Four New Records of Eriophyids and Associated Phytoseiids from Egypt

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INTRODUCTION

A worldwide count of eriophyid species is approximated to 4600 known species described under 420 genera (Amrine & de Lillo unpublished databases 2003 & 2010).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 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; *Cecidophyopsis porathii* Wang & Elhalawany, 2014). Seventy five eriophyoids belonging to 29 genera have been reported from Egypt. Among them, three belonging to the genus *Epiritrimerus*, (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 plant exudates from plants, but rarely plant tissue. Seventy five eriophyoids belonging to 29 genera have been reported from Egypt. Among them, three belonging to the genus *Epiritrimerus*, (Zaher, 1984, Elhalawany, 2012& Elhalawany et al., 2015).

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

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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 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. EGPEnio32.1–32.10), 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. rosmarinus* 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 palomarisis** Keifer, 1970 (Fig. 2)

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**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).

**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:** Phyllocopinae Napela, 1892

**Tribe:** Phyllocopini Napela, 1892

*Epitrimerus saudiarabis* Wang& Elhalawany, 2014 (Fig. 3)

**Synonyms:**

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

**Type data:** *Phoenix dactylifera* L. (Arecalesae); 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 *Epitrimerus saudiarabis* Wang & Elhalawany, 2014 from Egypt. The morphometry of the female and male appears to match the original description by Wang et al., 2014. *Epitrimerus cupressi* Keifer, 1939 (Fig. 4)


*Epitrimerus cupressi*; Keifer, 1952: 54.


**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): *Epitrimerus 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): *Epitrimerus 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. EGP/Erio29.16-29.25), 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 (D.İ.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**: Amblyseiiinae Muma
**Tribe**: Amblyseiini Muma
**Subtribe**: Amblyseiina Muma

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

**Amblyseius swirskii** Athias-Henriot


**Amblyseius (Amblyseius) swirskii** Ehara, 1966: 23.


**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. rosmarinusis on R. officinalis; S. palomaris on S. babylonica and S. matsuadana; E. saudiariabris on C. sempervirens. This predatory mite species has a wide range of host plant distribution (i.e. 22 host plants in Egypt) (Metrally et al., 2013).

**Subfamily**: Typhlodrominae Wainstein


**Tribe** Galendromiminini Chant & McMurtry 1994

Genus **Cynoseius** Muma 1961


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


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

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


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

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

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

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

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

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

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

This mite species was found to associate with C. rosmarinusis on R. officinalis; S. palomaris on S. babylonica and S. matsudana; E. saudiariabris on
this predatory mite species has a moderate range of host plant distribution (i.e. *Amaranthus sylvestris* Desf., *Cyperus alopecuroides* Rothb., *Setaria glauca* L., *Solanum melongena* L. and *Solanum nigrum* L.) in Egypt. (Metwally et al. 2013).

**Tribe:** Typhlodromini Wainstein


**Genus:** Typhlodromus (Typhlodromus) Scheuten

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


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


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.

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