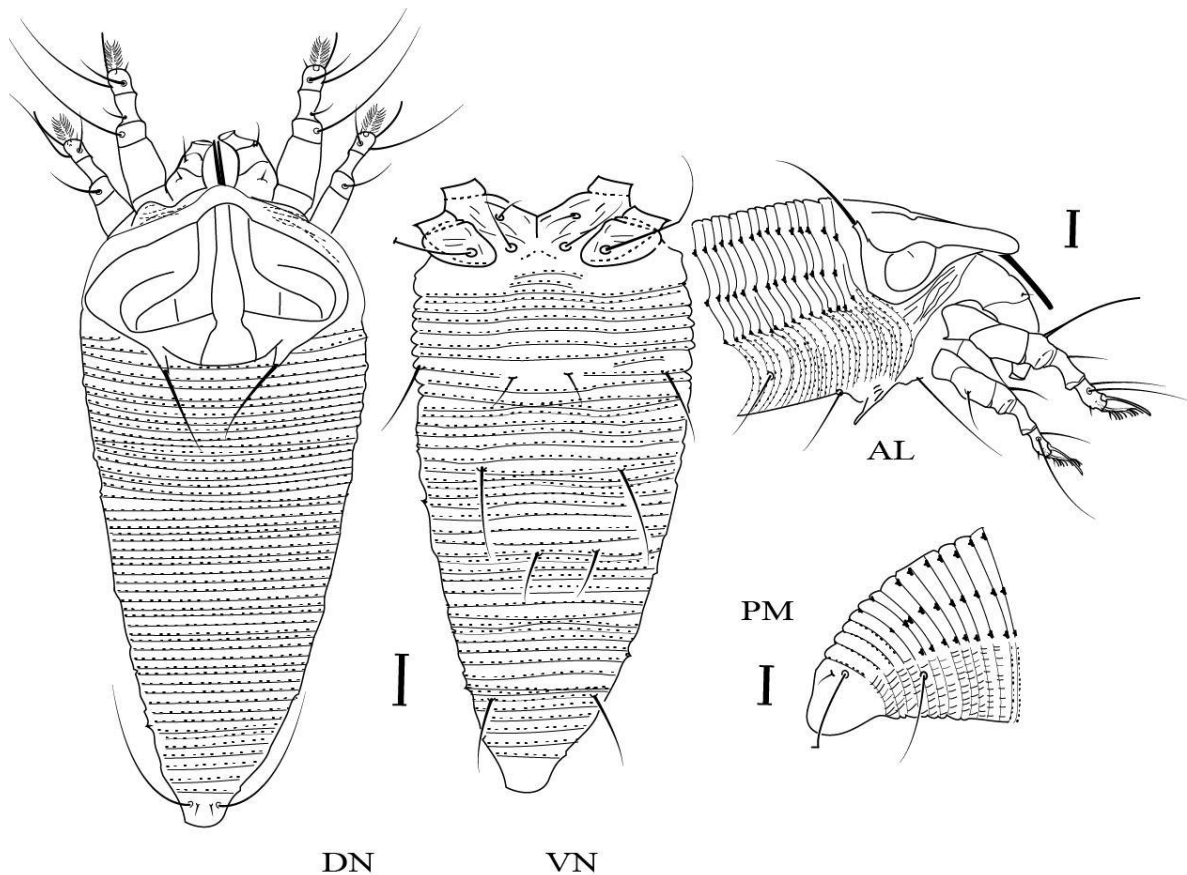


Fig. (2): *Echinacrus halawanii* sp. nov., AL. Lateral view of anterior body; PM. Lateral view of posterior opisthosoma; DN. Dorsal aspect Nymph and VN. Ventral aspect Nymph. Scale bar 10 $\mu$ m.

Table (1) list of *Echinacrus* sp.

Taxon	Host & habit	Distribution
<i>E. rhamnicroceae</i> Keifer; 1966: B-17:2, f.1 = <i>Pentamerus rhamnicroceae</i> (Keifer, 1966) Newkirk & Keifer, 1975. 583	<i>Rhamnus crocea</i> Nutt. (Rhamnaceae) & vagrant	(California) USA
<i>Echinacrus septemcarinatus</i> (Liro, 1941) = <i>Epitrimerus septemcarinatus</i> Liro, 1941: 22-23, f.15 = <i>Pentamerus septemcarinatus</i> (Liro, 1941) Roivainen, 1951. 52-54, f. 23 = <i>Echinacrus septemcarinatus</i> (Liro, 1941) Ozdikmen, 2008. 222.	<i>Rhamnus frangula</i> L. (Rhamnaceae) & Vagrant.	Finland; Hungary and Poland
<i>Echinacrus acaciae</i> (Meyer, 1989) = <i>Pentamerus acaciae</i> Meyer, 1989: 425-427, ff. 1-6. Ozdikmen, 2008. 221. = <i>Echinacrus acaciae</i> (Smith-Meyer, 1989) de Lillo & Amrine, 2008	<i>Acacia galpini</i> Burt (Fabaceae) & Davy. Vagrants on pods.	(Transvaal) South Africa
<i>Echinacrus psophocarpi</i> (Boczek & Chandrapatya, 1992) = <i>Pentamerus psophocarpi</i> Boczek & Chandrapatya, 1992. 269-271' f. 1. = <i>Echinacrus psophocarpi</i> (Boczek & Chandrapatya, 1992) de Lillo & Amrine, 2008.	<i>Psophocarpus tetragonolobus</i> (L.) DC. (Fabaceae) & Vagrant on lower leaf surface.	(Trad Province) Thailand
<i>Echinacrus meliae</i> (Kuang, 1998) = <i>Pentamerus meliae</i> Kuang, 1998. 301, 303, 305, f. 13-18. = <i>Echinacrus meliae</i> (Kuang-Haiyuan, 1998). Ozdikmen, 2008. 221 = <i>Echinacrus meliae</i> (Kuang, 1998) de Lillo & Amrine, 2008.	<i>Melia azedarach</i> L. var. <i>subtripinnata</i> Miq. (Meliaceae) & Vagrant	(Guangxi Zhuang Autonomous Region) China
<i>Echinacrus halawanii</i> El-halawany sp. nov.	<i>Acacia arabica</i> var. <i>nilotica</i> (L.) (Fabaceae). & Vagrant on lower leaf surface	(Qalubiya & Gahrbia Governorates) Egypt

annuli appearing more elongated from about the 10th ventral annulus from the rear. Lateral setae (*c*<sub>2</sub>) 13 (12-15) long, on annulus 3 (3-4) from genitalia; ventral setae I (*d*) 43 (38-44) long, 40 (38-42) apart, on annulus 18 (17-19); ventral setae II (*e*) 28 (26-29) long, 27 (27-28) apart, on annulus 33 (32-34); ventral setae III (*f*) 29 (28-30) long, 26 (25-27) apart, on annulus 50 (50-52) or 6<sub>h</sub> (6<sub>h</sub>-7<sub>h</sub>) from rear. Total ventral annuli 78 (70-78); microtubercles small, beadlike, on ring margins. Total ventral annuli 66 (65-67). Caudal setae (*h*<sub>2</sub>) 78 (74-80) long, 10 (10-11) apart; accessory setae (*hi*) 5 (4-5) long. Genitalia 17 (16-18) long, 22 (?1-24) wide, coverflap with 16 (14-16) longitudinal ridges, proximal setae on coxisternum III (*3a*) 35 (32-37) long, 12 (11-13) apart, reaching bases of setae (*d*).

Male: (n = 5) Smaller than female, body fusiform, 170 (160-180) long, 57 (54-59) wide, 52 thick; creamy yellow in color. Gnathosoma 25 (24-27) long, projecting obliquely down, basal setae (*ep*) 4 (4-5), antapical setae (*d*) 7 (6-8), chelicerae 21 (20-22). Prodorsal shield 46 (44-47) long, 50 (48-52) wide; prodorsal shield sub-triangular

with a prominent anterior lobe over rostrum, frontal lobe 10 (10-11) long. Dorsal tubercles on rear shield margin, 22 (20-23) apart, scapular setae (*sc*) 20 (20-22) long projecting posteriorly. Coxal area with dashes and lines; anterolateral setae on coxisternum I (*1b*) 8 (7-8) long, 14 (12-14) apart; proximal setae on coxisternum I (*1a*) 16 (15-17) long, 10 (10-11) apart; proximal setae on coxisternum II (*2a*) 24 (23-25) long, 24 (24-26) apart. Leg I 32 (30-35) long, femur 9 (8-10), basiventral femoral setae (*bv*) 9 (9-11) long; genu 6.5 (6-7) long, antaxial genual setae (*g*) 25 (25-27) long; tibia 8 (8-9), paraxial tibial setae (*t*) 4 (4-5) long, setae located 1/4 from dorsal base; tarsus 5 (5-6) long; tarsal empodium simple 7 (7-8) long, 9-rayed, tarsal solenidion tapered, dorsal setae (*ji'*) 21 (21-22) long, lateral setae (*ji''*) 22 (22-24) long, tarsal seta (*u'*) 3 (3-4). Legs II 30 (28-31) long, femur 7 (7-8) long, basiventral femoral setae (*bv*) 9 (8-9) long; genu 5 (5-6) long, antaxial genual setae (*g*) 7 (7-8) long; tibia 7 (7-8); tarsus 5.5 (5-6) long; tarsal empodium simple 17 (7-8) long, 9-rayed, tarsal solenidion tapered, dorsal setae (*ji'*) 9 (8-10) long, lateral setae (*ji''*) 25 (25-27) long, tarsal seta (*u'*) 3 (3-4).

Opisthosoma dorsally with 44 (43-45) tergites, tergites with five dorsal longitudinal wax spines bearing ridges with broad base, sternites with rounded microtubercles small, beadlike touching ring margins; ventral annuli appearing more elongated from about the 10th ventral annulus from the rear. Lateral setae (*c2*) 10 (9-10) long, on annulus 2 (2-3) from genitalia; ventral setae I (*d*) 33 (32-35) long, 32 (32-34) apart, on annulus 16 (16-17); ventral setae II (*e*) 21 (21-23) long, 17 (16-18) apart, on annulus 29 (29-31); ventral setae III (*f*) 22 (21-23) long, 21 (20-22) apart, on annulus 49 (49-51) or 6th (6th\_Th)) from rear. Total ventral annuli 64 (64-66); microtubercles small, beadlike, on ring margins. Caudal setae (*h2*) 70 (68-76) long; accessory setae (*hi*) 4 (3-4) long. Genitalia 10 (10-11) long, 22 (21-22) wide, proximal setae on coxisternum III (*3a*) 32 (30-33) long, 14 (13-14) apart, reaching bases of setae (*d*).

Nymph: (Measurements of range of 2 specimens). Fig. (2) 143-153, 50-55 wide; 55-64 thick; vermiform in shape, translucent and whitish in color. Gnathosoma: 30-35. Antapical seta (*d*) 4; basal seta (*ep*) 2; chelicerae 20-23; oral stylets 14-16. Prodorsal shield: 38-41 long, 48-52 wide; semi-ovoid, anterior lobe 6-7 long. Median line absent, admedian lines connected at base and at 1/3 prodorsal shield, make H-shaped figure at median of dorsal; submedian lines present and broken at 1/3 shield connected with transverse line. *Sc* 17-19, tubercles 20-21 apart. Legs: Leg I 28-30; femur 10, *bv* 4-6; genu 4-5, *l'* 17-20; tibia 5-6, *l'* 4; tarsus 4-5, *fi''* 20-22, *fi'* 18-20, solenidion (<p) 7, distally rounded but without knob; empodium (*em*) 7, 7-8 rayed. Leg II 26-28; femur 8.5, *bv* 5-6; genu 4, *l''* 8-9; tibia 4; tarsus 4-5, *t''* 16, *t'* 4-5, solenidion (<p) 8, distally rounded but without knob; empodium (*em*) 7 (7-8) rayed. Coxae: Coxal seta I (*Ib*) 7, tubercles 10-11 apart; coxal seta II (*Ja*) 10-12, tubercles 8 apart; coxal seta III (*2a*) 15-17, tubercles 17 apart. Coxae with fewer striations than adult. Prosternal apodeme present, 6 long. Coxigenital region with 9-10 microtuberculated annuli. Genital seta (*3a*) 12-14, tubercles 8-10 apart. Opisthosoma: with 50-53 annuli, evenly arched and subequal dorsoventrally. Microtubercles evenly present on all dorsal and ventral annuli but smaller, beadlike. Lateral seta (*c2*) 11, on annulus 2 (from genital tubercles); ventral seta I (*d*) 17-20 on annulus 15-16, tubercles 24-26 apart; ventral seta II (*e*) 9-11 on annulus 26, tubercles 16-17 apart; ventral seta III (*f*) 14-16 on annulus 6-7th

annulus from the rear, tubercles 22 apart. Caudal seta (*h2*) 50-60. Accessory seta (*hi*) 4.

Larva: Not observed.

Egg: Spherical, translucent to creamy white color, with diameter measured 40-60  $\mu$ m on the lower leaf surface.

Type data: Holotype, female, Qalubia governorate: Louguantai, 30°14' 18.78" N, 31°15'35.90" E; 5 July 2012, coll. Ashraf S. El halawany; ex *Acacia arabica* var. *nilotica* (L.) (Fabaceae).

Paratypes, 15 females and 5 males, with the same data as Holotype in fruit Acarology Dep. PPRI Dokki Egypt and in the National Collection of Arachnida, ARC-PPRI, Biosystematics, Pretoria South Africa (Eddie Uckermann) under No .....

Relation to host: Vagrant on leaf surface. No damage to the host was observed.

Etymology: This species is named after the late Dr. Mahmoud E. Elhawany, Head of Fruit Acarology Dept., PPRI, ARC, Egypt).

Remarks: The new species shows similar with *Echinacrus acaciae* (Meyer, 1989) by having ornamented coxae, scapular setae dorsal tubercles long and digitiform, ridges topped with broad base spines, but it can be differentiated by tarsal empodium 9-rayed (6-7 in *E. acaciae*), female coverflap with 14-16 longitudinal ridges (11 in *E. acaciae*), sternal line simple (sternal line forked posteriorly in *E. acaciae*).

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