

Four New Records of Eriophyids and Associated Phytoseiids from Egypt

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ABSTRACT

The present study reports four new records of eriophyid mites collected from Egypt during 2012 to 2015. *Cecidophyopsis rosmarinusis* Wang & Elhalawany, 2014 was on *Rosmarinus officinalis* L. (Lamiaceae); *Stenacis palomaris* Keifer, 1970 was on *Salix babylonica* L. and *S. matsudana* Thunb (Salicaceae); *Epitrimerus saudi-arabis* Wang & Elhalawany, 2014 was on *Phoenix dactylifera* L. (Arecaceae); *Epitrimerus cupressi* Keifer, 1939 was on *Cupressus sempervirens* L. (Cupressaceae). The genera *Cecidophyopsis* and *Stenacis* are new records for Egyptian fauna. These species are vagrants on leaves without any damage except the second species (*S. palomaris*) which causes witches' broom of terminal twigs of the host plant. Illustrations of the four species are provided. Three phytoseiid mite species (i.e. *Amblyseius swirskii* Athias-Henriot, *Cydnoseius negevi* (Swirski & Amitai), *Typhlodromus (Typhlodromus) athiasae* Porath & Swirski (Acari: Phytoseiidae)), were found in association with the recorded eriophyid mites on the mentioned host plants during this survey.

Key words: Eriophyidae, Taxonomy, *Cecidophyopsis*, *Epitrimerus*, *Stenacis*, Phytoseiidae.

INTRODUCTION

A worldwide count of eriophyoid species is approximated to 4600 known species described under 420 genera (Amrine & de Lillo unpublished databases 2003 & 2010).

Genus *Stenacis* Keifer (1970) is characterized by body elongate-wormlike; opisthosoma with narrow annuli subequal dorsoventrally; prodorsal shield with narrow, basally hinged, anterior projection over gnathosoma, either apically blunt or emarginated or acute; scapular tubercles set little ahead of rear margin; directing scapular setae up and divergently ahead; gnathosoma moderately large; prodorsal shield sub semicircular in anterior outline; coxae with all three pairs of standard setae; legs with all standard setae; opisthosoma annulus entirely microtuberculate; female genitalia at a moderate distance behind rear coxae. Nine species of the genus *Stenacis* Keifer were reported (Amrine *et al.*, 2003). Four of them were recorded on Salicaceae, (i.e. *Stenacis triradiatus* Nalepa, 1892) on *Salix alba* L. from Bosnia, Czech Republic, Croatia, Finland, Germany, Herzegovina, Hungary, Iraq, Italy, Kyrgyz Republic, Mexico, Moldova, Serbia, Slovenia and USA; *S. calisalicis* Keifer, 1944 on *S. babylonica* L. from Italy and USA; *S. palomaris* Keifer, 1970 on *S. lasiolepis* Benth from Italy, Hungary and USA and *S. lanzhouensis* Kuang, 1997 on *S. babylonica* from China (de Lillo and Amrine 2011, unpublished data)). No records of *Stenacis* species infesting Cupressaceae are available up to date.

Cecidophyopsis Keifer, 1959, is characterized by, body wormlike, gnathosoma small, down curved, first visible segment longer than second; prodorsal shield broadly rounded anteriorly, not projecting over

gnathosoma and concealing it in dorsal view; dorsal tubercles and setae missing; legs with all usual setae; opisthosoma annuli dorso-ventrally, microtuberculate; female genitalia close to coxae, the coxae separated somewhat; coxal tubercles, especially the second pair, partially surrounded by sub-circular elevations; female genital coverflap with numerous uneven longitudinal furrows, partly in two ranks. Up to date 19 species of the genus *Cecidophyopsis* Keifer are reported (Amrine *et al.* 2003). No species of this genus was reported from Egypt previously while two species were recorded from Saudi Arabia (i.e. *Cecidophyopsis rosmarinusis* Wang & Elhalawany, 2014 on *Rosmarinus officinalis* L. (Lamiaceae) and *Epitrimerus saudi-arabis* Wang & Elhalawany, 2014 on *Phoenix dactylifera* L. (Arecaceae) Wang *et al.*, 2014).

Seventy five eriophyoids belonging to 29 genera have been reported from Egypt. Among them, three belonging to the genus *Epitrimerus*, (Zaher, 1984, Elhalawany, 2012 & Elhalawany *et al.*, 2015).

Occurrence of bio-agents in specific regions are essential task, as it can show the status of the bio-agent/pests interactions, rising of new species or decline of dominant ones and the recovery of such fauna component after exposure to pesticides application. This action considers the first step to further studies about the use of bio-agents in biological control. Phytoseiid mites (Phytoseiidae: Mesostigmata) are predators of phytophagous mites and insects. Some species also feed on pollen and exudates from plants, but rarely plant tissue. Several members of this family are of great importance in the biological control of spider mites and other insect pests annoying crop production. Many researches dealt with the occurrence of phytoseiid mites in Egypt

Ali (2006) and Azouz *et al.* (2011) (on fruit trees), Basha *et al.* 2001 (on vegetables) Hagrass *et al.* (2008) (on field crops), Romeih *et al.* (2010) (on aromatic and medical plants), El-Adawy *et al.* (2001), Metwally and Sanad (2005) and Metwally *et al.* 2013 (on non-cultivated plants).

The relation between phytoseiid and eriophyid mite species varies from occurrence together at the same host plant or in the galls caused by the eriophyids (Hajizadah *et al.*, 2002, Prishmann *et al.*, 2005 & Lawson-Balagbo *et al.*, 2008) to rich and fecund food source for the phytoseiids (Villanueva and Childers, 2007 and Momen (2009 a, b and 2014) and/or consider the phytoseiid mite species as a promising candidates to control the eriophyid mites (Brodeur *et al.*, 1997, Metwally *et al.*, 2005, Lawson-Balagbo *et al.*, 2007 and Fernando, 2009).

Survey of eriophyid fauna on *Salix*, *Rosmarinus*, *Cupressus* and *Phoenix* from Egypt was conducted. In addition, the associated phytoseiid mites to the same host plants during the course of the study were reported. The aim of this work was to elucidate on the Acari fauna of the mentioned host plants.

MATERIALS AND METHODS

During the three year period from 2012–2015, random samples of fruit trees, ornamental plants and weeds showing symptoms of mite infestation were carried out in Qalyubia and Giza governorates of

Egypt.

Eriophyid specimens were collected from plant samples by direct examination using a stereomicroscope. Eriophyids were slide mounted in Keifer's F-medium according to Amrine & Manson (1996). The mites were examined and drawn using a Carl Zeiss phase-contrast microscope equipped with a drawing tube camera Lucida. Abbreviations follow Amrine *et al.* (2003). The morphological terminology used herein followed that of Lindquist (1996) and the generic classification based on Amrine *et al.* (2003). Specimens were measured following de Lillo *et al.* (2010). Host plant names and their synonymies were in accordance with the plant list on-line database (2010).

Phytoseiid mites were collected under a stereomicroscope or extracted from plant material using Berlese funnels. They were cleared in Nesbitt's fluid and slide mounted in Hoyer's medium. Their classification followed Chant and McMurtry (2007).

RESULTS AND DISCUSSION

New records for eriophyid mite fauna of Egypt.

Family: Eriophyidae Nalepa, 1898

Sub family: Cecidophyinae Keifer, 1966

Tribe: Cecidophyini Keifer, 1966

Cecidophyopsis rosmarinusis Wang & Elhalawany, 2014 (Fig. 1)

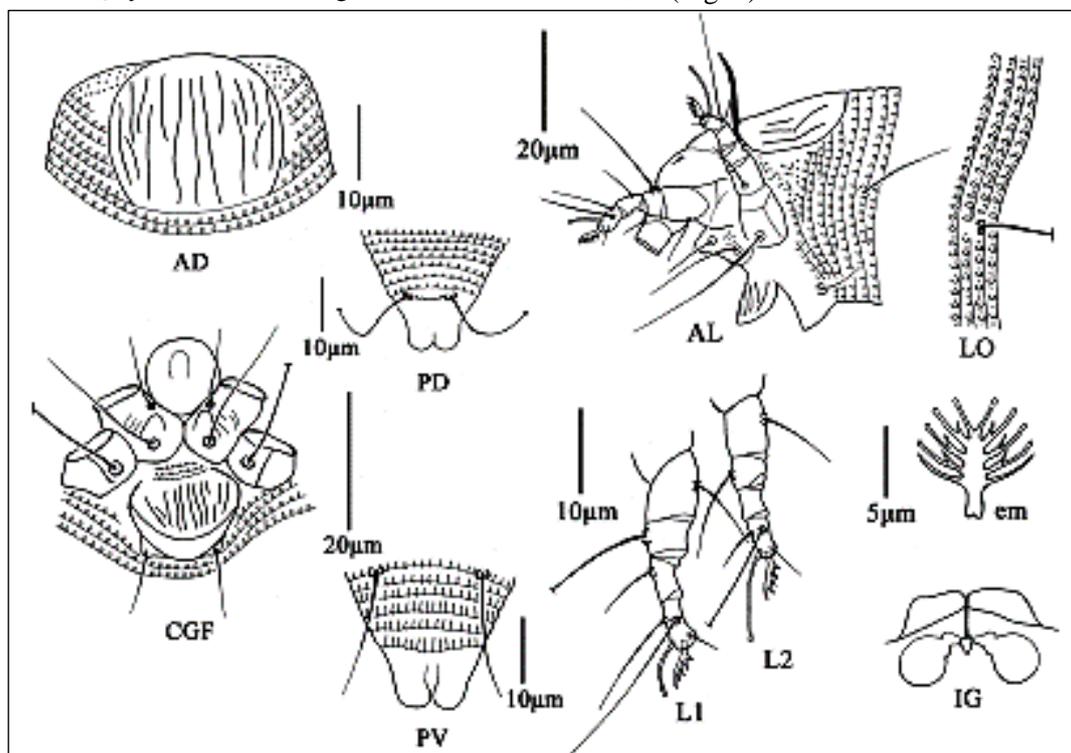


Fig. (1): *Cecidophyopsis rosmarinusis* Wang & Elhalawany, 2014: AD, antero-dorsal view; AL, antero-lateral view of female; LO, microtubercles in lateral view; L1, Leg I; L2, leg II; em, empodium; IG, female internal genitalia; CGF, female coxae and genitalia; PD, postero-dorsal view; PV, postero-ventral view (drawing presented after Wang *et al.*, 2014).

Type data: *Rosmarinus officinalis* L. (Lamiaceae); Riyadh Province, Saudi Arabia.

Relation to the host plant: Vagrant on leaf surface. No damage to the host plant was observed. (Wang *et al.*, 2014).

Geographic distribution: Saudi Arabia.

Material examined:

Two females on one slide (no. NJAUAcariEriEgypt6.4) from *R. officinalis* (Lamiaceae), Egypt, Giza, 30°1'8N, 31°12E, 15 May 2013. Coll. A. Elhalawany; deposited as slide mounted specimens in the Arthropod/Mite Collection of the Department of Entomology, Nanjing Agricultural University, Jiangsu Province, China. Two slides, with the same data deposited at Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), section of Entomology and Zoology,

University of Bari Aldo Moro, Bari, Italy. Four slides, with the same data deposited at Department of Zoology and Nematology, Faculty of Agricultural, Cairo University, Egypt. Ten females and three males on ten slides, with the same data (no. EGPERio32.1–32.10), 8 February 2015, deposited at fruit Acarology Department Plant Protection Research Institute Dokki Egypt.

Remarks:

This is the first record of occurrence of females and males of *C. rosmarinusis* in Egypt. The holotype female was described by Wang *et al.*, 2014, the male not found. The morphometry of the female appears to match the original description by Wang *et al.*, 2014.

Subfamily: Eriophyinae Nalepa, 1898

Tribe: Eriophyini Nalepa, 1898

Stenacis palomaris Keifer, 1970 (Fig. 2)

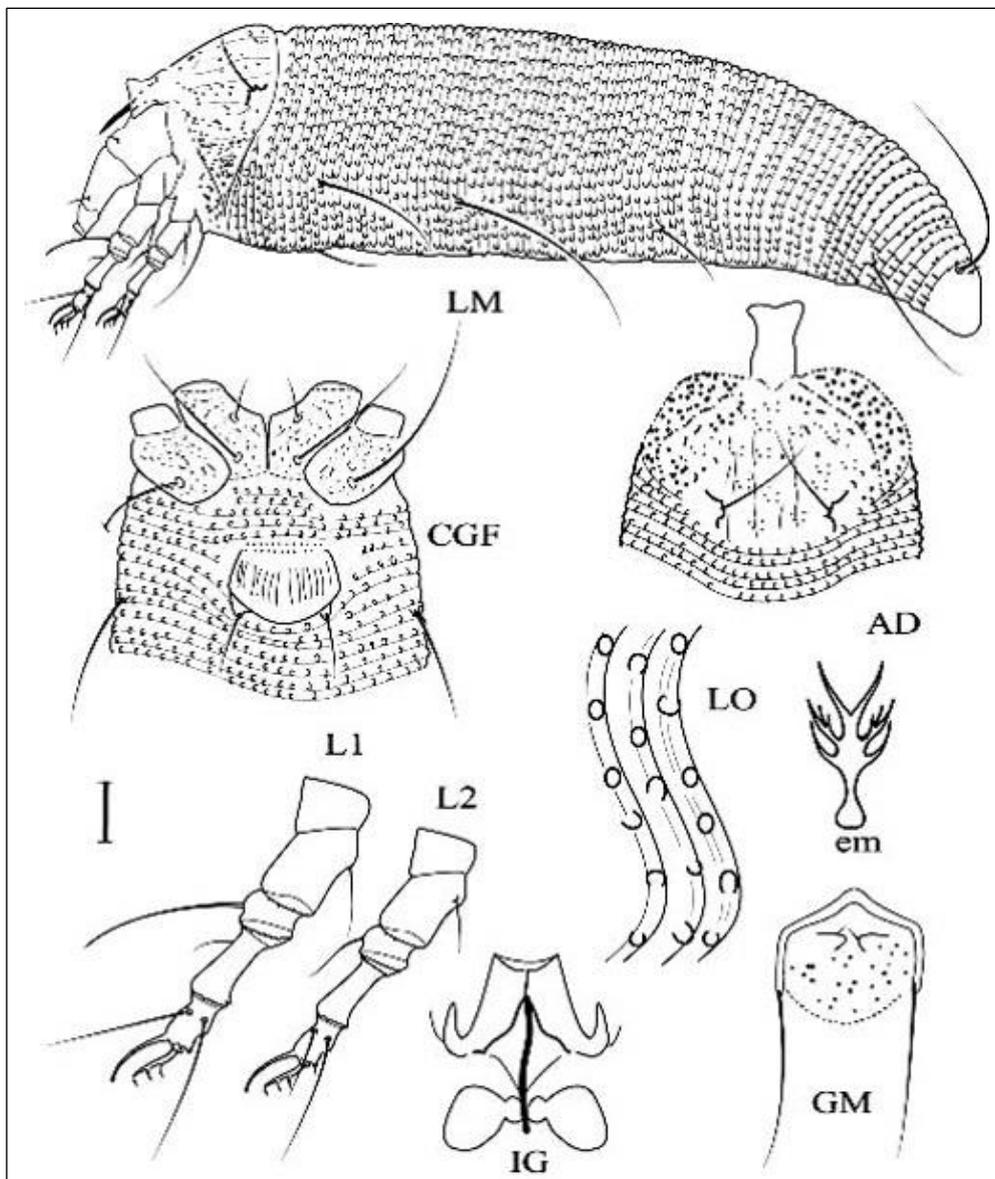


Fig. (2): *Stenacis palomaris* Keifer, 1970: LM, lateral view of female; AD, prodorsal shield female; CGF, female coxae and genitalia; em, empodium; LO, microtubercles in lateral view; L1, Leg I; L2, leg II; IG, female internal genitalia; GM, male genitalia. Scale bar- 10µm for LM , AD , CGF; 5µm for L1, L2, IG, GM; 2.5 µm em 2.5µm. (drawing presented after A. Elhalawany).

Type data: *Salix babylonica* L., *S. alba* L., *S. caprea* L., *S. elaeagnos* Scop., *S. matsudana* Koidz., *S. purpurea* L. (Salicaceae).

Host plant from Egypt: *S. babylonica* L. and *S. mucronata* Thunb.

Relation to the host plant: The mites inhabit buds, petiole bases, and leaves on gall midge rosettes (Keifer, 1970). In Egypt, it causes witches' broom of terminal twigs of the host plant.

Distribution: Italy; Hungary and USA.

Material examined:

Four females and one male (slide no. NJAUAcariEriEgypt44.1–44.5), from *S. babylonica*, Qalyubia governorate, Egypt, 4 March 2012, 30°17'20"N 31°12'46"E coll. A. Elhalawany, deposited as slide mounted specimens in the Arthropod/Mite Collection of the Department of Entomology, Nanjing Agricultural University, Jiangsu Province, China. 10 females and 10 males on 10 slides (slide no. EGPERio44.1–44.10), from *S. mucronata*, Qalyubia governorate, 10 May 2014, deposited at fruit Acarology Department Plant Protection Research Institute Dokki Egypt. 3 slides (no. AcY:13/372) with the same data deposited as slide mounted specimens in the National Collection of Arachnida, ARC–PPRI, Biosystematics, Pretoria South Africa. 4 slides, deposited at Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), section of Entomology and Zoology, University of Bari Aldo Moro, Bari, Italy. Two slides, with the same data deposited at Department of Zoology and Nematology, Faculty of Agricultural, Cairo University, Egypt.

Remarks:

This is the first record of occurrence of females and males of *Salix babylonica* and *S. mucronata* in Egypt. The morphometry of the female appears to match the original description by Keifer, 1970. The principal differences between this species and the descriptions given by Keifer are the size of the specimens now examined is longest (190–220) long; opisthosoma annuli with (64–72); scapular seta *Sc* short (15–18) long and seta *3a* short (13–15) long, the Egyptian specimens are slightly longer than those in Keifer's description.

Sub family: Phyllocoptinae Nalepa, 1892

Tribe: Phyllocoptini Nalepa, 1892

Eptrimerus saudiarabis Wang & Elhalawany, 2014 (Fig. 3)

Synonyms:

Acaphyllisa arabica Al–Atawi, Kamran & Flechtmann, 2014.

Type data: *Phoenix dactylifera* L. (Arecaceae); Riyadh Province, Saudi Arabia, collected by the first author.

Relation to the host plant: Vagrant on inner leaf surface. No damage to the host plant was observed (Wang *et al.*, 2014).

Geographic distribution. Saudi Arabia.

Material examined:

Five females and 2 males on 7 slides (no. AcY:13/368) from Egypt, Qalyubia, 30°17'20.02"N, 31°14'51.85"E 10 October 2012. Coll. A. Elhalawany; deposited as slide mounted specimens in the National Collection of Arachnida, ARC–PPRI, Biosystematics, Pretoria South Africa. Two slides from Egypt, Giza, 30° 1'8.11" N, 31°12'24.17" E, 27 April 2014. Coll. A. Elhalawany, deposited at Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), section of Entomology and Zoology, University of Bari Aldo Moro, Bari, Italy. 2 slides, with the same data deposited at Department of Zoology and Nematology, Faculty of Agricultural, Cairo University, Egypt.

Remarks:

The first author collected the same species from Riyadh province, Saudi Arabia during survey of mites inhabiting date palm. Al–atawi *et al.*, 2014 published this species as *Acaphyllisa arabica* Al–Atawi, Kamran & Flechtmann, 2014, depends on tarsal empodium divided into four rays on each side, while tarsal empodium 4–rayed simple, thus *A. arabica* is invalid name.

This is the first record of *Eptrimerus saudiarabis* Wang & Elhalawany, 2014 from Egypt. The morphometry of the female and male appears to match the original description by Wang *et al.*, 2014. *Eptrimerus cupressi* Keifer, 1939 (Fig. 4)

Platyphytoptus cupressi Keifer, 1939: 485–486.

Eptrimerus cupressi; Keifer, 1952: 54.

Eptrimerus cupressi; Amrine & Stasny, 1994: 182.

Host plant: *Cupressus sempervirens* L. (Cupressaceae).

Relation to the host plant: Vagrants on tips of the twigs and squeezed into the crevices between the leaf scales.

Distribution: USA.

Material examined:

Four females and one male (slide number NJAUAcariEriEgypt23.1–23.5), from *C. sempervirens*, Qalyubia governorate, Egypt, 3 November 2012, 30°15'N, 31°13'E, coll. A. Elhalawany, deposited as slide mounted specimens in the Arthropod/Mite Collection of the Department of Entomology, Nanjing Agricultural University, Jiangsu Province, China. 25 females and 10 males on 10 slides (slide no. EGPERio29.1–29.15), from *C. sempervirens*, Qalyubia governorate, Egypt, 3 November 2012, 30°15'N, 31°13'E, coll.

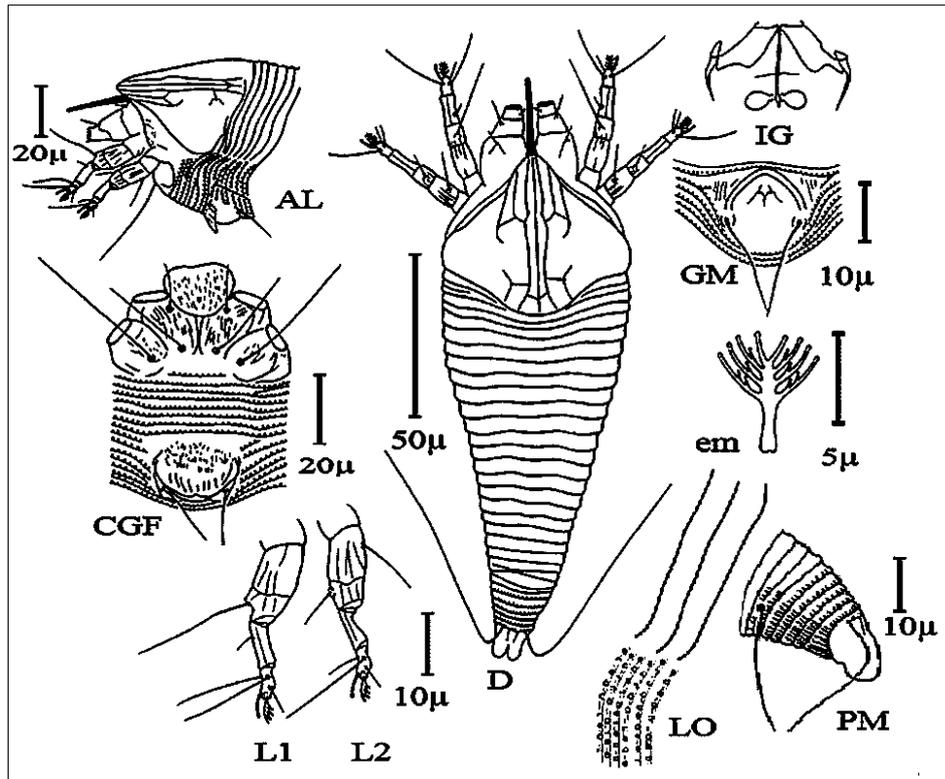


Fig. (3): *Eptrimerus saudiarabis* Wang & Elhalawany, 2014: AL, antero-lateral view of female; D, dorsal view of female; IG, female internal genitalia; GM, male genitalia; em, empodium; CGF, female coxae and genitalia; LO, microtubercles in lateral view; PM, postero-lateral view of female; L1, Leg I; L2, leg II (drawing presented after Wang *et al.*, 2014).

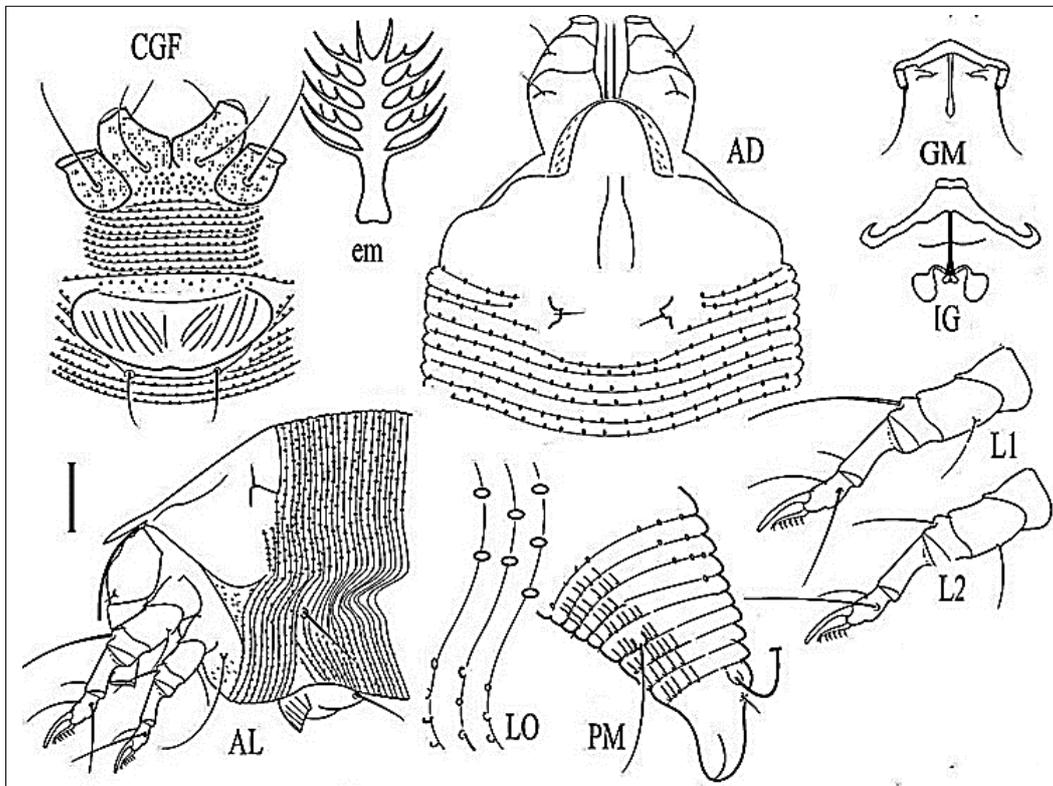


Fig. (4): *Eptrimerus cupressi* Keifer, 1939: AD, prodorsal shield female; em, empodium; CGF, female coxae and genitalia; AL, antero-lateral view of female; LO, microtubercles in lateral view; PM, postero-lateral view of female; L1, Leg I; L2, leg II; IG, female internal genitalia; GM, male genitalia. Scale bar- 10µm for all except em 2.5µm. (drawing presented after A. Elhalawany).

A. Elhalawany, deposited at fruit Acarology Department, Plant Protection Research Institute Dokki Egypt. Ten females and 5 males on 10 slides (slide no. EGPERio29.16–29.25), from *C. sempervirens*, Giza governorate, Egypt, 15 March 2014, 30°1'N, 31°1'E, coll. A. Elhalawany, deposited at fruit Acarology Department Plant Protection Research Institute Dokki Egypt; 2 slides with the same data, deposited at Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), section of Entomology and Zoology, University of Bari Aldo Moro, Bari, Italy. Five slides, with the same data deposited at Department of Zoology and Nematology, Faculty of Agricultural, Cairo University, Egypt.

Remarks:

This is the first record of occurrence of females and males of *E. cupressi* in Egypt. The holotype female was described by Keifer 1939; the male not found. This species associated with *Epitrimerus abousettai* Elhalawany, Wang & Xue, 2015 and *Stenacis aegyptius* Elhalawany, Wang & Xue, 2015 (In press).

PHYTOSEIIDAE: Berlese

Subfamily: Amblyseiinae Muma

Tribe: Amblyseiini Muma

Subtribe: Amblyseiina Muma

Genus *Amblyseius* Berlese 1914: 143; Chant & McMurtry 2007: 73.

Amblyseius swirskii Athias-Henriot

Amblyseius swirskii Athias-Henriot, 1962: 5; Porath & Swirski, 1965: 95; Athias-Henriot, 1966: 195; Swirski *et al.*, 1973: 80; Nasr & Abou-Awad, 1985: 246; Kandeel & Nassar, 1986: 174; Zaher, 1986: 105; Swirski *et al.*, 1998: 103; Chant & McMurtry, 2004: 199; 2007: 81; Ramadan *et al.*, 2004: 191; Zannou *et al.*, 2007: 27; Ramadan *et al.*, 2009: 117; Ferragut *et al.*, 2010: 124.

Amblyseius (Amblyseius) rykei Pritchard & Baker, 1962: 249. (synonymy by Zannou *et al.*, 2007: 27; Zannou & Hanna, 2011: 339).

Amblyseius (Amblyseius) swirskii Ehara, 1966: 23.

Amblyseius enab El-Badry, 1967a: 178; 1970: 504; Nasr & Abou-Awad, 1985: 246; Zaher, 1986: 104; Chant & McMurtry, 2004: 199; 2007: 78. (synonymy by Ramadan *et al.*, 2009: 117).

Typhlodromips enab Moraes *et al.*, 1986: 140; 2004: 212.

Typhlodromips swirskii.—Moraes *et al.*, 1986: 149; 2004: 227.

Amblyseius (Amblyseius) enab.—Ueckermann & Loots, 1988: 73.

Typhlodromips capsicum Basha, Yousef, Ibrahim & Mostafa, in Basha *et al.*, 2001: 372 (new synonymy).

This mite species was found to associate with *C. rosmarinus* on *R. officinalis*; *S. palomaris* on *S. babylonica* and *S. matsudana*; *E. saudiarabensis* on *P. dactylifera* and *E. cupressi* on *C. sempervirens*. This predatory mite species has a wide range of host plant distribution (i. e. 22 host plants in Egypt) (Metwally *et al.*, 2013).

Subfamily: *Typhlodrominae* Wainstein

Typhlodromini Wainstein, 1962a: 26.

Typhlodrominae Chant & McMurtry, 1994: 235; 2007: 131.

Tribe *Galendromimini* Chant & McMurtry 1994

Genus *Cydnoseius* Muma 1961

Cydnoseius negevi (Swirski & Amitai) Galendromimini Chant & McMurtry, 1994: 240; 2007: 137.

Typhlodromus (Typhlodromus) negevi Swirski & Amitai, 1961: 194.

Typhlodromus negevi Amitai & Swirski, 1966: 21.

Typhlodromus (Neoseiulus) negevi Ehara, 1966: 19. *Cydnoseius cordiae* Muma, 1967: 276. (synonymy by Chant & Yoshida-Shaul, 1986b: 2815; Chant & McMurtry, 1994: 241).

Typhlodromus medanicus El-Badry, 1967c: 108. (synonymy by Chant & Yoshida-Shaul, 1986b: 2815; Chant & McMurtry, 1994: 241).

Typhlodromus zaheri El-Badry, 1967a: 182. (synonymy by Chant & Yoshida-Shaul, 1986b: 2815; Chant & McMurtry, 1994: 241).

Typhlodromus zaheri El-Badry, 1970: 499; Zaher, 1986: 130. *Typhlodromus africanus* Yousef, 1980: 122. (synonymy by Chant & Yoshida-Shaul, 1986b: 2815; Chant & McMurtry, 1994: 241).

Typhlodromus schusteri Yousef & El-Brollosy [sic], in Zaher (1986): 129. (synonymy by Kanouh *et al.*, 2012: 266).

Cydnoseius africanus Moraes *et al.*, 1986: 184; 2004: 263.

Typhlodromus cordiae Zaher, 1986: 128.

Cydnoseius cordiae Moraes *et al.*, 1986: 184; 2004: 263.

Cydnoseius medanicus Moraes *et al.*, 1986: 184; 2004: 263.

Cydnodromella negevi Chant & Yoshida-Shaul, 1986b: 2815.

Amblydromella negevi Moraes *et al.*, 1986: 168.

Cydnoseius zaheri Moraes *et al.*, 1986: 184; 2004: 263.

Cydnoseius negevi Swirski *et al.*, 1998: 109; Chant & McMurtry, 1994: 241; Moraes *et al.*, 2004: 263; Negm *et al.*, 2012b: 263.

Neoseiulella schusteri Moraes *et al.*, 2004: 295.

This mite species was found to associate with *C. rosmarinus* on *R. officinalis*; *S. palomaris* on *S. babylonica* and *S. matsudana*; *E. saudiarabensis* on

P. dactylifera and *E. cupressi* on *C. sempervirens*. This predatory mite species has a moderate range of host plant distribution (i. e. *Amaranthus sylvesteris* Desf., *Cyperus alopecuroides* Rottb., *Setaria glauca* L., *Solanum melongena* L. and *Solanum nigrum* L.) in Egypt. (Metwally *et al.* 2013).

Tribe: Typhlodromini Wainstein
Typhlodromini Wainstein, 1962b: 26.

Genus: *Typhlodromus* (*Typhlodromus*) Scheuten
Typhlodromus (*Typhlodromus*) *athiasae* Porath & Swirski Chant, 1957: 289.

Typhlodromus athiasae Porath & Swirski, 1965: 90; Swirski & Amitai, 1965: 135; McMurtry, 1977: 22; Ragusa, 1977: 383; Swirski & Ragusa, 1977: 78; Swirski & Amitai, 1985: 184; Moraes *et al.*, 1986: 241; Zaher, 1986: 126; Çobanoğlu, 1989b: 172; Denmark, 1992b: 21; Swirski *et al.*, 1998: 118.

Typhlodromus (*Typhlodromus*) *athiasae*—Ehara, 1966: 19; Moraes *et al.*, 2004: 360; Papadoulis *et al.*, 2009: 147; Barbar *et al.*, 2013: 255.

Typhlodromus siwa El-Badry, 1967a: 183. (synonymy by Chant & Yoshida-Shaul, 1987: 1791; Denmark, 1992b: 21).

Typhlodromus perbibus Wainstein & Arutunjan, 1968: 1242. (synonymy by Chant & Yoshida-Shaul, 1987: 1792; Denmark, 1992b: 21).

Typhlodromus pelargonicus El-Badry, 1968b: 142. (synonymy by Abbasova, 1972: 18; Chant & Yoshida-Shaul, 1987: 1792; Denmark, 1992b: 21).

Typhlodromus hellenicus Swirski & Ragusa, 1977: 75. (synonymy by Chant & Yoshida-Shaul, 1987: 1792; Denmark, 1992b: 21).

Typhlodromus athiasae athiasae —Chant & Yoshida-Shaul, 1987: 1791; Karg, 1989b: 279.

Typhlodromus athiasae perbibus —Chant & Yoshida-Shaul, 1987: 1792; Karg, 1989b: 279; 1991: 35; 1993: 218; Swirski *et al.*, 1998: 118.

This mite species was found to associate with *C. rosmarinus* on *R. officinalis*; *S. palomaris*, on *S. babylonica* and *S. matsudana*. *E. saudiarabis* on *P. dactylifera* and *E. cupressi* on *C. sempervirens*. This predatory mite species was reported on (*Convolvulus arvensis* L. and *Vitis vinifera* L.) in Egypt (Metwally 2013).

Our results in agreement with those of Lawson-Balagbo *et al.* (2007 and 2008) who reported the occurrence of *Aceria guerreronis* on coconut and Elhalawany (2012) who reported the association of 16 Eriophyid mite species to some fruit trees and with other investigations concerning with coexistence of the natural predatory mites with the Eriophyid mite species on the same host plant. Nine phytoseiid mite species were reported to be associated with Eriophyid mites in Iran (Hajizadeh *et al.*, 2002), *Neoseiulus*

hanselli was found inside willow galls (*Salix* sp.) caused by the eriophyid mite *Aculus tetanothrix* (Nalepa) (Prischmann *et al.*, 2005)

The mentioned examples for the coexistence between the eriophyid and phytoseiid mites can explain the findings of our study; also open new prospects to further studies concerning the potentially application of the predatory mites and its involvement in the biocontrol of the eriophyid pests in the future specially for the economic plants.

ACKNOWLEDGMENTS

Deep thanks to Prof Dr. Enrico de Lillo University of Bari Aldo Moro, Italy for reviewing the earlier draft and suggestions on the manuscript. Appreciation to Prof Dr. M. Abou-Setta, PPRI-ARC, Egypt for reviewing the manuscript. Appreciation also to Dr. Gihan Sallam and Dr. Naglaa Fathi, for providing digital camera used in this study.

REFERENCES

- Al-Atawi, F.; Kamran, M. and Flechtmann, C. H. 2014. Eriophyid mites (Prostigmata: Eriophyidea) associated with date palms: new record and a new species of the genus *Acaphyllisa* from Saudi Arabia. *Internt. J Acarol.*, 40(4): 353–357.
- Ali, M. 2006. Studies on some mite species infesting deciduous fruits in Upper Egypt. Ph. D. thesis Fac. Agric. Assiut Univ., 151 pp.
- Amrine, J. W. and Manson, D. C. 1996. Preparation, mounting and descriptive study of eriophyid mites. In: Lindquist, E.E., Sabelis, M.W. & Bruin J. (Eds.), *Eriophyid mites: their biology, natural enemies and control*. World Crop Pests, 6. Elsevier Science Publishing, Amsterdam, The Netherlands, pp. 383–396.
- Amrine J. W. and Stasny T. A. 1994. Catalog of the Eriophyidae (Acarina: Prostigmata) of the world. Indira Publish. House, West Bloomfield, Michigan, USA: 804 pp.
- Amrine, J. W.; Stasny, T. A. and Flechtmann, C. H. 2003. Revised keys to the world genera of the Eriophyidae (Acari: Prostigmata). Indira Publishing House, West Bloomfield, Michigan, USA, 244 pp.
- Azouz, H.; Khalil, A. and Abu Zaid, A. E. 2011. Survey of some mites and spiders associated with date palm at Beni-Suef governorate, Egypt. *Egypt. J. Appl. Sci.*, 26: 50- 63.
- Basha A. E.; Yousef, A. A.; Ibrahim, M. H. and Mostafa, E. M. 2001. Five new phytoseiids from Egypt (Acari: Gamasida: Phytoseiidae). *Al-Azhar J. Agric. Res.*, 33: 371- 386.
- Brodeur, J.; Bouchard, A. and Turcotte, G. 1997.

- Potential of four species of predatory mites as biological control agents of the tomato russet mite, *Aculops lycopersici* (Masse) (Eriophyidae). *Can. Entomol.*, 129: 1–6.
- Chant, D. A. and McMurtry, J. A. 2007. Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata). West Bloomfield (MI): Indira Publish. House; 220 pp.
- de Lillo, E.; Craemer, C.; Amrine, J. W. and Nuzzaci, G. 2010. Recommended procedures and techniques for morphological studies of Eriophyidea (Acari: Prostigmata). *Exp. Appl. Acarol.*, 51: 283–307.
- Elhalawany, A. S. 2012. Survey of eriophyid mites on some fruit trees, with redescription of two newly recorded species and a checklist of eriophyid mites in Egypt (Acari: Eriophyidea). *Egypt. Acad. J. biolog. Sci.*, 5(2): 205–216.
- Elhalawany, A. S.; Wang, Q. and Xue, X. F. 2015. Two new species of eriophyid mites (Acari: Eriophyidae) infesting *Cupressus sempervirens* from Egypt. *Systematic and applied Acarology*. (In press).
- Fernando, L.C.; Waidyarathne, K. P.; Perera, K. F. and De Silva, P. H. 2009. Evidence for suppressing coconut mite, *Aceria guerreronis* by inductive release of the predatory mite, *Neoseiulus baraki*. *Biol Control*. 53:108–111.
- Hagrass, A. E.; EL-Naggar, M. E.; EL-Naggar, A. M. and Abou-Zeid, W. M. 2008. Incidence of mites inhabiting some field crops in two localities at Dakahlia governorate. *Egypt. J. Agric. Res.* 86: 353- 366.
- Hajizadeh, J.; Hosseini, R. and McMurtry, J. A. 2002. Phytoseiid mites (Acari: Phytoseiidae) associated with eriophyid mites (Acari: Eriophyidae) in Guilan province of Iran. *Intern. J. of Acarol.*, 28: 373–378.
- Keifer H.H. 1939. Eriophyid Studies VII. *Bulletin of the California Department of Agriculture*, 28: 484-505.
- Keifer H.H. 1944. Eriophyid Studies XIV. *Bulletin of the California Department of Agriculture*, 33: 18-38.
- Keifer H.H. 1952. Eriophyid Studies XVIII. *Bulletin of the California Department of Agriculture*, 41: 31-42.
- Keifer H.H. 1959. Eriophyid Studies XXVI. *Bulletin of the California Department of Agriculture*, 47: 271-281.
- Keifer H.H. 1970. Eriophyid Studies C-4. *Department of Agriculture, Agricultural Research Service*, 24 pp.
- Kuang, H.-Y and Pang, H.-L. 1997. Four new species of the Eriophyinae (Acari: Eriophyidae) from China. *Entomotaxonomia*, 19(3): 230-234.
- Lawson, B. M. L; Gondim, J. M.; Moraes, G.; Hanna, R. and Schausberger, P. 2007. Life history of the predatory mites *Neoseiulus paspalivorus* and *Proctolaelaps bickleyi*, candidates for biological control of *Aceria guerreronis*. *Exp. Appl. Acarol.*, 34: 49–61.
- Lawson-Balagbo, L. M.; Gondim, J. M.; de Moraes, G. J.; Hanna, R. and Schausberger, P. 2008. Exploration of the acarine fauna on coconut palm in Brazil with emphasis on *Aceria guerreronis* (Acari: Eriophyidae) and its natural enemies. *Bull. Entomol. Res.*, 98: 83–96.
- Lindquist, E. E. 1996. External anatomy and notation of structures. In: Lindquist, E.E., Sabelis, M.W. & Bruin, J. (Eds.), *Eriophyid Mites: their biology, natural enemies and control*. World Crop Pests, 6, Elsevier Science Publishing, Amsterdam, The Netherlands: 3–31.
- Metwally A. M. and Sanad, A.S. 2005. Description of the immature and adult stages of *Neoseiulus arundonaxi* n. sp. (Acari: Phytoseiidae) from Egypt. *Bull. Ent. Soc. Egypt*, 82: 63-70.
- Metwally, A. M.; El Khateeb, H. M. and Sanad, A. S. 2013. Occurrence of some predaceous mites associated with plants free from chemical pesticides Egypt. *J. Agric. Res.*, 91 (3): 949-958.
- Nalepa A. 1892. New gall mites. (4 Fort.) *Num. wharves. Akad. Wiss., Maths Nat. Kl., Vienna* 29 (13): 128.
- Prischmann, D. A.; James, D. G. and McMurtry, J. A. 2005. Occurrence of a predatory mite (Acari: Phytoseiidae) within willow galls caused by eriophyid mites. *Intern. J Acarol*, 31: 433–436.
- Romeih, M. A., Hassan, M.; Rizk, M. A. and Abo-Shnaf, R. A. 2010. Egyptian checklist of mites from aromatic, medicinal and ornamental plants. *Acarines*, 4: 37- 46.
- Plant List 2010. Version 1. Published on the Internet. Available from: <http://www.theplantlist.org/> (Accessed 29 May 2013).
- Villanueva, R. T. and Childers, C. C. 2007. Development of *Iphiseiodes quadripilis* (Banks) (Acari: Phytoseiidae) on pollen or mites diets and predation on *Aculops pelekassi* (Keifer) (Acari: Eriophyidae) in the laboratory. *Environ. Entomol.*, 36: 9–14.
- Wang, Q.; Elhalawany, A. S.; Xue, X. F. and Hong, X. Y. 2014. New species and records of eriophyid mites from Saudi Arabia (Acari: Eriophyidea). *Systematic and Applied Acarology*. 19(4): 409–430.
- Zaher, M. A. 1984. Survey and ecological studies on phytophagous, predaceous and soil mites in Egypt. I: Phytophagous mites in Egypt (Nile valley and Delta). PI 480 Programme. USA Project No. EG. ARS, 30. Grant. No, FG, EG., 139. 228pp.